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(Reprint from *The Fern Bulletin*, Jan. 1898, Vol. VI, No. 1.)

THE BRYOLOGIST.

VOL. I.

JANUARY, 1898.

NO. 1.

MOSS DEPARTMENT.

EDITED BY DR. A. J. GROUT.

Items for this department should be addressed to Dr. A. J. Grout, Plymouth, N. H.

THIS department is opened with the purpose of enabling any one at all interested in mosses to get some knowledge of these plants without excessive labor or expense. The articles in this first number will be followed by articles on collecting, mounting, methods of study and other topics of general interest. In the following numbers, as in this, we propose to describe and illustrate one or more of our common mosses and to continue this so long as it seems helpful or advisable.

The editor will also try to identify for subscribers difficult specimens accompanied by notes and return postage, but will not agree to do so if either of the above conditions is not complied with. All letters requiring a reply must also contain return postage. The specimens will be kept unless something to the contrary is requested.

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It is also hoped that the BULLETIN may become a medium for the communication of bryological notes of interest in the same way that has been so admirably done in the case of ferns and fern allies. Notes are earnestly solicited from all our moss students. The editor also plans to have ready for distribution specimens of as many of the species taken up as is possible. A nominal charge for each specimen will be made to pay for postage, lab. ls, assistance in making up packets, etc. The same arrangements for distribution to subscribers will be made in this department that is made in the case of ferns, *i. e.*, members having mosses to distribute will announce the fact in the BULLETIN and send out their material at their own terms.

OUTFIT FOR THE STUDY OF MOSSES.

FOR the study of mosses we should have a good hand-lens, a compound microscope with a magnifying power of 100 to 200 diameters (a two-inch eye-piece and a one-half and one-fifth lens make a good combination) a pair of dissecting needles, a pair of small sharp scissors, a pair of fine pointed forceps and a

pair of sharp eyes; also the following books: Lesquereux and James' "Manual of the Mosses of North America," price \$4.00; and "Analytic Keys to the Genera and Species of North American Mosses," by Prof. C. R. Barnes and Fred D. Heald, price \$1.00. Jameson and Dixon's "Handbook of British Mosses," costing about \$5.75, will be very useful.

Do not be appalled by the above list as it will be possible to learn many of the common mosses with the BULLETIN, hand-lens and the sharp eyes, and if driven to it one can do very well with the eyes and the BULLETIN alone. The editor knows twenty-five or more species of New England mosses that he can recognize without the aid of any lens, and nearly all of these possess characters sufficient to enable others to recognize them from a careful description accompanied by a simple illustration.

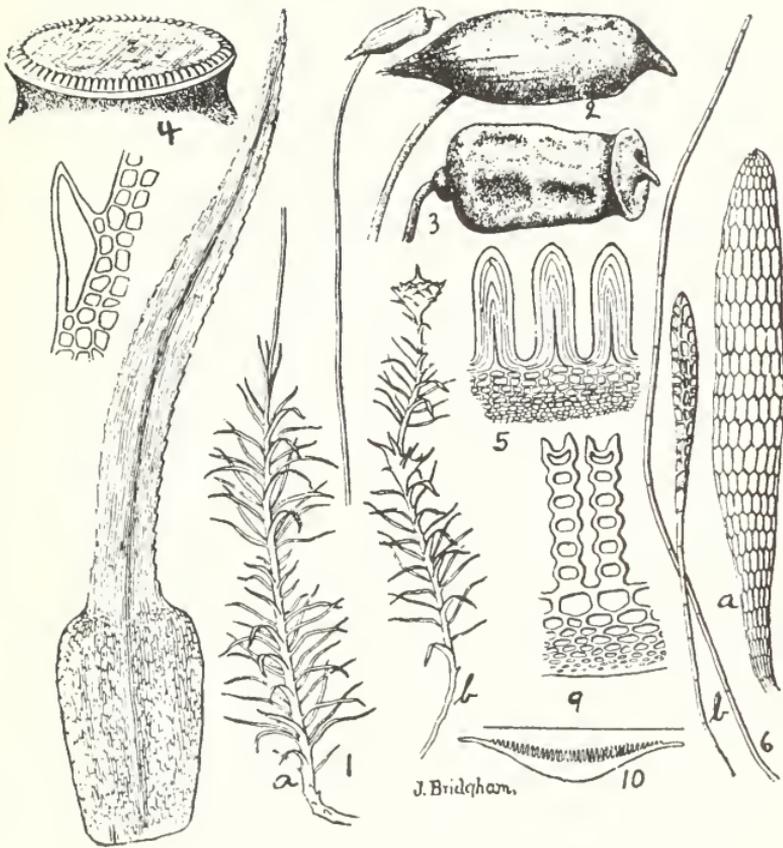
THE HAIR-CAP MOSSES.

THE Common Hair-cap moss (*Polytrichum commune* L.), is the most common and easily recognized of the group. The Latin and English names of this moss are both unusually appropriate. So common is it that scarcely any roadside or meadow is free from it. In many portions of New England it is a great nuisance in old meadows, entirely killing out the grass and covering the ground with a dark green mat of its closely growing upright stems.

From the figure of the fruiting plant it will be seen that it belongs to the acrocarpus division of the mosses, which have their fruit borne on the ends of the main stem. The plant with fruit grows from two to six inches in height. The base of the stem is fixed in the earth by a tangle of thread-like rhizoids which answer the purpose of roots and root hairs. Above are the leaves arranged in ranks, and from the top of the stem springs the long slender seta, bearing at the summit the square capsule or spore case. In the freshly matured plant the capsule is covered with a hairy cap (*calyptra*), whence the name Hair-cap Moss.

The seta and capsule of the moss correspond to what is commonly called a fern, while the rest of the plant corresponds to the prothallium, and if the base of the seta be carefully examined it will be found to be swollen and covered with little flask shaped bodies, the archegonia.

The fruit of the moss has developed from just such a body which was fertilized by an antherozoid, produced in the anthe-



POLYTRICHUM COMMUNE L.

1.—Male and female plants, about one-half natural size. 2 and 3.—Capsules with and without calyptra. 4.—Mouth of capsule, enlarged. 5.—Teeth of peristome, greatly enlarged. 6.—Antheridium and paraphyses, greatly enlarged. 7.—Leaf, enlarged. 8.—Margin of leaf enlarged to show tooth and cells. 9.—Lamellæ, greatly enlarged.

Taken by permission from Mrs. E. G. Britton's "Mosses of the Eastern United States." (in preparation).

ridium (fig. 6). The antheridia are borne on separate plants in terminal rosettes (fig 1). Both antheridia and archegonia grow intermingled with slender hairs called paraphyses (fig 6).

Returning to the capsule we shall find, if our plant is mature, that at the top of the capsule there is a lid or operculum (fig 3), which can be pulled off and which lets the spores escape. A strong dissecting microscope will be needed to see the antheridia and

archegonia and a compound microscope will be necessary to make out most of the following points:

If after removing the operculum we examine the mouth of the capsule under a low power we shall find it to be surrounded by a row of 64 teeth; this row of teeth is called the peristome. The points of the teeth are lightly attached to a membrane stretched across the mouth of the spore case. Under the compound microscope the leaves appear lanceolate and sharply serrate with a clasping base made up of large, nearly colorless cells, while the upper part of the leaf is much more dense, and is deep green. The midrib or costa is very broad and consists of several layers of cells while the margin consists of a single layer. In order to increase the light-receiving area this plant has adopted the curious contrivance of sending out from the upper surface of the costa radiating layers, lamellæ, a single cell thick. These are shown in a cross section of the leaf at fig. 10. The upper cell in this species is concave on its upper edge, as is shown in the greatly magnified lamellæ at fig. 9.

There are six species of *Polytrichum* which occur in New England. The most common species next to *P. commune* is *P. piliferum* Schreb., Awned Hair-cap Moss, which grows in dry situations around ledges and gravelly places. It is much smaller and is readily determined by the long slender awns at the apex of the leaves. I have collected this on the very brow of The Profile, Franconia Mountains. *P. juniperinum* Willd., Juniper-like Hair-cap Moss is also common in woods or peat bogs and is easily distinguished by its lighter color and the incurved margins of the leaves. If you climb any of the higher mountains you are sure in moist places to find *P. strictum* Banks, the Erect Hair-cap Moss. This is distinguished from all our other species by the dense felt of radicles which sometimes covers nearly the entire plant, and from *P. juniperinum*, of which it was formerly reckoned a variety, by the erect appressed leaves and cubical capsules. The three species last named have entire leaves. The only other species likely to be met with is *P. Ohioense*, Ren. and Card., Ohio Hair-cap Moss. This has serrate leaves and is not always readily distinguished from *P. commune* by an inexperienced observer. *P. commune* has the capsule cubical and entirely covered by the calyptra, while in *P. Ohioense* the capsule tapers into the seta and is not quite covered by the calyptra.

While the limited supply lasts specimens of *P. commune*, *P. strictum*, *P. juniperinum* and *P. piliferum* will be sent to any subscriber upon receipt of ten cents in stamps.

(Reprinted November 1901.)

THE BRYOLOGIST,

A DEPARTMENT OF THE FERN BULLETIN,

DEVOTED TO THE STUDY OF NORTH AMERICAN MOSSES.

EDITED BY DR. A. J. GROUT, PLYMOUTH, N. H.,

To whom all correspondence regarding the mosses should be addressed.

*This department is issued separately at twenty-five cents a year.
Subscriptions should be addressed to the Fern Bulletin, Binghamton, N. Y.*

VOL. I.

APRIL, 1898.

No. 2.

AMONG some of the good things in store for the beginners is an illustrated glossary of the terms in common use in bryological literature.

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IF you find the BRYOLOGIST interesting and helpful, mention it to your neighbors and friends. If it has induced you to subscribe to the FERN BULLETIN, this department will be materially aided by your informing the publishers of the fact.

* *

THE response to the first issue of this department has been very gratifying; many sets of the mosses offered have been sent out and the Editor has had his hands full of work identifying the mosses sent him. As will be seen by reading this issue, the Editor has at once obtained valuable assistance.

* *

IN addition to the articles designed to interest the beginners in the study of mosses, we shall in future publish in each issue a series of notes on new and rare mosses, and a resumé of all the recent publications on American mosses, including a list of all new species and those newly discovered in America, with a brief diagnosis of each. So many new mosses are being published in foreign periodicals difficult of access to the majority, that something of this sort has become almost a necessity. The BRYOLOGIST will endeavor to take up this work where the new edition of Barnes' Keys stopped.

* *

THE Editor has just issued a "List of Mosses Growing in Vermont, with Analytical Keys to the Genera and Species." This list contains about 240 species included in 72 genera. While primarily intended for the use of Vermont students, it will be almost equally useful to students in other northeastern states. Its

advantages over any other American work of a similar character are these: Great attention is given to the habitat of each species, that is, it tells one in what sort of place to look for each. While the keys and text include most of the common mosses of the northeastern states they are much simplified by the omission of many species which never occur in our limits and serve only to confuse the beginner in other keys in which they are included. It is the only American book on mosses, excepting monographs, with a nomenclature conforming to the Rochester Code. It is a very great inconvenience to unlearn names and learn new ones in their places. The inconvenience is best avoided by learning in the beginning the names which are to be used in the literature of the future. With the exception of the genus *Hypnum* and a few other doubtful cases, the names here used are the names to be adopted in subsequent American works. A complete index, and the synonymy of Lesquereaux and James' Manual make the list easy to use with the existing literature. The price is fifteen cents, postpaid. A copy of the list and a year's subscription to the *BYOLOGIST* will be sent for thirty cents.

THE POGONATUMS OR BEARDED MOSSES.

THE generic name of the hair cap mosses comes from two Greek words meaning many hairs, in reference to the hairy calyptra. The Pogonatum, which are very closely related to the hair-cap mosses, take their name from a word meaning a beard. Indeed, when you first discover one of the Pogonatum you will wonder what new hair-cap you have found. Dr. Robert Braithwaite, in his superb *British Moss-Flora*, has included the Pogonatum in the hair-cap mosses, but to most American students it has seemed better and much more convenient to keep them separate. So nearly alike are the two that we shall need no figure of the Pogonatum. They have the hairy calyptra, the lamellate costa, and the general habit of the hair-caps. They are, however, readily distinguished by the fact that the capsules are round instead of square and there are 32 teeth instead of 64. As in *Polytrichum*, the species are dioicous, that is, the male and female reproductive organs, antheridia and archegonia, are borne on separate plants.

There are four species of *Pogonatum* found in New England and the North Central States. The one most likely to be met

with is the slender Pogonatum (*P. tenue*—*P. brevicaulis* of many authors). It grows on bare clayey soil of banks, roadsides, and ditches. The plants do not grow close together but scattered, so that they look like small green dots against the lighter color of the soil. The stems are very short and simple, without branches; the leaves are few, 5–10, radical and very close to the ground, serrate, with few, 8–12, lamellæ. If the ground around the plants be examined, it will be found to be covered with a green felt, the protonema (fig. 1), which is composed of slender, green, alga-like threads that spring from the germinating spore and latter give rise to the mature moss plant. In this species, contrary to the general rule, the protonema lasts throughout the life of the plant. The abundance and persistence of the protonema may account for the smaller number of leaves and the reduced size of the plant, as it doubtless does as much starch-making as many leaves could do. The capsules are cylindric, nearly or quite erect, and are covered with very minute wart-like projections called papillæ. The short-leaved Pogonatum of the New Jersey pine barrens and southward is much like this species, but is easily distinguished by its shorter entire leaves. The urn-like Pogonatum (*P. urnigerum*), is fully as common as the slender Pogonatum in the hilly districts of New England. The stems are much longer, usually branched, naked below and densely leafy above, without persistent protonema. The leaves are serrate, but larger, with very many, 40–50, lamellæ. The capsules are very much like those of the slender Pogonatum. The alpine Pogonatum (*P. alpinum*), is almost sure to be at first mistaken for a hair-cap because of its large size, 2–6 inches in height. It is more likely to be met with than its name indicates, as it is not uncommon in New England on exposed places at an altitude of 1,000 feet or even less. It is readily distinguished by its size, its smooth and inclined or slightly curved capsule. Only those who are privileged to visit our higher mountains need expect to find the hair-like Pogonatum (*P. capillare*). It is most likely to be mistaken for the urn-like Pogonatum, from which it differs in its shorter capsule, nearly simple stem, and in the terminal cell of the lamellæ which is flat-topped; in the urn-like Pogonatum it is sharply rounded. The leaves are also much more curled when dry.

The common hair-cap moss is one of the few plants that have an almost world-wide distribution. It is found in all parts of North America, in Europe, and in Asia.

NOTES ON THE LIFE HISTORY OF THE MOSSES.

THE great majority of mosses mature their fruit in autumn or winter so that the spores are ready for germination in the spring as soon as the proper conditions of moisture and temperature arrive. When this time comes, the spores, which have been scattered by the wind and the jostling of small animals, burst their brown coats and send out delicate threads (fig. 2). These threads are of two kinds, those that are at the surface of the substratum such as those of the slender *Pogonatum* (fig. 1); these form the protonema, a tangle of green threads that might easily be mistaken for Algaë. Those which grow down beneath the surface are called rhizoids and serve the purpose of roots. This distinction between protonema and rhizoid is more apparent than real as each may develop the other and very often does so.

The protonema goes on growing like an Alga for a considerable time until it has reached the proper stage of development, when the first moss bud is formed (fig. 3), on some favorable portion of the protonema by the repeated division of a single unfertilized cell. Thus it will be seen that the whole moss plant thus far and including the protonema corresponds to the prothallium of the fern.

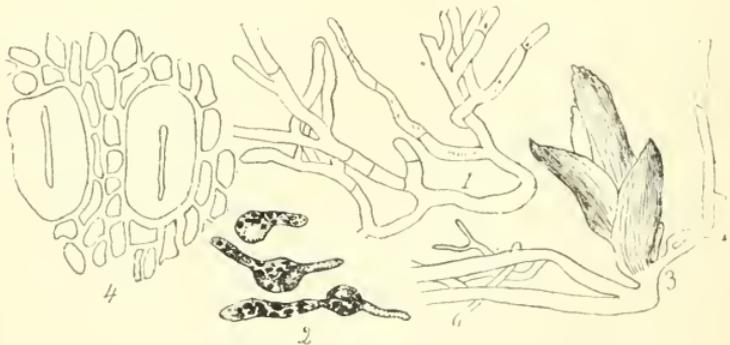


Fig. 1—Protonema of *Pogonatum tenue*. Fig. 2—Germinating moss spore (After Goebel). Fig. 3—Young moss plant starting from protonema. Fig. 4—Stomata and cells of base of outer (exothecial) wall of capsule of *Polytrichum commune*. Figs. 2 and 4 are magnified about twice as much as 1 and 3.

As no doubt our readers all know, the ferns have what is called an alternation of generations, the prothallium represent-

ing one generation, the sexual, so-called because of the fertilization of the archegonia by the antherozoids. The spore bearing fern is called the asexual generation because the spores are formed by simple cell division without fertilization. The capsule and seta of the moss correspond to this asexual generation of the fern.

The great difference between the moss and the fern lies in the fact that in the fern the asexual generation (gametophyte), merely serves as a starting point for the young fern, while in the case of the moss it persists and nourishes the asexual generation (sporophyte), throughout its life and in many cases persists for years, sending up a new sporophyte each year.

In most of the mosses, however, the sporophyte has begun to take care of itself. Referring to Fig. 3 of our last issue, a small knob, the apophysis or better the hypophysis, will be seen at the base of the capsule. If we divide the capsule longitudinally we shall find that the spore case does not extend to the hypophysis, but the base of the capsule just above it consists of a loose mass of cellular tissue. The walls of this part of the capsule are pierced by numerous stomata (Fig. 4), much like those of the epidermis of the under side of plant leaves and serving the same purposes.

NEW OR RARE MOSSES.

1.—ANACAMPTODON SPLACHNOIDES (Frölich) Brid.

THIS moss, though rare, has an extensive range, being known from Central and Southern Europe, and the Caucasian mountains, as well as from the mountainous regions of the Eastern United States. Although small, and rarely found except in small quantities, it is easily recognized by its dark green velvety appearance and usually abundant fruit, which is so distinctive a character that it has given both the generic and specific names to this species. The generic name refers to the teeth which are bent backward, and the specific name indicates its resemblance to the Splachnums, on account of the contraction below the mouth, which is so noticeable in the other capsules. Besides its unmistakable appearance, this moss has also a peculiar habit, by which it may be looked for and always recognized when found. It always grows around the edges of cavities in trees, where water stands, such as old knot-holes, in the forks of branches, and even on blazed surfaces and scars, usually on fallen trees. It also

loves deep, shady, damp woods at rather high elevations, and wild places, and is more or less abundant in such localities. I have found it completely surrounding a large hole in the trunk of a buttonball tree (*Platanus*) on the bank of the Holston River in Virginia, also on Buckeye, forming dense, velvety green cushions all around the rim of the hole, which was filled with water. In the Adirondack Mountains it grows on fallen beech trees around the base of Mt. Marcy, and I once found it in a blaze on a standing tree on the Boreas range. It is represented in the Herbarium of Columbia University from the following stations: Maine, Massachusetts, New York and New Jersey, Pennsylvania, Ohio, Illinois, Louisiana and Texas. It fruits from April to November, according to locality, the Texas station being the earliest, as might have been expected. The following notes from other collectors are interesting, and we believe that Mr. Burnett has duplicates for those who wish to exchange with him,—*Elizabeth G. Britton, Torrey Botanical Club, New York.*

Mrs. Britton and myself collected *Anacamptodon* two or three times during a memorable trip to the mountains of southwestern Virginia in 1892. The last time we found it we went through a particularly beautiful valley in the neighborhood of the small hamlet, Troutdale, on the borders of North Carolina. A legendary high cliff where "many mosses grow" was the goal of our journey. We walked several miles, almost losing ourselves in one of the most magnificent of forests. Magnolias, tulips, cherry and walnut trees, oaks and maples were there in profusion, with many others too numerous to mention. Our feet sank deep in the dense mossy carpet and at every turn there was something new and interesting to see and gather. The little scrap of *Anacamptodon* was found growing on a small dry twig, and much to our regret it was all that we found. Needless to say we did not reach the cliffs which to this day seem an El Dorado for future moss collectors in that locality.—*Anna Murray Vail, New York City.*

Twice only during my four years collecting have I found specimens of *Anacamptodon splachnoides*; in both instances in open woods on the hills nearly 2,000 feet above sea level. Sunday, July 25, while strolling along the banks of a creek about two miles from this city, I found in swampy ground at the base of a maple a mass of this moss over fifteen inches in length and from two to five inches in breadth. Owing to irregularities in the surface I could not remove it entire, but the fragments secured aggregated

over thirty-six square inches and bore nearly 1,000 capsules. The cavity seems to have been lined with a tough elastic fungoid growth, on the moist surface of which the moss grew.—*D. A. Burnett, Bradford, Pa.*

During the past four years, when collecting in Northern Ohio, the writer happened to find several small patches of the above rare moss. On one occasion the tree on which it grew was alive and overhanging the bottom of a creek at about a height of four feet. On another occasion it grew on a dead upright birch. There was in this tree at a height of about four feet above the ground a small cavity, but large enough to furnish room for a specimen of *Viola rotundifolia*, which nearly filled it and was in a thriving condition. It was on the border of this hollow knot that a small patch of *Anacamptodon* was seen growing.—*E. Clason, Cleveland, Ohio.*

I found the *Anacamptodon* twice this past summer—at Franconia Notch, near Profile Lake, N. H., August 19, and in Smugler's Notch, Mt. Mansfield, Vt., July 5; both were on old yellow birches and both were in good fruit. The Franconia Notch specimen was lining the lower part of a decaying hole in the birch, and its dark green foliage and curious fruit caught the eye at once.—*Dr. George G. Kennedy, Readville, Mass.*

A few years ago, on a rainy March day, as I was making my rounds, I chanced to see a moss about a rotten knot hole on a sour gum (*Nyssa*), and I scraped a liberal quantity from the bark, for it was something "new." Its color was what attracted my attention, a peculiar shade of bluish-green very different from that of most mosses. It proved to be *Anacamptodon splachnoides*, the first I had seen.—*George N. Best, M.D., Rosemond, N. J.*

NEW AMERICAN MOSSES.

From a Revision of the Claopodiums by Dr. G. N. Best. Bull. Torr. Bot. Club, **24**: 427. 1897.

CLAEPODIUM BOLANDERI Best. A less developed form of *C. crispifolium* (Hook.) R. & C., distinguished by its smaller size, pluripapillate leaf-cells, shorter ($1\frac{1}{2}$ -2cm.) seta, short broadly oval capsule and imperfect cilia. The leaves are broadly ovate-lanceolate with the margins not rugose. From Alaska to California, eastward to Idaho.

From a Preliminary Revision of the N. Am. Isotheciaceæ by A. J. Grout. Bull. Torr. Bot. Club, **23**: 223. 1896.

ENTODON SEDUCTRIX LANCEOLATUS Grout. Stem leaves ovate-lanceolate, acute; branch leaves broadly lanceolate, tapering

gradually to the serrate acute apex. On rotten wood, Hanging Rock, Wabash county, Ill., April 3, 1890, J. Schneck.

E. SEDUCTRIX MINUS Aust. Mss. in herb. Entire plant much reduced, dirty green; leaves, seta and capsule shorter than in type. Capsule 1.5–2mm. long, its length about three times its diameter. Ohio, Sullivant, Sand hill near Augusta, Ga., J. D. Smith, Feb. 2, 1877. A portion of No. 388 of Sull. and Lesq. Musc. Bor. Am., in Columbia Herb., issued as *Cylindrothecium compressum* Br. and Sch. is this variety.

E. SEDUCTRIX DEMETRII (Ren. & Card.) Grout. (*Entodon Demetrii* Ren & Card. Rev. Bry. **20**: 14, 1893.) Stem irregularly divided and branched, strongly complanate-foliate, slender having almost exactly the facies of *E. compressus*; leave ovate, gradually acute, very entire. Peristomal teeth often irregularly perforate. On stones at top of well, Emma, Saline county, Mo., Rev. C. H. Demetrio.

From "Fontinales Nouvelle," by J. Cardot, Rev. Bryol. **23**: 67, 1896.

F. FATUA Card. Distinguished from *F. antipyretica* L. by the leaves straight or little curved upon the keel and very open, by the narrower subcylindric capsule and by the more elongated peristomal teeth with more numerous lamellæ. The form of the capsule approaches that of *F. Kindbergii* Ren. and Card., from which it is distinguished at first sight by the non-cuspidate leaves, shortly and broadly acuminate and not presenting so clearly marked dimorphism. Vancouver, Macoun.

F. MISSOURICA Card. This species reminds one strongly of *F. biformis* Sulliv., but it is easily distinguished by its more persistent and longly acuminate cauline leaves with more compact tissue and by its less folded branch leaves, which are a little concave at the base, by the infolding of the borders, but not canaliculate. On rocks floating in the creeks, Benton county, Mo., Rev. C. H. Demetrio.

F. WAGHORNEI Card. Belonging to the group of *F. Novæ-Angliæ* Sulliv., but clearly distinguished from other described species by having the leaves nearly entire at the summit, the capsule half emergent, its peristome higher and strongly papillose, with its lattice nearly or quite perfect. *F. involuta* of Louisiana and Florida approaches it most closely, but is more slender, with narrower leaves ordinarily denticulate at summit, and capsule immersed. Trinity Bay and Witters Bay, Newfoundland, Rev. A. C. Waghorne.

Specimens of *Pogonatum tenue*, *P. alpinum*, *P. capillare*, and *Polytrichum Ohioense* will be sent to any subscriber of this journal on receipt of ten cents. A few sets of the mosses offered last quarter are still left. Mr. W. H. Stultz, 203 W. Second street, Duluth, Minn., will send a fruiting specimen of *Dicranum undulatum*, one of the most beautiful of our mosses, to any subscriber who sends him a self addressed stamped envelope.

(Reprinted November 1901.)

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VOL. I.

JULY, 1898.

No. 3.

THE Editor has received many gratifying comments from subscribers and also many helpful suggestions. He takes this means of thanking his numerous correspondents for their expressions of friendly interest.

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QUITE a number have expressed a wish that the BRYOLOGIST might appear oftener. We shall be only too glad to issue it oftener as soon as our subscription list will warrant it. Therefore, if you would like the BRYOLOGIST oftener, get some new subscribers.

* *

THERE seems to be a general desire for a Chapter for the study of mosses organized on somewhat the same lines as the Fern Chapter. The Editor has in mind a person who is exactly fitted for the work of organizing such a Chapter, but he will not consent to take up the work unless a sufficient number express themselves interested. The Chapter will aim to aid students of mosses as much as possible and the dues will be nominal. It is desired that all who wish to join such a Chapter communicate with the Editor at once in order that the Chapter may be on a working basis before autumn.

* *

HERE are some of the comments on the keys in the Editor's List of Vermont Mosses:

"I have given the keys a good trial with my botany class today. They are going to be a fine thing, and I congratulate you upon them."—*Prof. L. R. Jones, University of Vermont.*

"I find it (the List) excellent for acquainting our students with our mosses of New York."—*Prof. Carlton C. Curtis, Instructor in Botany, Columbia University.*

"They work out very nicely and will be useful to students of the local flora as well as to others of the neighboring states, who should be tempted to emulate Dr. Grout's good example."—*Mrs. E. G. Britton in the Plant World for May, 1898.*

HOW TO COLLECT MOSSES.

THE classification of mosses is so largely based on the characters of the capsule and seta that the beginner would best collect only fruiting specimens, unless he may chance to find something particularly striking. If one is to study the mosses at all carefully he must preserve his collections in a systematic way for future reference. The larger the number of correctly named specimens in a collection the more valuable and useful it is. Additional specimens can usually be obtained by exchange or by purchase. It has been the purpose of the Editor to place a series of correctly named specimens within the reach of all our readers because such specimens are almost indispensable for satisfactory work in the study of mosses. If one is to make exchanges, extra specimens must be collected and prepared. One should usually collect enough for six or more good specimens and if the mosses seems rare, collect a larger quantity.

Most species of mosses, by reason of their growing on the surface of trees, stones or earth, are subjected to great extremes of drouth and moisture so that they readily soak out in good condition for study, no matter how dried, provided only that they be dry enough to prevent moulding. Much more satisfactory specimens are made by drying under a light pressure. If the moss grows in thin mats it can be transferred bodily to the pressing sheets. If time is abundant, it will be well to separate the mats into sections such as will be distributed for herbarium specimens, wrapping each in a newspaper packet. If, as is often the case, two or more species are growing interwoven, it will be well to separate them. If the mats are thick and consist mostly of erect stems, it is better to break them up into vertical sections or slices. The substance upon which the plant is growing, the date, and the locality should be plainly noted in every case. The Editor always carries some old envelopes in his pocket and finds them very handy for collecting chance specimens.

An unnecessary and troublesome amount of earth or rotton wood often adheres to the plants; as much of this should be removed as can be done without injury to the specimens. After drying it can often be removed more easily. The best season for collecting varies with the plants. The Miniums, the Bryums, the hair caps and their allies will mostly be in prime condition by July first. Most of the Pleurocarpus mosses are in the best condition

in late autumn to early spring. The beginner would best not try to identify sterile specimens unless they have some striking character. If a perfect specimen cannot be identified, make careful notes and send the specimen and notes to some one who has a better knowledge of mosses.

THE CATHARINEAS.

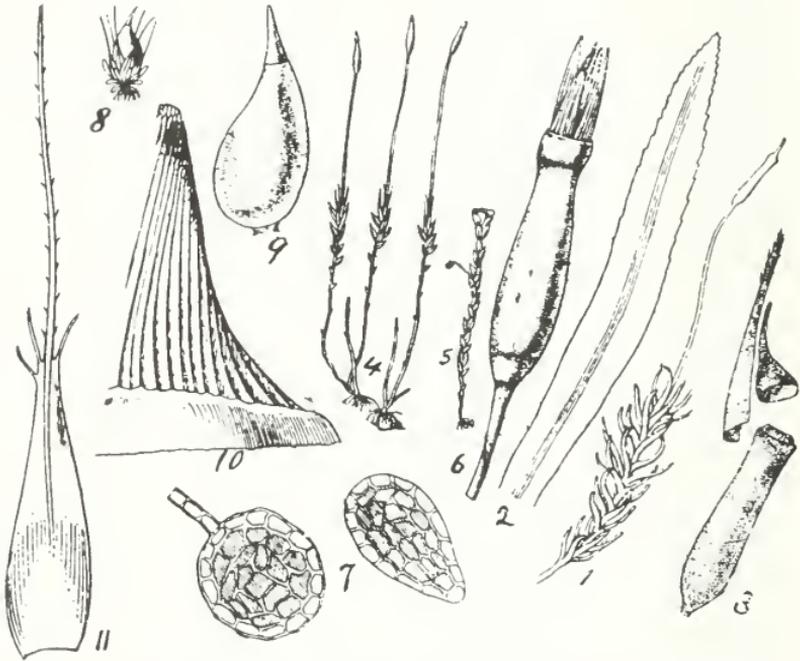
THE hair-cap mosses and the Pogonatum belong to the family Polytrichaceae, which in some respects is the most highly developed of all the mosses. The stem has a central axis of specialized tissue that in structure and function shows a near approach to the central fibro-vascular bundle of the ferns and their allies. The most notable member of the family in point of size is the magnificent Dawsonia of Australia, which reaches a height of 14 inches and has leaves an inch or more in length. There are several other genera belonging to this family, some of which are represented in North America, but the only other genus which our readers are likely to meet with is Catharinea, which, in 1780, was named by Erhart for the Empress Catharine II. of Russia, but sixty-four years later Bruch and Schimper changed its name to Atrichum.* If our readers are troubled by the recent changes of plant names, this instance will show them the justice of restoring names long in use but arbitrarily rejected by the caprice of a prominent botanical writer.

The Catharineas will be easily recognized by reference to Figs. 1-3. They have the lamellate costa of the hair-caps and a peristome of 32 teeth, similar in all respects. The calyptra, however, has become almost bald and shows mere traces of hairs in the spine-like projections near its apex (Fig. 3). The wavy Catharinea (*C. undulata*) is one of our most common and conspicuous mosses, being abundant everywhere on moist, shady banks. The novice will find it not always easy to distinguish the narrow-leaved Catharinea (which is less frequent and the only other species likely to be met with) from the wavy Catharinea. The wavy Catharinea has the leaves rather acute, serrate to the base; upper leaf cells irregular and rounded; capsule more or less curved, frequently several together. The narrow-leaved Catharinea is more slender; leaves more obtuse, less undulate, serrate in the

*See Mrs. Britton's article in the *Observer* for May, 1804.

upper half only; upper leaf cells regularly six angled, much smaller: capsule less curved, single.

Mr. Dixon says that these two species are separated by a combination of characters, most of which may, at one time or another, be found to some extent in both species. But he adds that they can usually be readily distinguished by the lamellæ, which, in



the wavy *Catharinaea*, are few, short and, when flattened out beneath a cover glass, occupy (in the upper part of the leaf) $\frac{1}{8}$ — $\frac{1}{10}$ the entire width of the leaf, while in the narrowed-leaved *Catharinaea* they cover $\frac{1}{3}$ — $\frac{1}{4}$ the width of the leaf.

EXPLANATION OF PLATE.

Figs. 1-3—*Catharinaea angustata*; 1, plant, natural size; 2, leaf, greatly enlarged; 3, capsule, operculum, and calyptra, enlarged. Figs. 4-7—*Georgia pellucida*; 4, plant, natural size, showing the basal branching; 5, Gemmiferous plant; 6, capsule, enlarged; 7, Gemmæ. Figs. 8-11—*Webera sessilis*; 8, plant, natural size; 9, capsule, greatly enlarged; 10, half of mouth of capsule, enlarged, showing plicate cone; 11, Perichaetial leaf. [Taken by permission from Mrs. Britton's plates in the *Observer*.]

This genus was named after George III., but its name was soon after changed to *Tetraphis* by another botanist. The latter name refers to the four large strong teeth of the peristome, by which character alone the genus is readily recognized. The pellucid *Georgia* (*G. pellucida*, Figs. 4-7) is very abundant on moist decaying wood, but seems to flourish best on the vertical sides of old stumps. Some of the plants bear peculiar looking tufts of leaves at the summit that might easily be mistaken for the antheridial heads. The species, however, is monoicous and these heads consist of large numbers of minute bright-green bodies, called gemmæ, surrounded by modified leaves. These bodies much magnified are shown in Fig. 7. These fall off and develop into new plants. This method of reproduction is rather rare in mosses and reminds one strongly of the gemmæ of *Lycopodium* or the bulblets of *Cystopteris*.

There is another species of this genus and another genus of this family which are found in North America, but they are so rare that none of our readers are likely to meet with them.

While *Georgia* belongs to a different family from the hair-caps, there are certain resemblances that have led botanists to put them into one group, the *Nematodontæ* or thread-toothed mosses in contrast to the *Arthrodontæ* or jointed-toothed mosses. The jointed-toothed mosses have the teeth of the peristome crossed by very conspicuous bars or joints which are formed by the thickening of the cell walls of a single layer of cells. The mosses we have thus far taken up belong to the thread-toothed mosses, in which the teeth are not jointed and are derived from several concentric layers of cells. In *Georgia* the teeth are formed from the division of the whole cellular tissue of the interior of the lid, but in the *Polytrichaceæ* the teeth are formed from more clearly differentiated tissue. Each tooth consists of several layers of fine threads (hence the name, thread-toothed), held together by cellular material. In *Dawsonia* the threads are set free and form brush-like tufts of cilia. These structures are so fundamentally different from those in the jointed-toothed mosses that *Arthrodontæ* and *Nematodontæ* ought to stand as the great divisions instead of *Acrocarpous* and *Pleurocarpous*.

The *Buxbaumias* and their allies, the oddest and most curious of all our mosses, belongs with the thread-toothed mosses, according to most recent writers, but they are not very common and

we will refer our readers to Mrs. Britton's article in the March, 96, *Observer* for a full description accompanied by an excellent plate. Figs. 8-11 represent the most abundant member of this family, the sessile *Webera* (*Webera sessilis* (Schmid.) Lindb. *Diphyscium foliosum* Mohr.), which is easily recognized by the odd shaped capsules and is easily distinguished from *Buxbaumia* by its much greater number of leaves.

NEW OR RARE MOSSES.

II.—BRACHYTHECIUM CYRTOPHYLLUM Kindb.

BRACHYTHECIUM *cyrtophyllum* Kindb. is a very interesting moss closely allied to *B. acuminatum*, but much more slender, with much smaller leaves and broader, shorter leaf cells. Besides the type collection at Brighton, Ontario, by Prof. Macoun, it had previously been collected by Austin at Waterloo, N. Y., and the specimen in his herbarium was labeled *Hypnum* (*Brachythecium*) *julaceum* sp. nov. It was distributed in Austin's *Musci Appalachiani* No. 311, as *B. acuminatum*, var. *setosum*.

Since this it has been collected by Prof. Holzinger and probably by others, but never in fruit until Mr. Burnett collected it as recorded below. The capsules, however, do not differ materially from those from *B. acuminatum*, except that they are more slender. Besides this collection of the fertile plant, Mr. Burnett has several times collected it in a sterile condition.—*A. J. G.*

Riverside Park, on the Alleghany River ten miles north of Bradford, near the mouth of Tuna Creek, is an interesting locality for the botanist. The rich, deep alluvium of the broad valley is greatly broken by numerous creeks or bayous, which, in seasons of protracted drouth, leaves many stagnant pools. In August, 1896, I found some beautiful specimens of *Dichelyma pallescens* in one of these pools. In October, 1897, we had a season of low water, and in seeking to locate my *Dichelyma* I came upon an uprooted tree, reclining upon another tree at an angle of about thirty degrees. The tree was large, partially denuded of bark, and decidedly slippery, but the sight of the dainty little *Brachythecium* with its glossy red-brown cylindrical capsules was too tempting to resist. Selecting the fertile and leaving most of the sterile I filled my pockets with what proved to be *Brachythecium cyrtophyllum fertile*.—*D. A. Burnett, Bradford, McKean Co., Pa.*

Brachythecium cyrtophyllum was collected by me at the base of some willow trees in the creek bottom of Rout "river," running through the village of Lanesboro, Filmore Co., Minn., in August, 1894.—*J. M. Holzinger, Winona, Minn.*

MOSES FOR DISTRIBUTION.

Mrs. Britton reports that she has still a large number of specimens of the Sword Moss (*Bryoziphium Norvegicum*), described in the *Plant World* for October, 1897, which she will be glad to distribute to all the readers of the *BRYOLOGIST* who will send her a self-addressed and stamped envelope to New Dorp, Richmond Co., N. Y. City, N. Y. On the same terms Miss Harriet Wheeler of Chatham, N. Y., will send specimens of *Pogonatum urnigerum*.

Specimens of *Catharinea undulata*, *C. angustata*, *Georgia pellucida*, and *Webera sessilis* will be sent to anyone sending ten cents to the editor of the *BRYOLOGIST*. The rarer mosses of the last two offerings are all exhausted, but *Polytrichum commune*, *P. juniperinum*, *P. piliferum*, *Pogonatum tenue*, and *P. alpinum* will be kept on hand and will be sent at any time for ten cents.

NEW AMERICAN MOSSES.

From "Fontinales Nouvelle," by J. Cardot.

F. MACMILLANI Card. This is a relative of *F. Lescurii*, from which it is distinguished by its more folded and slightly concave leaves, which are narrower and more longly acuminate with narrower and more elongated median cells, and alar-cells less differentiated. Northern Minnesota, near the international boundary. Prof. Conway MacMillan.

F. DELECARLICA MACOUNII Card. Differs from the typical form in the softer leaves and in the perichaetial leaves, which are round-obtuse, not apiculate. It is distinguished from *F. Delamarei* R. & C. by its more slender habit and much smaller, narrowly lanceolate leaves, which are about 2.25×0.5 mm. Lake Athabasca, Macoun.

From N. Am. species of *Amblystegium* by L. S. Cheney, *Bot. Gaz.*, **24**: 236-291. 1897.

A. RIPARIUM LONGIFOLIUM (Schultz) Sch. & Buys. Large yellowish green to bright yellow or bronze: stems moderately elongate, 3-8 cm. long; leaves large, 0.6-0.7 by 0.32-0.42 mm., slenderly acuminate. Vancouver and Washington.

From *Erythea*, **5**: 91. 1897.

HEDWIGIA ALBICANS (Wed.) Lindb., (*H. ciliata* Ehrh.) var. *detonsa* M. A. Howe. Perichaetial leaves entire or slightly den-

ticulate; stem leaves diaphanous at apex for $\frac{1}{5}$ – $\frac{1}{4}$ the length, margins plane or very slightly reflexed at base; calyptra usually glabrous. On rocks. From four stations in California.

From Memoirs of the Torrey Botanical Club, 6: No. 2.

BRACHYTHECIUM SALEBROSUM FLACCIDUM Br. & Sch. *Gametophyte* in wide loose dark-green mats; stem and branches slender, branch leaves distant, spreading, more or less complanate, strongly serrate, apex often twisted; stem leaves very broadly triangular-ovate approaching in outline those of *B. Starkei*, about 2×1.2 mm., very slenderly acuminate, slightly serrulate. *Sporophyte* with cilia often 3. Capsule much that of *B. oxycladon*. New Brunswick; Weehawken, N. J.; Oneida, N. Y. *B. salebrosus flaccidum* is the extreme broad-leaved form of the species and may be distinct, but at present our knowledge is insufficient to define it.

BRACHYTHECIUM FLEXICAULE R. & C. Stems creeping, densely radiculose, closely applied to the substratum, 5–12 cm. long, pinnately branching; branch leaves narrowly lanceolate, 2 – 2.5×0.5 – 0.65 mm., gradually narrowed to a very long slender apex, serrate; median cells linear-vermicular, 12–14:1; basal cells broader and shorter; extreme alar cells sub-quadrate; monoicous. *Sporophyte* usually not to be distinguished from that of *B. salebrosus*. Type locality, John's Beach, Newfoundland (Waghorne); on earth, Revelstoke, B. C. (Macoun, sent out as *B. glareosum*) on schistose rocks, Manchester, Vt.; New Jersey; on decaying wood, Bradford, Pa.; Adirondack Mountains, N. Y. This species seems to me to be almost identical with *B. salebrosus densum* Br. & Sch. Bryol. Eur. pl. 550, but M. Cardot thinks otherwise. It is easily distinguished from all its near allies by the extremely narrow stem leaves, gradually narrowed from just above the base to the apex.

BRACHYTHECIUM ROTEANUM DeNot. *Gametophyte* in glossy yellow-green mats; branches subjulaceous; branch leaves more closely imbricated and appressed than in *B. salebrosus*, ovate-lanceolate, long acuminate, 1.5 – 2×0.45 – 0.55 mm., serrate above, concave; median cells linear-fusiform, 10–12:1; several rows of basal cells much enlarged, quadrate to oblong-hexagonal; lower stem leaves ovate, abruptly narrowed to a long slender acumination, nearly entire, 2 – 2.4×0.9 mm; areolation much looser; monoicous. *Sporophyte* 2.5 cm. high; seta red-brown, smooth; capsule red-brown; cylindric, nearly erect, slightly arcuate, about 3 mm. long, 4:1; operculum conic rostrate; annulus (?), cilia 2 or 3, well developed, nodulose; spores granulose roughened, 13μ , Louisiana and Texas. Distinguished from *B. oxycladon* (*B. laetum* Br. & Sch.) by being monoicous and by the conspicuously enlarged basal cells of the leaves; from *B. salebrosus* by the longer suberect capsule and leaves scarcely or not at all plicate; from both by its much shorter-acuminate perichaetial leaves.

(Reprinted June, 1913.)

VOL. I.

No. 4.

THE BRYOLOGIST,

A DEPARTMENT OF THE FERN BULLETIN,

DEVOTED TO THE STUDY OF NORTH AMERICAN MOSSES.

EDITED BY DR. A. J. GROUT, PLYMOUTH, N. H.,

To whom all correspondence regarding the mosses should be addressed.

This department is issued separately at twenty-five cents a year. Subscriptions should be addressed to the Fern Bulletin, Binghamton, N. Y.

THE NEW MOSS CHAPTER.

THE proposed Moss Chapter has received support beyond the expectations of the Editor and his friends. Not only beginners, but several of the more prominent moss students, have volunteered their support. It is therefore proposed to form a correspondence Chapter of the Agassiz Association for the study of mosses, with a constitution similar to that of the Linnæan Fern Chapter. It seems appropriate that this Chapter should be called The Sullivant Moss Chapter, after that "Prince of American bryologists," William Starling Sullivant.

Mrs. Britton, the Editor of the FERN BULLETIN, and the Editor of the BRYOLOGIST, will act as a committee to name officers for the first year, and their appointments will be published in the January BRYOLOGIST. After this officers will be elected according to the Constitution. The Editor will act as secretary and treasurer *pro tem.* until that time, and all dues and correspondence should be directed to him until the appointments of officers are announced.

The officers appointed will constitute a committee to draft a constitution to be acted upon by the Chapter as soon as convenient.

The Chapter will be entitled to a page in each issue of the BRYOLOGIST for Chapter notes and news. All who join as active members before January 1st, 1900, will be entitled to a free copy of the Editor's "List of Vermont Mosses, with Keys." They shall also be entitled to exchange notices at the same terms as members of the Fern Chapter. The annual dues will be 25 cents for associate members and 50 cents for active. Both classes will receive the BRYOLOGIST free, but only the active members shall vote or hold office. Members of the Fern Chapter can become active

members of the Moss Chapter by paying 25 cents annually, but such members shall not be entitled to a separate copy of the BRYOLOGIST. All revenue for dues, etc., will go directly into the treasury of the Chapter, to be expended for the Chapter by the officers elected for that purpose.

The charter membership roll will remain open until Dec. 10th, 1898, and it is expected that there will be a large number of charter members, since the present month is the beginning of a season when the mosses are at their best.

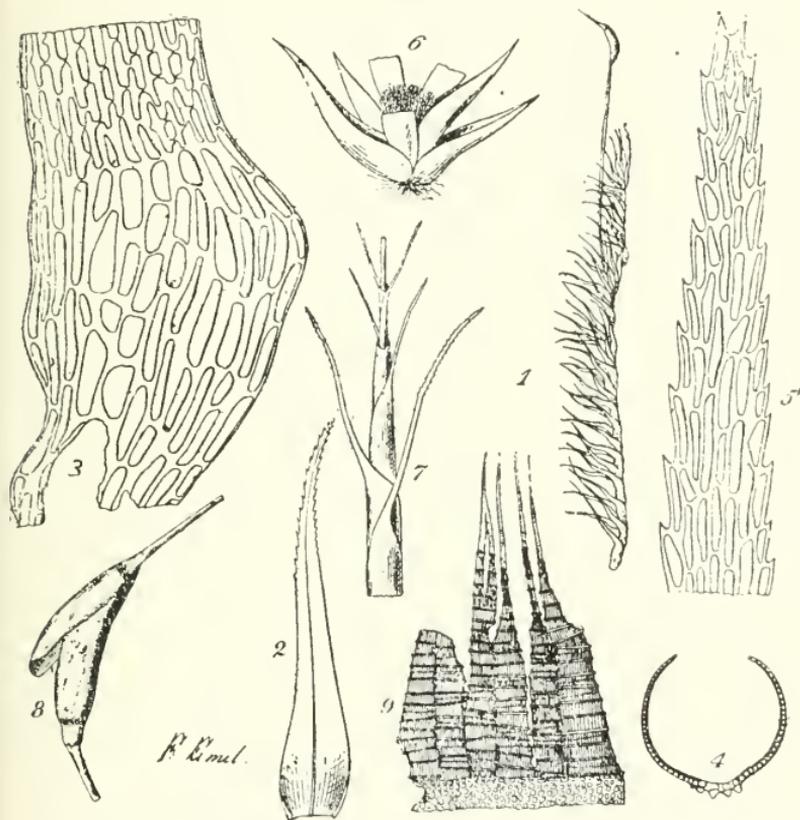
Only members of the Chapter will be entitled to the mosses offered in the BRYOLOGIST at the rates mentioned therein.

THE DICRANUMS.

THE Dicranums include some of our most common and easily recognized mosses, and they will be found in perfect fruit at the time this issue of the BRYOLOGIST reaches our readers. When one knows a single species of this genus, he will have little difficulty in recognizing the others, although it is not so easy to say just what characters give them their distinctive habit. The Dicranums usually grow in dense tufts or cushions which soak up water like a sponge and retain it for a long time. The leaves are usually bent to one side (secund), as if the wind had blown them strongly in one direction (Fig. 1). They are also usually curved like a scythe or a sickle (falcate).

The Dicranums are acrocarpous, but the stem grows on after the capsule has begun to develop, thus leaving the seta apparently starting from the side of the stem (Fig. 1). This often happens with a acrocarpous mosses, but their erect habit and stems little divided or branched enable the acrocarpous mosses to be distinguished from the pleurocarpous even when sterile. The capsules are on long setæ and are either curved (arcuate, Fig. 8) or drooping (cernous), or straight. The operculum is long-beaked (rostrate), and the calyptra smooth and split down one side (cucullate, Fig. 8). The base of the seta is surrounded by a cluster of specialized leaves (the perichæatial leaves, Fig. 7). There are perichæatial leaves in the hair-caps, but they are much less strongly differentiated. The peristome is single—that is, it consists of one row of 16 jointed teeth, which are split half way down into two or three prongs (Fig. 9). It is strongly colored and makes a most beautiful microscopic object. Most of the species have at least the lower part of the stem covered with a

thick felt of radicles. The leaves are usually lanceolate to lance-subulate, with a concave base and a very strong costa extending nearly or quite to the apex of the leaf, or even beyond. Fig. 4 shows the leaf in cross section and also shows the narrow lamellæ, which are found on the *lower side* of the costa instead of the upper, as in the hair-caps. These lamellæ are often very strongly toothed. A section of the leaf is not necessary in order to see the lamellæ



DICRANUM SCOPARIUM.

Fig. 1. Plant natural size, the fruit terminal, becoming lateral by the growth of the stem; 2, single leaf enlarged; 3, part of base of leaf, showing the enlarged cells at basal angles, and the porose cells above; 4, cross-section of leaf showing the ridges on the back of the vein; 5, apex of leaf enlarged; 6, antheridial bud; 7, perichæial leaves, sheathing the base of the seta; 8, capsule with the calyptra and lid on; 9, peristome showing two teeth divided more or less irregularly to the middle.

[From Mrs. Britton's article in the February, 1895, *Observer*. By permission].

clearly. If several leaves be mounted in water, some will nearly always be turned so as to show them in profile. This is rendered easier by the fact that in many species the edges of the leaves are rolled in (involute) in the upper part so that the leaves are tubulose. The upper leaf cells are elongated-rectangular, oblong-linear, quadrate or elliptical, according to the species; toward the base they are elongated-rectangular. Those at the basal angles are much enlarged and inflated, and are often of a different color from the others (Fig. 3, lower portion). This last character distinguishes the *Dicranum*s from the allied genera and species except *Campylopus*, in which the seta is curved and the capsule pendent. Many of the species have the cells communicating by pores, as shown in the upper part of Fig. 3. Such cells are called porose or pitted. The protoplasm of the adjoining cells communicates through these pores. These pores are very helpful in determining the species.

While there are 20 species of *Dicranum* found in the United States north of Virginia and east of the Mississippi, there are only five that are likely to be found by the great majority of our readers. One of the most common and conspicuous is the broom moss (*D. scoparium*), so called because its leaves all point one way in a manner that reminds one of a hair-broom or counter-brush.* This is often used by florists and other merchants to form banks of dark green in their windows. It can be found almost anywhere in the woods, on the ground, roots of trees, and rocks. It is much the coarsest-appearing of the common species that have curved capsules. A reference to the figures will give all further details necessary for the identification of this species.

The wavy *Dicranum* (*D. undulatum*) also grows on the ground and rocks, but is the largest of the five species, and is at once distinguished in the field by its beautiful silky, strongly undulate leaves and clustered capsules. That is, it has several capsules with setæ inclosed in one cluster of perichæatial leaves (perichætium). The leaf cells are elongated and porose, like those of the broom moss.

The fuscous *Dicranum* (*D. fuscescens*) grows on rotten wood, and is the only other common *Dicranum* with a curved capsule. It is easily distinguished from the preceding species by its smaller size, more delicate appearance, and leaves not undulate but

*Fide Mrs. E. G. Britton in the New York Teachers' Monograph, Vol. 1, No. 2.

crisped after the manner of curled hair. Its capsules are single, and much shorter and more strongly arcuate than in the above species. Under the microscope it is at once distinguished by the short upper leaf cells nearly or quite as broad as long and often quadrate. None of the leaf cells are porose (rarely a very few near the base).

Another species with curved capsules is the pale Dicranum (*D. pallidum*, *D. spurium condensatum* of L. & J. Manual). This is found on sandy plains in New Jersey and the neighboring territory, but is probably not found elsewhere within the range mentioned above. It is distinguished from all the above mentioned species by its small size (less than one inch in height); from the broom moss by its short irregular upper leaf cells with cell walls without pores, excepting a very few in the lower part; from the fuscous Dicranum by the more compact tufts, and leaves equally spreading, not secund, and little crisped.

There are two common species with erect straight capsules. Of these two, the flagellate Dicranum (*D. flagellare*) is much the more common. It is found in moist woods nearly everywhere. It grows on *decayed logs and stumps*, and often produces abundant flagellæ from the upper part of the plant. These flagellæ bear minute ecostate leaves very different from those on the main plant. In this species the costa does not extend to the apex of the leaf.

The other erect capsuled Dicranum, the fulvous Dicranum (*D. fulvum*) grows on *rocks* and has the costa excurrent—that is, extending beyond the lamina of the leaf into a thick point. In our next number we plan to publish an entirely new key to the whole twenty species. This key will be especially adapted to the use of beginners. We also hope to have some of the rarer species to distribute.

MICROSCOPIC PREPARATIONS OF MOSSES.

PORTIONS of the types of Hedwig's species, many of which are North American, and all of which date back to the beginning of this century, are preserved at the Boissier Herbarium in Geneva, mounted on small mica slides. The medium is a very durable one, for all the slides which I have examined have kept perfectly, and it seems to have been easily handled, for the specimens are not shrivelled or broken. I have since adopted this method for keeping all dissections that I make of the mosses,

and have also learned that others have done the same. I quote from the *Revue Bryologique* for 1893, M. Amann's remarks on this subject:

"The employment of mica slides for the preserving in the herbarium microscopic preparations of the organs of the mosses was recommended in 1853 by Carl Mueller in his 'Deutschlands Moose.' This eminent bryologist says in one of the numbers of *Natur* that thanks to this method, which permits the comparison under the microscope in a few minutes of the organs of a great number of species, it has been possible for him to devote himself to the systematic study of the mosses of the entire world.

"In fact these microscopic preparations accompanying every specimen in the herbarium and enclosed in the same envelope with the specimen from which they were taken, permits a great economy of time and are for that reason exceedingly convenient."

M. Amann objects to them, however, as dry mounts, because of the imperfection of the image and because all our modern objectives are corrected for a standard thickness of cover-glass. He therefore prefers to use a small slide, only 25 mm. long and $\frac{3}{4}$ mm. thick, which is specially made for anatomical preparations. As a mounting medium he uses gum arabic dissolved in glycerine jelly, thinned with distilled water, to the thickness of honey. Specimens transferred from either cold or hot water to this medium harden in a few hours and preserve indefinitely, being less bulky than ordinary slides for microscopic preparations.—*E. G. Britton.*

My method of making microscopic slides is as follows: Dissections are made in water on the stage of a simple microscope. This stage is removable so that it can be placed under a compound microscope and the smaller parts examined without disturbing their position. Such parts as I wish to retain are transferred to a few drops of dilute glycerine (10 to 20 per cent.) on a glass slide on the end of which a number is marked with pen and ink for means of identification. This is set aside without cover glass until the water has entirely evaporated, leaving only clear glycerine. It usually requires at least an hour, generally more, unless the slide is placed where it will be warm (but not *hot*).

I usually leave it over night when convenient. After this it only remains to again transfer to hard glycerine jelly by almost any of the methods in general use. For the "permanent" slide and cover I now invariably use mica. The slides are fairly stiff and from $1\frac{3}{4}$ to 2 inches long by $\frac{3}{4}$ or $\frac{7}{8}$ wide, while the covers are thinner and $\frac{5}{8}$ by $\frac{1}{2}$ inch or larger, as the particular case demands. These slides are placed in small envelopes glued

to the herbarium sheets on which the plants, from which the dissections were made, are fastened. The necessary legend for identification is easily scratched on the mica with a metal point.—*J. Franklin Collins.*

As some of our readers may not be familiar with glycerine jelly, it may be useful to state that it can be bought of any dealer in microscopical supplies. It can be softened for use by heating a bit on a slide, or by immersing the bottle in cold water and then raising the water to the boiling point, when the jelly will be liquefied. If a slide bearing a water or glycerine mount be slightly warmed, the jelly can be easily run under the cover glass by putting a drop on one side and drawing out the other medium at the other side with a piece of blotting paper. An ordinary kerosene lamp can be used to warm slides if nothing better is at hand.

Mr. Collins' method will do away with the shrinkage which is so troublesome when water mounts are transferred directly to the jelly. I once obtained a large quantity of excellent mica from a wall-paper factory where it was ground up to make the glittering specks in the wall-paper. This was much cheaper than the article ordinarily sold at hardware stores because of the small size of the pieces. I do not think that the ordinary moss mount requires a power high enough to render the variations in thickness of covers of very great importance and always use mica covers for my small slides.—*A. J. G.*

MOSESSES FOR DISTRIBUTION.

Specimens of *Dicranum scoparium*, *D. fuscescens*, *D. fulvum*, *D. flagellare*, and *D. pallidum* (this last by courtesy of Mr. C. F. Saunders) will be sent to any subscriber for 12 cents. A sterile specimen of *D. undulatum* will be added for an extra two cents if any failed to take advantage of Mr. Stultz's offer.

NEW AMERICAN MOSESSES.

From Notes on California Bryophytes, by M. A. Howe in *Erythea*. 5: 92. 1897.

STABLERIA GRACILIS (Wils.) Lindb. "On charred stumps and logs, mainly of *Sequoia sempervirens*. First collected in Turner's Cañon between Cazadero and Fort Ross, Sonoma county, March 15, 1896; later at various stations in Mendocino county, and near Eureka, Humboldt county. Most of these specimens, in our judgment, cannot be distinguished even varietally from the European plants. The processes of the endostome are often as long

as the teeth, but they are so described by Boulay and by Husnot, and are sometimes equally long in Wilson's *Musc. Brit.* No. 220. *Stableria gracilis* was discovered by Wilson in Cheshire, England, in 1833. Since then, three or four English stations and two in Finistère, France, have been added. It is another interesting link in the chain of relationship between the bryophyte flora of California and that of Europe."

STABLERIA GRACILIS (Wils.) Lindb., var. *CALIFORNICA* M. A. Howe. "Leaves linear-lanceolate, acuminate, broader than in the typical form and without subulate points; antheridia surrounded by a few small bracts, on a short gemmiform branch. Near Eureka. The leaves of this variety are often strikingly different from those of the type, but it grows mingled with the ordinary form and plants bearing leaves of a transitional character are found. The specimens which we have identified with the type, so far as observed, are paroicous, but var. *Californica* appears always to be autoicous. Braithwaite describes *Stableria gracilis* as exhibiting both these methods of bearing the antheridia."

Stableria is a genus closely related to *Leptobryum pyriforme* (L.) Wils., and for the benefit of our readers we insert Mr. Dixon's description of the species: "Stems densely tufted, slender, hardly branched, about $\frac{1}{4}$ - $\frac{1}{2}$ in. high, rarely taller, bright green, silky. Leaves flexuose, when dry somewhat curled, very narrow, linear-setaceous, the upper longest (1-1 $\frac{1}{2}$ lines); margin plane, entire or obsoletely denticulate above, nerve vanishing at apex, narrow, rather indistinct above, areolation narrowly linear-rhomboid, at base wider, hexagonal-rectangular, hyaline. Seta short, less than $\frac{1}{2}$ in. high, pale, very slender; capsule suberect, narrowly clavate, with a slender tapering neck, thin-walled; lid acutely pointed. Peristome teeth incurved when dry, inserted below the mouth of the capsule; outer teeth narrow, distant; inner peristome a very short basal membrane with sixteen slender processes without intermediate cilia. Paroicous; antheridia in the axils of the comal leaves."

From *Memoirs of the Torrey Botanical Club*, 6: No. 2.

BRACHYTHECIUM LAMPROCHRYSUM GIGANTEUM n. var. Stems much stouter, secondary stems with fewer branches; stem leaves distant, longer, 3-3.5 mm. long, very strongly plicate; extreme alar cells inflated. Capsule ovoid; operculum conic-rostrate; annulus large, persistent; segments as long as teeth, from a very broad basal membrane; cilia 2 or 3 well developed, nodose; spores maturing in winter. Atku Id., Behring Sea. (U. S. S. Albatross, No. 44. June 10, 1894.)

BRACHYTHECIUM RIVULARE CATARACTARUM Sauter. *Fl. Herzogth-Salzburg*, 3: 60. 1870. Floating, dark green to golden green, brown underneath; secondary stems much elongated, simple or sparingly branched; branches short, directed forward at an acute angle; leaves much more closely imbricated, especially at the tips of the branches. On timbers of old dam, Staley's Creek, Virginia.

(Reprinted June, 1913.)

THE BRYOLOGIST,

A DEPARTMENT OF THE FERN BULLETIN,

DEVOTED TO THE STUDY OF NORTH AMERICAN MOSSES.

ISSUED QUARTERLY.

EDITED BY DR. A. J. GROUT, PLYMOUTH, N. H.,

To whom all correspondence regarding the mosses should be addressed.

This department is issued separately at twenty-five cents a year. Subscriptions should be addressed to the Fern Bulletin, Binghamton, N. Y.

VOL. II.

JANUARY, 1899.

NO. 1.

HEATER FOR GLYCERINE JELLY SLIDES.

BY J. FRANKLIN COLLINS.

A FEW years ago while making glycerine jelly mounts by one of the old, laborious methods (one which is still in use), it occurred to me that there ought to be some more convenient method devised. After some experimenting, an apparatus was constructed which seemed to answer the requirements of economy and convenience. I have now been using it about three years and find it a great improvement over the old method. Recently Dr. G. G. Kennedy had one constructed with some slight modifications. After it was completed I used it several times and found it did the work as well, in every respect, as mine, and had the advantage of being simpler in construction.

The accompanying illustration and description embody the better features of both heaters, though following the lines of Dr. Kennedy's more closely than of mine. The figures are one-fourth natural size, so that any dimensions not specially stated can be ascertained by measuring the drawing and multiplying by 4.

A is a side view with the hand-rests removed; *B* shows a portion of one end (the lamp end), with hand-rest (*x*) in place and hand lens (*l*) removed, *C* (inserted within the contour of *A* in order to economize space) is a plan of the cover *s* shown in *A* and *B*. The base and supports (*e*, *e*¹, *e*²), as well as the hand-rests (*x*), are of white-wood; all other parts are of brass or copper, except *f*.

The circular tank *xa* is connected with *xb* by the two $\frac{3}{8}$ inch pipes *c*¹ and *c*². *xb* is a rectangular box about $3\frac{1}{4} \times 1\frac{1}{4} \times \frac{1}{2}$, on the flat top of which the blank slide is placed to heat. This flat

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In fig. *C* the circle *a* is cut out to fit closely about the narrowest part of the neck of the homeopathic vial (*k*) containing the glycerine jelly (*j*). The radiating lines *a-b*, etc., are cut with a fret saw and the metal portions between them bent out (one at a time) until *a* is large enough to allow the top of the vial to be thrust through.

The metal is then bent back and the bottle is held as shown in fig. *A*.

To place jelly on slide, remove the glass rod (*l*) and cork (*y*) together, and touch end of rod to the warm slide on *xb*. If more jelly is required, repeat.

To prepare for use, pour into *xa* sufficient hot water to raise the level to *h*, when vial *k* is in position, and place lamp with *small flame* in position. As soon as jelly is fluid it is ready for use and will remain so as long as the water level is kept above the tube *c*¹, and the lamp is kept burning. The circulation of water, which should never *boil*, is indicated by the arrows.

THE DICRANUMS.—II.

It is hoped that the following purely artificial key may prove of value to beginners:

- | | | |
|--|----|--------------------|
| 1—Capsule cernuous, more or less arcuate. | 2 | |
| Capsule erect, symmetric. | 14 | |
| 2—Upper leaf cells longer than broad, porose. | 3 | |
| " " " not porose, nearly as broad as | | |
| long. | 5. | |
| 3—Capsules clustered, leaves strongly transverse- | | |
| ly undulate, silky. | | <i>undulatum.</i> |
| Capsules solitary. | 4. | |
| 4—Leaves transversely undulate when moist, | | |
| slightly or not at all secund; costa without | | |
| lamellæ at back. | | <i>Bonjeani.</i> |
| Leaves not at all undulate, secund, with | | |
| strongly serrate lamellæ at back. | | <i>scoparium.</i> |
| 5—Leaves strongly papillose at back, little or not | | |
| at all secund. | | <i>spurium.</i> |
| Leaves not noticeably papillose. | 6. | |
| 6—Capsules clustered. | | <i>Drummondii.</i> |
| Capsules solitary (rarely two together in <i>Mühl-</i> | | |
| <i>enbeckii</i>). | 7 | |
| 7—Costa not reaching apex. | | <i>Bergeri.</i> |
| Costa percurrent or excurrent. | 8 | |

- 8—Lower leaf cells more or less porose; capsules not strumose (except slightly so in *D. pallidum*). 9
 - Leaf cells not at all porose; capsules strumose. 12
- 9—Leaves entire or very faintly denticulate. *elongatum*.
 - Leaves serrulate. 10
- 10—Leaves strongly falcate-secund; upper leaf cells regular. *fuscescens*.
 - Leaves little or not at all secund; upper leaf cells very irregular. 11
- 11—Costa at least $\frac{1}{10}$ width of leaf at the broadest point of the leaf. Plants 3-6 cm. high. *Mühlenbeckii*.
 - Costa $\frac{1}{10}$ width of leaf; plants 2-3 cm. high. *pallidum*.
- 12—Leaves falcate-secund. 13
 - Leaves spreading. *schisti*.
- 13—Leaves with distinct angular cells; capsule oblong-cylindric. *Starkei*.
 - Leaves with few angular cells; capsule short, obovate *falcatum*.
- 14—Costa ending in the serrulate apex; leaves curled when dry. 15
 - Costa excurrent; leaves scarcely altered by drying (except *D. fulvellum* and *D. fulvum*) 16
- 15—Apex of leaf papillose at back; upper leaf cells rectangular. *montanum*.
 - Apex of leaf not papillose; upper leaf cells less regular; plants commonly giving off numerous axillary erect flagellæ bearing minute ecostate leaves. *flagellare*.
- 16—Costa narrow, $\frac{1}{5}$ to $\frac{1}{4}$ width of leaf at base. 17
 - Costa broader, $\frac{1}{3}$ to $\frac{1}{2}$ width of leaf. 18
- 17—Dioicous; 3-4 cm. or more high. *Sauteri*.
 - Autoicous; 0.5-2 cm. high. *fulvellum*.
- 18—Margin and costa of leaves entire; apex usually broken. *viride*.
 - Margin and costa of leaves serrulate. 19
- 19—Costa equalling $\frac{1}{3}$ width of leaf at the base, or less; leaves gradually narrowed to apex; all upper surface leaf cells rectangular. *fulvum*.
 - Costa $\frac{1}{3}$ width of base of leaf, or more; leaves abruptly narrowed to a long slender point; all upper leaf cells greatly elongated-linear. *longifolium*.

Look on the summit of your highest accessible hill or mountain for the long-leaved Dicranum (*D. longifolium*). It grows on stone walls and exposed rocks. It is usually sterile, but is easily recognized and distinguished from the fulvous Dicranum

by the characters given in the key. *D. Drummondii* grows in much the same situations as the wavy *Dicranum*, and is frequently mingled with it. Its capsules are also clustered and the leaves slightly wavy. The waviness of the leaves is much less marked and the plants have not the same silky sheen. The upper leaf cells are much shorter, nearly as broad as long and afford a sure ground for distinction. *D. viride* is probably not very rare, but is almost always sterile. It can be distinguished by the broken-leaf apices and the other characters given in the key. *D. spurium* does not look like a *Dicranum* because of the equally spreading soft crisped-incurved leaves. Under the microscope its leaves are readily distinguished from those of any other species by the large and conspicuous papillæ which cover the upper part of the back of the leaf and are easily seen because the margins are incurved in this region. *Dicranella heteromalla* has the same general appearance as the *Dicranums*, and is very common. It is smaller than most of the *Dicranums*, and its leaves lack the inflated angular cells so characteristic of *Dicranum*. Other species of this and allied genera may be met with, but they can readily be distinguished from *Dicranum* by the characters mentioned in the last article.

GEOGRAPHICAL DISTRIBUTION OF DICRANA.

By RODNEY H. TRUE.

AT the suggestion of Dr. Grout, I have prepared the following brief statement of the distribution of twenty species of the genus *Dicranum* selected by him. I have used such local lists and similar helps as were at my disposal and wish it born in mind that I am not able to warrant the accuracy of the determinations on which they were founded. I hope, however, that, by reference to a large body of authentic herbarium material, I have been able to give a substantially correct idea of the distribution of these mosses. I should be willing, as far as my time permits, to determine doubtful forms for any who care to send specimens and letter postage for reply.

Dicranum Bergeri Bland. A moss characteristically found in marshy places, most frequently in sphagnum bogs; widely distributed.—N. J., New Eng., Can., Greenland, Wis., Minn., Rocky Mts., Alaska.

Dicranum Blytii Schimp. (*D. schisti*). A rare Arctic species.—White Mts., Labrador, Greenland, Selkirk Mts., Vancouver Id., Brit. Col.

Dicranum Bonjeani de Not. The species or its varieties found in both lowlands and in subalpine regions. The species in its typical form is most frequent in moist locations; widely distributed.—N. C., Penn., New Eng., Ontario, Greenland, O., Ill., Wis., Mont., Wash., Brit. Col., Alaska.

Dicranum Drummondii Muell. A moss of the woods; probably does not occur as far west as Rocky Mts.—N. Y., New Eng., Ontario, Minn.

Dicranum elongatum Schwaegr. A moss of alpine and subalpine range; rather rare.—White Mts., Me. (Mt. Katahdin), Newfoundland, Greenland, N. shores L. Superior, Alaska.

Dicranum falcatum Hedw. A rare alpine moss found in White Mts., Oreg. (Mt. Hood), and Wash. (Röell).

Dicranum flagellare Hedw. A very common species in woods; one of the most widely distributed species.—Va., N. J., Mass., New Brunswick, Ontario, O., Mich., Minn., S. D., Manitoba, N. W. Terr.

Dicranum fulvellum (Dicks.) Smith. A rare alpine species.—White Mts., Adirondacks (?), Oreg. (Mt. Hood), Greenland.

Dicranum fulvum Hook. A less widely distributed species characteristic in regions marked by outcrops of silicious rocks—N. C., Va., Penn., N. Eng., New Brunswick, Ontario, Wis.

Dicranum fuscescens Turn. Widely distributed in mountainous or high, hilly country, in woods.—Va., N. Y., N. Eng., New Brunswick, Newfoundland, Greenland, Ontario, L. Superior, Minn., Col., Wash., N. W. Terr., Alaska.

Dicranum longifolium Hedw. Characteristic of rocky, elevated regions.—Va., N. Y., N. Eng., Miquelon Id., Greenland, Mich., Minn., Mont., Col., Selkirk Mts., Rocky Mts., Brit. Col.

Dicranum montanum Hedw. On decaying wood in forests, less frequent in southern range of genus.—N. Y., N. Eng., New Brunswick, Quebec, Niagara Falls, Wis., Minn., Mont., Manitoba.

Dicranum Mühlenbeckii Bry. Eur. Usually in rocky, elevated regions; also in subalpine localities; more frequent westward.—Penn., Vt., Ontario, Hudson's Bay, Wis., Mont., Col., N. M., Wy., Wash., Brit. Col., Alaska.

Dicranum pallidum Bry. Eur. Characteristic in southern part of the range of genus, in low, sandy regions.—Fla., Ga., N. C., N. J., Wis.

Dicranum Sauteri Schimp. A subalpine species rare to America.—Adirondacks (Mrs. E. G. Britton).

Dicranum scoparium Hedw. One of the most widely distributed species.—N. C., Va., Md., Penn., N. Eng., New Brunswick, Newfoundland, Greenland, Ontario, Mich., Ind., Ill., Minn., Mont., Wy., Col., Cal., Wash., Alaska.

Dicranum spurium Hedw. Characteristic in barren localities eastward. A rather rare species.—Va., N. J., Vt., Nova Scotia, Quebec, Ontario.

Dicranum Starkei W. & M. A rare alpine moss.—White Mts., Idaho, Wash., Vancouver Id., Rocky Mts., Selkirk Mts., Smith's Sound.

Dicranum undulatum Ehrh. A moss of lowlands, widely distributed.—N. J., N. Eng., New Brunswick, Newfoundland, Labrador, Ontario, Mich., Ill., Minn., Vancouver Id., Brit. Col.

Dicranum viride (S. & L.) Lindb. Characteristic of forests and shady places; widely scattered east of eastern slope of Rocky Mts. Seems to be replaced by *D. strictum* (Schleich), in the West.—Va., N. Y., Vt., New Brunswick, Ontario, Newfoundland, O., Wis., Minn. Reported at Morley, in Rocky Mts., by J. Macoun.

Grimmia mollis B. & S. in the United States.

Last summer, while on a vacation outing in northwestern Montana, I collected some mosses around Lake McDonald, Flat-head county. Sperry Glacier, about ten miles east of the north end of that lake, was one of the objective points of our collecting trips. It was at the foot of this glacier that I found a curious soft *Grimmia*, which on investigation after my return home, proved to be *Grimmia mollis* B. & S. This is the first discovery of this truly glacial moss on the North American continent. In Europe it occurs, usually above 6,000 feet altitude, in the Pyrenees, the Alps, the mountains of Bohemia, and of the Scandinavian Peninsular, always near glaciers, or streams fed by glaciers or snowfields. It has also been found in Greenland. This distribution makes its almost certain that *Grimmia mollis* also occurs in the Canadian Rockies. But whether it has come to our regions by way of Greenland around the north, or south of Hudson's Bay, or by way of the Alaskan mountains, across Behring's Strait, from the direction of Siberia, needs to be determined by finding intermediate stations.—*John M. Holzinger.*

Mosses For Distribution.

Mosses offered the Chapter are: By Mrs. E. G. Britton, 103d St. and Amsterdam Ave., New York City, *Dicranum viride* for a self-addressed stamped envelope; by A. J. Grout, *D. Drummondii*, *D. spurium*, *D. longifolium* and *Dicranella heteromalla*, for ten cents to members.

A Correction.

In the second line of the second paragraph on page 41 of the 1898 FERN BULLETIN, for "asexual" read "sexual." We hereby acknowledge our obligation to the subscriber who called our attention to this slip of the types.

THE SULLIVANT MOSS CHAPTER OF THE AGASSIZ ASSOCIATION.

—The Sullivant Moss Chapter starts out with a charter membership of over thirty, a very promising beginning indeed.

—A list of members and a draft of the constitution will have reached each member before this issue of the BRYOLOGIST.

—The committee announced in our last issue have appointed the following officers for 1899: President, A. J. Grout; vice-president, J. Franklin Collins, of Providence, R. I.; secretary and treasurer, Mrs. Annie Morrill Smith, 78 Orange St., Brooklyn, N. Y. It was deemed best to appoint officers for the first year until a constitution should be adopted and the organization perfected. All communications with reference to membership, dues, etc., should be addressed to Mrs. Smith.

—The president proposes that for their Chapter work the members try to obtain new facts concerning the distribution of the Dicranums by collecting and studying all the species to be found in their localities. To assist in this we publish an entirely new key, and Dr. True has very kindly given us the known ranges. The extension of the known range of any species should be noted and note and specimen forwarded to the secretary. In case any of the species Dr. True has noted as rare should be collected, it should also be forwarded with full notes.

—On account of the snow we may not be able to accomplish much except to become familiar with our specimens already collected. It is hoped that enough notes may be received by the first of March to enable the secretary to give a very creditable account of work accomplished, and that before the year is over we may make a valuable addition to the knowledge of the distribution of this and other genera.

—The president is strongly of the opinion that the concentrated study of a single genus is much the best way, for the beginner at least, to study the mosses. One learns to recognize species and to distinguish closely related species to a degree that is otherwise impossible. The president himself while studying Dicranums for the BRYOLOGIST found right at home three species that he had never collected before.

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VOL. II.

APRIL, 1899.

NO. 2.

ALL correspondence intended for the editor should be addressed to 175 Halsey Street, Brooklyn, N. Y., until July 1st, '99.

* * *

THE editor takes pleasure in announcing that the promised illustrated glossary of bryological terms will be begun in the July number of the BRYOLOGIST. Mr. H. N. Dixon and his publisher have very kindly permitted us the use of the drawings in the first five plates of Dixon and Jameson's Handbook of the British Mosses. The editor considers this book to be the best moss manual in the English language, and as it includes a majority of our mosses of Northeastern America it is almost indispensable to the student who wishes to know our mosses well.

PREPARATION OF MOSSES FOR EXAMINATION WITH THE COMPOUND MICROSCOPE.

MOST of us who have studied mosses for some time have come to use by imitation or discovery, some methods of manipulation which may be useful to others. The editor would be glad to have others send notes on this subject in addition to what he presents here.

If the moss be fresh and moist it is all ready for operations. Dried specimens should be softened by boiling. The parts to be studied can be boiled in water on a slide by holding it over a lamp, but it is much better to boil the whole plant. An alcohol lamp and tin cup can be used, or if convenient, boiling water can be poured into a cup and the plant placed in this. This also will serve to drive out the air bubbles that will cling if cold water be used.

One should have the following implements if possible: A pair of fine pointed forceps with comparatively large surface of contact at the points, a pair of small, fine-pointed, sharp scissors, dissecting needles, and a sharp scalpel or razor and a stick of pith.

The leaves should be removed with the forceps by seizing them near their bases and stripping downward; these are then put in a drop of water on a slide and covered with a cover glass; in this drop of water should be placed also a portion of the branch from which the leaves have been stripped. An examination of this last will show whether the bases of the leaves are decurrent or not and will give a profile view of the leaves that will tell whether there are any teeth or papillæ on their backs. With the hair-caps and their allies and some other mosses, a cross-section of the leaves is often necessary to definitely determine the species. This often seems very difficult to a beginner but is really quite simple unless very beautiful sections are desired. The most common method is to split a stick of pith a little distance and insert a bunch of leaves in the cleft, pressing the sides together with the thumb and finger of the left hand. Then cut thin sections of pith and leaves with a very sharp razor or scalpel. The pith should be thoroughly moistened and there should be water on the upper surface of the razor to float away the sections cut. After a number of sections have been made, all the masses of pith and leaf sections should be removed to a drop of water on a slide and the pith and large pieces of leaves should be removed. Pith can be obtained from young elder shoots or the stems of the flowering raspberry, or if nothing better is at hand the pith of a cornstalk can be used. Mrs. Britton thinks that this method is "more bother than it is worth for all simple leaf sections*" but recommends it for other sections. She places a number of the leaves side by side in the same direction so that they may be easily held firm with the thumb nail of the left hand—"begin cutting at the tips of the leaves" (using a razor or sharp knife) "moving the nail from side to side and working downward to the lower half of the leaf." I have often used another method with success. Grasp a bunch of leaves between the thumb and forefinger of the left hand and with the scissors (which must be sharp) cut section after section from the bunch as thin as possible and among the mass of sections will be found some that will show the desired structures. If the leaves are very small a whole stem or branch covered with leaves can be sectioned without first removing the leaves.

**Observer* for May, 1894.

To study the peristome and annulus, etc.; if the operculum still remains, remove it with forceps or dissecting needle, carefully saving it on the slide; cut the capsule lengthwise with the scissors and spread out each half on the slide, one outside up and the other the inside up; or the capsule can be first split and the pieces of operculum removed afterwards. This prevents any loss of minute parts. If the spores obscure the parts, a minute's boiling over the lamp will scatter them. The walls of the capsule will often curl up so strongly as to make it necessary to split them with the dissecting needles to cause them to lie flat.

WHAT ARE MOSSES?

BY A. J. GROUT AND MARIE L. SANIAL.

THERE are at least three different classes of plants which popularly pass under the name of mosses: true mosses, Hepaticæ or liverworts, and lichens. The lichens are gray, yellow, brown and various other colors and shades, but are seldom of true plant green; then, too, they have no true stem and leaves, but may consist of ascending or even pendant (in the case of tree lichens, "hair moss") stem-like divisions or of a flattened thalloid expansion either membranaceous or coriaceous in structure.

There are two species of lichens to which the name *moss* has been popularly and erroneously applied. The first the hair "moss" (*Usnea*), consists of strong, greenish-gray filaments and resembles a small mane or wig. It clothes the branches of trees and undershrubs in dark woods and is well known to every hunter of squirrels, from its amazing similarity to the tail of a hiding gray squirrel.

The second is the reindeer "moss" (*Cladonia rangiferina*), the great boon of the Laplander. It simulates a grayish crust-like mass of much-branched, rootless and leafless hollow shrubs in miniature, their height being seldom more than two inches.

The liverworts are more likely to be mistaken for mosses, as they belong to the same branch or subdivision (*Bryophyta*) of the vegetable kingdom, and are very closely related. The foliose hepatics have a stem and leaves, and when sterile some forms may be mistaken for true mosses, even by one who has a considerable knowledge of the plants, especially the alpine *Gymnomitrium*, which has closely appressed but emarginate leaves and julaceous, erect branches.

In general the leafy hepatics can be distinguished from the mosses by the flattened appearance of the plant, due to a marked differentiation of the upper (dorsal) and the lower (ventral) surface. The leaves also are apparently arranged in two rows overlapping like shingles (imbricated). An exception to this is *Gymnomitrium* before mentioned. The leaves of hepatics consist of a single layer of almost regularly hexagonal cells, without even the rudiment of a mid-rib (except in one or two rare forms), and they are often bifid or multifid.

If in fruit, the leafy hepatics can easily be recognized by the dark, globular, four-valved capsule borne on a slender, delicate, white fruitstalk and having spiral elaters mixed with the spores.

The true mosses, on the other hand, possess stem and leaves arranged in ranks and while often flattened have a much less marked dorso-ventral differentiation. The leaves are never bifid or multifid and the leaf-cells are usually much elongated, seldom regularly hexagonal and in three-fourths of the species possess well-defined mid-rib.

No moss except the rare *Andreaea* has a capsule splitting into four valves but nearly all moss capsules open by a lid (*operculum*), and most have a characteristic fringe of teeth (*peristome*) about the mouth. No true moss has spiral elaters mixed with its spores. In color, mosses, excepting the peat mosses, are nearly all of some shade of green ranging from almost black to a light yellow green.

Any good text-book of botany will give these distinctions with more detail and usually with helpful illustrations.

THE CORD MOSS AND ITS ALLIES.

THERE are several common and interesting allies of the *Dicranums* that would make profitable study, but for variety's sake we will turn our attention to a moss with a double peristome and other characters not before treated of in THE BRYOLOGIST.

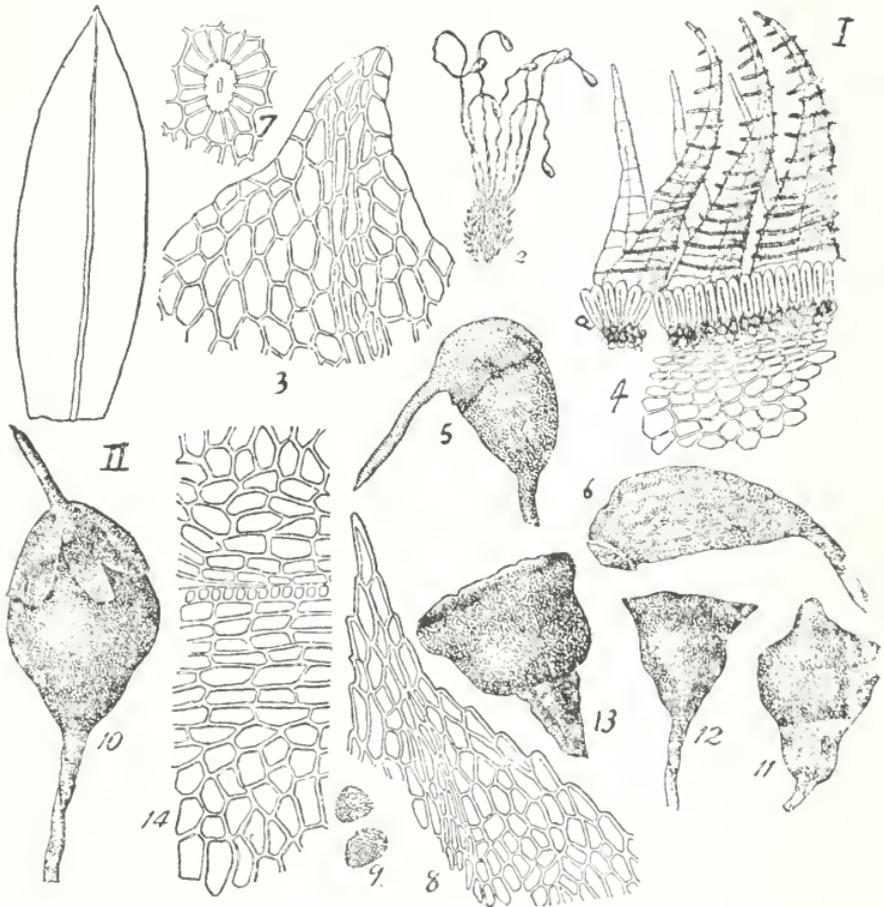
The cord moss (*Funaria hygrometrica*) is so called because of the twisted seta which is very hygroscopic and untwists when moist. Its Latin name, *Funaria*, is derived from *funis*, a rope. This twisting of the seta is not peculiar to this group, however, but is common in many other groups. The cord moss is to be found everywhere, being especially abundant in waste places and on soil recently burned over. I have seen it completely cover the

soil in an old strawberry bed. When mature it is easily recognized by the peculiar looking curved capsule, with its mouth on one side (Figs. 5 and 6). When immature it is much harder to recognize because the capsule is erect and nearly symmetric and the calyptra has not assumed the rakish position indicated in figure 5.

This moss has perhaps been given a more careful study than any other species, and it is the one described in nearly all our textbooks. There are several other species in the United States, but only this one is likely to be met with by our readers. So characteristic is the appearance of the mature plant that we will give no detailed description, but will refer briefly to the characters not before explained. When the lid is removed there will be seen at the base of the peristome around the outer rim of the urn, two or three rows of peculiar vesicular (bladder-like), thin-walled cells, forming the annulus (Fig. 4a). If the operculum has already fallen, the annulus will be gone also. It is said to be deciduous. In some species it remains attached to the mouth of the urn and is said to be persistent. The annulus is very highly elastic, and when the capsule is fully ripe it helps throw off the operculum. The peristome consists of sixteen undivided, colored, articulate teeth, and inside of these another row of sixteen thin, light-colored teeth, known as the endostome, each tooth being called a segment or process. In *Funaria* the segments are entirely separate and are opposite the teeth. If the teeth be viewed in profile a sharp projection (appendage) will be seen extending inwards from each articulation. The articulations mark the boundary between the cells and the appendage, the thickened wall separating the two cells. These appendages are well shown in Fig. 4.

The spores ripen early in June, and there is not a member of the Chapter who cannot easily collect an abundance of fresh material for study.

The Urn Moss (*Physcomitrium turbinatum* (Mx.) Brid.)—*P. pyriforme* of Lesquereux and James' Manual) is undoubtedly very closely related to *Funaria*. The figures show us that the leaf structure of one species resembles the other, but to the beginner it will seem strange to classify a moss with no peristome at all as the near relative of one with a double peristome. Yet this arrangement is accepted by pretty nearly everybody who has studied the two carefully, and there are several other similar cases. For some unexplained reason the urn moss seems to have lost its peri-



(The figures below the line I represent *Funaria hygrometrica*; those below the line II, *Physcomitrium turbinatum*.)

I. 1, Outline of leaf; 2, deperculate plants; 3, apex of leaf, showing costa ending below apex; 4, a portion of the mouth of the capsule after the operculum has fallen, showing annulus and peristome; 7, stoma from base of capsule. II. 8, Apex of leaf, showing costa terminating below the leaf-apex; 9, spores; 10-13, capsules in various stages; 14, a section of the mouth of capsule and operculum, showing annulus and transversely elongated cells at the mouth of capsule.

[Taken from Mrs. Britton's *Observer* articles, by permission.]

stome. There are several species of *Physcomitrium* in the United States, but *P. turbinatum* is by far the most frequent and will be readily recognized from the figures. It is common in old fields,

open grassy places and the like. It is very small and will be easily overlooked. It, also, comes to maturity in June.

Mrs. Britton has given these two species a much fuller treatment in *The Observer*, and has written a monograph of the species of *Physcomitrium* which appears in the *Bulletin of the Torrey Botanical Club* for May, 1894.

The beginner may perhaps confuse species of *Pottia* with the urn mosses, especially *P. truncatula*. In this last species, however, the costa is excurrent, passing out of the apex of the leaf into a short point. The costa is percurrent or excurrent in nearly all of our species of *Pottia*, and in most the leaf cells are papillose. The *Pottias*, moreover, mature their capsules in winter.

MOSESSES FOR DISTRIBUTION.

THE Splachnaceæ are of our queerest and most interesting mosses. They are usually found growing on decaying animal matter or nitrogen-containing animal excreta. They are furthermore remarkable for the extreme development of the apophysis which never occupies less than half of the capsule and in some species of *Splachnum* is so greatly enlarged as to become umbrella-shaped, reminding the writer of the hood of a cobra. There are a large number of stomata in the outer wall of the apophysis and a large amount of assimilative tissue within, which goes to show that this grotesque outgrowth is another of Nature's devices to provide nourishment for her lowly children.

For a stamped self-addressed envelope, the following mosses will be sent to members of the Moss Chapter only: Mrs. Britton will send *Tetraplodon bryoides*, an alpine member of this group; Mr. A. A. Eaton will send *Splachnum ampullaceum*; Mr. J. Warren Huntington will send *Buxbaumia aphylla*, which was mentioned in a previous article; Mrs. Emilia C. Anthony will send "the white moss" (*Leucobryum glaucum*), which grows in conspicuous whitish cushions in woods throughout our range. This moss is a near relative of the *Dicranums* as its peristome will show and it is also remarkable in having its leaves of more than one layer of cells. It is thought by many botanists that these leaves represent the greatly expanded costa, from which the lamina has entirely disappeared. This will not seem improbable to those who have studied the leaves of the long-leaved *Dicranum*.

The Cambridge Botanical Supply Co., of Cambridge, Mass., will send *Brachythecium asperrimum*, Mitt.

For five cents in stamps A. J. Grout will send *Funaria hygrometrica* and *Physcomitrium turbinatum*.

The above specimens are all fertile. Hereafter when sterile specimens are offered, *st.* will be placed after their names. For addresses, see list of members.

THE SULLIVANT MOSS CHAPTER OF THE AGASSIZ ASSOCIATION

—Our apologies are due to Vice-president Collins for the omission of his name from the list of charter members.

—Only eleven votes were cast in the vote for the constitution, but as they were all affirmative and constitute a quorum the constitution is adopted.

—The president hopes that no one will think him to be the person referred to in the July BRYOLOGIST, as "just the man for the place." The person thus referred to positively declined the honor.

—Fifty members, and more are joining every day. Copies of the constitution will be mailed to any one interested in moss study, upon application to the secretary.

—Vice-president Collins sends the following note on mica for slides: "A good grade of mica for microscopic slides can be obtained of Eugene Munsell & Co., 218 Water street, New York City. It comes in square pieces, 2x2, and is readily cut into two slides and two covers, with an old pair of shears. It generally comes much too thick, but is readily split to the desired thickness. I obtained a pound of it in March, 1898, and have been using it pretty constantly since, and have two-thirds of it unused now. The price quoted me in March was 51 cents per pound net, less 2 per cent. for cash in ten days, delivered."

—Our secretary sends the following method of preparing mica slides for use, after separating the mica and trimming the pieces into the desired sizes: 1st. Place the whole in a dish and cover with alcohol and let stand for twenty-four hours. The alcohol need not be of high grade. Wood alcohol such as is used for burning in lamps is good enough. 2d. Pour the alcohol off, keeping it for such use or for burning, cover the mica with water in which pour a few drops of hydrochloric acid. Let this stand for several hours, taking care to separate the thin slides in such manner that all may be acted upon by the acid bath. 3d. Pour this off and repeatedly wash in *warm* water, by pouring the water on and stirring to insure perfect cleaning. 4th. Dry by spreading the mica on towels and when dry polish with lens paper. Finally place in a covered box to keep free from dust.

THE BRYOLOGIST

A DEPARTMENT OF THE FERN BULLETIN,

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ISSUED QUARTERLY.

EDITED BY DR. A. J. GROUT, PLYMOUTH, N. H.

To whom all correspondence regarding the mosses should be addressed.

This department is issued separately at twenty-five cents a year. Subscriptions should be addressed to the Fern Bulletin, Binghamton, N. Y.

VOL. II.

JULY, 1899.

No. 3.

A BRYOLOGICAL MEMORIAL MEETING AT COLUMBUS, OHIO.

COLUMBUS was the home for many years of William S. Sulivant and Leo Lesquereux, two names which will always awaken love and reverence from all students of North American mosses and hepatics. It is twenty-six years since Sulivant died, and this last quarter of the century has seen a marked extension of the limits of bryological study and a large increase in the number of students. It seems a fitting time and place to take a survey of the field, review the past and make plans for the future, hence it is proposed to make the coming meeting of the American Association for the Advancement of Science, which is to be held at Columbus, the occasion for a Memorial Day in honor of the Nestors of American bryology and to call on all botanists and botanical magazines to help make the occasion a memorable success. It is proposed to present a series of papers illustrated by photographs, specimens and microscopical slides, as well as books and pamphlets, under the following topics: Historical papers and collections showing the bryological work of Hedwig, Palisot de Beauvois, Michaux, Muhlenberg, Bridel, Torrey, Drummond Hooker and Wilson, Greville, Sulivant and Lesquereux, James and Watson, Austin, Ravenel, Wolle, Eaton and Faxon, Müller and Gottsche.

Supplementing these there will be shown collections of specimens, macroscopic and microscopic, illustrating the monographic work of living American students. If foreign students who have worked on North American Bryophytes can be persuaded to cooperate with us, the following will be asked to contribute: Bes-

from the Woodsy Mnium by the very long slender teeth on the margins of the leaf. These teeth are two or three cells in length and extend to the *base* of the leaf. So marked is the length and distribution of these teeth that a hand lens alone suffices to distinguish the species when once one knows them. The cells of the leaves are also much larger than in the Woodsy Mnium.

The "beaked Mnium" (*M. rostratum* Schrad.) closely resembles the above species and is quite frequent, but the leaves are obtuse and mucronate instead of acuminate, and the operculum, if present, clearly marks the species by its long beak. Often growing with these species, but larger, without stolons and with two or three capsules in a cluster, is "Drummond's Mnium" (*M. Drummondii* Br. & Sch.). Another species sure to be met with in wet and swampy places is *Mnium punctatum*. Its leaves are so large that it could be easily mistaken for a flowering plant. It matures its capsules sparingly and earliest of all our species, in early or late April according to the locality and season. The operculum is long-beaked, the leaves are obovate, bordered and entire, and very broad and obtuse at the apex, slightly emarginate, with usually a slight apiculus and the costa nearly or quite reaching the apex. A form in which the costa ceases some distance below the apex is variety *elatum*. The cells of the leaves are so large as to be readily seen with a hand lens. Species of *Byrum* are likely to be mistaken for *Mnium*, but in *Mnium* the cells are little, if any, longer than broad, while in *Bryum* they are usually much longer than broad. In our next issue we hope to give a key to all our eastern species with their distribution.—
A. J. G.

NOTEWORTHY AMERICAN MOSSES.

IN THE number of the *Minnesota Botanical Studies*, published in May, 1897, Mr. J. M. Holzinger has some very valuable notes on "The Genus *Coscinodon*." He gives the following distinctions for separating the troublesome species *C. Wrightii* and *C. Rauli*.

C. Wrightii is silvery-green from the presence of the much lengthened hair-points on the upper leaves, which stand erect. It grows in small, dense cushions of a lighter color than *C. Rauli*. The hair points while diminishing in length toward the base of the stem, are still distinctly present and in the middle of young

stems the hair-points are as long as the leaves. Leaves *erect-approximated*, the blades distinctly spoon-shaped all along the stem. In section the leaves are uniformly and evenly concave, the costa projecting evenly above and below the lamina except at apex where it projects on the under side alone; costa with a single row of large cells across the *upper surface*, continuous with the leaf cells.

C. Rauli is less silvery, there being fewer long hairs and is usually in looser, more extended patches; coarser and more branching; the hair-points discontinue below the upper third of the stem in young plants; stem leaves *obliquely ascending*, spreading with a distinct keel on the under side. In section the costa is *deeply furrowed* above.

It is stated that *C. Renaaldi* Cardot is not sufficiently distinct from *C. Rauli* on the authority of Cardot himself.

Mr. Holzinger also publishes *C. Wrightii*, var. *brevis*, Holzinger. "Monœcious; simple or branching, one of the branches usually terminating in the antheridial, the other in the archeogonial bud; leaves crowded toward the top of the stem into a terminal bud, rapidly reduced to scales so that the stem below the middle is nearly naked; leaves not distinctly spoon-shaped." Winona, Minn., *Holzinger*.

In the issue of the same publication for June 15, 1898, M. Jules Cardot publishes *Fontinalis Holzingeri*. "Of the group Heterophyllæ related to *F. Missouriica* Card., but with leaves more rigid, cells longer, not or scarcely flexuose, strongly chlorophyllose, marginal firm." Northeastern Minn., *Holzinger*.

In the same paper Mr. Holzinger shows conclusively that *Homalia Jamesii*, Schimp, is at most only a variety of *H. trichomanoides* (Schreb.) Br. & Sch., the only difference being in the more obtuse leaves of the American form, which character even is quite variable.

H. Macounii Kindb., is also given as a synonym of the variety *Jamesii*.

MOSSES FOR DISTRIBUTION TO THE CHAPTER.

By A. J. Grout. *Mnium sylvaticum*, *M. cuspidatum*, *M. punctatum* st., and *M. rostratum* st. for 10 cents. By Miss Cora H. Clarke, 91 Mt. Vernon street, Boston, Mass., any or all of the allowing species for a self-addressed stamped envelope: *Pottia truncatula*, *Gerorgia pellucida*, *Pogonatum tenue*, *Anomodon rostratus*.

AN ILLUSTRATED GLOSSARY OF BRYOLOGICAL TERMS.

By A. J. GROUT, Ph. D.

THIS is not intended to be an exhaustive glossary of botanical terms, but a glossary of those terms which are either confined to bryological works or are used in a somewhat different meaning when applied to mosses. Thus the common terms descriptive of leaves are omitted, except acumen and a few others that are used in a peculiar or unusual way by some authors. Very few terms are here defined that are sufficiently well defined in the common phanerogamic botanies like Gray, Wood, or Britton and Brown.

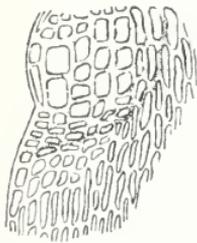
Braithwaite's British Moss Flora, Lesquereux and James' Manual, and Dixon and Jameson's Handbook of British Mosses have been largely consulted and an attempt has been made to determine the meaning of each term according to the usage of all the authors accessible.

For most of the cuts we are indebted to the kindness of Mr. H. N. Dixon, Mr. Jameson, and their publishers, who have very kindly allowed us the use of the cuts in their Handbook of British Mosses, a work which should be in the hands of every moss student whether English or American. Terms whose meaning can be made sufficiently clear by definition are not illustrated as a rule. In order to use the same figure to illustrate two or more definitions without having definition and figure too far apart, the glossary will be arranged alphabetically under topics, such as leaves, capsules, etc. The first section will consist of those terms which apply to leaves.

TERMS USED IN DESCRIBING LEAVES.

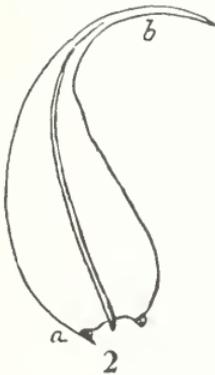
Acumen, the gradually tapering narrow point of an acuminate leaf. (Fig. 2, *b*.)

Acuminate, a term usually applied to leaves that gradually taper to a narrow point. A few recent writers use term as applying only to those leaves that are not uniformly narrowed and limit the term acumen to that part of the apex beyond the point where the narrowing begins to be less abrupt. According to these authors a leaf uniformly narrowed would not be acuminate, no matter how slender the apex. The author has followed this usage to some extent in previous writings, but general usage does not seem to sanction this restriction of the term.



1

Areolation, the net-work formed by the outlines of the cells of a leaf.



2

Auricles, small lobes at the basal angles of the leaf, usually consisting of cells differing from those of the main part of the leaf in size or shape or both. (Fig. 1 and Fig. 2, *a.*) Properly used only when there is an outward curve in the outline of the leaf at the base, as in the figures, but often used loosely to denote the basal angles of widely decurrent leaves.

Basal or basilar cells, cells at the base or insertion of the leaf, often of different shape and color from those of the main part of the leaf. *Bicostate*, having a double costa, which is usually much shorter than in leaves having a single costa.



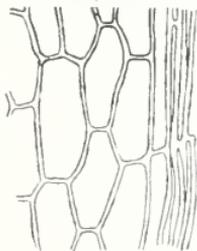
3

Bifarious, growing in two ranks.

Bracts, a term applied to the leaves surrounding the reproductive organs. Those surrounding the antheridia are called perigonal bracts or leaves, and those surrounding the archegonia and base of seta are called perichæatial.

Bistratose, of two layers of cells. (Fig. 3.)

Canaliculate, channelled. Applied to leaves with margins incurved, so as to give them a channel-like form, *e. g.* the upper part of the leaves of *Dicranum fuscescens*. A more complete inrolling until the margins meet would make the leaf tubulose.



4

Bordered, having a margin different from the rest of the leaf. In *Mnium* and *Bryum* the border consists of a few rows of greatly elongated cells, often in two or more layers. In *Fissidens* the border is of a different color, but with little difference in cell structure. (Fig. 4.)

(To be continued.)

NEW AMERICAN MOSSES.

From Memoirs of the Torrey Botanical Club, 6: No. 2.

BRACHYTHECIUM POPULEUM OVATUM n. var. Often having the appearance of var. *rufescens*, but with the stem leaves broadly cordate-ovate, 1.4 by 0.8 mm., concave, margins reflexed below; rather abruptly narrowed to a much shorter subulate acumination; costa very stout, often ending below apex; branch leaves ovate-lanceolate, medium cells 5: 1. On dry rocks in woods with *Grimmia apocarpa*. Johnson and Peacham, Vt.; Indian Falls, Owen Sound; New Harbor, Newfoundland, Jan. 30, 1881.

BRACHYTHECIUM LEIBERGII. Branch leaves falcate-secund, decurrent, 1.2-0.4 mm., lanceolate, gradually very slenderly acuminate, serrate, costate to beyond the middle; median cells fusiform, 8-10: 1; basal shorter and broader; quadrate alar cells numerous; stem-leaves ovate to ovate-lanceolate, more strongly plicate; monoicous. Seta red-brown, roughened with rather low blunt papillæ; capsule light brown, 1.5 mm., long, 1.5-2: 1, short-ovoid, unsymmetric, horizontal; operculum short conic; annulus present; cilia two or three, appendiculate. Type locality, summit of "Bareknob," Traill River Basin, Idaho, alt. 5,500 feet. (J. B. Leiberg, 288. July, 1891.) The gametophyte closely resembles *B. erythrorrhizon*, from which it differs in the rough seta and in being monoicous. Easily distinguished from *B. velutinum* by the larger stem leaves.

DICRANUM LONGIFOLIUM SUBALPINUM Milde. "Densely tufted and reminding one strongly of *Campylopus Schwartzii*, blackish green, leaves erect-spreading, stiff, shorter than in the species, mostly broken off, much less strongly dentate." *Limpicht, Laubmoose*. On exposed rocks of "the Nose" Mt. Mansfield summit. July '96, A. J. Grout. Determined by Prof. R. H. True, who remarks that it is sparingly collected in Europe.

From a revision of the North American Eurhynchia, by A. J. Grout. Bull. Torr. Bot. Club, 25: 221-256. 1898.

EURHYNCHIUM STRIGOSUM ROBUSTUM Roell, Hedwigia, 36: 52. 1897. *Eurhynchium strigosum* (in part) of American authors. Gametophyte with the habit *Brachythecium plumosum*, branches 6-12 mm. long, ascending or erect, often fasciculately divided, terete-foliate, more blunt than in *E. strigosum*; leaves from the middle of the branches erect-spreading, ovate-lanceolate, very slightly or not at all decurrent, 1-1.3 x 0.4-0.5 mm., usually acute; quadrate and oval alar cells confined to the extreme angles; stem leaves 1.2-1.5 x 0.4-0.6 mm., longer acuminate, acumination often subfiliform. Sporophyte rather larger than in the typical form. Type locality, vicinity of Chicago, Ill.; Eastern Canada and in the United States from Louisiana to Minnesota and eastward. More abundant northward. The common eastern form.

—Mr. B. D. Gilbert has a specimen of *Dicranum spurium*, collected by E. C. Howe, at New Baltimore, N. Y.

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To whom all correspondence regarding the mosses should be addressed.

This department is issued separately at twenty-five cents a year, by the Fern Bulletin Co., Binghamton, N. Y. Subscriptions should be mailed to this address.

VOL. II.

OCTOBER, 1899.

No. 4.

KEY TO THE MNIUMS OF NORTHEASTERN NORTH AMERICA.

1. Leaves not bordered 2.
Leaves bordered 3.
2. Plants large, leaves entire or very slightly serrate by projecting cells; leaf cells twice as long as broad *M. cinclidioides*.
Plants much smaller, leaves usually serrate; leaf cells isodiametric (*i. e.*, as broad as long) *M. stellare*.
3. Leaves entire 4.
Leaves serrate, with single teeth 7.
Leaves serrate, with teeth in pairs 11.
4. Leaves costate to apex *M. punctatum*.
Costa vanishing below apex 5.
5. Upper leaf cells isodiametric *M. hymenophylloides*.
Upper leaf cells longer than broad 6.
6. Margin of leaves thickened, of 2-4 layers; dioicous; capsule oval. *M. punctatum*, var. *elatum*.
Margin of leaves not thickened; synoicous; capsule roundish. *M. pseudopunctatum*.
7. Basilar branches stoloniform; capsules single or clustered. 8.
Basilar branches erect or stems simple; capsules clustered. *M. Drummondii*.
8. Leaves rounded at apex, mucronate; operculum rostrate. *M. rostratum*.
Leaves acuminate; operculum mamillate or apiculate 9.
9. Leaves serrate to base, teeth usually more than one cell in length 10.
Leaves serrate to middle, teeth consisting of a single cell. *M. sylvaticum*.
10. Dioicous; operculum mamillate *M. cuspidatum*.
Synoicous; operculum apiculate *M. medium*.

- | | |
|--|--------------------------------|
| 11. Costa vanishing below apex | <i>M. hornum.</i> |
| Costa reaching apex | 12. |
| 12. Costa toothed on the back; dioicous | 13. |
| Costa not toothed on the back; synoicous | 14. |
| 13. Costa excurrent in upper leaves; leaf cells 0.18-0.030 mm. | |
| | <i>M. pseudolycopodioides.</i> |
| Costa percurrent; leaf cells about 0.015 mm. | |
| | <i>M. orthorrhynchum.</i> |
| 14. Capsules clustered | <i>M. spinulosum.</i> |
| Capsules solitary | <i>M. marginatum.</i> |

It is to be regretted that the question of plant names should arise to bother beginners, but many of those in Lesquereux and James' Manual are untenable. We have chosen to use the nomenclature of Braithwaite's "British Moss Flora," which is also followed in the editor's "Vermont Mosses." Mrs. Smith very kindly contributes a table of synonyms.

In using the key it will be well to remember that *M. cuspidatum*, var. *rugicum* often has entire leaves. The American *M. lycopodioides* of L. & J. is doubtfully the same as the European plant of the same name, and hence was called *M. pseudolycopodioides* C. M. & Kindb. Mrs. Britton informs us that the plant we described in the July issue as *M. punctatum* is really the variety *elatum*. The variety grows on the ground in bogs, while the species grows on wet stones and is much smaller.

The writer has found *M. stellare* and *M. cinclidioides* abundant in Plymouth, N. H.; both sterile except a very few capsules of *M. stellare*. *M. stellare* grows on humus at the base of trees in swampy woods. *M. cinclidioides* in the swampy places near by; it resembles *M. punctatum*, var. *elatum* in appearance, but is easily distinguished by the non-margined leaves.

Mrs. E. G. Britton very kindly furnished us with a list of the Mniums of this region, and has promised an article on their habits and distribution for the January issue.—A. J. G.

SYNONYMS.

In the list of species of Mnium found in eastern United States the first name given is the one used by Dr. Grout in his keys. *B.* stands for Braithwaite, "British Moss Flora;" *L. & J.* for Lesquereux & James, "Manual of Mosses of N. A.;" *D. & J.* for Dixon & Jameson, "Student's Handbook British Mosses," and *H.* for Husnot, "Muscologia Galliaë." In cases where any of these authorities are omitted, it means that the moss is not treated by those authors:

1. *M. ciliare* (Grev.) Lindb.=*M. affine*, var. *ciliare* (Grev.) C. M. See Limpricht "Laubmoose," p. 479.
2. *M. cinclidioides* (Blytt) Hübn. of B.=*M. cinclidioides* Hübn. of L. & J. and D. & J. and *M. cinclidioides* Blytt. of H.
3. *M. cuspidatum* (L.) Neck. of B.=*M. affine* Bland. of L. & J. and D. & J. and *M. affine* Schw. of H. Its varieties are *M. affine*, var. *elatum* B. & S. of authors cited. *M. affine*, var. *rugicum* B. & S. of L. & J. and D. & J.=*M. affine*, var. *rugicum* Laur. of B.
4. *M. Drummondii* B. & S. of L. & J.
5. *M. hornum* L. Same by four authors cited.
6. *M. hymenophylloides* Hübn. of L. & J. and H.
7. *M. marginatum* (Dicks.) P. Beauv. of B. & H.=*M. serratum* Laich. of L. & J.=*M. serratum* Schrad. of D. & J.
8. *M. medium* B. & S. of L. & J.=B. note Vol. II., p. 243=*M. affine* Schw., var. *medium* of H.
9. *M. orthorrhynchum* B. & S.=Same by all authors cited.
10. *M. punctatum* Hedw. of L. & J. and H.=*M. punctatum* L. of B. and D. & J.=*M. punctatum* Hedw. var. *elatum* B. & S. of L. & J. and H.=*M. punctatum* L. var. *elatum* Schimp. of B. and D. and J.
11. *M. pseudopunctatum* B. & S. of B.=*M. subglobosum* B. & S. of L. & J., D. & J., and H.
12. *M. pseudolycopodioides* C. M. & Kindb.=*M. lycopodioides* (Brid.) Schwagr. of L. & J. See note under key.
13. *M. silvaticum* Lindb. of B.=*M. cuspidatum* Hedw. of L. & J. and H.
14. *M. spinulosum* B. & S. of L. & J. and H. See note, D. & J., p. 348.
15. *M. stellare* Reich. of all authors cited.
16. *M. rostratum* Schrad. of B. and D. & J.=*M. rostratum* Schwagr. of L. & J. and H.—*A. M. S.*

SOME ADDITIONAL NOTES ON THE METHODS OF MICROSCOPIC EXAMINATION OF MOSSES.

BY JOHN M. HOLZINGER.

THE electric current runs along the line of least resistance. So, in our working methods on mosses, we strive to find a plan that shall lead to results exact and satisfactory by a way most direct and least expensive of time and tools. I have read with interest the article on this subject in the April BRYOLOGIST; and since my own method of work is in part different from those described, I gladly furnish it to our younger moss students,

hoping that some of them may try it and find it as satisfactory as the writer.

In the first place, I invariably prepare my dry material for examination by simply soaking it in a tumbler of cold water for a sufficient length of time. The usual time required for examining one moss is almost always sufficient to soak up the next victim. The only time when a moment's boiling over a flame becomes necessary is when spores interfere with the study of the peristome, after the dissection of a recently ripe and still operculate capsule.

In the second place, I work almost entirely with mounted needle and small convex edged scalpel *under* the arm-supported lens of a dissecting microscope, whether it be in removing leaves from stems, for examination entire, or in making sections of leaves or of stems, or of capsules, or in searching for gametophytes and sporophytes. I remove only the largest leaves, as of *Polytrichum*, of some *Mniums*, etc., with simply scalpel and tweezers. I suppose everyone can work best by that method to which he has become accustomed, and in which he has become practiced, from the beginning, whether it involves the use of pith, or simply of the thumb nail and razor. But I believe the method I have suggested is, on the whole, the simplest, most certain and most satisfactory, because most expeditious. May I tax the patience of my readers with one illustration?

Suppose I have soaked up some plants of an *Orthotrichum* which occurs around Winona on limestone boulders, for critical study. I carefully select a plant as perfect as possible, *i. e.*, with leaves unbroken, and fresh, with a fully ripe capsule, but not so old as to have a demoralized peristome, placing it on a glass slip in as much water as will adhere to it. This slip is put on the dissecting stage, under the lens, to be cursorily examined. If earth, sand or vegetable debris adhere to it, I endeavor with needle and scalpel to float this superfluous material away from the specimen. I may wash it thus, on the glass slip, through several waters. When perfectly clean, it is ready for detailed dissection. I decide to examine leaves, both entire and in cross-section, the capsule wall to determine whether it is cryptopore or phaneropore, and the peristome.

I remove several leaves from the base of my plant, carefully cutting off short pieces of stem from below up, and pressing off the lowest leaves with needle and scalpel. (In some cases I get good results readily by scraping the leafy stem downward, and

selecting those least broken up.) From a lot thus separated I select several for examination entire, removing them to another clean glass slip into a drop or two of clean water, or dilute glycerine, and covering them with a cover glass. They are now ready for the compound microscope, and may be temporarily laid aside till all the other slips are prepared.

The preparation of cross sections of the leaves is a somewhat more delicate task. I again select three or four of the best leaves, and transfer them to another slip into a little water. Under the dissecting lens I now endeavor to hold them with bent needle down into the water on the slip, bases toward me and to the left, apex away from me and toward right. This with the left hand. Then I cut with a chop-knife motion across the leaves, endeavoring to cut very thin, parallel slices. The scalpel of course must be kept very sharp, and I always keep a fine hone and razor strop on my work table. The difficulty of this operation, which is viewed through the lens, is fast diminished by practice. It arises from the surface tension of the water, which is somewhat violently disturbed by the touch of the scalpel, on the edge of which a meniscus leaps up to a microscopically considerable height, causing the small moss pieces to dance a lively jig for a moment, and throwing them into confusion. With this disturbance one soon learns to reckon in this process of working. The thinnest sections are soon selected, and are lifted with needle and scalpel on to another slip into a drop of water or glycerine, and covered with a circle.

The capsule I cut crosswise first, close to the peristome. If spores are too abundant, and are likely to interfere with the examination, I endeavor to press and work out the bulk of them, transferring the washed parts to another slip with a drop of water. Then I split each part again lengthwise; the base of the capsule thus split is carefully laid with outer surface turned *upward*; the peristome pieces are arranged so that one has the *outer*, the other the *inner* surface turned upward, for obvious reasons. The parts are then covered with a cover glass, and everything is ready for a detailed microscopic examination.

Finally, if it is found necessary to determine the presence of the gametophyte on the plant, as perfect a plant as possible is selected after soaking, and is carefully looked over with the dissecting lens for small buds of somewhat different construction than ordinary short stems. These buds are then split lengthwise in a drop of water, the parts floated out, and covered.

ILLUSTRATED GLOSSARY.—Continued.



5

Circinate, curved into a circle, resembling fig. 2, but still more incurved so that the apex is nearly or quite bent around to the leaf base; e. g. leaves of *Hypnum uncinatum*.

Cirrate or *cirrhate*, applied to leaves which curl up in drying. Cirrate leaves are more regularly curled than crispate leaves.

Cirrhose, having a wavy hair point.

Cochleariform, rounded and concave like a spoon or ladle.

Complicate, folded together.

Costa, the nerve or midrib of a moss leaf.

Costate, having a costa.

Crispate, or *crisped*, frizzled, curled and twisted in various ways. (Fig. 5.)

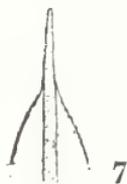


6

Cucullate, hood-shaped, the apex curved in like a slipper. (Apex of leaf in fig. 6.)

Cultriform, curved like a short, wide scimitar, e. g., the leaves of *Homalia trichomanoides Jamesii*.

Cymbiform, boat-shaped (used by Dixon as a synonym of cucullate): e. g. leaves of *Sphagnum cymbifolium*. (The whole leaf in fig. 6.)



7

Dorsal, belonging to or on the back; i. e., the face of a leaf remote from the stem.

Ecostate, lacking a costa.

Excurrent costa, a costa running out beyond the lamina of a leaf. (Fig. 7.)

Excavate (leaf-insertion), hollowed out in a curve.

Falcate, curved like a sickle. (Fig. 2.)

Flexuose, bent backwards and forwards or waved.

Hamate, or hamulose, curved like a hook; more sharply and abruptly curved than in *falcate* and *circinate*.

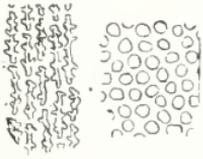
Heteromallous, leaves or branches turned in different directions.

Homomallous, all turned in the same direction.

Imbricated, closely over lapping each other like the tiles of a roof. (Fig. 8.)



8



9

Incrassate, of the cell walls, thickened; of the cells, having thickened walls. (Fig. 9.)

Inflated, applied to the alar cells of leaves when enlarged much beyond the size of the neighboring cells. (Fig. 10.)

Lamellæ, thin sheets or plates of tissue; e. g. the plates arising from the costa of the



10

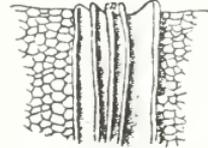


Lamellate, having lamellæ.

Lamina, the blade or expanded part of the leaf as distinct from the costa.

Limb, the upper part of a leaf as distinct from the leaf base.

Limbate leaf, a leaf bordered by a part of another color; e. g. many species of



11

Fissidens.

Margined, see bordered.

Median leaf cells, those from the middle of the leaf.

Nerve, see costa.

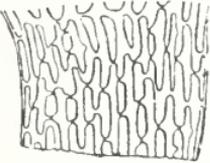
Papilla, minute rounded or acute protuberances.

Papillose, rough with papillæ. (Fig. 3.)

Paraphyllia, minute leaf-like or much branched organs among the leaves. (Fig. 12.)

E. g. *Thuidium*.

Parenchymatous, cells with broad ends abutting on each other, not dovetailing into each other. (The large cells in Fig. 4.)



13

Patent, spreading at an angle of 26°-45° (Braithwaite); spreading at an angle of 45° or more (Dixon).

Patulous, more widely spreading than patent.

Percurrent costa, reaching to the apex of the leaf, but not beyond.

Perichaetial, see bracts.

Perigonal, see bracts.

Pitted cell walls, marked with small apertures or depressions; e. g. the cell walls of the leaves of *Dicranum scoparium* and other species.



12

THE SULLIVANT MOSS CHAPTER.

Elections.

As soon as this meets your eye, or at latest before Nov. 1st, send in your vote to the Judge of Elections, Mrs. M. L. Stevens, 6 Holyoke Place, Cambridge, Mass. For address of candidates, see list of members. For further instructions, see your copy of the Constitution. Candidates: For President, Miss Mary E. Hart, Dr. A. J. Grout; for Vice-President, J. F. Collins, Will R. Maxon; for Secretary-Treasurer, Mrs. Annie Morrill Smith, Miss Harriet L. Wheeler, of Chatham, N. Y.

A. J. G., J. F. C., A. M. S.

Do not forget to send Mrs. Smith an account of your work at once, that she may make out a yearly report to gladden all our hearts. This means every active member, and we shall be pleased to hear from the associates.

—Mr. J. W. Huntington has collected *Hylocomium squarrosum* and *Dicranum montanum*, in Amesbury, Mass.

—Mrs. Annie Morrill Smith, 78 Orange street, Brooklyn, N. Y., plans a revision of the *Timmiaceæ*, and wishes both European and American specimens for examination, or she will exchange in case any one has duplicates to spare.

—The notice of the Columbus meeting nearly crowded out Chapter notes in the last issue, but we hope to make up for it in this. The members of the Chapter have not been idle, and we shall have a fine lot of notes in our next number. We hope every member of the Chapter will collect all the *Mniums* possible and be ready with notes. Mrs. Britton has promised us an article for the January number that will give complete ranges so far as known of all the Eastern species. Mrs. Britton has made a special study of the genus, and her article and notes will be of the greatest value.—G.

Mosses for Distribution.

By A. J. Grout, Boys' High School, Brooklyn, N. Y.: *Mnium cinclidioides*, str. and *M. stellare*, str., for five cents in stamps. *Dicranoweissia cirrhata* (L.) Lindb., by Cambridge Botanical Supply Co. for a self-addressed stamped envelope. Will persons who can offer other species than those already offered please notify the editor?

THE BRYOLOGIST

VOL. III.

JANUARY, 1900.

NO. 1.

WITH this number THE BRYOLOGIST begins an independent existence. We hereby acknowledge our great indebtedness to our late associate, *The Fern Bulletin*. Without that assistance neither the Sullivant Moss Chapter nor THE BRYOLOGIST could have attained its present growth. This issue contains twelve pages and is furnished with a cover. We hope that our reception will warrant an increase to sixteen pages next year. A glance over our columns for the past year will show that we number among our contributors most of the prominent moss students of the United States. The increase in price will, we feel sure, be more than made up to subscribers by the increased value of the journal.

* *
*

WE hope that every one, whether a member of the Moss Chapter or not, will read carefully the Secretary's report. The Editor himself scarcely expected such marked results from the first year's work. Certainly an organization which accomplishes such results is worth the careful consideration of every moss student. Such consideration will lead to membership, we believe.

* *
*

THE success of the Sullivant Moss Chapter is due very largely to the efforts of its Secretary, Mrs. Annie Morrill Smith, who has devoted time, strength, and money to the work of the Chapter, to an extent little realized except by a very few. Mrs. Smith's success in the work of the Moss Chapter argues well for the future of THE BRYOLOGIST, since she has kindly consented to share the burdens of editorship. We feel sure that all our readers will be glad to welcome her as Associate Editor.

* *
*

LIKE all other publications, THE BRYOLOGIST depends for its success upon its meeting the wants of its constituency. The Editors will be pleased to have moss students indicate to them those features of the journal that have been most helpful, and also will be pleased to receive suggestions; these will be adopted if they seem practicable.

A. J. G.

ILLUSTRATED GLOSSARY—Continued.

Plicate, folded in pleats or furrows; *e. g.* leaves of *Camptothecium*. (Fig. 14.)

Plicæ, folds of a plicate leaf.

Pluriseriate, many ranked; *i. e.*, as applied to leaves, arranged in several rows along the stem.

Porose, see pitted, with which Fig. 13 belongs.

Primordial utricle, "The first layer deposited within a cell." As applied to the cells of the moss leaf it refers to the layer of protoplasm lying next the cell wall, which often is very conspicuous when dried and shrunken away from the cell wall. As a character for use in the identification of species it is valueless, because its appearance is due to circumstances not well understood, and is frequently present in some specimens and lacking in others of the same species.

Prosenchymatous cells, cells with pointed ends dovetailing into each other. (Fig. 15.)

Quadrata cells, cells square or nearly so. (Fig 1.)

Rosulate, in the form of a rosette.

Rugose, wrinkled (in the case of leaves it is usually applied to transverse wrinkles); *e. g.* leaves of *Hypnum rugosum*.

Secund, twisted or turned to one side. (Fig. 16.) *E. g.* leaves of many *Hypnums*. Not necessarily curved as in the figure.

Striate, marked with striæ or slight furrows.

Sulcate, deeply furrowed with longitudinal channels. As applied to leaves, both striate and sulcate really refer to the fold whose concave surface is on the inner or ventral surface of the leaf.

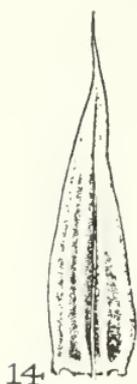
Tubulose, see *canaliculate*.

Uncinate, hooked, curved back at point. (Fig. 16.)

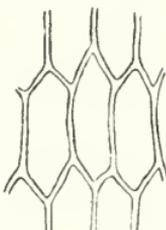
Undulate, with an alternately concave and convex margin, wavy; *e. g.* leaves of *Dicranum undulatum*.

Ventral surface, the surface of a leaf next the stem.

Vermicular, narrow and curved like a little worm; applied to leaf cells.



14



15



16



17

Verruculose or *verrucose*, covered with wart-like prominences. (Fig. 17.)

Vesicular, inflated like a bladder.

Wavy, see undulate.

TERMS USED IN CONNECTION WITH THE REPRODUCTIVE ORGANS.

Acrocarpus, having the sporophyte terminal on a stem or ordinary branch. Acrocarpous mosses can usually be easily distinguished by the erect habit as shown in the figure. (Fig. 18.) The old sporophyte often seems lateral in acrocarpous mosses, because the stem grows on the next year from a point just below the base of the sporophyte.

Aggregate, clustered; usually applied to two or more sporophytes from one perichæcium.

Amentula, applied to the special antheridia-bearing branches of *Sphagnum*.

Androgynous, with antheridia and archegonia in the same cluster of leaves; *i. e.*, either synoicous or paroicous.

Antheridium, the male reproductive organ containing the antherozoids. (Fig. 19.)

Antherozoid, the small flagellate male cell which escapes from the antheridium, and in wet weather swims to the archegonium and down its neck to the egg cell in the bottom.

Archegonium, the flask-shaped female reproductive organ. (Fig. 20.) See also antherozoid.

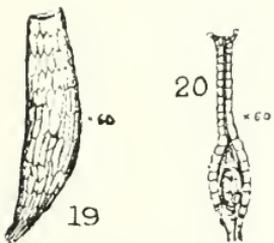
Autoicous or *autæicous*, having male and female organs on the same plant. According to Braithwaite there are three forms:

1. *Cladautoicous*, with the male organs on a special proper branch.

2. *Gonioautoicous*, with the male organs in a bud-like cluster, and axillary on a female branch.

3. *Rhizautoicous*, male branch very short and cohering to the female by the rhizoids.

(To be continued.)



ANTHEROZOIDS OF MOSSES.

EVER since I began the study of the mosses nearly ten years ago, I have been searching for moss antheridia with motile antherozoids. My search was entirely fruitless until the spring of 1899, when I collected some male heads of *Polytrichum juniperinum* about May 4th, a week or ten days after the snow had melted from over them. These heads were allowed to partially dry in a plant press and were then kept about a week or rather less in this half-dried condition. Then on mounting the antherida in water whole swarms of antherozoids were seen not free, but swimming with a rapid rotary motion, each inside of its own little capsule.

P. commune starts earlier, and I have always been too late in my attempts to get antherozoids from that species.

Let those who wish to study these interesting objects collect the male heads of *P. juniperinum* about two weeks after the snow has gone from off them, and proceed as above. I may add that not one botanist in a hundred has ever seen these bodies in motion.—
A. J. Grout.

DISTRIBUTION OF THE EASTERN SPECIES OF MNIMUM.

BY ELIZABETH G. BRITTON.

THE species of this genus are easily recognized by their leaves which are either doubly toothed, singly toothed, or entire, and in all but two species bordered by longer, narrower cells.

A.—Leaves biserrate, margins bordered.

1. *M. hornum* (L.) Hedw. In swamps and banks of streams in woods. Along the Bronx river, Bronx Park, N. Y. City; Can., N. B., N. S., Nf., Ont., Me., N. H., Vt., Mass., R. Id., Conn., N. Y., N. J., Pa., Va., W. Va., N. C.
2. *M. orthorhynchum* Br. & Sch. On rocks along streams. Gr., Lab., Can., Ont., Brit. Am., N. Y., Pa., Colo., Mont.
Var. *tenellum* Sch. Drummond's Mosses No. 529. (*M. inclinatum* Mac. Cat. 141) Ont., R. M., B. C.
(*M. lycopodioides* of L. & J. Man. non Hook.). (*M. pseudolycopodioides* C. M. & Kindb.) seems to be referable to *M. orthorhynchum*, as none of the American specimens thus far show any distinctive characters for separating. The taller plants with globose capsules resembling *M. hornum* of Europe (Rab. Bry. Eu. No. 39), have not thus far been seen from N. Am.
3. *M. riparium* Mitt. (*M. parvum* Aust. ms. in herb.) Sull. & Lesq. Musci bor Am., No. 298, *fide* Jaeger Adumb. 1873.

Canada, Macoun *vide* Kindberg, Pa., Muhlenberg in herb. Hedwig, *vide* Cardot. On wet rocks in shade along banks of streams, rarely fruiting. Rockland Co., N. Y., and Bergen Co., N. J. Austin.

4. *M. marginatum* (Dicks.) P. B. (*M. serratum* Schrad. *M. Niagarae* Kindb.) Crevices of rocks and margins of streams. Can., N. B., Ont., Minn., Vt., N. Y., N. J., Pa., O., Va., Mont., Idaho.
5. *M. spinulosum* Br. & Sch. On rocks and banks in woods. Can., Que., Ont., C. W., N. H., Vt., N. Y., O., Mont., I., Wash., B. C., Alaska. (*M. spinosum* (Voit.) Schw. has not been recorded from the Eastern States except for the reference in the foot-note to *M. spinulosum* in L. & J. Man. p. 247).

B.—Leaves serrate, teeth single, margins bordered.

6. *M. rostratum* Schrad. Wet rocks and banks in woods. Can., N. S., Ont., C. W., V. Id., N. E., Conn., N. Y., N. J., Pa., O., Va., Mont., Wyo., Or.
7. *M. cuspidatum* (L.) Leyss. (*M. sylvaticum*, Lindb.) Our commonest species. Damp ground in shade. Reported from nearly every State and Territory in U. S.
8. *M. Drummondii* Br. & Sch. On the ground in shady places. Can., N. B., Ont., Mich., Me., N. H., Vt., N. Y.
9. *M. affine* Bland. (*M. cuspidatum* Neck.) In bogs and wet woods; often sterile or forming only long showy stolons. N. Y., N. J., Pa., Va., W. Va.
Var. *ciliare* (Grev.) C. M. (*M. macrociliare* Kindb. in part). More common than the species, from which it differs by the long cilia-toothed leaves, single capsules on a seta which is red and bent below. Me., N. H., Vt., Mass., Conn., N. Y., N. J., Pa., O., Va., W. Va., Ga., La., Mo., Wis., Mont., Cal., B. C.

Var. *rugicum* Br. & Sch. Leaves slightly serrate or entire. Can., N. H., Mass., Vt., N. Y., N. J., O., Va., Tenn., La.

10. *M. medium*, Br. & Sch. Wet rocks, Little Falls, N. J., Austin. Can., N. B., Ont., P. Edw. Id., N. H., Mass., Vt., N. Y., N. J., Minn.

C.—Leaves entire or simply serrate; not bordered.

11. *M. stellare* Reich. Shaded banks, cliffs, rocks and roots of trees in swamps; not rare but seldom fruiting. Can., N. B., N. S., Ont., R. M., N. H., Mass., Vt., N. Y., N. J., O.
12. *M. cinclidioides* (Blytt.) Huebn. Swamps and wet woods, sterile. Palisades of N. J., Austin. Gr., Can., Lab., V. Id., Me., N. H., Mass., N. Y., N. J., Pa.

D.—Leaves bordered, entire.

13. *M. punctatum* (L.) Hedw. On rocks and logs in streams, on cliffs. Can., Nf., N. S., Miq., Ont., Me., N. H., Conn.,

N. Y., N. J., O., Va., W. Va., Wis. On stones along the Bronx river, Bronx Park.

Var. *elatum* B. S. In bogs and swamps, large tomentose plants. Can., N. B., Ont., N. W. T. and Alaska, Me., N. H., Mass., Vt., N. Y., N. J., Pa., Va., Mich., Idaho.

14. *M. subglobosum* Br. & Sch. (*M. pseudopunctatum* Br. & Sch.) In bogs and swamps, especially in peat. Gr., Nf., Ont., Me., Mont., Alaska and Yukon Terr.
15. *M. hymenophylloides* Hubn. Rare on cliffs, sterile. Gr., Lab., Can., R. M., Vt., N. Y.

A NEW SPECIES OF MNIUM FROM IDAHO AND MONTANA.

BY E. G. BRITTON AND R. S. WILLIAMS.

MNIUM NUDUM, n. sp. R. S. Williams. Plants in loose, extensive mats of a dark green color, stems red, naked below, arising from a radiculose, horizontal portion seldom more than 2-3cm. high; cross-section of stem with three sharp projecting angles and two rounded ones, in each of which is a small leaf-trace, central strand well developed, outer walls of one row of thick-walled red cells; leaves crowded at the apex in the gametophyte, largest at summit, often 5-8mm. long by 4-5mm. wide, slightly contracted at base, not decurrent, margins entire, not thickened, bordered by one or two rows of pale elongated cells, apex rounded, retuse or apiculate; vein usually vanishing below the apex, but occasionally confluent with the margin, broad at base gradually tapering, with a central colored strand; cells slightly elongated transversely, 0.80-.108mm.; hexagonal, not collenchymatic, inflated.

Dioicous, male plants often leafless except at apex; seta bright red, 1-2.5cm. high; capsules ovoid, 4-5mm. long, pendent, becoming horizontal when old; lid apiculate, mouth bordered by several rows of dark cells; annulus large, simple; peristome slightly longer than the endostome, teeth with about 30 rows of outer plates and 35 inner lamellæ; membrane of endostome solid, not perforate, carinate segments split along the keel in the upper part, cilia three; endostome and the upper part of the teeth papillose; spores .027-.032mm., maturing in early spring.

Differs from *M. subglobosum*, to which it has been referred, in its dioicous inflorescence, naked stems and shorter pedicels, larger peristome with more numerous lamellæ; from *M. punctatum* in the not thickened border of the leaves and the naked stems, not radiculose; and from *M. glabrescens* also in the not thickened border of the leaf, and stouter, more erect pedicel.

Growing in damp shady hollows and along streams, also on decaying logs near cold springs, on both slopes of the Rocky Mountains in Idaho and Montana. Traille River basin, Idaho, *J. B. Leiber*, March-May, 1889; Two Medicine Lake, *R. S. Williams*, 1897; Avalanche basin, Montana, *J. M. Holzinger*, July, 1898, issued as *M. subglobosum* No. 33 by Mr. Holzinger. Mr. Williams sent me this species with a drawing and description in 1897, dedicated to me, but in order to do justice to Mr. Holzinger, who has also recognized the differences between it and its allies, we have adopted his name with his consent. We offer about two dozen specimens at seven (7 cts.) cents apiece with printed labels. Address, R. S. Williams, N. Y. Botanical Gardens.

HOW TO MOUNT MOSSES.

THE most artistic way of mounting mosses is to glue the specimens to small cards, which can be fastened to regular herbarium paper, or perhaps it will be found more satisfactory to glue directly to the herbarium sheet. Mr. C. G. Pringle mounts his on cards, as does Dr. John K. Small, who has the neatest appearing collection of mosses the editor has ever seen. An ideal way would be to have a duplicate of each glued specimen in an envelope beside it for study, so that the appearance need not be spoiled by breaking off bits for microscopic examination. However, I do not know of any collection thus arranged. The great majority of moss collectors simply inclose the specimen in an envelope made for the purpose, and glue the envelope to the herbarium sheet, putting the label on the outside of the envelope. There are several styles of envelopes in use, one a rectangular piece of paper folded across so that the lower edge reaches within an inch or so of the upper edge. This edge is then folded down and the ends folded under. The only objection to this style of envelope is the time needed to open and refold the envelope for the examination of the specimen. These envelopes should be of different sizes to fit the size of the specimen.

Many use half-size herbarium paper, 11 ½ by 8 ½, and I should recommend this for amateur work, unless a large collection is planned. If there are only one or two specimens of each species they look lonesome on a full-size sheet, to say nothing of wasted space and increased cost. Personally, however, I greatly regret that I began mounting my collection on small sheets.

In mounting mosses on cards, I thin the ordinary liquid glue with vinegar, using about 25 per cent. of vinegar to 75 per cent. glue. I then spread a thin layer of this on a dinner plate and carefully place the specimen to be mounted on the plate, when it becomes well smeared with glue on the under side. The specimen is then placed on the card and put under light pressure until dry. It is a good plan to put clean white newspaper over the specimens and change after a few hours to prevent any accidental surplus of glue from becoming attached to undesirable objects. For cards, ordinary herbarium paper cut to a suitable size is very satisfactory.—A. J. G.

NEW AMERICAN MOSSES.—Continued

From a revision of the North American Eurhynchia, by A. J. Grout. Bull. Torr. Bot. Club, 25: 221-256. 1898.

EURHYNCHIUM STRIGOSUM SCABRISSETUM Grout. Seta plainly scabrous with papillæ; otherwise like var. *præcox*. On shaded ground. Type from the Palisades, N. J.; Sargentsville, N. J.; Rensselaer Co., N. Y.; Vineyard Haven, Mass.

EURHYNCHIUM PRÆLONGUM CALIFORNICUM, var. nov. Gametophyte with the habit of a *Thuidium*; stems 15-20cm. long, closely and regularly pinnate, seldom stoloniferous, more robust throughout than *E. prælongum*; leaves of the maximum size. Type from California, Bolander, No. 46. 1876.

EURHYNCHIUM BRITTONIÆ sp. nov. This species is very closely related to *E. prælongum Californicum* and greatly resembles it in appearance, but is easily distinguished by its nearly smooth seta and nearly entire stem leaves. Type from California, Bolander. Specimens of this species of Bolander's California collections are in the National Museum from "Little River (Mendocino Co.?) at the foot of pine tree, No. 332." Also in the herbarium of Mr. J. M. Holzinger as No. 530.

From *Rhodora*, 1: 78-80. pl. 5. 1899.

POTTIA RANDII Geo. G. Kennedy. Autoicous: Male flower gemmiform. Leaves octofolius, entire, loosely disposed on lower part of stem and forming a rosette above, 3-5mm. long by 1mm. wide, oblong, apiculate, margin revolute to above the middle, bordered. Costa stout, excurrent. Cells at base long rectangular; above rounded, hexagonal or rhomboidal; capsule gymnostomous, erect or sub-erect, oblong-oval, *unequal*; *collum conspicuus*; operculum conical with a stout beak; annulus of three rows

of cells, persistent. Spores yellow, papillose, seldom round. Plants 15mm. in height. Among stones in the sand by the sea shore, Baker Island near Mt. Desert, Maine.—E. L. Rand. Nearest to *P. littoralis* Mitt.

Corrections.

In the last number the printer unfortunately transposed the figures 2 and 3 at the end of the first and second lines of the key to *Mnium*. In section 3 of the key the printer also interchanged the figures 4 and 7 in the first two lines of the section. In the first line of section 13 of the key read 0.018 for 0.18. The distinctions between *M. spinulosum* and *M. marginatum* are insufficient, as a very large proportion of the specimens of *M. spinulosum* have the capsules solitary.

The following additional characters are given by Limpricht in his "Laubmoose":

- Leaves crisped when dry, upper leaves not in a rosette *M. marginatum.*
- Leaves not crisped when dry, upper leaves in a rosette *M. spinulosum.*

The differences are relative, but well marked. *M. spinulosum* is much more likely to be found.

Notice to Moss Students.

Mr. John M. Holzinger of Winona, Minnesota, is compiling a paper about living moss students and asks all such to exchange photographs with him, each photograph to bear on the back the autograph, address, and year of birth of the sender. We quote from his open letter in the *Asa Gray Bulletin*, the following questions which he would like each moss student to answer:

1. Your vocation.
2. The time you are able to give annually to the study of mosses.
3. A list of your bryological papers or larger works; also a list of exsiccata you have distributed.
4. Which genera or larger groups of mosses interest you especially?
5. Are you willing to have referred to you, for critical examination, species that fall in the line of your special interest?
6. Do you exchange mosses? If so, what material do you offer?

If for any reason a photograph cannot be sent, he will be very glad to get at least a brief statement to each of the above six questions from anyone from whom he has so far not heard.

THE SULLIVANT MOSS CHAPTER.

President's Report.

The President's report is almost a superfluity, since the Secretary's report is so full and inspiring. Yet there are one or two things to which the President wishes to call the attention of the Chapter. The membership has become so large and the requests for assistance in the identification of mosses so numerous that the President would have been utterly overwhelmed had not Mrs. Smith kindly undertaken to do the bulk of the work. Some members have seemed to feel that Mrs. Smith's identifications were not as valuable as those of better known moss students. Mrs. Smith has as good judgement and as complete a library on mosses as any other private individual in New York City, and all doubtful specimens are referred by her to specialists. Yet because of her willingness she is threatened with overwork. If our members would enclose with each specimen a carefully prepared glycerine jelly slide with leaves and capsule mounted therein, they would greatly assist Mrs. Smith and indirectly assist others.

Secretary's Report.

It is with pleasure I present the first annual report of the Sullivant Moss Chapter, which was organized January 1st, 1899, with a charter membership of 29 Active and 5 Associates. We have now 51 Active and 7 Associates, making a total of 58 members. During the year letters have been exchanged with almost every member, starting beginners with named sets of mosses and instructions for study, identifying mosses for those interested in field work, as well as those making microscopical studies. In each case mica slides have been made and filed with the specimen so that they can be easily referred to if needed. In response to the request for reports of personal work done this year, we have heard from fifteen members. Mrs. Anthony has been working on Orthotricums and Hypnum, and has also found the haunts of several of the rarer mosses, *Buxbaumia aphylla*, etc. Mrs. Britton's work is too vast and too well known to need comment, but her time and knowledge so fully placed at the service of our members requires a word of grateful appreciation. Mr. Collins has made collections and published results in *THE BRYOLOGIST*, *Rhodora* and in "Botanizing," a work recently issued. He has also made illustrations in *Rhodora* for *Grimmia Exansii*, newly described by

Mrs. Britton. Mr. Chamberlain reports "an interesting find of *Amblystegium Lescurii* in a woodland brook, Bristo', Maine, and *Brachythecium rutabulum* under my window." Please note the last three words and let them emphasize the opportunities we each possess. Mr. Walter Greenalch reports a list of 95 species already determined, including many rare species, among others a *Timmia*. Mr. Huntington has made many interesting discoveries of mosses not before reported in his locality. They have been given in THE BRYOLOGIST. Miss Mary E. Hart, of Western College, Oxford, Ohio, sends us the following notes on the Dicranums of that State: In the "Catalogue of Ohio Plants," published in the Geological Survey, Vol. 7, part 2, the following mosses with others are catalogued with localities: *D. fulvum*, *D. fuscescens* and *D. Montanum*. Leo Lesquereux and H. C. Beardslee catalogue the following as from Ohio: *D. undulatum*, *D. spurium* and *D. Schrader* (*D. Bergeri*). Miss Hart has sent us specimens of *D. undulatum* from Gambier, O. Mrs. Josephine D. Lowe has devoted her energies to organizing a band of workers wherever she has been. The Philadelphia Moss Chapter was started with four members, and they devoted their time to collecting local mosses and adding to the herbarium of the Botanical Section of the Academy of Natural Sciences. When Mrs. Lowe moved to Hartford she began to interest others in study, and another section of our Chapter will be the result. The work of our President Dr. Grout, is known to all as far as that contained in THE BRYOLOGIST. More technical articles have appeared in *Rhodor*a, *Revue Bryologique* and the *Bulletin of the Torrey Botanical Club*. He is now giving a course on the Pleurocarpous mosses before the Botanical Department of the Brooklyn Institute, and in this connection has added several species to the flora of Long Island, the last being *Plagiothecium denticulatum* forma *propagulifera* Ruth. Space forbids particularizing the work of Miss Bailey, Mrs. Lamprey, Miss Warner, Mr. Barbour, Miss Clarke, Mr. Dodge and Mr. Stultz. I can only add a word urging more frequent communications regarding the study of the hour while the moss under consideration is fresh in mind. A brief note in THE BRYOLOGIST not only adds to its interest, but serves to keep in touch one with another.

Don't forget that membership fees are due Jan. 1st, 1900. Please remit promptly and save delays. Note the announcement on second page of the cover.

ANNIE MORRILL SMITH, Secretary.

Treasurer's Report.

The following statement of the finances of the Chapter for the year 1899 is respectfully submitted:

RECEIPTS.

By dues from Active members	\$25 50
By dues from Associate members	1 75
	\$27 25

DISBURSEMENTS.

To BRYOLOGIST	\$10 20
To printing Constitution	6 00
To printing blank receipts	1 50
To Vermont Keys	1 10
To admission to Agassiz Association	1 00
To postage	1 96
	\$21 76
Cash on hand	5 49
	\$27 25

ANNIE MORRILL SMITH, Treasurer.

Report of Judge of Elections.

Mrs. Annie Morrill Smith, Secretary:

DEAR MADAM—As Judge of Election I submit the following report of the first annual election:

Number of votes cast	12.
For President—Dr. A. J. Grout	9
Miss Mary Hart	3—12.
For Vice-President—Mr. J. F. Collins	8
William R. Maxon	3—11.
For Sec. Treas.—Mrs. Smith	8
Miss Wheeler	4—12.

Messrs. Grout and Collins and Mrs. Smith are elected.

MRS. M. L. STEVENS, Judge of Elections.

Nov. 1st, 1899.

MOSESSES FOR DISTRIBUTION.

For a stamped envelope Mrs. J. D. Lowe offers, *Thuidium delicatulum* Lindb., *Aulacomnium heterostichum*, *Hedwigia ciliata*, *Georgia pellucida*, *Dicranella rufescens*, all in fruit; Mr. W. C. Barbour, *Cylindrothecium seductrix*, *Bryum roseum*, *Hypnum reptile* and *Brachythecium rutabulum*; Mrs. Annie Morrill Smith, *Mnium spinulosum* and *Catharinaea crispa* st.; Mr. J. W. Huntington, *Dicranum Bergeri* st. and *Dichelyma capillacea*; Mrs. E. G. Britton, antheridial plants of *Mnium hornum*.

THE BRYOLOGIST

VOL. III.

APRIL, 1900.

No. 2.

KEY TO BRYUM.

BRYUM is one of the most difficult and unsatisfactory genera for beginners, as well as for any one, unless he be a specialist in that particular genus. The key which is here printed will not enable a beginner or any one else to accurately determine Bryums without a careful comparison with a good description. Often authentic specimens will be necessary to make sure of the plant. The key is intended to help the student to locate the species certainly within two or three closely allied species and to give hints as to the exact species.

The length of costa and distinctness of border vary on the same plant. The border often varies on the same leaf. Lower leaves of Bryum are usually shorter and broader than the upper leaves and always have a shorter costa. The inner comal leaves are usually larger and narrower than the general run of leaves on the plant. The border of a Bryum leaf is usually most distinct near the base and least distinct near the apex. In using the key select leaves in the lower part of the upper third of the leafy portion of the stem and look for border in the upper third of the leaf. The margin of the leaves is frequently strongly recurved and gives the appearance of a margin whether a margin be really present or not. To make sure, the margin must be flattened out by manipulation with needles and pressure on cover-glass. It may even be necessary to use scissors.

Some of the species vary in the characters used in the key, hence these species have to be included under each of the headings. For instance *B. fallens*, *B. turbinatum* and *B. pseudotriquetrum* may have the apex of leaf either serrate or entire, and are included under each division of section 5. In section 17 these three species are referred back to section 14, where they have already been treated.

Height as used in the key refers to the gametophyte alone; it does not include the capsule and seta.

The leaves in Bryum are smaller than in Mnium and the leaf cells are markedly longer than broad except in *B. capillare*, which

beginners almost invariably refer to Mnium. The capsules are usually more slender, longer necked, and more pendent.

Webera (*Pohlia* of the L. & J. Manual) is so much like Bryum that a word of warning may not be out of place here. The leaf cells in Webera are much longer than in Bryum. Our most common species (*W. nutans*) is offered this quarter by the Sul-livant Moss Chapter, in order to help distinguish these two genera.

KEY TO BRYUM.

1. Leaves bordered, 2.
Leaves not bordered, at least in the upper half, 19.
2. Costa plainly vanishing below apex, 3.
Costa percurrent or excurrent, 4.
3. Upper leaves orbicular, obtuse, *cyclophyllum*.
Upper leaves acute, with long decurrent wings, *Duvalii*.
4. Leaf cells above base with length less than twice their
diameter, *capillare*.
Leaf cells more than 2.5 : 1, 5.
5. Apex of leaf serrate, or excurrent costa toothed 6.
Apex of leaf entire, or excurrent costa smooth, 16.
6. Plants large, 3 cm. or more in height, 13.
Plants smaller, 2 cm. or less in height, 7.
7. Endostome adherent to peristome, cilia lacking, 8.
Endostome free, with 2-4 appendiculate cilia, 10.
8. Capsule prominent on the back, mouth oblique, costa
shortly excurrent, border 2-3 stratose, autoicous,
uliginosum (cernuum).
Capsule regular, costa long excurrent, border of one
layer of cells, usually synoicous, 9.
9. Capsule narrowly pyriform, long necked, teeth of peris-
tome simply articulate, *inclinatum*.
Capsule ventricose in the middle, short necked; teeth
of peristome with the transverse bars connected
together by numerous oblique or nearly vertical lines
on the inner surface of the teeth, *pendulum*.
10. Costa long excurrent; dioicous, *caespiticium*.
Costa long excurrent; synoicous, 11.
Costa long excurrent; autoicous, *pallescens*.
Costa percurrent or shortly excurrent, 12.
11. Capsule usually incurved; operculum small, persistent,
. *intermedium*.
Capsule regular; lid larger; spores maturing earlier;
leaf border more distinct, *cuspidatum*.
12. Leaves decurrent; synoicous, *bimum*.
Leaves not decurrent, dioicous, *turbinatum*.
13. Synoicous; leaves decurrent, *bimum*.
Dioicous, 14.
Autoicous; leaves scarcely decurrent, *pallescens*.

14. Leaves decurrent, border bistratose, *pallens*.
 Leaves not decurrent, border of one layer only, 15.
15. Leaves narrowly bordered; capsule short pyriform,
 constricted below the lid, *turbinatum*.
 Leaves broadly bordered; capsule long obconic, not
 constricted, *pseudotriquetrum*.
16. Leaves with shortish points; costa scarcely or shortly
 excurrent, 17.
 Leaves with costa excurrent into a long point, 18.
17. Endostome adhering to peristome, cilia lacking, *purpurascens*.
 Endostome free, with 2-4 appendiculate cilia, 14.
18. Subalpine; autoicous; peristome teeth simply articulate;
 cilia 3, appendiculate, *pallescens*.
 Plants of lower elevations; synoicous, rarely subautoi-
 cous; teeth as described under 9; cilia lacking, *pendulum*.
19. Costa plainly vanishing below apex, 20.
 Costa excurrent or percurrent, 22.
20. Branches julaceous, plants silvery and shining when dry,
 common in paths and waste soil, *argenteum*.
 Branches not julaceous, leaves green, larger at summit
 of stem, forming tufts or rosettes, 21.
21. Plants from underground stolons, lower leaves minute
 and scale-like, upper leaves large, 10-12 x 3-4 mm.,
 forming a strongly marked rosette; habit and ap-
 pearance of a Mnium; not rare, *proliferum*.
 Plants not from stolons; difference between upper and
 lower leaves less marked, upper 3 x 1.5 mm. A rare
 alpine moss, *calophyllum*.
22. Stems, slender, filiform, julaceous; wet rocks in moun-
 tain streams; rare, *concinatum*.
 Stems not julaceous, 23.
23. Costa excurrent into a long point, 24.
 Costa shortly or not at all excurrent, 25.
24. Synoicous, fruiting in late summer and autumn. *intermedium*.
 Dioicous, fruiting in summer; leaves sometimes faintly
 bordered, *cœspiticium*.
25. Costa scarcely or not at all excurrent, tufts dense and
 wide, glossy red and green; capsule red brown.
 Wet rocks in mountains; rare and beautifully col-
 ored, *alpinum*.
 Costa distinctly excurrent, tufts thin, ripe capsule pur-
 ple-red, *atropurpureum (bicolor.)*
 A. J. G.

WE hope that every person interested in the study of mosses will make a special effort to attend the gathering of the clans next June. For full particulars, see third page of cover.

HOW TO KNOW SOME OF THE COMMONER BRYUMS.

BY ELIZABETH G. BRITTON.

THERE are about 500 species of *Bryum*; 195 have been reported from Europe and North America, 50 of which are common to both. Taking it for granted that those who will use this article know the differences between *Leptobryum*, *Webera*, and *Bryum*, and that they are not likely at first to collect any of the rarer species of the other sections, I will describe, as briefly as possible, the few species of *Eubryum* and *Rhodobryum* which are most often collected. Dividing the *Eubryums*, as Dixon does, into two series, the first to include the larger species with long, narrow leaves, excurrent costa, usually prolonged into an awn, with tall pedicels, and capsules generally one-eighth to one-quarter of an inch long; the second to include the smaller species, with small leaves, rarely acuminate, the costa ending with or below the apex; the capsules small, and often deep red. In the first group we have five of the species described, four of them common.

Bryum bimum is common in wet woods at base of trees, in swamps, on rocks and moist banks, and even on old stone walls and railroad cuttings, having been reported from Newfoundland to Vancouver Island, and in the United States from Maine to Florida, and Washington to California. As Dixon says: "It is not to be confounded with any other except *B. pseudotriquetrum*, on account of its robust habit, the large leaves with short points and long capsules on a tall seta, and the synoicous inflorescence." The stems are matted together by a red-brown felt of radicles, and the leaves are twisted when dry, the margins strongly recurved, and bordered by several rows of narrow cells. The var. *elatum* grows in very wet places, and I have collected it in a spring in Smuggler's Notch, five inches high. *Bryum pseudotriquetrum* (*B. ventricosum*) is considered by Dixon to be only a dioicous form of *B. bimum*. It has the same range in the United States, and often grows with it, here as well as in England. *B. intermedium* is almost as common a species, with as wide a range, preferring moist places, but resembling more in its leaves *B. caespiticium*, from which it differs in being synoicous and in maturing its capsules later, in summer and autumn, instead of spring, having an incurved capsule with small mouth, and pale teeth.

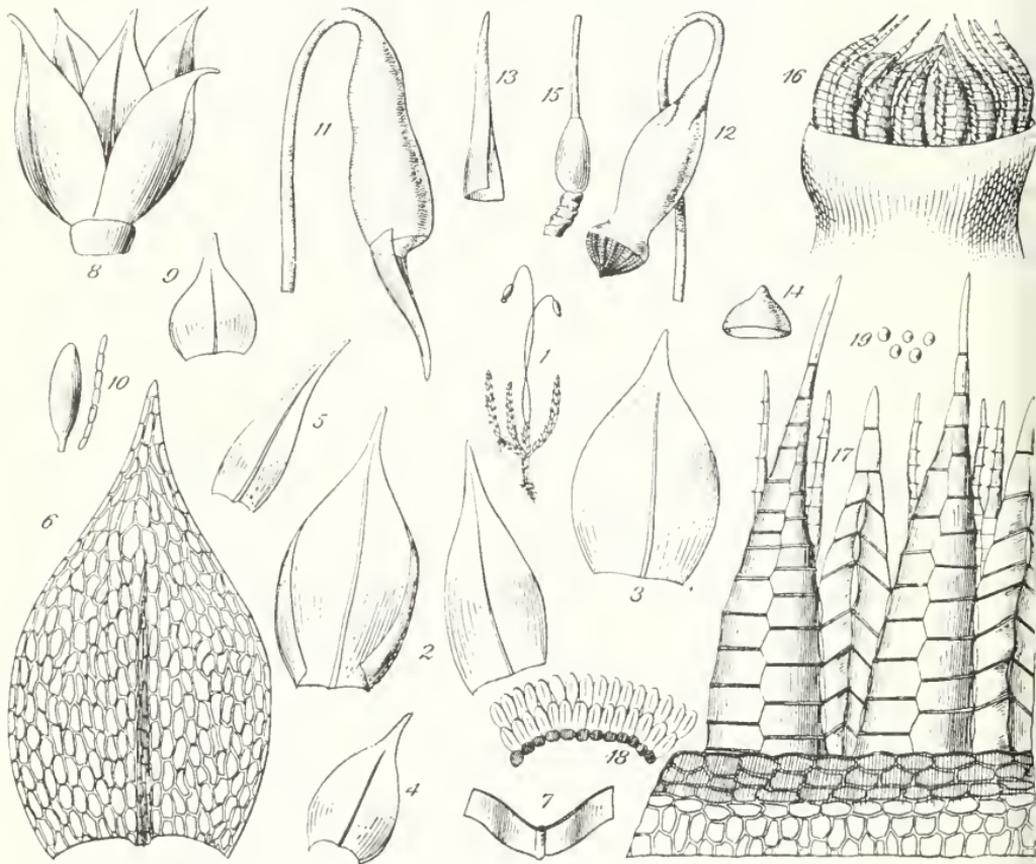
Bryum caespiticium, as its name indicates, forms dense tufts, bright green and glossy. The leaves end in a long serrate bristle, are crowded, but not twisted when dry, with narrow marginal cells. It is conspicuously dioicous, the antheridial heads mingled with the fertile plants. The pedicels and capsules are shorter than in *B. binum*. It is common under trees in open woods, and on old walls, ranging throughout Europe and Asia, reaching 14,000 feet in the Himalayas. In North America also it is very common, having been collected in nearly every State and throughout British America.

Bryum capillare is so named for the thread-like points of the leaves, which are wider than in *binum* or *caespiticium*, spirally twisted when dry, and less crowded on the stem. The plants are usually dioicous, but here again Dixon ignores species based solely on this character and unites with it *B. torquescens*, which is usually synoicous, but known to be variable. Both species love rich, loamy soil in woods, preferring hilly or mountainous regions, and are oftenest found on rock ledges in the Alleghenies and Rocky Mountains, ranging southward down the Andes. It forms soft dark green tufts, fruits but seldom, and varies greatly in the length of the costa, which may be either percurrent, excurrent, or disappear below the apex, but is smooth. Sterile plants have been collected in the Hemlock Grove in Bronx Park, and on the Palisades Austin found the var *flaccidum* on wet, shady rocks. It fruits in summer.

Bryum argenteum may be taken as the type of the second group of smaller species. It certainly is the most cosmopolitan, found throughout Europe and Asia, ranging from sea-level to 12,000 feet in the Himalayas and the Andes, where it becomes conspicuously white and is known as the var. *lanatum*. It is very common in the United States and Canada, in sandy soil and waste places, and has been collected in several cities between the paving stones and bricks, also on old roofs, walls, and door-mats. It fruits abundantly, maturing during the fall and winter, but keeping it almost throughout the year. It is also the most easily recognized of any of the species, except *B. roseum*, by its silvery, gray leaves, which, when old, are white and without chlorophyll at apex, but when young are green and then liable to be mistaken for some other species. The leaves are crowded on the stems, overlapping each other, making the stems julaceous, and ending in a slender bristle forming a brush of hairs at the tips of the

branches. The pedicels and capsules are a dark red when ripe, and the lid and annulus are large and make beautiful objects under the microscope, as well as the peristome.

Bryum roseum (*Rhodobryum proliferum*) is the largest and showiest of our *Bryums*, forming rosettes of leaves at the summits of the erect stems which arise from creeping stolons, and are almost leafless below. Only under favorable circumstances does this species form mats or cushions; usually the plants are scat-



DESCRIPTION OF PLATE.

Bryum argenteum.—1. Plant, natural size. 2-5. Outlines of leaves. 6. One leaf enlarged, showing cells. 7. Cross-section. 8. Antheridial head. 9. Bract. 10. Antheridium and paraphysis. 11. Young capsule with calyptra. 12. Old capsule. 13. Calyptra. 14. Lid. 15. Vaginule at base of seta. 16. Peristome. 17. Portion of peristome, with two teeth, two keeled segments and cilia. 18. Annulus. 19. Spores.

tered, and in this region sterile. The fruit is also rare in England. The rosettes are sometimes quite small, and scattered in among other mosses, though they may reach half an inch across, bearing as many as five capsules on stout, erect pedicels, the capsules often one-quarter of an inch in length, and slightly curved. Kindberg has separated off *B. Ontariense* as a species, but the differences which he notes are seen also in European specimens, according to Cardot, who believes it to be simply a form of *B. roseum*. Certainly there are great differences in specimens according to habitat. The species has a wide range, but is most common in the East, from New Brunswick to Ontario, and Maine to Virginia, also in California. It grows in woods, on rocks and logs and at the base of trees, in rich, loamy soil, and a few depauperate specimens have been found in Bronx Park. Mats of it, brought down from the Adirondacks, have suffered from our hot, dry summers. In Mexico and South America there are several closely allied species, and the genus seems to reach its maximum development in Japan, where one species grows which is six inches in height, and has rosettes an inch across.

New York Botanical Gardens, New York City.

CLAOPODIUM PELLUCINERVE (Mitt.)

AMONG a number of interesting mosses brought back from the Yukon Territory by Mr. R. S. Williams is *Claopodium pellucinerve*. Although destitute of fruit, yet when compared with a specimen of this species kindly sent to me by Dr. Mitten, it is found to be unquestionably the same. *C. pellucinerve* was originally described as *Leskea* in *Mitt. Musc. Ind. Or.* and was collected at Simla, North India. Comparing it with the recognized North American *Claopodia** it is found to be somewhat intermediate between *C. Whippleanum* and *C. Bolanderi*, differing from the former in not having the leaves of the terminal branches two-ranked, the stem leaves entire and not margined by a row of curvilinear cells, the median cells oval rhombic, distinctly studded by minute, bead-like papillæ, and the subfiliform acumen hyaline pointed. From *C. Bolanderi* it differs in being smaller, the stem leaves 0.25–0.35mm. wide and 0.5–0.7mm. long, the median cells oval-rhombic, not quadrate hexagonal as in that species, and in the more numerous and distinct papillæ. Dr. Mitten informs me that the capsule of *C. pellucinerve* is exactly the same as that of *C. Whippleanum*.—*G. N. Best, Rosemont, N. J.*

*Bull. Torr. Club 24: 427. 1897.

GRIMMIA TERETINERVIS LIMPR. IN NORTH AMERICA.

BY JOHN M. HOLZINGER.

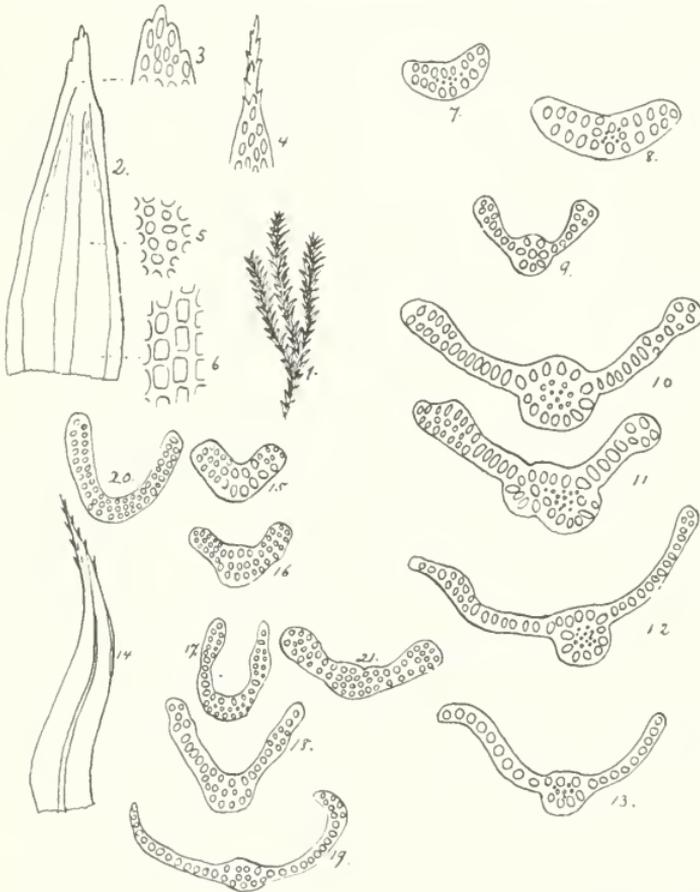
FOR nearly fifteen years the writer has had under observation a plant which occurs abundantly in certain localities near Winona, on arenaceous boulders near the tops of our bluffs. It prefers north exposures, and grows in dense, black green cushions one to four inches in diameter. It has been found at several stations within a radius of forty miles, but always sterile, or with depauperate female flowers only. All attempts at a satisfactory determination of this plant in its sterile form have been futile, until recently I happened upon Limpricht's figures of leaf sections of his *Grimmia teretinervis*; these agreed strikingly with the accompanying figures of leaf-sections of the American plant drawn some time prior to the discovery. Professor Limpricht at first referred this plant doubtfully to *Eugrimmia*, but entered it in his Laubmoose under *Schistidium*. Had he adhered to his first judgment and entered it as a *Eugrimmia*, the determination could have been made long ago, for I have persistently referred it to *Eugrimmia*. I am of opinion that the plant belongs nearer to *Grimmia Otneyi* Sulliv., and *Grimmia campestris* Burchell, than to any other American species of this genus. The reasons for this conclusion will be suggested by a comparison of leaf-cells and leaf-sections figured below, without detailed discussion.

Prof. Limpricht, to whom the plant has been referred for comparison, states that he considers it correctly determined. He has also kindly sent for comparison some of the plants collected by J. Breidler in Steinmark, cited in Laubm., 1: p. 718. These plants agree very closely with the American plants and fully clear up all remaining doubts. Prof. Limpricht describes the stems as unbranched; Breidler's plants are certainly branched, as are those from near Winona. The leaves are described as "lance-linear from (or above) a decurrent oval base;" this description of an "oval base" had vexed me a little, apparently constituting a disagreement; but the leaves on Breidler's and the American plant are exactly alike in shape. Then, our plants seemed to have none of the golden-yellow gemmæ (Brutkörper) mentioned at the end of the author's description. On this point Prof. Limpricht writes, in his letter dated February 4, 1900: "The species never shows gemmæ; my citation rests upon an error into which I was led by the scant original material in 1884, which was mixed

with *Didymodon rigidum*; and it is to this that the described 'gemmae' belong."

Allowing, therefore, the modifications suggested above, that author's original description, subjoined, holds for this plant

Some weeks ago I received from Mrs Britton a specimen of *Grimmia teretinervis* collected in Austrian Tyrol by Dr. Burchard. That plant, though coming from the first region cited in Laubm. p. 718, does not agree so well with the author's description, nor



EXPLANATION OF FIGURES. GRIMMIA TERETINERVIS Limpr. Fig. 1. A plant, $x2\frac{1}{2}$. Fig. 2. A leaf, $x30$. Figs. 3-6. Enlarged cells from apex, middle, and base of leaf. Figs. 7-13. Cross-sections of leaves. Fig. 14. Enlarged leaf of *Grimmia Olneyi*. Figs. 15-20. Cross-sections of leaves of *Grimmia campestris* Burchell. Fig. 21. Cross-section of a leaf of *Grimmia Olneyi* above middle.

with the American specimens, as does Breidler's plant communicated by the author. But this is a matter for European students to settle. It is a matter of satisfaction for American students to be sure that the plant in question is true *Grimmia teretinervis* Limpr., and the writer desires to thank both the author and Mrs. Britton for kindly sending specimens, without which this problem could not have been settled.

The description of *Grimmia teretinervis*, is translated from Limpr., Laubm., 1: 717, 718.

297. SCHISTIDIUM (?) TERETINERVE (Limpr.) Synonym: *Grimmia* (*Eugrimmia*?) *teretinervis* Limpr. in 61. Jahresb. d. schles. Ges. p. 216 (1884). Dioicous, known only in female sterile plants. Perhaps to be placed next to *Grimmia commutata* or *G. ovata*. Cushions blackish, more rarely dark-green, to 4 cm. in diameter, loosely cohering, in habit somewhat like *G. commutata*. Stems 1-2, rarely 3 cm. long, slender, unbranched, in cross section showing large thin-walled parenchyma cells, small thick-walled cortical cells and a little developed central strand. Leaves firm, the lower erect patent, the upper appressed, but when moistened becoming somewhat recurved, then also erect-patent, from a decurrent oval base, lance linear, concave (1.2-1.35 mm. long and 0.4-0.45 mm. wide) with a slender, short, toothed hair about 0.45 mm. long; lower leaves hairless, or with a very short hair point. Leaf margin plane, only at the base slightly reflexed. Lamina toward base of one cell layer, in the middle sporadically bistratose, toward apex bistratose for several cells from the margin, hence the unistratose areas on each side of the costa appear as two well defined longitudinal strips. Costa stout, brownish; bi convex, with 4-6 ventral cells, central cells alike, small. Leaf cells similar throughout, with rather thick, yet even walls, not unequally thickened, very small, roundish-quadrate, 0.007-0.009 mm. in size, only toward the base on each side of the costa with a few rows of short rectangular cells. Female buds at ends of branches, with 5-6 poorly developed archegonia (0.54 mm long) and a few pellucid paraphyses. Male plants and fruit not known.

Winona, Minn., February, 1900.

KEEP watch of the different mosses in your locality and record the date of the first appearance of the sporophyte and the date of ripening spores. Be sure to collect specimens to verify your observations.

ILLUSTRATED GLOSSARY—Continued.

Bi-sexual, synoicous.

Cladocarpous, having the sporophyte terminating a short special fertile branch; something like half-way between acrocarpous and pleurocarpous; *e. g.* *Fontinalis*.

Dioicous or *diœcious*, having the male and female organs on separate plants.

Flowers, often applied to the reproductive organs.

Fruit, often applied to the sporophyte.

Gametophyte or *gametophore*, that part of the plant which bears the gametes or sexual cells. In mosses all the plant except the "fruit," or seta and capsule.

Inflorescence, often applied to the clusters of reproductive organs.

Monoicous or *monœcious*, having male and female organs on the same plant.

Oösphere, the egg cell or ovum found in the base of the archegonium. After fertilization, by

union with the antherozoid, it develops into the sporophyte- (Fig. 20.)

Paraphyses, jointed hyaline hairs growing among the reproductive organs. (Fig. 21.)

Paroicous, having its male and female organs in the same cluster, but not mixed, the antheridia being in the axils of the perichaetial bracts below the archegonia. (Fig. 22.)

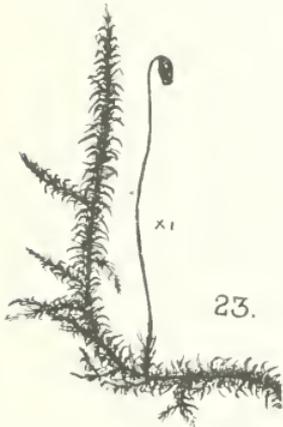
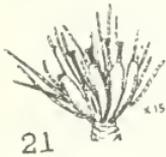
Perichaetium and *perigonium*, see under topic *leaves*.

Pleurocarpous, having the sporophyte lateral on a short lateral special branch. (Fig. 23.) Pleurocarpous mosses can usually be recognized by the creeping habit.

Spermatozoid, see *antherozoid*.

Sporophyte or *sprophore*, the spore-bearing part or generation. In mosses it consists of the seta and capsule and constitutes the so called fruit.

Stipitate, having a short stem. Applied to antheridia and archegonia.



Synœious or *synœious*, having the male and female organs mixed together in the same cluster. (Fig. 21.)

TERMS USED IN THE DESCRIPTION OF THE GAMETOPHYTE, EXCLUSIVE OF THOSE ALREADY DEFINED.

Cæspitose, forming matted tufts or cushions; e. g. *Leucobryum*.

Canescent, rather hoary; e. g. *Racomitrium canescens*.

Central strand. The middle of many moss stems is made up of a bundle of much narrower and more slender cells, known as the "central strand." (Fig. 24.) This is usually continuous with the midrib or costa of the leaves, much after the manner of the vascular bundles in the higher plants.

Capitulum, a rounded head.

Coma or *comal tuft*, a tuft of leaves at the top of a stem or branch.

Confervoid, formed of fine threads.

Fascicle, a bunch or cluster of leaves or branches.

Fasciculate, arranged in bunches

Fastigiate, of branches, all reaching an equal height (Fig. 18).

Flagella, fine string-like branches; e. g. *Dicranum flagellare*.

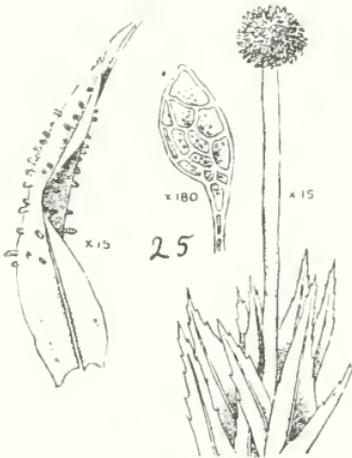
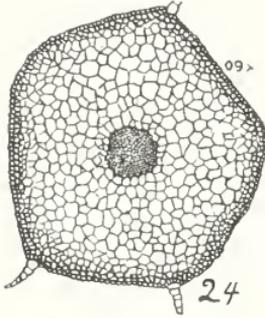
Gemmæ, bud like bodies, capable of reproducing the plant. Sometimes borne in special heads, sometimes on the surface of the leaves. (Fig. 25.)

Gemmiferous or *Gemmiparous*, bearing gemmæ.

Gregarious, growing near together or clustered, but not in close tufts or mats.

Hygroscopic, readily absorbing water and thereby altered in form or direction.

Julaceous, smooth, slender and cylindrical; like a catkin or a worm.



THE BRYOLOGIST

VOL. III.

JULY, 1900.

No. 3.

FISSIDENS IN NORTHEASTERN NORTH AMERICA.

By ANN'E MORRILL SMITH.

IT is very easy to recognize a *Fissidens* if looked at carefully with a hand lens, and under the microscope with even a very low power one need not hesitate. The leaves are entirely different from any of the mosses already studied in *THE BRYOLOGIST*. They are in two ranks and apparently edgewise to the stem, with the basal portion of the upper edge apparently split in two and sheathing the stem and the lower edge of the leaf next above it, as shown in the figure. In *Bryum* the border is made up of cells of an entirely different character and shape from those of the rest of the leaf, while in *Fissidens* the border cells are of the same size and differ only in being of a lighter color, or paler, as the key says. The leaf then consists of three parts, differently named by different authors. I prefer to follow in this study Prof. Charles R. Barnes' Revision of the North American Species of *Fissidens*, *Botanical Gazette*, Vol. XII, January and February, 1887. The three parts are called *vaginant lamina*, *vertical lamina* and *inferior lamina* to designate respectively the sheathing or conduplicate portion of the leaf, Fig. 3, *a*; the whole of the vertical blade, *b*; and the part of it below the costa, *c*. The peristome is so much like that of the *Dicranums* that the families to which these genera belong are usually regarded as somewhat closely allied.

For the benefit of the more advanced students I refer them to a reprint on "The Genus *Fissidens*," by Ernest Stanley Salmon, of Charlton House, Kew, England, in *Annals of Botany*, Vol. XIII, March, 1899. This, in three double plates, gives 94 figures and is very full regarding the morphology of the genus as well as classification.

Key to the species:*

A.—FRUIT TERMINAL.

- Leaves with a narrow border, at least on the vaginant lamina—
Border usually confluent at apex with percurrent costa;
male flowers axillary, *F. brvoides*.
Border wanting at apex; male flowers at base of stems;
leaf cells smooth, *F. incurvus*.
Border none except on vaginant lamina; leaf cells papil-
lose, *F. Ravenelii*.

*I am greatly indebted to Prof. Charles R. Barnes for invaluable assistance in preparing this key.

Leaves without a border—

- Leaves obtuse, cells pellucid, operculum, conic, *F. obtusifolius.*
- Leaves apiculate, operculum acicular-rostrate, *F. osuundoides.*

B.—FRUIT LATERAL.

Leaves without a border—

- Leaves broad pointed, irregularly serrulate; fruit sub-basal; plants 1–2cm. high, *F. subbasilaris.*
- Leaves mucronate, regularly serrulate; fruit basal or sub-basal, *F. taxifolius.*

Leaves bordered by several rows of paler, often incrassate cells—

- Leaf cells obscure (6–9×6–12μ), capsule erect or inclined, *F. cristatus* Wils*.
- Leaf cells distinct (12–15×18–24μ) capsule erect or inclined, *F. adiantoides.*

C.—PLANTS AQUATIC.

- Plants sterile, large (5–15cm.), growing in very wet places or in water. Leaves thick, rigid, opaque. *F. grandifrons.*
- Plants filiform, much branched, aquatic and floating, with the habit of a Fontinalis. Leaves not rigid, *F. julianus.*

**F. decipiens* L. & J. Manual.

The ten species above given are those most likely to be collected in our range. Of the aquatic series only *F. grandifrons* Bridel and *F. julianus* (Savi.) Schimp. are included, though *F. Hallianus* Mitt. may be found more rarely on wood and stones in swamps and streams. *F. grandifrons* Bridel has been found over a wider range than is given in the Manual and should be looked for in many limestone regions. Owing to its large size it will not be overlooked if present at all. *F. Closteri* Aust. and *F. hyalinus* Hook. & Wils. have been omitted as being too rare and also too minute to be often found by a beginner, for whom this key and notes are intended. *F. polypoidoides* Hedw. has also been left out, as it is sub-tropical only. It is found in Florida and in the southern half of Georgia.

Of the species given in the key, *F. subbasilaris* Hedw. is reported as not common. I have it from two stations only, one in New York State and the other near Baltimore. It is a small plant and therefore easily overlooked; this applies as well to *F. bryoides* Hedw., which may sometimes be found growing on greenhouse pots. *F. incurvus* Schwaegr. is another small plant very common East. There are two varieties as given by Prof. Barnes in his Revision, namely, var. *minutulus* Aust. and var. *exiguus* Aust. Authors differ about the specific rank of these three mosses, but this question will not be considered now, as one

will not go far wrong if they unite both varieties under *incurvus*, and leave the subject of specific rank and nomenclature to wiser heads.

F. Ravenelii Sulliv. is a minute moss found on Cypress trees in southern swamps, but while more frequent in the extreme south, is reported from South Carolina and further search may extend its northern limits. The other mosses of our list are of medium to large size and common. *F. cristatus* Wils., which is offered to Chapter members, is of medium size and grows on the soil and rocks; it somewhat resembles *F. adiantoides* Hedw., but the leaves are usually more closely imbricated. *F. obtusifolius* Wils. grows on wet rocks or stones and is of frequent occurrence, constituting with *F. adiantoides* Hedw., *F. cristatus* Wils. and *F. taxifolius* Hedw., our most common species. *F. osmundoides* Hedw. is also common in all situations.



DESCRIPTION OF FIGURES. 1. Fruiting *Fissidens cristatus*. 2. Capsule with calyptra removed. 3. Leaf and portion of stem to which it is attached. 4. Leaves, showing how they overlap each other and sheath the stem.

FISSIDENS HYALINUS.

WE found this moss growing on a steep bank in a moist, shaded ravine, along with *F. taxifolius* and *Hypnum hians*. It seems not to grow abundantly where it does grow, and this, added to its insignificant appearance, makes it a difficult object to find.

When we gathered these plants a short time ago it occurred to me that the conditions were not so peculiar that they might not be found in other places, and we began a hunt for other banks in moist, shaded ravines where the *taxifolius* grows. The *taxifolius* was our guide, and we have recently been successful in finding the moss in three other places.

We begin to think this little moss is more widely distributed than has been supposed. When in fruit it may be detected by a sharp eye held close to the ground, as the red peristome is prominent for so small an object. In hunting for this plant we have found it a good plan to take up with a case knife a slice of ground where smaller plants of *taxifolius* grow somewhat loosely and examine with a magnifying glass. If the *hyalinus* is in fruit it is easily detected by its red peristome, and its leaf is easily known when seen through a glass, since it is without mid-rib and the cells are so large that its appearance is similar to that of *Physcomitrium*. The *hyalinus* sometimes grows in clusters of 20 to 50 plants, but oftener separately.—*Extract from a letter of Alonzo Linn to Mrs. E. G. Britton, Nov. 1st, 1894.*

FISSIDENS GRANDIFRONS Brid.

THIS rare and interesting species is one of the largest of the genus; its stems measure from one to five inches in length, often repeatedly branched and rooting at the base of each branch, ultimately dividing into numerous smaller plants, and thus propagating the species. The leaves are long and narrow, closely placed, and the stem appears as a white wavy line between their clasping bases. They are composed of several layers of cells, which make them opaque and dense, for which reason Carl Müller coined the name *Pachyfissidens*, since raised to generic rank by Limpricht. They grow immersed in water saturated with lime, or in mud, and the plants are often encrusted and discolored to a dark green or brown. The species is dioicous, and the fruit has been found only once, in the Himalaya Mountains by Falconer, though this species occurs at several stations in

Europe, along the Rhine and its tributaries, in Switzerland and the Pyrenees. In America it is not uncommon, New York State leading with four or five stations in the western and central part, Niagara Falls being the best known. It has also been found in the mountains of Virginia, and in Michigan, Ohio, and Missouri. It occurs at several stations in Ontario, and in the Rocky Mountains from British Columbia to Idaho and Montana, and from Washington to California. Its nearest relative seems to be a Mexican species, *F. insignis* Sch. from Mt. Orizaba, of which the fruit is unknown.—*E. G. Britton.*

ON THE GENUS *FISSIDENS*, BY ERNEST STANLEY SALMON, ANN. OF BOT. 13: 103-130, PLATES 5-7, MARCH, 1899.

“THE structure of the leaf in the genus *Fissidens* is generally described as quite anomalous amongst mosses.”

After describing this structure, the author proceeds to explain the three principal theories which have been advanced to explain the morphology. The first one, accepted up to 1819, held that the leaf corresponds to that of other mosses, and that the sheathing part results from a split in the thickness of the leaf. The second was that of Robert Brown, published in 1819, which held that the double division of the leaf is its true blade, and the deviation from the normal structure is in the greater compression of the leaf and in the addition of a dorsal and terminal wing. “In support of this view it may be observed that in the lower leaves of the stem both the additional wings are greatly reduced in size, and in some cases entirely wanting, as they are universally in the perigonal leaves, which likewise have the more ordinary form, being only moderately concave and not even navicular.” This view was accepted by Bruch and Schimper, and has been followed by Limpricht and others. Lindberg advanced the third theory, and has been followed by Braithwaite, stating that the whole expansion of the leaf is the true leaf, with the exception of one of the wings of the sheathing part, which is considered a stipule.

In order to prove which of these theories is correct, Mr. Salmon has studied the structure of the vein of the leaves of 18 species of *Fissidens* and those of similar leaves in *Bryoxiphium*, *Sorapilla* and *Diplophyllum*, and compared them with leaves of *Polytrichum*, *Catharinea*, *Pottia*, *Barbula* and *Tortula*, such of them as have outgrowths or lamellæ on their leaves. He con-

cludes that the structure of the vein and the occasional differentiation of the line of suture between the vaginant lamina and the apical wing, notably in *F. Floridanus*, proves Robert Brown's theory to have been correct. His sections and figures include six North American species of *Fissidens*, as follows: *bryoides*, *decepiens*, *incurvus*, *Floridanus*, *grandifrons* and *taxifolius*; also *Catharinea angustata*, *Polytrichum formosum*, *Pottia cavifolia*, *Barbula chloronotis*, and *Bryoxiphium Norvegicum*. The plates are excellent, and the whole study is eminently satisfactory to all students of this genus, as showing what morphology can do to help us in classification.—*E. G. Britton.*

NOTE ON CINCLIDOTUS FONTINALOIDES.

IN THE month of July, 1869, the writer made a boat voyage around the northeast coast of Lake Superior. On the 27th of that month he collected in a brook thirty miles west of Michipicoten. The gatherings were submitted to careful examination by myself, but as many species were found that I had never before seen, and, being without books, I could do nothing with them. In 1871, through Mrs. Roy, of Owen Sound, Ontario, I opened up a correspondence with Prof. James. The specimens found on the rocks in the brook were submitted to him and named *Cinclidotus fontinaloides*, but sterile.

Later I may have submitted them to Austin, and from him got the name *Racomitrium aciculare*, or I may have named them so myself; but at any rate that was the second name.

Still unsatisfied, I sent part of the original specimen to Dr. Kindberg, who named it *Grimmia apocarpa*, var. *rivularis*. Within the last month Mrs. Britton has confirmed the later determination, so that *Cinclidotus fontinaloides*, as far as the writer's specimens are concerned, has to be eliminated from the North American Flora.—*John Macoun, Ottawa, Canada, February 23d, 1900.*

[A NOTE.—A search has been made for the original specimens on which the note in Lesquereux and James' Manual was founded, but they are not to be found in the James collection. Whether they were returned to Mrs. Roy or sent to the Lesquereux herbarium, remains yet to be discovered. At any rate nothing exists in any collection thus far made to show that *Cinclidotus fontinaloides* has been thus far found in America.—*E. G. BRITTON.*]

ILLUSTRATED GLOSSARY—Continued.



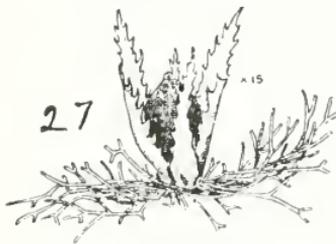
Pinnate, having numerous equidistant spreading branches on each side, like a feather. (Fig. 26.)

Plumose, feathery.

Polygamous, with antheridia and archegonia disposed in various ways on the same plant.

Proliferous, bearing young shoots from the antheridial or archegonial cluster of leaves.

Protonema, the green, branched, alga-like threads produced



from the spore and often persistent during the lifetime of the plant produced from it. Protonema and radicles differ chiefly in the presence or absence of chlorophyll, and either may develop the other. (Fig. 27.)

Pseudopodium, a leafless branch resembling a seta and often bearing gemmæ. (Fig. 25.)

Pulvinate, like a cushion.

Radicles, rootlets springing from the sides and base of stem. See also *protonema*.

Ramuli, minute branchlets.

Rhizoid, see *radicles*.

Stoloniferous stem, a slender creeping stem with minute leaves.

Tomentose, covered with a thick felt of radicles.

TERMS USED IN DESCRIBING THE SPOROPHYTE.

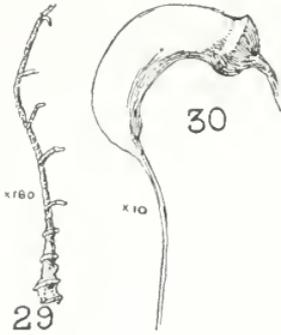
Acicular, needle-shaped. Applied to the beak of the operculum.

Amphithecium, the outer layers of cells of the sporogonium.



Annulus, a specialized ring of vesicular cells between the mouth of the capsule and the lid. These cells are often highly elastic and aid in removing the lid when the spores are ripe; they have a peculiar appearance, which is well illustrated in Fig. 28.

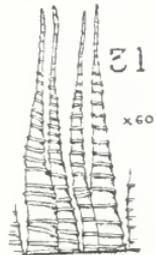
have a peculiar appearance, which is well illustrated in Fig. 28.



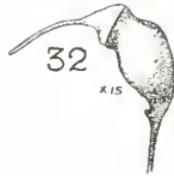
Apophysis, see *hypophysis*, the more correct term according to Braithwaite.

Appendiculate cilia, cilia with small transverse spurs attached at intervals along the margin. (Fig. 29.) As these bars sometimes extend inward instead of laterally, they are not always visible in a strictly dorsal view.

Arcuate (capsule), bent in a curve like a bow. (Fig. 30.)



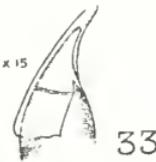
Articulate (teeth of peristome), marked by cross-bars as in Figs. 31 and 43.



Astomous (capsule), without a mouth. Used of capsules which have no regularly dehiscent lid.

Beak, prolonged narrow tip of the operculum. The opercula in

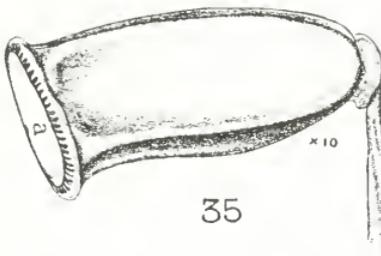
Figs. 30 and 32 are strongly beaked.



Calyptra, the thin veil or hood covering the mouth of the capsule. (Figs. 33 and 41.)

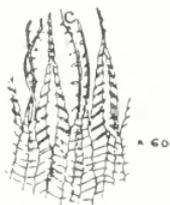
Cancellate, latticed. Used of the endostome of the Fontinalaceæ.

Capsule, the enlarged distal end of the sporophyte; it contains the spores, and is sometimes known as the sporangium. (Figs. 30, 32, 35, 39 and 40.)



Cernuous (capsule), drooping or nodding, somewhat inclined as opposed to erect. (Fig. 35.)

Cilia, hair-like threads of the endostome, alternating with the segments. (Fig. 29 and Figs. 36, c and 43, d)



Clathrate, resembling lattice-work.

Cleistocarpous, capsule opening irregularly, not by a lid or valves.

Collum, the neck or tapering base of the capsule. (See Fig. 40.)

Columella, the central axis of the capsule; around it and between it and the outer wall of the capsule are borne the spores. Sometimes the

36

37



lid adheres to it and is raised upon it, as in Fig. 37.

Constricted, used of capsules that become narrowed under the mouth when dry. (Fig. 32.)

Contracted, see *constricted*.

INJURY DONE TO MOSSES BY INSECTS.

BY G. N. BEST.

MOSSES furnish an excellent harbor for insects which in turn feed upon, mutilate and destroy them. From a diagnostic standpoint the injury they inflict is of importance since it modifies to a considerable extent the normal characters. When mosses are seriously injured, they show it in their short, stubby branches and in their withered, shrunk, often contorted and discolored leaves. The stems are the parts most commonly attacked. On these appear minute reddish-brown spots or nodules, usually with a central perforation, around which the tissues are necrosed and thickened. These spots not rarely coalesce to form patches, girdling the stem in such a way as to interfere with its nutrition. Less often the midribs, the pedicels and the capsules are attacked in the same manner. A common seat of injury is about the base of the capsule which then rarely attains a normal development, the peristome suffering most. When the stems are affected the areolation of the leaves is often quite abnormal, the basal and alar cells especially. Sometimes the cells of one-half of a leaf differ from those of the other half. In fact these deformities not rarely so obscure the normal characters, as to give grounds for a suspicion that a new species is at hand; and it is quite probable that not a few species owe their existence more to insects than to nature.

NEW AMERICAN MOSSES.

GRIMMIA EVANSI E. G. Britton. *Rhodora* 1: 148, 1899, *pl.* 7, "Plants forming low, dense, dirty tufts of a dark green or yellowish brown color, only the uppermost ends of the branches being green and free from gravel. Stems about 15mm. high, with short fastigiate branches 5mm. long, naked and radiculose below, crowded above with spreading leaves which are about 1mm. long by 0.5-0.7mm broad, oblong, concave, acute or apiculate with inrolled margins above, forming a more or less

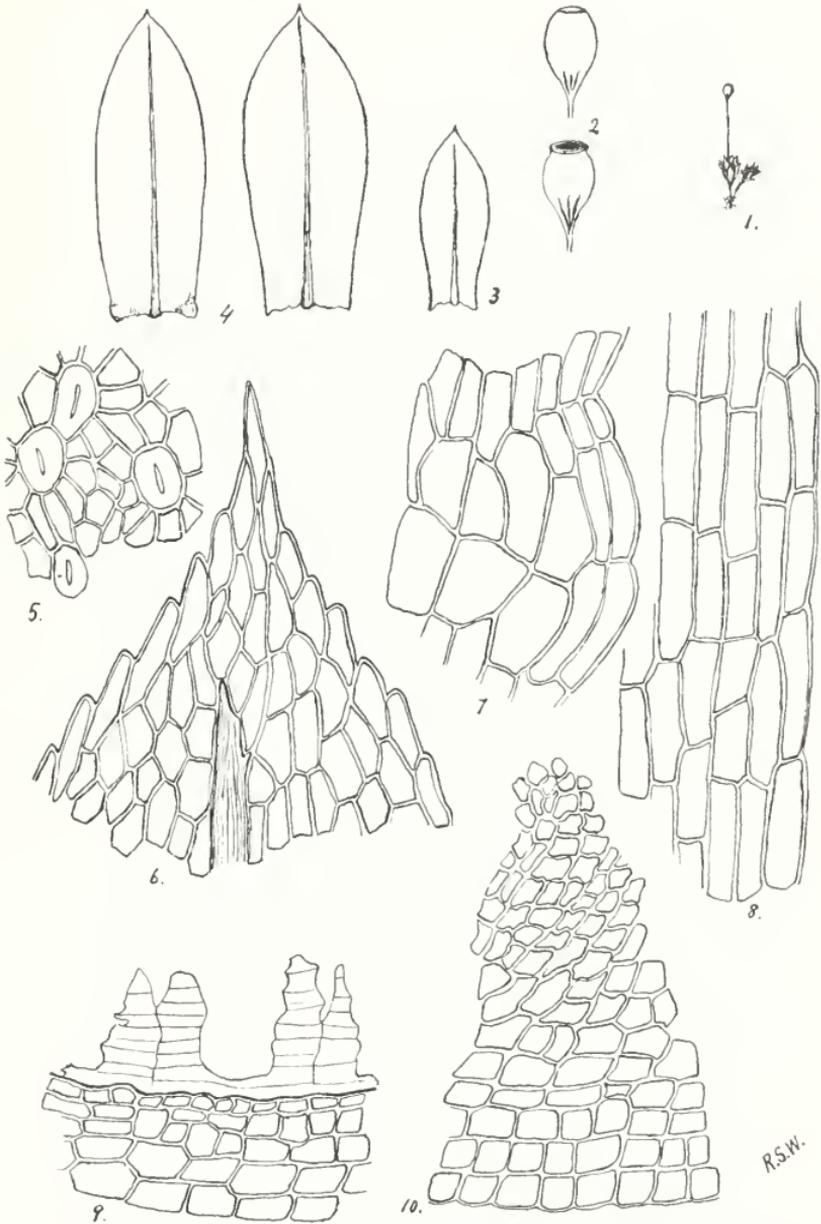
cucullate apex, the stout vein ending in or just below the point which occasionally is formed by a single short hyaline cell; apical cells rounded and indistinct, slightly sinuous, composed more or less of two irregular layers of cells, or frequently with only one layer and occasional groups of bistromatic cells here and there, not papillose, but the thickened walls of the apical cells giving an irregular outline to the cross-sections of the leaves; basal cells in one layer, more distinct, oblong or quadrate, .013-.021mm. in diameter. Dioicous, only male plants collected, antheridia large, bright yellow, with or without paraphyses.

On rocks, Tuckerman's Ravine, Mt. Washington, N. H., alt. 1,230m., July 30, 1890. Collected by Dr. Alexander W. Evans of Yale University, to whom this species is dedicated in recognition of his services to American bryology. Dr. Evans' specimens have been compared with *Grimmia caespiticia* (Brid.) Jur., (*G. sulcata* Sauter) and with Limpricht's description and figures (Rab. Kryptfl. 4: 2, 778, *fig. 203*). Though closely resembling this species in the form and structure of the leaves, ours lack the two prominent folds of the European species and the plants are coarser and more loosely tufted."

ENTOSTHODON LEIBERGII, sp. nov. E. G. Britton.

PLANTS gregarious; stems short, 5mm., simple or divided at base, naked below, leaves crowded at summit, the largest 2-3mm. long by 1mm. wide, oblong-lanceolate, acute or apiculate, the vein ending in or below the apex or excurrent into a subulate point, serrate, above, marginal cells somewhat longer and narrower, but not bordered, those of the basal angles occasionally inflated, forming an auricle; perichetial leaves smaller, generally entire, with the vein ending far below the apex. Autoicous; seta 5-10mm. long, pale, becoming red brown as well as the mature capsule, which is globose-pyriform, 1-2mm. long, with a tapering neck; stomata numerous; lid convex, bordered with yellow, the marginal cells quadratic in straight rows, the inner smaller, irregular and oblique; mouth slightly flaring when dry, bordered by 4-8 rows of transversely elongated cells and one row of orange-colored smaller cells; annulus none; peristome short, rudimentary, teeth irregular, divided, orange-colored; spores rough, .025-.029mm. rusty brown.

In wet, springy places near Hope, Idaho, at 2100 feet, May, 1892. Collected by John B. Leiberg, to whom this species is dedicated. Nearest to *Entosthodon ericetorum* C. M. (*Funaria obtusa* Lindb.), from which it differs in its larger size, broader leaves without the narrow border of cells, so markedly shown in No. 281 of Wilson's Musci Britannici.



DESCRIPTION OF PLATE.—1. Plant, natural size. 2. Capsules enlarged. 3. Lower leaf. 4. Upper leaves. 5. Stomata. 6. Apex of leaf. 7. Auricled basal cells. 8. Median cells. 9. Portion of peristome. 10. Portion of lid.

TWO NEW SPECIES OF BRACHYTHECIUM.

BRACHYTHECIUM NOVEBORACENSE sp. nov. Gametophyte in loosely interwoven, thin, bright green mats, darker green to brown below; stems ascending or creeping, irregularly and rather sparingly branching, sparingly radiculose except when in contact with the soil; branches 3-6cm. long, somewhat fasciculate; branch leaves distant, loosely spreading, not at all or very slightly striate when dry, very narrowly decurrent, ovate-lanceolate, slender pointed, strongly serrulate above, about 2×0.75 mm, costate nearly to middle; median cells linear-vermicular, 12-18:1; basal cells enlarged, shorter and broader, oblong to subquadrate; stem leaves very distant below, spreading, broadly ovate, acuminate, 2.25×1 mm., alar cells somewhat inflated, with a tendency to form auricles, otherwise like branch leaves; costa sometimes double with one long and one short branch. Monoicous; perichæatial leaves squarrose, long filiform-acuminate from an ovate base, ecostate, nearly or quite entire.

Sporophyte 2-2.5cm. high; seta red, strongly twisted to the right, rough with scattered papillæ; capsule sub-erect and slightly unsymmetric when fresh and ripe, curved and strongly contracted under the mouth when dry and empty, light red-brown, 2-2.25mm. long, 3:1; operculum long conic, abruptly apiculate; annulus? Teeth papillose above with long sharp papillæ; median line very indistinct in lower two-thirds of teeth; inner peristome nearly as long as teeth, with basal membrane as long as segments; segments papillose, more or less split; cilia single and large or double; spores ripening in autumn (Dec.) unequally developed, rough, the largest 0.026mm.

Type from peaty soil in swampy woods, Valley Stream, L. Id., December 9, 1899; closely interwoven with *B. acutum*.

This might be easily mistaken for *B. rutabulum* when sterile, and indeed would be hard to distinguish from it. The alar cells, however, are larger and the leaf apices shorter as a rule. The leaf apices are longer and alar cells smaller than is usual in *B. rivulare*. The leaf characters are somewhat intermediate between these two species and those of *B. Starkei*, but the stem leaves are longer and ovate rather than deltoid ovate. The stem leaves are more distant than in any of the related species, reminding one of *Hypnum cordifolium*. The sporophyte is distinct from that of any other species in the light colored capsule, sub-erect and slightly unsymmetric and much smaller than in any of the related species; teeth much narrower, without a distinct median line in the upper middle portion.

This species is so distinct that collectors ought to have no difficulty in recognizing it. A specimen from Van Cortland Park, New York City, has the seta rougher than in the type.

BRACHYTHECIUM WASHINGTONIANUM Eaton, Ms., newly described. Gametophyte in loose mats of bright glossy yellow-green; stems creeping, ascending, 5-10cm. long, closely and more

or less regularly pinnate, particularly near the ends; branches 7-12mm. long; branch leaves equally spreading, strongly plicate, both moist and dry, ovate, not decurrent, 1.5-1.75 × 0.45-0.70mm., broadest a little above the base and thence gradually narrowed to a long narrow apex, more strongly serrate above than in *B. lamprochryseum*; costa extending from one-half to two-thirds the entire length of the leaf; median cells linear-vermicular 0.080-0.125mm. in length; 10-16:1; basal cells shorter and broader, extreme alar sometimes inflated and vesicular with a single row of much enlarged rectangular cells along the base (These frequently fail to be detached with the leaf); stem leaves of lower stems slenderly deltoid-ovate, auricled and decurrent (The auricles are often made more distinct by strong plicæ near the margin, as in *Climacium Americanum*), 2-2.5mm. long and about one half as wide at the widest portion of the base; median and basal cells as in the branch leaves; auricular cells rectangular to hexagonorhomboidal, the lower somewhat inflated and vesicular. Dioicous apparently; no male buds found; perichaetial leaves sheathing with long squarrose filiform apices, entire or distantly dentate above, ecostate or rarely with traces of a costa.

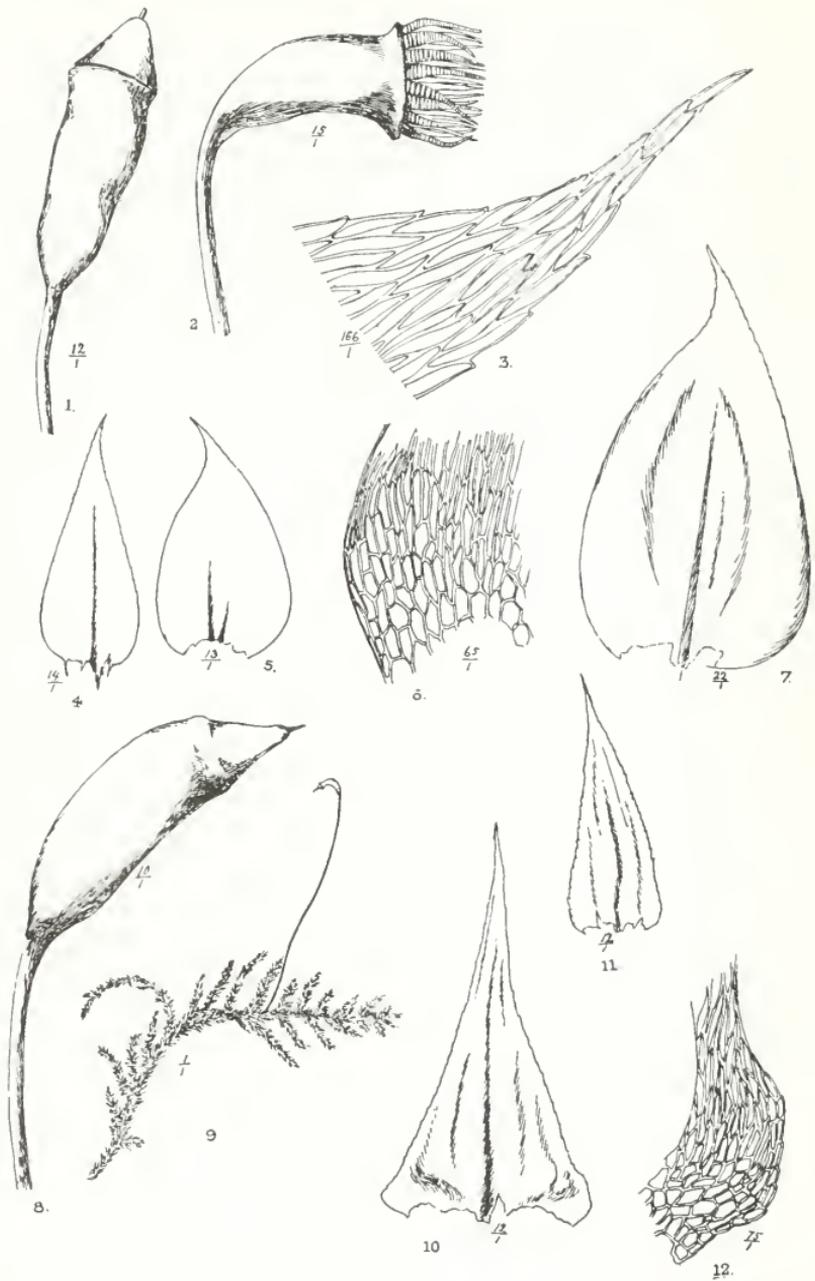
Sporophyte 3-4cm. high; seta red, becoming red-brown when old, very rough, very little or not at all twisted; capsule oblong-cylindric, arcuate and inclined, to nearly horizontal, with operculum about 3.5mm. long, about 4:1; somewhat contracted under the mouth when dry; operculum conic and rostrate with a shining black, needle-like beak, about one-third the height of the entire operculum; annulus inconspicuous, of a single row of cells; teeth red; segments slender, widely open along the keel, from a basal membrane about one-half their height; cilia two or three, well developed but shorter than the segments, nodose or slightly appendiculate; spores about 0.013mm., shrunken and apparently immature on date of collection, November 23, 1890

Type locality, moist banks, Mason county, Washington.

G. V. Piper, No. 25, Nov. 23, 1890.

Type in Eaton Herbarium at Yale. Co-type in Herbarium of Columbia University.

Closely related to *B. asperrimum* and *B. lamprochryseum*, differing from both in its almost regularly pinnate branching and auriculate stem leaves; also from the former in the narrower, more strongly plicate stem leaves, branch leaves not decurrent, and in the longer, more slender, and more arcuate capsule. From the latter it also differs in the more slender habit and narrower, less plicate stem leaves. *B. asperrimum* and *B. Washingtonianum* are characterized by an operculum abruptly rostrate when dry, with a slender black shining beak, the operculum itself being some shade of brown. This is well illustrated in Sullivant's figures of *B. asperrimum*. Icones Musc. Suppl., pl. 76. When moist this operculum becomes long conic and rostrate, as shown in the plate. Taken by itself, this species might be referred to



DESCRIPTION OF PLATE I.—Figs 1-7, *B. noveboracense*: 1 and 2. Capsules. 7. Stem leaf. 6 and 3. Basal angle and apex of the same. 5. Stem leaf with double costa. 4. Branch leaf. Figs. 8-12, *B. washingtonianum*: 10. Stem leaf. 12. Basal angle of the same. 11. Branch leaf

Eurhynchium or *Camptothecium*, but it is certainly more closely related to *B. asperrimum* and *B. lamprochryseum* than to any other species of Musci. The capsules of *B. asperrimum* in Sullivan's figures are more slender than is the rule in a large series of specimens examined.

The following additional collections have been made:

J. B. Leiberger (No. 573), Lake Pend d'Orielle, Idaho, in calcareous springs, Jan. 21, '91. This is more robust and less pinnate than the type and varies in the direction of *B. lamprochryseum*. Macoun's Canadian Musci, 439, *Hypnum* (*Camptothecium*) *megaptitulum*, on base of old stumps near the sea, Hastings, Barnard Inlet, B. C., is apparently this species. Both these specimens have been previously referred by me to *B. lamprochryseum*, this being the nearest species previously described.

FURTHER NOTES ON MOUNTING MOSSES.

IT is an acknowledged fact that the present method of mounting mosses is productive of anything but good looking sheets after the collection has been in existence for some time. Unless the sheet is full, there is always the temptation to add just one more specimen. Then as study proceeds, some of these specimens are almost sure to be referred to other places, and must be detached from the sheet, leaving unsightly spots. By the use of half or quarter sheets much of this difficulty may be avoided, but for one who wishes to mount mosses on sheets the same size of those his flowering plants are mounted upon, some sort of an elastic system must be adopted which will allow him to fill the whole sheet at once, and yet permit the collection to grow. The method here illustrated seems to meet all requirements. It consists of the ordinary mounting sheet of standard size, in which sixteen short slits are cut, and into which the corners of four quarter sheets may be inserted. The specimens are then mounted on the small sheets, and afterwards fastened to the ordinary sheet by placing the corners in the slits. This method has the following advantages: Specimens wanted for study may be detached instantly. Specimens may be changed about on the sheet without damaging the sheet or specimens. Different species of the same genus may be mounted on the same sheet temporarily, and later replaced by other specimens, in which case all the specimens of one species may be kept on the same sheet, and lastly, the whole collection can be filed away in covers uniform with those of flowering plants. While this is primarily an elastic system the mounts may be made permanent by fastening the small sheets to the large one with a drop of glue.—*Willard N. Clute, Binghamton, N. Y.*

THE SULLIVANT MOSS CHAPTER.

We purpose printing each quarter a list of members who have added new or interesting localities for our rarer mosses, or extensions of range for the more common ones.

(Names of L. & J. Manual are used for convenience.)

Mr. J. Warren Huntington has listed 122 species from Amesbury, Mass., including the following: *Dicranum viride* Schimp. *Dichelyma capillaceum* B. & S. *Catharinea crispa* James. *Brachythecium rutabulum* B. & S. *Plagiothecium latebricola* B. & S. *Homalothecium subcapillatum* Sulliv. *Fissidens minutulus* Sulliv.

Mr. Charles K. Dodge, Port Huron, Mich., reports: *Mnium rostratum* Schrad. *Polytrichum strictum* Banks.

Mrs. Eby, Lancaster, Pa., reports: *Barbula muralis* Tim n.

Miss Crockett, Camden, Maine, has collected over 43 species, including *Thuidium scitum* Aust. *Hypnum glutans* L. *Mnium affine* Bland (var. *ciliare* of Mrs. Britton's list) *M. orthorrhynchum* B. & S. *Hypnum dilatatum* Wils.

Mr. Greenalch has collected 96 species in and near Schuylerville, N. Y., including the following: *Anacamptodon splachnoides* Brid. *Thelia asprella* Sulliv. *Anomodon obtusifolius* B. & S. *Pylaisia velutina* B. & S. *Hypnum serrulatum* Hedw. *H. rusciforme* Weis. *H. hispidulum* Brid. *H. cupressiforme* L. *Mnium marginatum* (Dicks) P. Beauv. *M. orthorrhynchum* B. & S. *Timmia megapolitana* Hedw. *Buxbaumia aphylla* L. *Dichelyma falcatum* Myrin. *Gymnostomum curvirostrum* Hedw. *Fissidens incurvus* Schwægr. *F. taxifolius* Hedw. *Leptotrichum glaucescens* Hampe. *Dicranum fulvum* Hooker. *Orthotrichum strangulatum* Beauv. *Encalypta ciliata* Hedw.

Mr. Edward B. Chamberlain reports the following: *Mnium spinulosum* from central Maine, collected by E. D. Merrill. *M. stellare* from Hebron, Maine, collected by Mrs. M. L. Stevens.

Mr. Francis Windle, West Chester, Pa., has consented to identify any Lichens that members of the Chapter may send to him, enclosing the necessary return postage.

THE BRYOLOGIST

VOL. III.

OCTOBER, 1900.

No. 4.

THE success of THE BRYOLOGIST and of the Sullivant Moss Chapter has been very largely due to the untiring efforts of Mrs. Smith. It is to be hoped that the members of the Chapter will remember this when they vote. It is needless to say that this is inserted without consulting Mrs. Smith.

* *
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BEGINNING with the January number, THE BRYOLOGIST will contain sixteen pages. At least two pages will be devoted to the Lichens, under the editorship of Mrs. Carolyn W. Harris. Mrs. Harris is well qualified for this work, and we assure our readers that there is a rare treat in store for them. Some space will also be devoted to the Hepatics, as circumstances warrant.

* *
*

KEEP watch of the different mosses in your locality and record the date of the first appearance of the sporophyte and the date of maturing spores. Be sure to collect specimens to verify your observations. This kind of work can be done by anybody who is willing to take a little pains in observing, and it is work of great scientific value when collected and correlated. Altogether too little work of this kind has been done in the past in any department of botany. There is a regular procession of mosses, as it were. Beginning in early spring one can collect mosses in mature fruit all the year round. Different species of the same genus mature spores at different seasons, and in this way afford as good a means of identifying the species as any structural characters.

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TO STIMULATE work of this sort, the Editor offers as a prize a century of North American Musci Pleurocarpi and a year's subscription to THE BRYOLOGIST to that subscriber of this journal who shall send him the dates of appearance of sporophyte and of maturing spores of the largest list of mosses. The dates can be given as the first, second, third, or fourth week of the month, or the exact day of collecting can be given. The list must be accompanied by a specimen of species listed, collected on the date given by the person submitting the list. Date of maturing spores will count two points, date of appearance of sporophyte one point. Spores are supposed to be mature when the lid readily separates from the dry capsule. Observations previous to date may be counted if a specimen has been preserved. Specimens should be fully labeled. Contest closes December 1, 1901.

SUGGESTION FOR GLYCERINE JELLY MOUNTS.

BY PROF. JOHN M. HOLZINGER.

I HAVE always found it awkward to handle small mounts of mosses or sections of organs in jelly between mica. To obviate this difficulty I have hit upon a plan which has received much favorable comment from several of my correspondents.

I take two thicknesses of paper, one of ordinary writing paper, the other cardboard slightly heavier than postal card paper. From each I cut out strips of equal size, as long as ordinary microscope slides and a very little wider. These I fasten at one end with paste to keep them from slipping. Then I lay the glycerine jelly mount, which of course must not be as wide or as long as my paper slide, on this paper slide and center it, marking off a space a little less than the mount. This space I cut through both thicknesses with a sharp pointed pen-knife. Then I cover the inside of the cardboard with paste, lay down over it, properly centered, the jelly mount, and press down the thin paper, carefully avoiding any misplacement. The two thicknesses of paper thus become a frame for the mount, with a sufficient margin of white paper to receive all necessary data.

These slides I keep each with its proper packet of moss material, protecting it from injury by a small paper pocket. This idea is not original, but was suggested by some mounts of Bruch's which I remember having seen in the National Herbarium at Washington.

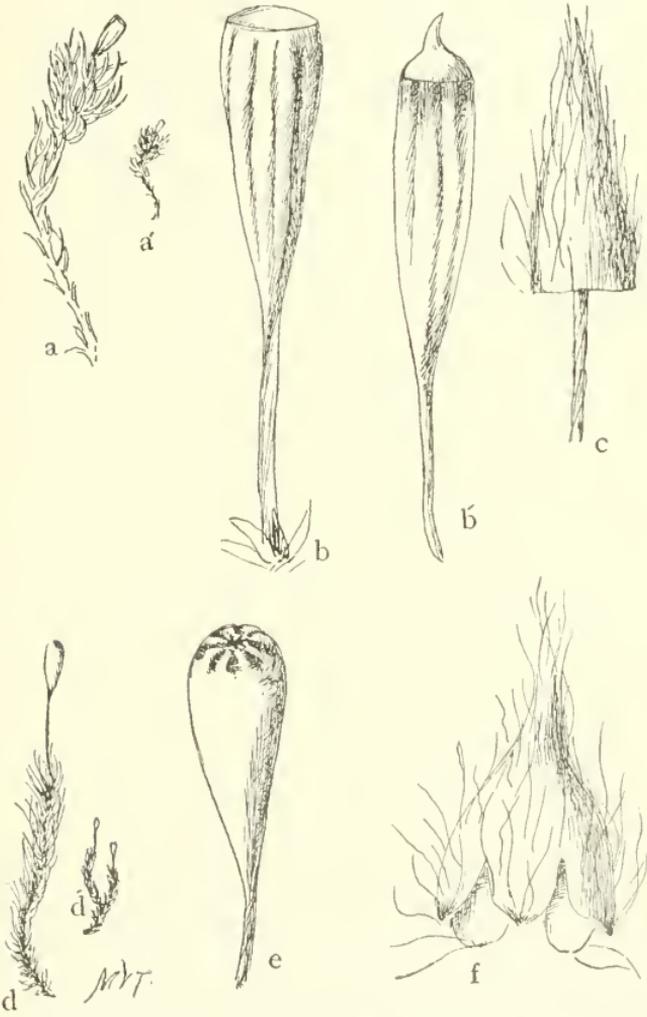
P. S.—That was a timely suggestion made recently in these columns by Mrs. Britton to the younger moss students who habitually appeal to their older moss friends for aid in determinations, namely, that they should send with each moss to be named a prepared slide. If this were done more uniformly the elder "brethren" would be saved much mechanical work of preparing moss parts for inspection. But I am sure it would also have a more far-reaching effect upon all who take up the study of mosses, making them much more thorough, and acquainting them much more rapidly with the microscopic characters of our mosses. One is much more likely to examine critically a moss accompanied by a slide than one without such preparation. And this not only because it is easier to examine it, but largely because the preparation of the slide is an earnest of the purpose of the beginner who seeks aid.

Winnona, Minn.

[Four parts should always be mounted on each slide—stem leaves, branch leaves from the middle of the branch, the short branch from which the middle leaves have been stripped, and the peristome.—Eds.]

WEISSIA.*
BY A. J. GROUT.

THE Weissias have the characteristic brownish-green or blackish-green color of the Grimmiaceae family. They are distinguished from all save Orthotrichum by the hairy calyptra. Both Orthotrichum and Weissia grow on the bark of trees or more rarely on rocks, in cushions of varying size and thickness.



DESCRIPTION OF FIGURES. a, a', *Weissia ulophylla* $\times 4$ and $\times 1$ respectively. b, b', Capsules of the same $\times 20$. c, Young sporophyte with calyptra $\times 20$. d, d', *Weissia coarctata* $\times 4$ and $\times 1$ respectively. e, Capsule $\times 20$. f, Calyptra of mature capsule $\times 21$.

The Weissias growing on trees usually grow in more rounded tufts with the leaves more crisped when dry than is usual with Orthotrichum growing in similar situations. The books all say that the hairs on the calyptra of Weissia are flexuous, and those on Orthotrichum straight, but this distinction appears to be rather too fine for the amateur to profit by it. The capsules in both genera are erect and symmetric and quite regularly striate when dry with eight or sixteen ridges and as many alternating furrows. These ridges consist of cells larger, darker, and thicker-walled than the alternating tissue. The seta in Orthotrichum is so short that the capsule is nearly always partially immersed; in Weissia the seta is long enough to exert the capsule entirely beyond the perichaetial leaves.

Orthotrichum is a very large and difficult genus, and cannot be successfully treated in a book of this kind. Weissia is a small genus whose species are easily recognizable without any lens whatever.

The Puckered Weissia has pear-shaped capsules, abruptly narrowed to the very small mouth; the ridges and furrows extend only a short distance around the mouth of the capsule, giving it the peculiar and characteristic appearance shown in the cut.

The capsules of the Crisped Weissia have a much larger mouth and are striate for the entire length. The seta is shorter, the color is lighter, and the tufts are rather thicker than in the Puckered Weissia. In a not uncommon variety of the Crisped Weissia the capsule is much shorter and is suddenly contracted into a neck, narrow and much twisted when dry. These two species grow exclusively on trees; the third, the American Weissia, grows exclusively on rocks. Its leaves are rigid when dry like those of Orthotrichum, not crisped as in the two tree-growing species; the capsules very closely resemble those of the Crisped Weissia.

All three of the Weissias are common in the hilly regions of our range. They mature their capsules in autumn or early winter, but apart from the calyptra are more characteristic when dry and empty. The tree-growing species furnish good collecting for winter and early spring, when most other mosses are buried under the snow.

WEISSIA EHRLH. = *Ulot* Mohr.

The Puckered Weissia = *W. coarctata* (Beauv.) Lindb. = *Ulot* *Ludwigii* Brid.

The Crisped W. = *W. ulophylla* Ehrh. = *Ulot* *crispa* Brid.
variety = *W. ulophylla crispula* (Bruch) Hammar
= *Ulot* *crispula* Brid.

The American Weissia = *W. Americana* (Beauv.) Lindb. = *Ulot* *Hutchinsæ* Schimp.

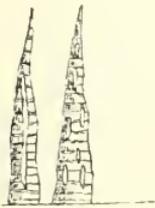
*From "Mosses With a Hand-lens," by permission.
Brooklyn, N. Y.

NOTES.

Antherozoids of Mosses.—Dr. Grout states that “not one botanist in a hundred has ever seen these bodies in motion.” I think this is too sweeping a statement. I have had no difficulty in finding motile antherozoids whenever I chose to look for them. I have seen them in the following species: *Aulacomnium palustre*, *Dicranella heteromalla*, *Physcomitrium turbinatum*, and *Bryum argenteum*. It seems to me to be only necessary to study any of the commoner species in some locality for several years, and watch the changes in development due to variation in the seasons, and the amount of moisture, to learn when and where to find them.—*E. G. Britton.*

North American Musci Pleurocarpi, issued by A. J. Grout, Ph. D.—Dr. Grout has taken the initiative in issuing these exsiccatae by beginning with several of the genera which he has recently studied and monographed, and securing the aid of L. S. Cheney and others. It is just what is needed at the present time, sets of species of certain critically-studied genera, so that those who have been trying to follow the many changes and corrections incident on the great stimulus which has been given to the study of North American mosses by the numerous European publications of the last decade, shall have a chance to understand and correctly appreciate these changes without the expenditure of so much time and money as is necessary to ferret them out individually. A similar set of acrocarpous mosses will be issued from the Herbarium of the New York Botanical Gardens by the workers there, and a large accumulation of material is awaiting sorting and determination from various parts of the country. Dr. Small has made large southern collections, Mr. Williams has lived for many years in Montana and secured many valuable specimens, and there are many other sets of specimens awaiting the students to come and work on them.—*E. G. B.*

ILLUSTRATED GLOSSARY—Continued.



Cribose (of the peristome teeth), perforated with small apertures. (Fig. 38.)

Cucullate calyptra, a calyptra that is hood-shaped and split on one side only. (Fig. 33.)

Cygneous (of the seta), curved suddenly downwards like a swan's neck.

Deoperculate, applied to a capsule after its lid has fallen off.

Dimidiate, split on one side.

Divisural line, the line down the teeth of a peristome,

through which they split. (The zigzag line down the middle of the teeth and the line down the middle of the segments in Fig. 43.)

Emergent, or *emersed*, half uncovered; of the capsule, when the perichaetial leaves reach but do not overtop it.

Endostome, see *peristome*.

Endothecium, the inner layers of cells of the capsule.

Epiphragm, a membrane covering the mouth of the deoperculate capsule; in the Polytrichums and their allies it consists of the dilated top of the columella. (Fig 35, a.)

Exostome, see *peristome*.

Exserted, elevated above the surrounding parts; of the capsule, when the perichaetial leaves do not reach so high as its base.

Fenestrated, perforated.

Geniculate (of the seta), suddenly bent, like a knee.

Gibbous (of the capsule), more tumid or swollen on one side than on the other.

(Fig. 39.)

Glaucous, originally applied to plants covered with a bluish white bloom, but now applied to mosses that have that color.

Granulose, or *granulated*, rough as with minute grains of sand.

Gymnostomous, without a peristome.

Hygroscopic, readily absorbing water and thereby altered in form or direction. *Hygrometric* is sometimes used with a similar meaning.

Hypophysis, a swelling of the seta immediately under the capsule. (Fig. 35.)

Immersed, covered up; of the capsule when the perichaetial leaves project beyond it.

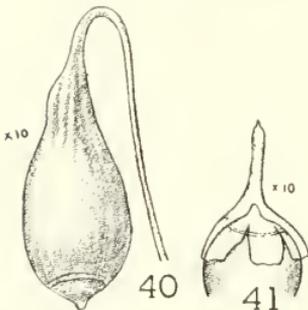
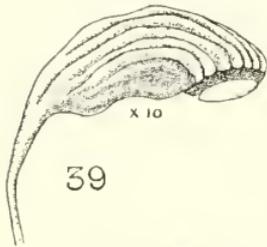
Leptodermous, thin coated; applied to capsules when soft and pliable.

Lid, = *operculum*, which see.

Mamillate, or *mammillar* (of the lid of the capsule), convex with a short projection in the center. (Figs. 40 and 41.)

Mitriform (of the calyptra), cleft on two or more sides, and symmetrical. (Fig. 41.)

Muricate, *Muriculate* (of the spore), rough with minute sharp points.



Neck (of the capsule), the lowest part just above the point where it joins the seta. See also *collum*.

Nodose, covered with knots or prominences.

Nodulose, covered with very small knots or prominences. (The cilia in Fig. 43.)

Ochrea, a thin sheath around the base of the seta, terminating the vaginula.

Operculum, the lid which closes the capsule and, falling, permits the spores to escape. (Figs. 32, 37, 40.)

Pachydermous, thick skinned; applied to the walls of capsules or to cells when firm and resisting.

Papillose (of the seta), rough with small rounded or acute protuberances. (Fig. 42.)

Pedicel, = *seta*, which see.

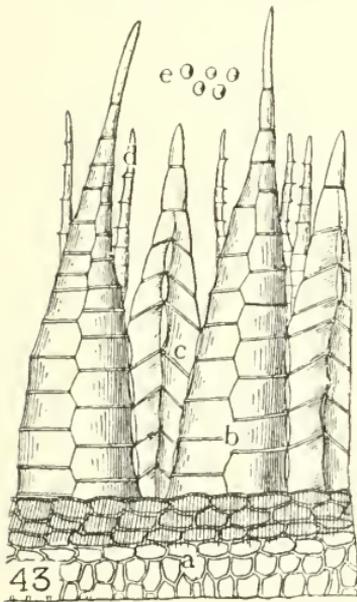
Pendulous, somewhat hanging or drooping; more so than in *cernous*. (Fig. 40.)

Peristome, the fringe surrounding the mouth of the capsule upon removing the lid. This fringe may consist of a single row of processes,

known as *teeth*, as in Fig. 31, or of a double row as in Fig. 43. In the latter case the entire fringe is still the *peristome*, but the term is also applied in a particular sense to the outer row; the outer row is often spoken of as the *exostome* (*b*), and the inner as the *endostome* (*c*). The inner row consists of as many projections as the outer, but alternating with them; these are known as *processes* or *segments* (*c*). Between the segments there are often one or more slender hair-like processes known as *cilia*. (Fig. 43, *d*; fig. 36, *c*.)

Moss peristomes, viewed with a compound microscope, are among the most beautiful of natural objects. They are not composed of

cells (except in the Polytrichaceæ and a few other small families), but of thickened cell walls. The cross markings on the teeth, segments, and cilia are the lines of junction of the transverse cell walls with the longitudinal cell walls forming the peristome. The



radial walls are rarely thickened so as to appear in any way; the divisural line shows the place of their attachment to the teeth and segments.

NEW AMERICAN MOSSES.

HYPNUM (CALLIERGON) CYCLOPHYLLOTUM Holzinger, Minnesota Botanical Studies, Nov., 1896, *pl.* 39.

“Plants dark green above, yellow below; 8-10cm. high; erect by crowding. Stem leaves concave, ascending when moist, as broad as long, or *broader*, obtuse, entire margined, costate to apex; costa broad; leaf angles decurrent, strongly excavate, their cells *abruptly* enlarged, hyaline, 0.08-0.1mm. \times 0.025-0.04mm., the thin walled cells not quite reaching the costa; upper leaf cells 0.04-0.06mm. \times 0.008-0.01mm.; branch leaves, of the short axillary branches, also concave, much smaller, the costa faint, not extended into the obtuse apex. Dioicous; antheridial buds numerous along the middle part of the stem, shorter than the leaves, in their axils. Fruiting plants not found.

“This plant is near *Hypnum cordifolium*, but differs from this species in having its leaves more *closely* set on the stem, costate to apex, and *much wider* in proportion to length; also in having the larger cells of the auricles abruptly enlarged, and the leaf cells proper *smaller*.

“It differs from *Hypnum giganteum* in its unusually broad leaves, smaller size, dark green color, and fewer and shorter branches.”

Collected in Lamoille “Cave,” Minnesota; associated with *Brachythecium rivulare*.

GRIMMIA (EUGRIMMIA) BRITTONIÆ R. S. Williams, Bull. Torr. Bot. Club, 27: 316. *pl.* 19. 1900.

“Growing in dense hemispherical tufts up to 3.5cm. high. Stems slender, usually bearing long branches. Outer perichaetial and upper stem leaves with blade 1mm. in length, oblong, somewhat lanceolate pointed, concave, flat on the borders with a nearly smooth hair point up to three times the length of blade; lower leaves a little smaller with hair point scarcely equaling blade, more concave and somewhat recurved; inner perichaetial leaves minute, triangular, with hair point eight to ten times length of blade; upper cells irregular, roundish or quadratic, about 0.006mm. in diameter, gradually becoming elongated below, towards the base three or four times longer than broad near the costa and one and a half to two times longer than broad near margin; cells

but slightly sinuous walled when filled with chlorophyl, later on the walls become distinctly sinuous both above and below.

“Apparently dioicous; fruit unknown.”

Growing on shaded perpendicular walls, partly calcareous, in rather dry places. Collected for several seasons in Bad Rock Cañon, Flathead river, Mont.

Dedicated to Mrs. E. G. Britton.

GRIMMIA (EUGRIMMIA) TENUICAULIS, R. S. Williams, l. c. *pl.* 20.

“In compact tufts up to 6 cm. high. Stems very slender, often threadlike, with few simple, mostly short branches; perichaetial and upper stem leaves rather broadly ovate-lanceolate, concave, revolute on the borders, blade $1\frac{1}{3}$ mm. long, with rough hair point about $\frac{2}{3}$ blade in length, the papillæ of point spreading, often recurved; moistened leaves erect-spreading; upper cells irregular, somewhat transversely or vertically elongated, mingled with rounded cells 0.004.006 mm. in diameter; cells toward base more or less elongated rectangular, those near margin from nearly quadratic to twice longer than broad, toward costa becoming 2.4 times longer than broad; cells apparently never sinuose walled; occasionally the leaf is hyaline nearly $\frac{1}{4}$ down from apex, the hyaline cells always elongated; evidently dioicous; sporophyte not seen.”

“Type from near Neihart, Belt Mts., Mont., Sept. 21, also, obtained at Marsh Lake and Dawson on the Yukon River.”

The above descriptions are slightly abbreviated from the original.—A. J. G.

RECENT LITERATURE RELATING TO NORTH AMERICAN MOSSES.

M. JULES CARDOT, the well-known French student of mosses, has recently rendered a great service to American bryology in examining the types of Hedwig and Schwægrichen, which are preserved in the Boissier Herbarium.* One of the greatest stumbling blocks to American students is the uncertainty as to what the types may be, for they are often in European herbaria accessible only to the man who can afford to cross the Atlantic. We hope Monsieur Cardot will not stop here, but will go on and look up other American types stored in foreign museums. The types of the late C. Müller will afford an interesting and profitable study. We present below some of the most important of M. Cardot's conclusions:

Barbula acuminata Hedw.—*B. fallax* Hedw.

B. lanceolata Hedw. is a form of *B. unguiculata* Hedw., as also is *B. stricta* Hedw.

* Etude sur la Flore Bryologique de L'Amerique Du Nord. From Bull. Herb. Boissier 7: 300-380, 1899.

Hypnum asprellum Schwægr., Suppl. 1²: 246 is a slender form of *Brachythecium plumosum* (Sw.) B. & S.

Hypnum chrysostomum Rich. is a form of *Brachythecium plumosum*.

H. fragile Brid. is a form of *H. chrysophyllum* Brid.

Hypnum polyrhizon Brid. is a form of *Brachythecium plumosum*.

The type of *Hypnum stoloniferum* Hook. is the form known as var. *Cardoti* (Kindb) R. & C. M. Cardot proposes the name var. *substoloniferum* for the plant to which recent authors have applied the name *Hypnum* (*Isothecium*, *Eurhynchium*) *stoloniferum*.

Hypnum tenax Hedw. is a synonym of *Amblystegium irriguum*. The specific name *tenax* antedating *Hypnum irriguum* of Wilson by fifty years.

Leskea compressa Hedw. = *Entodon cladorrhizans* (Hedw.) C. M.; not *E. compressus* C. M.

Leskea fasciculosa Hedw. is a var. of *Eurhynchium strigosum* (Hoffm.) B. & S., intermediate between var. *diversifolium* and var. *præcox*. It is undoubtedly the var. *præcox* as defined in my revision. This opinion is based on the locality from which the specimen came.

Leskea gracilescens Hedw. was not found in the Herbarium. In the opinion of M. Cardot it is probably *L. microcarpa* Sulliv.

Leskea imbricatula Hedw. is a synonym of *Brachythecium acuminatum* (Hedw.) Kindb.

Pterigynandrum intricatum Hedw. = *Pylaisiella velutina* (Schimp.) Kindb., not *P. intricata* of modern authors. For the plant known as *P. intricata* he proposes the name *Pylaisia Schimperii* R. & C. This modified to *Pylaisiella* becomes *Pylaisiella Schimperii* (R. & C.) Grout, as issued in my North American Musci Pleurocarpi No. 3: Jan. 1, 1900.

Petrogonium ascendens Schwægr. = *Platygyrium brachycladon* Kindb. It is apparently a separate species near *Entodon repens* (Brid.) Grout.

Trichostomum tenax Hedw. = *Ditrichum tortile*, var. *pusillum* of Europe.

Hypnum siphon P. Beauv. = *Amblystegium floridanum* R. & C. and not *A. riparium* (L.) B. & S. A. J. G.

THE SULLIVANT MOSS CHAPTER.

Report of the Second Meeting of the Sullivant Moss Chapter.

On June 27th, 1900, the Sullivant Moss Chapter was a guest at the Museum of the New York Botanical Garden at Bronx Park, and held its second meeting there, being called to order by President Grout at 1:30 P. M. The meeting, owing to the extreme heat, was very informal. A number of papers were read by title only, as time was limited. Dr. Grout gave the opening address of welcome, emphasizing the point that in times past a classical education was considered necessary, whereas now no one could be considered cultured who did not have a knowledge of some of the many departments now comprised under the head of "Natural Science." Then followed a report of the first meeting of the Chapter, held at Columbus, Ohio, August, 1899, read by Mrs. E. G. Britton. This gave the history of the organization for the first six months. Then followed the report of the Secretary up to date. Prof. T. C. Porter, of Easton, Pa., gave most interesting personal reminiscences of collecting with Lesquereux, and other distinguished botanists. Dr. George N. Best read a valuable paper on "Asexual Reproduction in the Mosses." Miss Taylor gave a paper on her recent studies "On the Stem of *Dendroligotrichum dendroides*." Mr. Williams gave an account of his collecting in the Klondike, and explained his collection, which was on exhibition, as was also the Herbarium of the Chapter. This exhausted the time and the meeting was adjourned. Some went on the walk about the Garden, and some remained to carry on an informal discussion till time for the "Al fresco" dinner at French Charlie's. Thirty-two persons were present. The Chapter now numbers 83. *All interested in Mosses, Hepatics and Lichens* are invited to join.

Local lists were exhibited from twenty-five members, and the general feeling was that the Chapter was now on a firm basis and only needed the enthusiastic coöperation of all to make it a most powerful working force in its chosen field.

Respectfully submitted,

ANNIE MORRILL SMITH, Secretary.

NOTE.

Buxbaumia aphylla L.—This rare and curious moss has been twice found in Chester county, Pa., first, by Benjamin M. Everhart many years ago near the South Valley hills, on slaty soil; second, by myself in a woods near West Chester, on the north slope of a slaty hill near a stream, where many other mosses grew. The *Buxbaumia* was then in fruit—December 16, 1899—but spores not yet ripened. I visited the spot again this spring—March 7, 1900—and found a few plants which had fruited, but had shed their spores by this time, excepting one capsule. In this instance it was a winter fruiting plant; Dixon and Jameson give its fruiting time as early summer.—*Francis Windle, West Chester, Pa.*

Elections.

Forward your ballots for officers and amendments to Mr. J. Franklin Collins, 468 Hope St, Providence, R. I., on or before November 1st Show your interest in the Chapter by voting as early as possible.

CANDIDATES.

For President—Dr. G. N. Best, of Rosemont, N. J., the well-known writer on mosses and the author of several monographs, and Mrs. Carolyn W. Harris, of Brooklyn, N. Y.

For Vice-President—Mr. J. Warren Huntington, of Amesbury, Mass., and Mr. Edw. B. Chamberlain, of Providence, R. I.

For Secretary-Treasurer—Mrs. Annie Morrill Smith, and Miss Harriet Wheeler, of Chatham, N. Y.

AMENDMENT.

The following amendment to the Constitution is proposed:

Section 4 of Article 3 shall be amended so as to read: The regular yearly dues shall be seventy-five cents for active members and fifty cents for associate members.

A. J. GROUT,
ANNIE MORRILL SMITH,
J. FRANKLIN COLLINS.

This amendment is proposed in order to give the Chapter a little revenue for postage, printing, etc. At present much of the Chapter expense has been met by Mrs. Smith.—*A. J. G.*

The Chapter is to be congratulated that Dr. Best has consented to become a candidate, as there is no one better qualified for the position than he. Very few students in this country have the knowledge of our common mosses that is possessed by Dr. Best, as any one will have discovered that has been fortunate enough to correspond with him.—*A. J. G.*

The printer made two or three serious errors in my Keys to Vt. Mosses and I have prepared a set of printed corrections to be supplied to Chapter members for a self-addressed stamped envelope.—*A. J. G.*

THE BRYOLOGIST.

VOL. IV.

JANUARY, 1901.

No. 1.

READERS OF THE BRYOLOGIST will be interested to know that in this, its first year of independent existence, it has just paid for itself. This may seem a poor showing to those not acquainted with such matters, but we can assure our readers that it is a better financial showing than many more pretentious scientific journals can make. Encouraged by the cordial reception given the BRYOLOGIST during the past year, the EDITORS have decided to add four pages to each issue and illustrate more freely, nearly doubling the cost of the journal.

* *
* *

In order to fill the additional space with material, we earnestly solicit from our readers more short notes on interesting finds. The notes on *Buxbaumia* in this number will illustrate what is meant.

VEGETATIVE REPRODUCTION OF MOSSES.

BY G. N. BEST.

The asexual or vegetative reproduction of mosses, by which we mean the multiplication of these plants by other means than by sexually formed spores, is accomplished in two general ways, either by parts of the plants normally considered, or by adventitious formations which appear on the normal plant for this purpose.

More than fifty years ago Schimper* made the broad assertion that "every leaf and every portion of a leaf detached from the mother plant and placed under favorable conditions can produce proembryonic filaments," and more recently Limpricht† has stated that "all parts of a moss plant have the capacity to produce secondary protonema." It remained, however, for Heald‡ to demonstrate experimentally that if a moss leaf was detached from its stem and placed under favorable conditions for growth, it would produce rhizoids from its lower surface and protonema from its upper, and that in time buds would appear on the latter, and that these would ultimately grow into the vegetative plant. But it is to Correns|| more than to anyone else that we are indebted for a comprehensive treatise on this subject.

It is of interest to note that the outer cells of the stems and branches of a moss plant, as well as the leaf cells, are analogous in function to sexually formed spores, in that they have the capacity to produce rhizoids and protonema, and thus reproduce the parent plant. While it is exceptional for vegetative buds to appear on the rhizoids, they sometimes so occur. It is not uncommon, however, for rhizoids to produce secondary protonemata and for buds to appear on these as on primary protonemata.

*Recherches Anat. et Morph. sur les Mousses, 19, 1848.

†Die Laubmoose, 1:61, 1890.

‡Bot. Gaz., 26:169, 1898.

||Vermehrung der Laubmoose, 1899.

The stems of most mosses are made up of a succession of similar parts, the annual growths, and are separable or transversely breakable at certain points, more especially at the points where one season's growth ends and the next begins. When a part is detached and is carried to a favorable spot, it commences its growth by producing rhizoids, which serve the double purpose of fastening it to a substratum and of assisting in its nourishment. The part may now continue its growth and develop into a plant, or it may produce protonemata with vegetative buds directly, or by the intervention of rhizoids. Branches, when detached from their stems, usually reproduce the plant in the same manner as stems. They are, however, in some species, as *Campylopus flexuosus*, provided with special means for vegetative reproduction. At a certain point, usually near its distal end, the branch is so weakened by a cleavage in its walls (Trennschicht), that the terminal portion is readily shed. When detached, these end branches (Endknospen) grow into plants in the manner already detailed. In structure and development they are closely related to bulbils. When a leaf of a moss plant is detached from its stem (which often happens as the result of mechanical action or of a process of fatty degeneration of its insertion cells, as in *Dicranum scoparium*) and finds a favorable lodgment, it reproduces the parent plant as stated when reference was made to Heald's experiments, more rarely by vegetative buds directly from its surface. In some species, as *Dicranum viride* and *Anomodon tristis*, the leaves are transversely breakable by a line of weakened cell cohesion, the detached or broken parts reproducing the plant as is done by the whole leaf.

The adventitious formations which serve to propagate asexually the moss plants are of two kinds, bulbils, sometimes called gammae, and brood bodies, sometimes called propagula. In their simplest form, bulbils are little buds without apparent central axes, and usually appear on the stem, as in *Webera annotina*, but may be located on any part of the moss plant. When shed, sometimes even before, they produce rhizoids and grow directly into the vegetative plant. In their higher development, with rudimentary stems and leaves, they appear in bud-like aggregations on the end of stems, as in *Leskea nervosa*, sometimes on branches as well. In their highest development, their character as shoots becomes apparent, with stems and leaves, as in *Dicranum flagellare*, growing into plants, however, in precisely the same manner as is done by the simplest forms.

Brood bodies are polymorphous and variously located. In their simplest form they are deciduous rhizo-protonemata which appear in clusters on stems, often on midveins, as in *Plagiothecium Roeseanum*. They are, however, usually more complex in structure, and are sometimes borne on specialized stems and branches, the pseudopodia, as in *Aulacomnium palustre*: or in a cup-shaped involucre, as in *Georgia pellucida*; or on rhizoids (Brutknollen), as in some of the Barbulae; or on the excurrent costa, as in *Ulota phyllantha*; or on the paraphyses, as in *Pottia riparia*; or on the upper surface of leaves, as in *Tortula papillosa*; or on both surfaces, as in *Orthotrichum Lyellii*; or in fasciculate clusters on the midrib at the base of the leaves, as in *Grimmia torquata*. In whatever form or position they appear, their function is the same, the reproduction of the parent plant, which they accomplish by producing protonemata.

What are these brood bodies, and what structures do they represent? Evidently they are either metamorphosed buds or leaves. It may be conjectured that there was a time in the history of these plants when they were destitute of sporophytes, and that vegetative reproduction was the only means of their multiplication. Even at this day, were it not for this factor, our moss flora would dwindle away and become but a remnant of what it now is. By the action of winds, rains and snows, these brood bodies, as also stem segments and leaves, are not only loosened from their attachments, but are carried away, sometimes to considerable distances, and thus become effective not only in the propagation but in the dissemination as well, of the plants from which they were derived.

HYLOCOMIUMS OF THE NORTHEASTERN UNITED STATES.

BY ANNIE MORRILL SMITH.

Key to the species.

- | | |
|---|----------------|
| Leaves secund, sharply serrate at apex, costa long and single; alar cells quadrate, | 1. rugosum |
| Leaves not secund (equally spreading). | |
| Paraphyllia none. | |
| Leaves sulcate, bicostate; leaf cells enlarged at base, | 2. triquetrum |
| Leaves slightly sulcate, faintly bicostate or ecostate, a triangular patch of orange cells at angles, | 3. parietinum |
| Leaves not sulcate, faintly bicostate, alar cells somewhat enlarged and more hyaline, not inflated, suddenly recurved-squarrose at tip, | 4. squarrosum |
| Paraphyllia present. | |
| Leaves deeply sulcate, with long distinct double nerve, serrate in upper half, | 5. umbratum |
| Leaves obscurely bicostate; paraphyllia pinnate: branches 2-3 pinnate, | 6. proliferum |
| Leaves distinctly double nerved; paraphyllia minute: branches irregularly pinnate, | 7. brevirostre |
| Leaves one-nerved to middle, coarsely serrate, | 8. Pyrenaicum |

In the present study of *Hylocomiums*, eight species found in northeastern America have been included. Lesquereux & James' Manual cannot be followed in this genus. *H. rugosum* is there placed in the subgenus *Rhytidium*, *H. Schreberi* in the *Calliergon* group. I prefer to follow Limpricht and include the latter among the *Hylocomiums*, dropping also Lesquereux & James' subgenus *Pleurozium*, and counting all in one genus. *H. robustum* and *H. loreum* are of western range only, and are therefore omitted.

It is difficult to describe in words the differences which separate the *Hylocomiums* from the *Hypniums*, but when once the general appearance of the plants is learned, one can readily see a strong family resemblance. They are of free and robust growth, loving both damp and shade as well as the open situations. Most of our species of *Hylocomiums* fruit sparingly or infrequently, the capsules maturing in late summer or autumn. *H. rugosum* never fruits with us, but fruits abundantly in the Klondike.

1. *H. rugosum* (Ehrh) De Not., is not very common, but is found in patches by itself, and can readily be identified by its second leaves, with



Fig. 1. *H. rugosum* x 1; leaves x 5; alar cells highly magnified.

long-pointed and serrate apex, and by the small alar cells, which are quite different from any of the other species. It has acute, spinulose papillae on the back of the leaf. Its favorite habitat seems to be on thin layers of soil on bluffs and ledges, though it is found on grassy banks in woods, and in mountain regions. Adirondack Mts., Bluffs of Lake Champlain, and around the lakes of central New York.

2. *H. triquetrum* (L.) B. & S. is the coarsest and most bushy of all the *Hypnum*s, and is very common. It grows in loose tufts in pine woods on the ground, or on rocks in both very dry and very wet situations. Once known this moss is never overlooked. The leaves are large and spreading with a broad orange-colored insertion, as seen under the microscope. They have a strong double nerve, with stout papillae on the back.

3. *H. parietinum* Lindb. (*Hypnum Schreberi* Willd.), is by Lindberg as well as Limpricht, placed in the genus under consideration, and as it has a very decided likeness to the other species in the field, it is given here. The habit of growth is more slender than the preceding species, the main stems being longer and the branches more pinnate. The nerve is very faint when present, and is either lacking or double. The point of distinction under the microscope is a small triangular patch of inflated orange cells at base of the leaf. It is a very common moss, found on rocks, ground and logs in damp woods. It somewhat resembles *Hypnum cuspidatum* in outward appearance.



Fig. 2. *Hylocomium triquetrum* x 1; stem leaf x 4.

4. *H. squarrosus* (L.) B. & S. has a more feathery look than *H. parietinum*, the leaves being thinner and more spreading (squarrose) on the stems, which are usually red, as are also those of *parietinum* and *proliferum*. The apices of the leaves are long and slender and reflexed. The

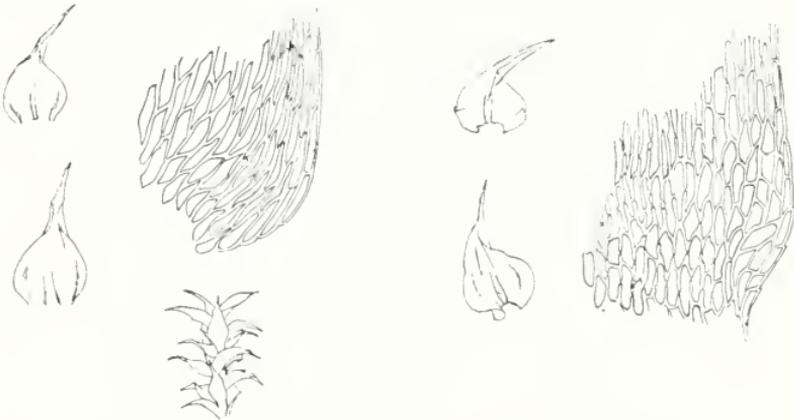


Fig. 3. On the left leaves of *H. squarrosus* x 5; branch x 4; alar cells highly magnified. On the right leaves of *H. triquetrum* x 5; alar cells highly magnified showing pitted cell walls.

alar cells are somewhat larger and clearer, but are not inflated. The cells in this species are papillose, and the papillae are from the end walls of the

cells and not from their faces, as is more often the case in other genera. *H. squarrosus* is rather rare, growing in low swampy places in the Adirondacks, Berkshires, Green Mountains, White Mountains, and along the Massachusetts coast.

The preceding species are without paraphyllia; in the following they are highly developed.

5. *H. umbratum* (Ehrh.) B. & S. has dense paraphyllia, leaves rather small, sharply serrate to apex. They are deeply sulcate or folded, with a strong double nerve. It varies in outward looks, having somewhat the habit of *proliferum*. In the field one would be more apt to confound it with *Pyrenaicum* though this last is a larger and coarser plant. *H. umbratum* is a moss of cool moist mountain woods, and is usually abundant, growing on rocks and ground in wet places in deep woods above 2,000 feet.

6. *H. proliferum* (L.) Lindb. (*H. splendens* B. & S.) is as easily recognized as *H. triquetrum* when once in mind, it having a most distinct habit. The branches are tri-pinnate and closely set, giving it a similar look to some forms of *umbratum*, but its mode of growth is somewhat unusual, and could



Fig. 4. *Hylocomium proliferum* x 1.

not be mistaken for any other species of the genus. The paraphyllia are small and pinnate. We also find spinulose papillae on the back of the leaves. The moss is common on dead trees and fallen logs in moist, cool woods. Its delicate color and feathery aspect makes it our most showy and beautiful *Hylocomium*.

7. *H. brevirostre* (Ehrh.) B. & S. is a larger moss, with more irregularly pinnate mode of branching and the serration of the leaf more conspicuous than in the following species, which it somewhat resembles when dried. In the field it would be more often mistaken for *squarrosum*, because of its spreading but not reflexed leaves. It is not common.

8. *H. Pyrenaicum* (Spruce) Lindb. is a synonym for *Hypnum Oakesii* Sulliv. In this species the serration of leaf is decided but fine, the nerve is distinctly single to the middle of the leaf, the cells are papillose, and uniform to the colored base of insertion on the stem. It grows on old logs and on earth in cool, damp woods.

The distinctions between species are well given in Dixon & Jameson's Handbook of British mosses, in the fine print. This is still our only available Handbook covering the whole field, as the Lesquereux & James Manual is superseded by more recent works. Husnot's *Muscologia Gallica*, is complete, and is useful for reference. In Rabenhorst's *Kryptogamen-Flora* the mosses by Limpricht have just reached the *Hylocomiums*, which have not yet been issued. Braithwaite's *British Moss-Flora*, so valuable in many genera, has only begun on the Hypnaceae. Dr. Grout's book "Mosses with a Hand-Lens" is now ready for the use of beginners, and we hope other more advanced works will follow.

ILLUSTRATED GLOSSARY—Concluded.

The researches of Philibert have shown that the endostome, not the exostome, corresponds to the peristome of the mosses having a single row of teeth.

Processes, see under *peristome*.

Rostellate, (of the operculum) with a short beak.

Rostrate, (of the operculum) with a long beak. [Figs. 30 and 32.]

Rough, same as *papillose*.

Scabrous, same as *papillose*.

Segments see *peristome*.

Seta, the stalk on which the capsule is borne. [Figs. 30, 35, and 40.]

Sporangium, often applied to the capsule, but by some authors restricted to the spore-sac, or inner sac of the capsule containing the spores.

Spores, small round bodies contained in the capsule, serving the purpose of seeds, but in no way homologous with them. [Fig. 43, e.]

Sporogonium, the sporophyte or spore bearing part of the moss.

Stegocarpous, having the capsule operculate.

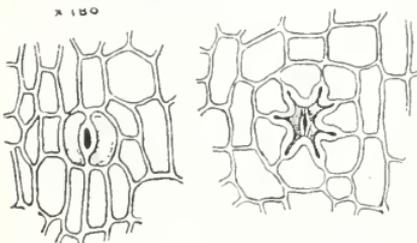


Fig. 44.

Fig. 44a.

Stomata, spores in the walls of capsules, surrounded by special guard-cells and serving the same purpose as the stomata in the epidermis of the leaves of the flowering plants. They may be superficial as in Fig. 44, or immersed, i. e. sunken and nearly covered by other cells as in Fig. 44a.



Fig. 45.



Fig. 46.

Struma, a goitre-like swelling on one side at the base of the capsule. [Fig. 32.]

Strumose, having a struma.

Sulcate (of the capsule) deeply furrowed. [Fig. 39.]

Systilius (the lid continuing fixed to the columella, and thus elevated above the capsule when dry). [Fig. 37.]

Tesselate, checkered in little squares; applied particularly to the peristomes of some of the Tortulaceae. [Fig. 45.]

Tooth, see under *peristome*.

Trabeculate (of the peristome teeth) with prominent transverse bars. [Fig. 31.]

Tumid, *Turgid*, appearing as if swollen from pressure within.

Turbinate, top shaped, *e. g.*, capsule of *Bryum turbinatum*.

Umbonate, round with a projecting-point in the centre.

Urceolate, shaped like an urn or pitcher.

Vaginula, the cellular sheath surrounding the base of the seta, originally the lower part of the archegonium.

Veil, the calyptra.

Ventricose, bulging on one side. [Fig. 46.]

NOTES ON BUXBAUMIA.

Mr. R. S. Williams, who has a note on *Buxbaumia* in the Journal of the New York Botanical Garden for July, 1900, and another in the Bulletin of the Torrey Botanical Club for August, 1900, states that we have three good species in the United States, *B. indusiata*, Brid., with two-celled superficial stomata, and two others, *B. aphylla* L., and *B. Piperi* Best, with one-celled immersed stomata. The first two range across the continent, the last has not yet been found east of the Rockies.

This distinction between our two eastern species will be welcomed by those who have had difficulty in determining them. This distinction is easily observed by mounting a portion of the wall of the capsule near the base. This distinction is explained and illustrated in the conclusion of the Illustrated Glossary in this number.

Mr. Williams has collected *B. aphylla* in the New York Botanical Garden. He states that, in his observation, *Buxbaumia* always grows on rotten wood or soil containing fragments of rotten wood.—A. J. G.

Mr. Windle's note in the October BRYOLOGIST on *Buxbaumia aphylla* was very interesting to me, because it tallied very closely with my experience with that interesting species. He spoke of finding the plant in an immature state December 1st, and as having shed its spores by March 1st, which I think is almost always correct. But this year I collected it on the trunk of a tree in perfect fruit, with not a spore shed, September 15th. In 1899 I collected my material February 1st, and in 1900, January 1st. I have found this moss in four localities in Amesbury, Mass. Every one of these locations is on the north side of a hill, as they were in Mr. Windle's find. I

wonder if they are ever found otherwise. One of these stations was discovered by Dr. R. H. True, Mr. A. A. Eaton and myself, and Dr. True discovered the fact that each lid pointed to the south, which was certainly true of that colony. Whether it be the case generally, I am not prepared to say. Up to this fall I have never found a calyptra. I think they are all gone long before the capsule is mature. It is very symmetrical, being perfectly cylindrical and just covering the lid. I was fortunate enough to collect a few plants just as the sporophyte first appeared, and found them interesting indeed. This date was October 11, 1900.—*J. Warren Huntington, Amesbury, Mass.*

I have collected *Buxbaumia* but once, at Jamaica, L. I., on soil—just ordinary woody soil, October 15, 1899. It was in the lance stage, the capsules being entirely undifferentiated from the seta, so far as appearance went, except for the calyptra.—*A. J. G.*

It may be interesting to know the stations where I have found *Buxbaumia aphylla*. It does not seem so rare to me, because I have several times come upon it, though in very small quantities in each instance. I have found it in the town of Austerlitz, and again in the town of Ghent in this [Columbia] county. At the first place it grew on a shaded bank by the roadside, in the latter beside a path leading to a waterfall, and in deep shade. This summer I found it by the roadside on the way to Hanging Rock Falls, near Ellenville.—*Harriet Wheeler.*

FUNARIA FLAVICANS Michx.

Last June the writer collected specimens of a *Funaria* growing on grav-

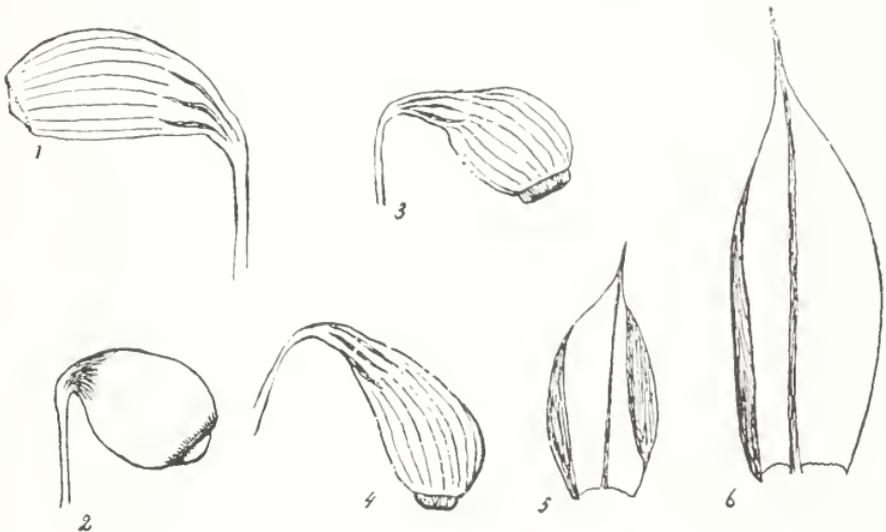


Fig. 1. Capsule not quite mature. 2. Mature capsule with obnormally short column. 3 and 4. Ripe capsules without lid. 5 and 6. Middle and upper leaf. Figures magnified about 11 diameters.

elley soil in a damp hollow at Bedford Park, New York City, that proved to

be *flavicans*, and as the remarks under this species both in the Lesquereux & James' Manual and in Sullivan's "Icones" are somewhat misleading, the following notes may be of interest:

The species grows in separate tufts, as well as mingled with *hygrometrica*, from which it may be distinguished by average smaller size, erect pedicel, more pointed leaves, and mouth less oblique, as well as less furrowed capsule, which matures a week or two earlier than in *hygrometrica*, in this region at least, where the best specimens were collected from the 1st to the 10th of June. When well ripened, the capsules are very dark reddish, with a low convex lid not apiculate. The mouth of *hygrometrica* measures about ten-fifteenths mm. across, of *flavicans* eight-fifteenths to nine-fifteenths mm., and of *F. microstoma* about one-half mm. The spores of the first measure up to about .018 mm., of the other two, up to about .025 mm. *F. flavicans* is essentially a southern species, Austin only, I believe, having collected it a little farther north than this, near Closter, N. J.—*R. S. Williams, New York Botanical Garden.*

GRIMMIA MANNIAE AND GRIMMIA HOLZINGERI.

BY PROF. J. M. HOLZINGER.

"GRIMMIA HOLZINGERI Card. & Ther. sp. nov.—Very small, slender, in small cushions, dull green, fuscous below. Stems erect, 4-6 mm. high, sparingly branched, branches sometimes attenuate, subflagellate. Leaves crowded, very small, 0.50-0.70 mm. long, 0.20-0.35 mm. broad, erect when moist, appressed when dry, shortly ovate-oblong, concave, all obtusely acuminate, margins plane, entire; costa channeled, reaching the apex, 0.023 mm. broad at base, upper cells bistratose, quadrate-subrotund, the lower cells larger, unistratose, yellow, the lowest oblong or sublinear, all incrassate. Other parts unknown.

"This very minute species, resembling in habit the small forms of *Andreaea petrophila*, is quite distinct from all the European and North American species of *Grimmia* with muticous leaves by the small size, and the shape and areolation of the leaves.—Base of Sperry glacier, Mt. Trilby." Bot. Gaz 30:124. 1900.

Grimmia Manniae C. Muell. in Flora, 70:223, 224. 1887.

"GRIMMIA (EUGRIMMIA) MANNIAE n. sp.: dioecious; in delicate crowded intensely green cushions; the fastigiate branched stems very slender, densely leafy, loosely cohering and obtuse at apex; stem leaves closely imbricated, small, from a broad truncate base extended into an open deeply keeled lamina which is obtusely short-acuminate, their erect margins very entire, slender costa green, excurrent to percurrent, small basal cells greenish but empty, hexagonal, somewhat thick walled, the upper cells minute and indistinct; perichaetial leaves densely imbricated, several, larger, more obtuse, areolation larger, more involute (i. e. rolled up); all leaves somewhat succulent; capsule erect, rather large, globe- to urn-shaped, its walls coriaceous, pachydermous, red, raised on a reddish slender slightly spirally twisted seta, which is rather long exerted considering the small size of the

plant; the conic operculum a very little oblique; teeth short, red; more or less split lengthwise and frequently perforated.

"Type station: California, Napa Co., Napa Springs. Coll. Mrs. Martha Mann, May 2, 1886.

"By the character of its crowded sods and of its stems this species approaches somewhat *Grimmia plagiopodia*; but by its delicate beautiful capsules on short pedicels it stands quite apart, a most elegant species.

"A beautiful *Grimmia*, distinguished at the first glance. Its stems remind of a *Zygodon* of the cut of *Z. Fosteri* rather than of a *Grimmia*. And its fruits possess a Bryum-like appearance of the type of *Doliolidium*, only in diminutive form."

Dr. Kindberg has suggested that *Grimmia Holzingeri* Card. & Ther., is *Grimmia Manniae*. This calls attention, first of all, to the latter species, which seems not to have been collected since 1886. The above is a translation of the original description. The type station, Napa Springs, California, is some 75 miles north of San Francisco, on the foot-hills of the Coast Range, in Tertiary formation, at an elevation of less than a thousand feet, probably.

Grimmia Holzingeri occurs on Archaean rocks, in the heart of the Rockies, at an altitude of 7000-8000 feet, in sight of slowly expiring glaciers. Once mighty streams of ice, associated with European alpine species, fully 700 miles to the northeast of the other plant, and the Bitter Root mountains, the barren plateau region including the Snake river plains of Idaho, the Great Basin of Utah and Nevada, and the Sierra Nevada range of California lie between the stations. Nevertheless, the two plants in gross appearance, in size, texture and color, looks exactly alike. And Dr. Kindberg may be right. Unfortunately, *G. Holzingeri* was found in the sterile state only. The comparison which the writer was able to make with two sterile plants of type material of *G. Manniae* kindly communicated by Dr. Kindberg, resulted in discovering apparent discrepancies in size and areolation of leaves. But since the original description of *G. Manniae* has become available to the writer, the idea has gained ground that the comparison of the two plants, which at first seemed to cast doubt upon Dr. Kindberg's suggestion, may, by accident, have been between perichaetial leaves of one plant and ordinary stems leaves of the other! And, in spite of the considerable difference in altitude at which the plants occur, they may prove identical. Further and more conclusive investigation is necessary to establish this identity beyond doubt, and the writer would consider it a favor if any moss students who read the BRYOLOGIST, and have found *Grimmia Manniae*, either near Napa Springs, California, or at points intermediate between this type station and that of *Grimmia Holzingeri*, namely, the region north of Lake McDonald, northwest Montana, would enter into correspondence with him, with a view fully to clear up the present doubt. Meanwhile, the difference in altitude, in geological horizon, and the great distance between the two type stations, are serious obstacles in the way of reducing *Grimmia Holzingeri*.

And, whereas in the cases of unusual plant distribution noticed by the writer, a plausible explanation has always been found by reference to the phenomena of the great ice cap over the Northern Hemisphere, and the

earlier and recent proximity of the Old and New World continents in the far north, no such explanation presents itself to clear up this case, should the two plants finally be proved identical.

WEBERA PROLIGERA (Lindb.) Kindb. IN NORTH AMERICA.

This European moss, which ranges from the Alps to Scandinavia, was collected by the writer some three years ago in the upper Mississippi valley, but was only recently doubtfully referred to this species. Though the plant is more robust, and has its peculiar "gemmae" *yellowish* instead of *greenish*, as in the Old World plant, it seems best to adhere to the present determination. Mr. Nicholson, Dr. Bryhn, and Dr. I Hagen, write that forms as robust as this occur in Europe; and, together with such careful workers as Dr. G. N. Best and M. Jules Cardot, they agree that this determination is right. It was Dr. Best who first called attention to the agreement between the figures in Correns' article on Brutkoerper and the "propagula" on this moss. It is interesting to note that both this plant and *Grimmia teretinerwis* were also collected by Breidler in Steiermark.—*John M. Holzinger.*

A NEW HYPNUM FROM MONTANA.

Recently the writer distributed his northwest Montana mosses, collected near Lake McDonald in 1898. Among these was a *Hypnum* which Dr. Best kindly determined for me as *Hypnum turgescens* Sch. The plant is indeed the same as Can. Musc. 483, determined by Dr. Kindberg. Within a few weeks word came from three prominent European moss students, indicating that each recognized in this a new species, distinct from *H. turgescens*. Two of these gentlemen agree in referring it to *Limnobium*, one nearest to *H. molle*, the other nearest to *H. dilatatum*. To avoid further attempts at describing this moss, the writer feels constrained to publish this note.

The plant is distinct from its near relatives by the larger size of all its parts, and by the different shape of its leaves. Leaves broadest below the first quarter, distinctly decurrent, lurid or olivaceous green, distant, and very widely spreading, the areolation more loose, and formed by longer cells. The plant must be called **Hypnum (Limnobium) Bestii** Ren. & Bryhn.

In the next BRYOLOGIST will appear a more detailed description, some figures, and explanations that will do justice to all concerned. Dr. Best writes that *Limnobium* is antedated by a genus of flowering plants, and that Braithwaith uses *Hygrohypnum* in its stead. So this moss may have to be called *Hygrohypnum Bestii* Ren. & Bryhn.—*John M. Holzinger.*

HYPNUM OCCIDENTALE S. & L.

In Bull. Torr. Club, 17:277. 1890, N. C. Kindberg described *Thuidium Vancouveriense* as a new species from Vancouver Island. In Cat. Can. Plants, 6:183. 1892, the same plant is described as *Heterocladium Vancouveriense*, and in Eur. & N. Amer. Bryineæ it is referred to the author's new genus, *Pseudoleskella*. It turns out, however, that this supposed new species, which has done good service in three genera in no less than six years, is identical with *Hypnum occidentale* S. & L., described and figured in Icon. Musc. Supp. 105. pl. 51. 1874, as an authentic specimen from Dr. Kindberg, which I owe to the kindness of Prof. J. M. Holzinger, and a portion of Sullivant's type, which I owe to the courtesy of Mrs. Britton, clearly prove. *Thuidium Vancouveriense* must therefore be relegated to the long list of synonyms for which we have to thank our worthy trans-atlantic confreres, and which might easily have been avoided, had all of them been as anxious to ascertain what American bryologists have done, as some of them have been eager to make new species of American mosses.—G. V. Best.

LICHENS—THE USNEAS.

In commencing our study of lichens, it has been thought best to begin with *Usnea* and some of the varieties, as they are so generally called mosses.

The so-called Florida moss which grows so luxuriantly on the trees in the Southern States, is often supposed to be a lichen. It is, in fact, a flowering plant, and belongs to the Bromeliaceae, or Pineapple family. Its botanical name is *Tillandsia usneoides*, the specific name indicating its resemblance to *Usnea*.

Some botanists think lichens are only a higher order of fungi, others who have studied them closely accord them a place by themselves, between the fungi and mosses.*

A lichen is composed of an alga and a fungus, the alga supplying chlorophyll or green matter, the fungus absorbing moisture from the atmosphere and mineral substances from the substratum. The two live together in what is called a symbiotic relationship, the one necessary to the life and development of the other.

As this article is intended for beginners in the study of these interesting plants, a few definitions of the principal parts of *Usnea* may be helpful.

The *thallus* is the vegetative portion, taking the place of the stem and branches in the flowering plants. In *Usnea* it is fruticose or shrub-like. In some species it is erect and rather rigid, in others it is pendulous and soft, and through the centre runs a white cottony substance which is called the medullary cord.

Fibrils are the fine hair-like branches found on the main thallus. In some species these are stiff, in others they are soft. *Fibrils* are also found on the margin of the apothecia.

* Instructions for collecting and mounting lichens can be found in Asa Gray Bulletin, Vol. VI, No. 1, February, 1898.

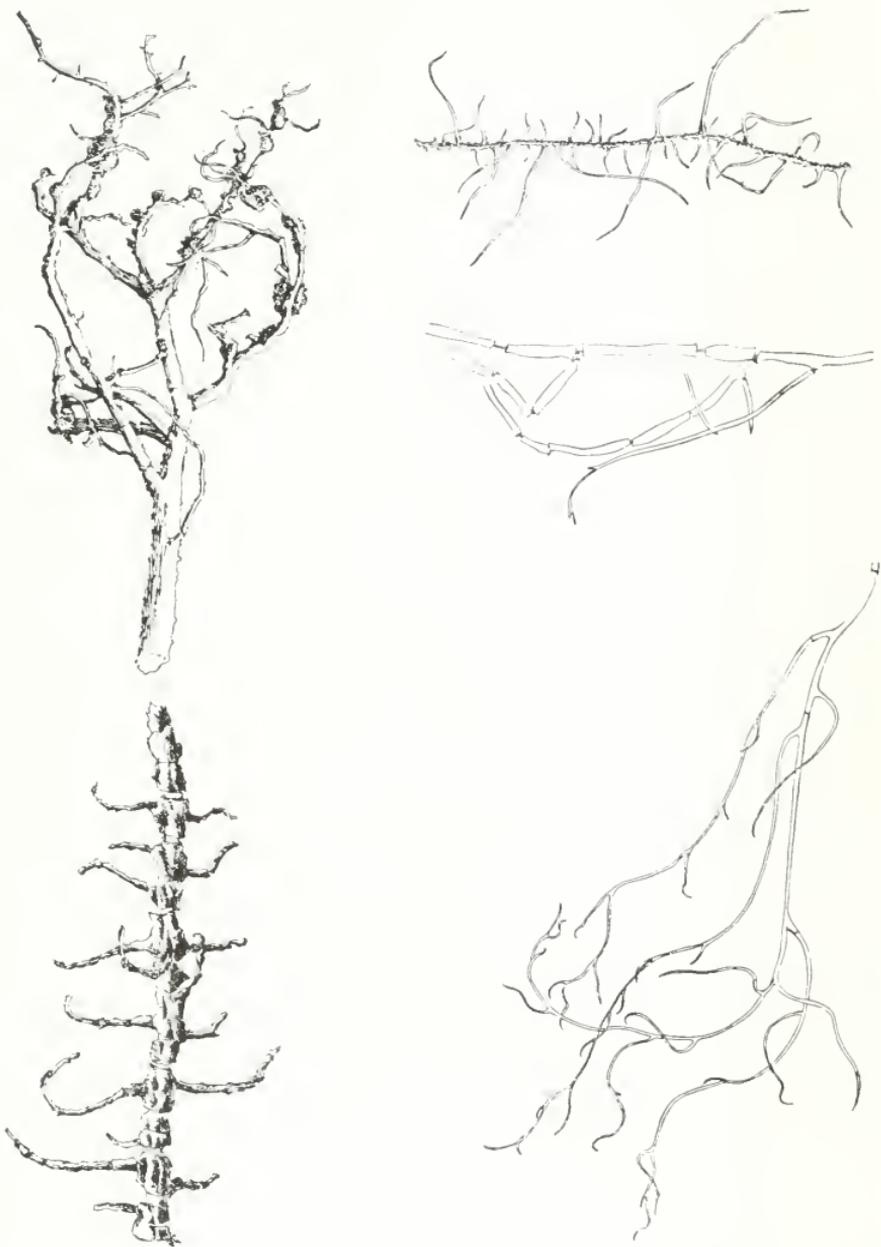


Plate I. On the left: upper, branch of *Usnea barbata hirta* x 5 showing soredia: lower, portion of *U. angulata* x 5. On the right: upper, portion of *U. longissima* x 2; middle, of *U. articulata* x 2; lower, of *U. trichodea* x 2.

The *apothecia*, which are developed on the thallus, are the fruit bodies, and contain the spores. Their form is dish-like, scutellaeform. They are a delicate flesh-color, and on the margins are long fibrils.

Soredia are vegetative bodies appearing on the thallus as pale green, mealy-looking objects. They are composed of a few algal cells and threads of hyphae. These soredia, in dry weather, are easily detached, and if conditions are favorable, develop into lichens.

The most common form belonging to this genus, is

Usnea barbata (L.) Fr. var. *florida* Fr. It grows all over the world on dead trees, sometimes on those which are still living, but are probably diseased, and on old fence rails. The thallus, which is light green, is not smooth, but is covered with fine points. Many lichenists call it scurfy, but it is simply, rather. From the main thallus are fine, rather stiff fibrils. It is firmly attached to the substratum by a more or less spreading base. From this it branches, giving it a shrubby appearance. The apothecia are a pale flesh-color, quite large, surrounded by long greenish fibrils. While the apothecia are not rare, many specimens will be found which are sterile, but can be determined by the appearance of the thallus and habit of growth.

Usnea barbata (L.) var. *hirta* Fr. is much like *florida*, and often grows on the same tree. It can be distinguished by the soredia with which it is usually thickly covered.

Usnea barbata (L.) Fr. var. *rubiginea* Michx. is very similar to *hirta*, but is a dull red. In some specimens the soredia give it a silvery look.

Usnea barbata (L.) Fr. var. *ceratina* Schaer. is a pendulous species. It is rather stiff and coarse, has longer branches than *florida*, and no fine fibrils.

Usnea barbata (L.) Fr. var. *articulata* Ach. is also pendulous and light green. The thallus, while not smooth, is less scurfy than the other varieties of *Usnea barbata*. It is broken into short pieces or joints, between these can be seen the medullary cord.

Usnea angulata Ach. as the name indicates, is angled, the thallus and fibrils appearing like a miniature branch of cork elm. It is pendulous and rather rigid, is a darker, duller green than the other species of *Usnea*.

Usnea trichodea Ach. has a soft pendulous thallus, which is a light gray-green, with few branches somewhat interlaced. The apothecia are small.

Usnea longissima Ach. is a mountain species. The thallus is pendulous and soft. It is pale green, the main thallus almost white, with many short, fine fibrils a little darker in color. It hangs from the dead spruces in the Adirondacks, three or more feet in length. After drying it is almost a straw-color.

There are a few more species of *Usnea*, but these given are the common ones.

Like the mosses, the different species of lichens are so closely allied that it is often difficult to decide to which species a given specimen belongs. After the genera are learned, every new species determined is a joy to one really interested in these curious, much-neglected, but beautiful plants.

REPORT
OF THE
Sullivant Moss Chapter.

REPORT OF THE PRESIDENT.

A report of the official acts of the President during the past year must of a necessity be very brief, as those acts have been so few. He has helped the Secretary in identifying a few difficult mosses communicated by members, edited the items for the Moss Chapter page of the *BRYOLOGIST*, and made suggestions about the amendments of the Constitution and the candidates for office. He feels that the greatest service he has rendered to the Chapter is the work done in securing the board of officers for 1901. Our new President unties bryological knots with such apparent ease that you may be tempted to send all your puzzles to him. Don't do it! He is a very busy man, but also very obliging, and for these reasons we want to save him as much as possible. Send all except the very worst to Mrs. Smith. If they prove too much for her, she will send them to Dr. Best. Mrs. Smith has done most of the Chapter work for the past year, and I hope you will let her know of your appreciation whenever possible. Our new Vice-President is one of the most indefatigable collectors in the Chapter and has already made many interesting discoveries.

REPORT OF THE SECRETARY.

In submitting the Second Annual Report of the Sullivant Moss Chapter, a most gratifying degree of prosperity is observed. Our membership list now stands at 92, showing an increase of 34 during the year. The number of those in more or less regular correspondence with the Secretary has increased. It was the intention to keep an accurate account of all letters written and of the mosses identified, but this turned out to be impossible under the circumstances. It is enough to say that the studies of some twenty have been supervised, and much mutual profit has been the result. The mosses collected have come in from a wide range of territory, our membership covering 20 States, the District of Columbia, and Canada. Some have remembered the Chapter while visiting California and the Pacific coast.

A good beginning for the Chapter Herbarium has been made. At the meeting on June 27, 1900, at the Museum of the New York Botanical Gar-

den, at Bronx Park, the Chapter Herbarium was exhibited. It then consisted of 153 sheets, divided among 52 genera, and a large amount of fine material has since been received and will be mounted as time permits. The Herbarium is felt by the officers to be an important work, as the future Secretaries may not have access to large herbaria, and will need this in the work of identification. Another development of the year has been the inclusion of the study of the hepatics and lichens. This is a distinct evolution of our Chapter work, and is in the nature of a wheel within a wheel. Both groups of plants are found growing with the mosses, and are often sent in for identification, consequently an effort was made to find some Chapter member able to do the work. Mr. Barbour kindly offered to undertake the hepatics, and already over sixty specimens have been sent to him for identification, and he is working up an enthusiastic circle.

We all know that the lichens belong to an entirely distinct family, and from a systematic standpoint do not come within our field, but there seemed to be such an urgent demand for some one to give a helping hand, that Mrs. Harris was prevailed upon to take up the work. Our Chapter is distinctly a society for mutual help, and the more advanced are giving their time and knowledge to those beginning the study of cryptogams, hoping, yea feeling sure, that ere long those receiving help now will be able soon to help others, and so pass on the work in ever widening circles.

In accepting the Secretaryship for the coming year, it is with regret that we part with our leader, Dr. Grout, who has always been lavish of his time and energy in Chapter work, and from Mr. Collins, who has ever promptly responded to calls made upon him, but I am sure we will cordially unite with Dr. Best and Mr. Huntington, and give them our enthusiastic support. The Chapter may be considered as fully organized, and its future development now rests with each individual member.

The first death among our number to be recorded is that of Rev. George D. Hulst. He was President of the Department of Botany of the Brooklyn Institute of Arts and Sciences, and his name will long be remembered by his contributions to our Chapter Herbarium.

Attention is called to the unanimous adoption of the amendment, which increases the Chapter dues to seventy-five cents for active, and fifty cents for associate members. It is hoped that *all* will class themselves in the active ranks, and by a prompt renewal make the necessary funds available in planning the year's expenses.

ANNIE MORRILL SMITH.

REPORT OF THE TREASURER.

The following statement for the year 1900 is respectfully submitted:

RECEIPTS.

By dues from members,	\$43.75
By cash on hand January 1, 1899,	5.49
	<hr/>
	\$49.24

DISBURSEMENTS.

To Bryologist,	\$33.80
Express,	.65
Herbarium supplies,	6.41
Stationery, printing, etc.,	7.25

	\$48.11
Cash on hand,	1.13

	\$49.24

ANNIE MORRILL SMITH.

REPORT OF JUDGE OF ELECTIONS.

MRS. ANNIE MORRILL SMITH, Secretary:

I submit the report of the election of Sullivant Moss Chapter officers for 1901, as follows:

Number of votes cast,	28
Defective ballots,	1
Partially defective,	1
President: Dr. G. N. Best,	26
Mrs. C. W. Harris,	1—27
Vice-President: Mrs. J. W. Huntington,	17
Mr. E. B. Chamberlain,	10—27
Secretary-Treasurer: Mrs. A. M. Smith,	25
Miss H. Wheeler,	1—26
Amendment: For adoption,	23
Against,	0—23
Messrs. Best and Huntington, and Mrs. Smith are elected.	
Respectfully submitted,	

J. FRANKLIN COLLINS, *Judge of Elections.*

LIST OF MEMBERS.

1 Anthony, Mrs. Emilia C.,	Gouverneur, N. Y.
2 Barbour, Mr. Wm. C.,	Sayre, Pa.
3 Barnes, Miss Edith,	Northboro, Mass.
4 Bailey, Miss H. B.,	830 Amsterdam avenue, N. Y. City.
5 Billings, Miss Elizabeth,	Woodstock, Vt.
6 Bivins, Mrs. E. C.,	162 North 20th street, Philadelphia, Pa.
7 Britton, Mrs. Elizabeth G.,	Botanical Garden, Bronx Park, N. Y. City.
8 Brown, Mr. Edgar,	Div. of Botany, Dept. Agric., Washington, D. C.
9 Barnes, Prof. Charles R.,	Dep't. Bot., Univ. Chicago, Chicago, Ill.

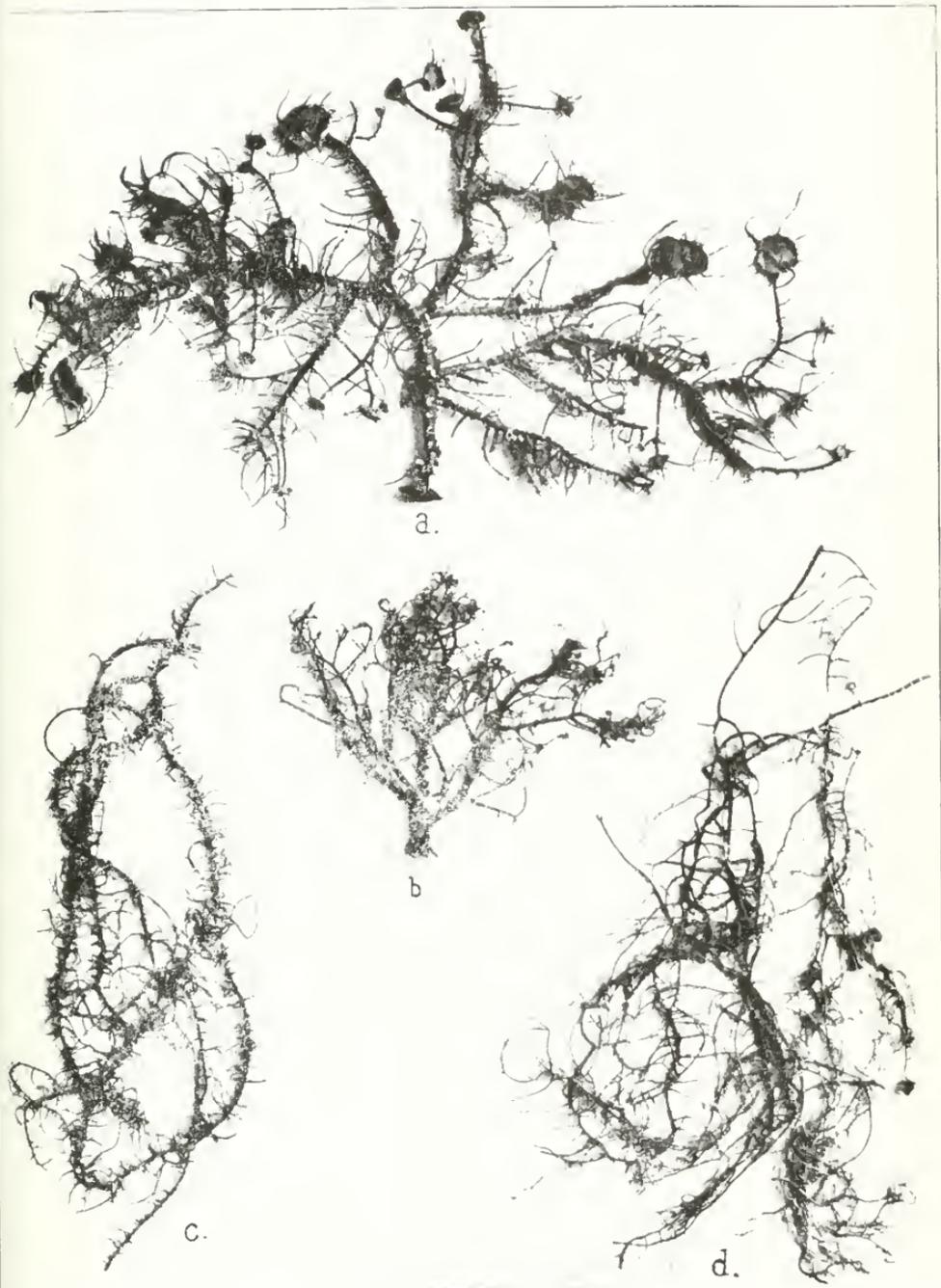


Plate II. a. *Usnea barbata florida*. b. *U. barbata hirta*. c. *U. angulata*. d. *U. trichodea*.

(Photographed natural size by Leon E. Grout.)

- 10 Best, Dr. George N., Rosemont, N. J.
 11 Carter, Mrs. R. H., 37 Church street, Laconia, N. H.
 12 Chamberlain, Mr. Edw. B., Brown University, Providence, R. I.
 13 Chapin, Mrs. L. N., Hotel Margaret, Brooklyn, N. Y. City.
 14 Clute, Mr. Willard N., Binghamton, N. Y.
 15 Crockett, Miss Alice L., Camden, Maine.
 16 Collins, Mr. J. Franklin, 468 Hope street, Providence, R. I.
 17 Clarke, Miss Cora H., 91 Mt. Vernon street, Boston, Mass.
 18 Clarke, Mrs. Sarah L., 1 West 81st street, N. Y. City.
 19 Clarks, Mr. H. S., 31 Wells street, Hartford, Conn.
 20 Coomes, Mrs. Laura M., Queens, Queens County, N. Y. City.
 21 Cummings, Miss Clara E., Wellesley College, Wellesley, Mass.
 22 Cushman, Miss Mary H., 300 North Fifth street, Reading, Pa.
 23 Demetrio, Rev. C. H., Emma, Mo.
 24 Dacy, Miss Alice E., 28 Ward street, Boston, Mass.
 25 Dodge, Charles K., Esq., Port Huron, Mich.
 26 Day, Miss Mary F., 658 Monroe street, Brooklyn, N. Y. City.
 27 Eaton, Mr. Alvah A., Seabrook, N. H.
 28 Eby, Mrs. Amelia F., 141 North Duke street, Lancaster, Pa.
 29 Evans, Dr. Alex. W., 2 Hillhouse avenue, New Haven, Conn.
 30 Fisher, Mr. George L., 15 East street, St. Thomas, Ontario, Canada.
 31 Findlay, Mr. W. J., 1009 Arch street, Philadelphia, Pa.
 32 Garver, Mr. H. B., Middletown, Pa.
 33 Gilman, Mr. C. W., Palisades, Rockland County, N. Y.
 34 Gilbert, Mr. B. D., Clayville, N. Y.
 35 Grout, Dr. A. J., 360 Lenox Road, Brooklyn, N. Y. City.
 36 Greenalch, Mr. Wallace, Schuylerville, N. Y.
 37 Green, Prof. H. A., Chester, S. C.
 38 Gregory, Mrs. H. T., Southern Pines, N. C.
 39 Greever, Mr. C. O., 1345 East Ninth street, Des Moines, Iowa.
 40 Hart, Miss Mary E., Dept't Biology, Western College, Oxford, Ohio.
 41 Huntington, Mr. J. Warren, Pond Hills Farm, Amesbury, Mass.
 42 Holzinger, Prof. J. M., Winona, Minn.
 43 Harris, Mrs. Carolyn W., 125 St. Marks avenue, Brooklyn, N. Y. City.
 44 Harris, Mr. Wilson P., 566 Massachusetts avenue, Boston, Mass.
 45 House, Mr. Homer D., 726 South Crouse avenue, Syracuse, N. Y.
 46 *Hulst, Rev. George D., 15 Himrod street, Brooklyn, N. Y. City.
 47 Hadley, Mrs. Sarah B., South Canterbury, Conn.
 48 Jackson, Mr. Joseph, 15 Woodland street, Worcester, Mass.
 49 Joline, Mrs. A. H., 1 West 72d street, N. Y. City.
 50 Kennedy, Dr. George G., Readville, Mass.
 51 Krout, Prof. A. F. K., 2132 North 13th street, Philadelphia, Pa.
 52 Lamprey, Mrs. E. S., 2 Guild street, Concord, N. H.
 53 Lippencott, Mr. Charles D., Swedesboro, N. J.
 54 Lowe, Mrs. Josephine D., Noroton, Fairfield county, Conn.
 55 Mathews, Miss Carolin, Waterville, Maine.
 56 Maxon, Mr. Wm. R., U. S. National Museum, Washington, D. C.

57	Marshall, Miss M. A.,	Still River, Mass.
58	McDonald, Mr. Frank E.,	417 California avenue, Peoria, Ill.
59	Mirick, Miss Nellie,	28 East Walnut street, Oneida, N. Y.
60	MacElwee, Mr. Alex.,	5236 Harlan street, W. Philadelphia, Pa.
61	Moore, Mrs. Adele D.,	170 East First street, Corning, N. Y.
62	Miller, Miss Mary F.,	1109 M. street, N. W., Washington, D. C.
63	Newman, Rev. S. M.,	Cor. 10th and G streets, N. W. Washington, D. C.
64	O'Connor, Dr. Helen Cox,	29 West 45th street, N. Y. City.
65	Paddock, Miss Mabel M.,	Fairbanks Museum, St. Johnsbury, Vt.
66	Perrine, Miss Lura L.,	State Normal School, Valley City, N. Dakota.
67	Plitt, Mr. Charles C.,	1706 Hanover street, Baltimore, Md.
68	Palmer, Mrs. Rebecca L.,	615 Putnam avenue, Brooklyn, N. Y. City.
69	Puffer, Mrs. James J.,	Box 39, Sudbury, Mass.
70	Saunders, Mr. C. F.,	307 Walnut street, Philadelphia, Pa.
71	Stevens, Mrs. M. L.,	6 Holyoke Place, Cambridge, Mass.
72	Smith, Mrs. Annie Morrill,	78 Orange street, Brooklyn, N. Y. City.
73	Stultz, Mr. W. H.,	103 West Second street, Duluth, Minn.
74	Small, Miss Abby M.,	Northboro, Mass.
75	Sanborn, Miss Sarah F.,	54 Center street, Concord, N. H.
76	Stigell, Miss Carolin,	27 Monroe Place, Brooklyn, N. Y. City.
77	Streeter, Mrs. M. B.,	113 Hooper street, Brooklyn, N. Y. City.
78	Seeley, Mrs. J. A.,	104 State street, Ogdensburg, N. Y.
79	Shepard, Mrs. C. S.,	415 Washington avenue, Brooklyn, N. Y. City.
80	Sharp, Mrs. Katherine D.,	London, Ohio.
81	Thompson, Miss Esther H.,	Box 407, Litchfield, Conn.
82	Talbott, Mrs. Laura Osborne,	1445 Huntington Pl., Washington, D.C.
83	Van der Eike, Mr. Paul,	New Glarus, Wis.
84	Warner, Miss Edith A.,	78 Orange street, Brooklyn, N. Y. City.
85	Windle, Mr. Francis,	8 South High street, West Chester, Pa.
86	Wheeler, Miss Harriett,	Chatham, Columbia county, N. Y.
87	Wheeler, Mr. John A.,	Milford, N. H.
88	Wetherby, Mr. A. G.,	Magnetic City, Mitchell county, N. C.
89	Williams, Mrs. Mary E.,	1536 Pine street, Philadelphia, Pa.
90	Williams, Mr. R. S.,	Botanical Garden, Bronx Park, N. Y. City.
91	Williams, Mr. Thomas A.,	Takoma Park, D. C.
92	Adam, Mr. F. M.,	361 Madison street, Brooklyn, N. Y.

A copy of Dr. Grout's Illustrated Glossary will be sent free to every member of the Chapter sending seventy-cents as annual dues, if application be made to the Secretary for the same, OR, if eighty-five cents more be added (\$1.60) a copy of Mosses with a Hand-lens will be sent. Direct all such orders to Mrs. Smith.

The October 1900 number was issued October 8th.

THE BRYOLOGIST

VOL. IV.

APRIL, 1901.

No. 2.

IN The Plant World for October, 3: 145-148. *pl.* 5. 1900, Mr. F. H. Knowlton has some "Notes for the Beginner in the Study of Mosses." We are very glad to see others trying to interest people in the study of mosses, for experience has shown that persons so interested very soon subscribe for THE BRYOLOGIST.

* * *

THE EDITORS OF THE BRYOLOGIST feel a personal loss in the death of Mr. Thomas A. Williams, formerly editor of the Asa Gray Bulletin. Although Mr. Williams had begun a series of articles on lichens in the Asa Gray Bulletin, he had promised all the aid and assistance in his power to Mrs. Harris with her articles in THE BRYOLOGIST. By his death the botanical world loses not only a scholar, but a man of rare courtesy and kindness of nature.

* * *

WE have added four extra pages to this issue in an attempt to bring the descriptions of new species up to date. It is interesting to note that most of our new species are by Europeans, who seem to have greater assurance in matters relating to American bryology than American botanists themselves.

HYPNUM BESTII Ren. & Bryhn.

BY R. S. WILLIAMS.

HYPNUM (LIMNOBIUM) BESTII Ren. & Bryhn; M. F. Renauld, Bull. d. L'Acad. Int. d. Geog. Bot. 10: 7. Ja. 1. 1901.

Hypnum (Hygrohypnum) Bestii (Ren. & Bryhn) Holzinger, Bryologist, 4: 12. 1900.

Hypnum turgescens T. Jensen; Macoun, Can. Mosses, no. 483. Kicking-Horse Lake, 7500 feet, August, 1890, and Hector, B. C., 1890.

Hypnum palustre Hudson; Austin Herbarium. Sierra Nevada, California, Warne.

Hypnum dilatatum Wils., *vide* D. C. Eaton. No. 34, C. V. Piper, Olympic Mountains; also no. 80, Lillewaup Falls, Washington.

Hypnum dilatatum Wils., *vide* R. S. Williams, no. 410, South Fork of Cutbank Creek, Montana; no. 166, Neihart, Montana, and no. 770, Skagway, Alaska; also no. 99, J. A. Allen, Mt. Ranier, Washington, 5000 feet, 1898.

This plant is published by M. Renauld as a subspecies of *H. molle* Dickson. It appears to be a not uncommon plant throughout the Rocky Mountains, ex-

The January BRYOLOGIST was issued January 9th.

tending from Alaska to California, and eastward to the Belt Mountains of Montana, but not yet found fruiting. The finest specimens come from the vicinity of Mt. Rainier, those of J. A. Allen's having stems up to 20 cm. long. I incline to think it will stand as a species quite distinct from *H. molle*. In general appearance it more resembles *dilatatum*, but is distinct from both these species in having no central strand to the stem. *H. dilatatum* also has a more rounded leaf, with a distinct convex cluster of alar cells not found in *Bestii*, while this last is a stouter plant than *molle*, with stiff, wiry stems, rough below with the broken-off bases of the second leaves.

†† ON LIMNOBIUM BESTII Ren. & Bryhn.

BY J. M. HOLZINGER.

IN THE BRYOLOGIST of January, 1901, the writer published a brief notice regarding this moss, promising there a more detailed description, some figures and explanations that would do justice to all concerned. Simultaneously with this note there appeared from the pen of M. F. Renauld a discussion and description of this plant and related European forms in the Bulletin de l'Académie Internationale de Géographie Botanique, January 1, 1901; also in Revue Bryologique of the same date. It was the knowledge that these articles were to appear which seemed to justify the brevity of my own note. It has seemed best for various reasons to translate M. Renauld's more full note from the Bulletin above referred to. The accompanying figures were drawn by M. Renauld, and are here published with his consent.

"Hypnum (Limnobium) molle Dicks. Subspecies *H. Bestii Ren. et Bryhn. Cushions soft pale olive-green. Stem stout, firm, 6—8 cm. long, at the base generally stripped of leaves, divided above into several erect branches. Leaves distant, everywhere spreading, sometimes squarrose at the apex, *rather large*, as much as 3 mm. long and 2 mm. wide, ovate-elliptical; above the middle distinctly narrowed, broadly and bluntly acuminate, at the apex indistinctly denticulate. Costa very strong, two-forked, the longer branch extending to the middle or a little beyond. Areolation very loose, consisting of linear-rhombic or fusiform cells, the upper ones shorter, those in the middle up to 80 μ long, at the apex frequently subacute, those at the base more loose, the alar ones few, indistinct, lengthened, rectangular, hardly inflated, forming rather indistinct auricles.

"Hab. North America: Avalanche Basin, Montana, alt. 1500 m., leg. J. Holzinger, July 29, 1898.

"The robust appearance of this plant, its color, its very large, distant leaves, spreading in all directions, give at first the impression of a distinct species; and yet the comparison with numerous specimens of *H. molle* Dicks. shows the more close affinity with this species as it is understood by Schimper, Syn. ed. II.

† M. F. Renauld in Bull. de l'Acad. Intern. de Geog. Bot. 1 Jan. 1901, p. 7. Translated by J. M. H.

NOTE.—The asterisk, *, is used by European bryologists to mark subspecies.

†† By a typographical error in the January issue, page 12, last line, *Hygrohypnum Bestii* (Ren. & Bryhn) Holzinger was printed *Hygrohypnum Bestii* Ren. & Bryhn. The editor alone is responsible for this.

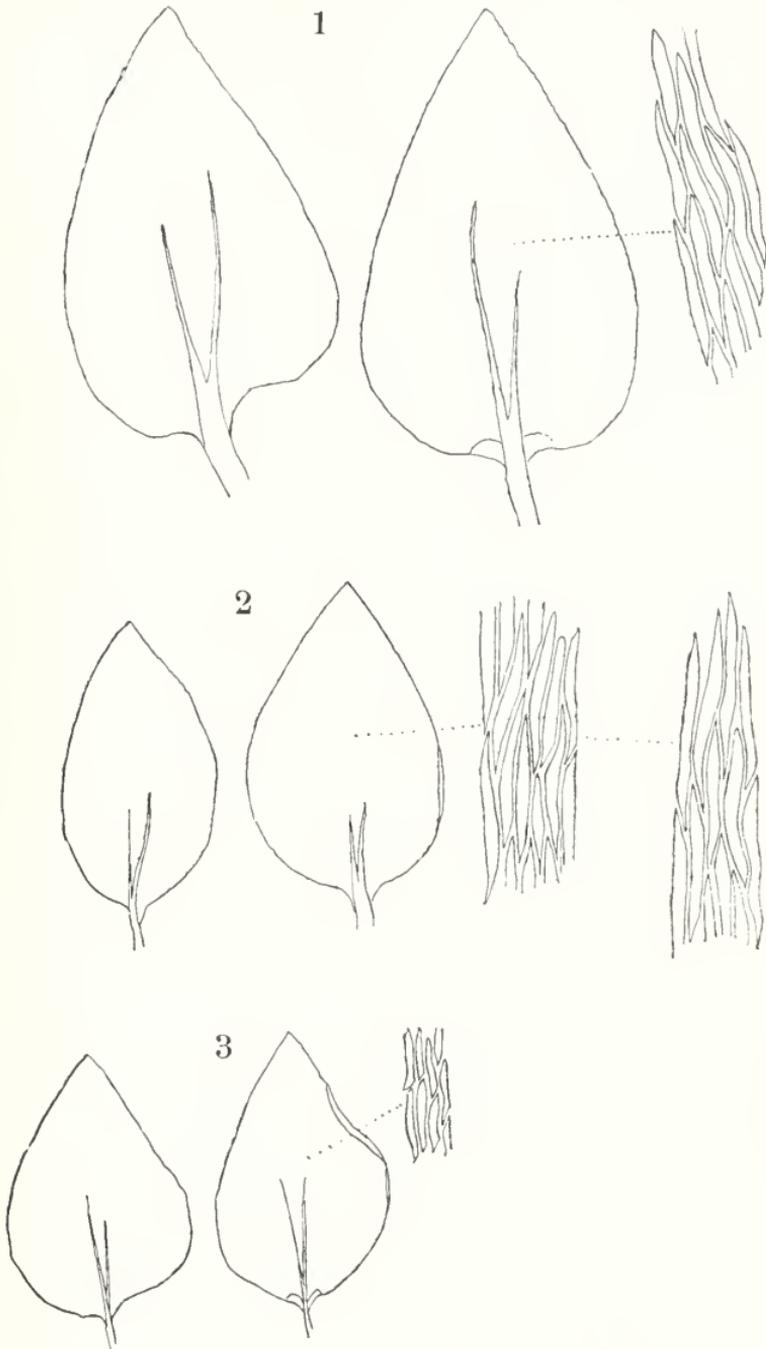


Plate III. 1. *Hypnum Bestii* Ren. et Bryhn, from Montana. 2. *H. Besiit* var. *Pyrenaicum* Ren. from the Pyrenees. 3. *H. molle* var. *maximum* Boul. from Mont Blanc. Leaves x 16, leaf cells x 200. Renauld, del.

(*H. molle* Dicks., var. *maximum* Boul. Musc. Fr.). The form of the leaves is the same, and this is the principal character used for separating from it *H. dilatatum* Wils. and *H. alpinum* Sch. These latter species intergrade with each other and with *H. molle* by numerous transitional forms poorly delimited, so that one can not consider them as distinct species. The case stands the same with **H. Bestii* Ren. et Bryhn, which allies itself with the type of *H. molle* Dicks. rather than with *H. dilatatum* and *H. alpinum*, but which is distinct by its general make-up, its loosely-set leaves, the areolation a little more loose and the middle cells longer (60-90 μ , while in *H. molle* they are 40-70 μ).

"A form collected in 1884 by Dr. Jeanbernat in the Pyrenees had struck me by its peculiar appearance, differing from all European or American specimens of *H. molle* which I have been able to see, and had labeled in my herbarium '*H. molle* Dicks. forma *insignis*.' Its form is a little less robust, the leaves are smaller, the costa is less strong than in the plant from Montana; but one finds here again the same distinctive appearance (port), the leaves less crowded, spreading, the areolation more lax and the cells in the middle of the leaf long and rather pointed. It ought to be placed as a variety with **H. Bestii* Ren. et Bryhn.

"Var. *Pyrenaicum* Ren. In appearance very similar, but of smaller size, leaves smaller, costa a little shorter, less stout.

"Hab. Pyrenees, Lac de Camporeil, Capsir, alt. 2200 m., leg. Dr. Jeanbernat, 1883."

GRIMMIA HOLZINGERI ONCE MORE.

By J. M. HOLZINGER.

The note in the January BRYOLOGIST was written with the desire to clear up effectually the doubt regarding this species caused by Dr. Kindberg's sug-

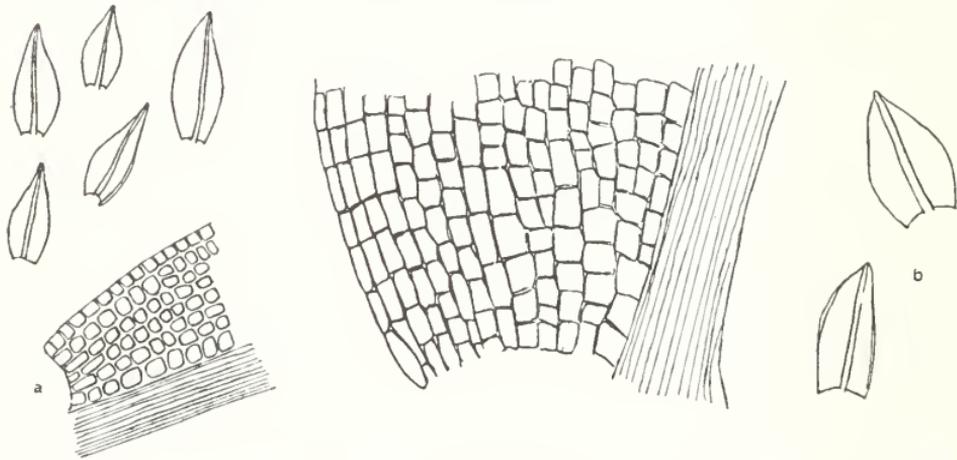


Fig. 1. a, *Grimmia Holzingeri* Card. et Ther.; b, *G. Manniae* C. Muell. Leaves of each x 21.5, leaf cells x 180. Cardot, del.

gestion. It was hoped to find other stations than the type localities for the two plants involved. But so far it does not appear that either plant has been collected a second time. Through the kindness of Mrs. Britton, the writer learns that some of the material from the type station of *Grimmia Manniae* is in the herbarium of Columbia University, which makes it possible to investigate conclusively the claims of the two species independently. Yet, according to a note and drawings in a recent letter from M. Cardot, who has a right to be heard on this point, it seems hardly necessary to doubt further the distinctness of the two species. For the benefit of American students, both are published herewith.

M. Cardot says: "Although approaching it closely in some respects, *Grimmia Manniae* is quite different, having larger, thicker leaves, with basal areolation loose, formed of hyaline thin walled cells; while in *Grimmia Holzingeri* the basal cells are yellowish and thick walled. I inclose comparative figures of the two mosses."

These figures represent leaves and basal leaf cells of the two species, and argue well for the validity of *Grimmia Holzingeri*.

MOSSSES NEW TO NORTH AMERICA.

* *DESMATODON SYSTILOIDES* Ren. & Card. Bot. Gaz. **30**: 16. *pl. II*. July, 1900. Monoicous, gregarious. Stems short, erect, 2-5mm. high. Leaves crowded in a rosette, spreading, oblong-lanceolate, rather suddenly and shortly acuminate, acute, margins plane, irregularly dentate above; nerve strong, reddish, percurrent or shortly excurrent; lower cells lax, sub-rectangular, empty, hyaline or yellowish; middle and upper cells small, obscured by numerous papillae; 2-4 rows on the margin of quadrate or shortly rectangular cells, hardly or faintly papillose, forming a distinct yellowish translucent border. Perichaetial leaves scarcely different, a little shorter. Capsule erect, 8-12 mm. long, on a yellow or pale red seta, twisted to the right when dry, short, oblong, brown; operculum short-conic or sub-rostrate, persisting at the top of the columella; no annulus or peristome observed. Spores smooth, 18-20 μ in diameter.

Labrador: L'Anse-au-Mort (Rev. A. C. Waghorne, 1894).

By the lid attached to the collumella and persistent after the opening of the capsule this species resembles *D. systylius* B. & S., but is clearly distinct from it by the leaves of a more obscure and more papillose areolation, with a distinct pellucid yellowish border, the nerve stouter, brownish, not or very shortly excurrent, and by the total lack of peristome; at least all the capsules we have been able to examine do not show the slightest trace of this organ. The pellucid border of the leaves shows some relationship between *D. systyloides* Ren. & Card, and *D. Porteri* James, but the latter has a much narrower capsule with a highly conic lid not adhering to the collumella, and the peristome and annulus are well developed.

* *BARBULA EUSTEGIA* Card. & Ther. *l. c.* Dioicous? gregarious in mats. Stem very short, 1-2 mm. high. Leaves when dry erect, flexuous, when moist recurved, spreading, linear-lanceolate, acute, sub-acute or slightly obtuse, plicate,

* Translated by Miss E. A. Warner.

channeled above; lower leaves very small, 0.5 mm. long, perceptibly larger above; upper ones 1 mm. long, margins plane or scarcely revolute, entire; costa vanishing in the apex or hardly reaching it, papillose on the back; lower cells pellucid, somewhat lax, smooth, oblong, sub-rectangular; the median quadrate; the upper ones small scarcely 4-5 μ long, rounded-quadrate, obtuse, minutely papillose. Perichaetial leaves larger than the stem leaves, the outer appressed at the half-sheathing base, rather abruptly elongated into a channeled spreading or recurved acumen; the inner ones broadly and shortly acuminate, areolation pellucid throughout. Capsule 1-2 mm. long, 0.3-0.4 mm. broad, oblong, erect or oblique, on a pale slender seta 12-18 mm. long, twisted to the right when dry; operculum conic-subulate, equalling or surpassing the capsule. Annulus compound, 0.07 mm. broad. Peristome deep red; basal membrane 0.08 mm. high, teeth twisted, about 1 mm. long, strongly granulose. Spores smooth, 8 μ in diameter. Male flowers unknown. Very probably dioicous. (p. 17. *pl. II*.)

Idaho: Cedar creek, Latah county, on ground (L. F. Henderson, 1897).

This moss, received from Mr. Henderson only in very small quantity, seems a miniature of *B. flavipes* B. & S., from which, besides in its small size, it differs chiefly by the lid as long as the capsule, or even longer. By this character, as well as by the form of the leaves, it resembles also *Trichostomum dicranoides* Sch. (*T. macrostegium* Sull. Icon. Suppl. 35, *pl. 22*) from Central and South America and the Antilles, which has been also recorded from Alabama; but this last species has the beak of the lid thinner, the leaves larger, broader, denticulate above, a less opaque areolation of larger and more distinct cells, and the peristome less twisted, with a shorter basilar membrane.

* * *

POLYTRICHUM JENSENII Hagen, in Meddelelser om Grönland, 15: 444. 1898.

This very rare European species was collected on the shore of Beaver Lake in the Yellowstone National Park in the summer of 1898 by Prof. Aven Nelson. It is closely related to *P. commune* having the terminal cells of the lamellae of the same general form. Prof. Nelson's plants are sterile and were at first thought to be a diseased form of *P. commune*, but a careful study of the plant by Dr. I. Hagen and others established the identity of the plant beyond reasonable doubt. It is more slender and lighter colored than *P. commune*. The leaves are shorter and more erect when moist, nearly entire, and with much less slender apex, being acute instead of slenderly acuminate. At the point of transition between the sheathing base and the lamina there is a dark brown spot on each side of the costa, caused by shrinking; at this point the leaves break off easily.—From an article by J. M. Holzinger in *Asa Gray Bulletin*, 3: 95-99. *f. 6*. October, 1900.

CURRENT BRYOLOGICAL LITERATURE.

In the *Revue Bryologique* for January, 1901 (28: 1), Mr. R. S. Williams reports the receipt of a specimen of *Timmia cucullata* Mx. from Europe, under the name of *T. megapolitana* Hedw. *T. cucullata* has not before been credited to Europe.

T. cucullata has the leaf as wide above or even wider than the clasping

base in most of the leaves; the leaf median cells are 0.012 mm. in diameter. The capsule is always curved, nodding, scarcely furrowed when old, and wide-mouthed, gradually narrowing from mouth to seta; the exothelial cells are mostly elongated and sinuous walled. In the United States this species seems to be the only one found any distance east of the Rocky Mountains. It also occurs on the Pacific slope. It usually grows on damp shady banks, sometimes on the base of trees.

T. megapolitana has a leaf base wider than the blade above, median cells about 0.008 mm. in diameter; ripe capsule nearly straight, becoming furrowed with age and mouth not wider than capsule below; the exothelial walls irregular, scarcely elongated, and sinuous walled. Usually growing at a somewhat higher elevation than *T. cucullata*, on rather dry soil at the base of ledges of rocks. Rocky Mountains and northward.

The European *T. cucullata* was from near Archangel, Russia.

* * *

In the Bulletin of the Torrey Botanical Club for December, 1900 (27: 648-649), Mrs. Britton has the following notes:

"*DIDYMODON RIPARIUS* Aust.—This species was described as *Pottia riparia* Aust. in the Supplement to Sullivan's Icones in 1874, and the fruit was figured on Plate 21. In 1880, Warnstorff described *Barbula lingulata*, which Limpricht later changed to *Trichostomum Warnstorffii* (Laubm. 1: 587. 1888) the specific name being preoccupied. In 1892, Kindberg in Macoun's Catalogue, described *Leptodontium Canadense*, as a new species, remarking that 'it is rather peculiar that this genus had not been represented before in North America.' In the Bryineae of Europe and North America, he described this species as *Didymodon Macounii* Kindb. (new name) and referred *Pottia riparia* Aust. to *Didymodon riparius* Aust., the name it bore in Austin's herbarium. I have critically compared all these specimens and am persuaded that they are one and the same species, characterized by very peculiar brood-bodies, borne on long slender filaments, either in clusters in the axils of the leaves or at the summit of the stems, mixed with the archegonia and seeming to replace the paraphyses. Limpricht figured them on page 588, Fig. 171 of the Laubmoose, and Correns in his *Untersuchen der Laubmoose* has also figured and described them as *Trichostomum Warnstorffii*. The European specimens have not been found fruiting, and Austin's station on the Palisades is the only one thus far discovered where it is known to fruit. It has probably been overlooked in many places, on account of its small size, dirty appearance, and sterility. The following stations are recorded for North America: On rocks in streams, Palisades of northern New Jersey and southern New York, C. F. Austin; Niagara Falls, F. Wolle;? Watkins; Chilson Lake, Mrs. Harris; Bashbish Falls, R. S. Williams. Penna.: Bethlehem, Rau and Wolle; Pocono Mt., T. C. Porter. Springfield, Ohio, Miss Biddlecome; Owen Sound, Ont., J. Macoun. In Europe it is only known in Switzerland from the Rhine at Schaffhausen and in the lake at Zurich."

Mrs. Britton and Mr. Ernest S. Salmon have agreed that *Grimmia Philibertiana* E. G. Britton, is a synonym of *Grimmia anomala* Hpe. This species has never been found fruiting in Europe, but was collected in fruit in Idaho by

Mr. J. B. Leiberger. (It is interesting to note that both these rarely fruiting species bear abundant brood-bodies.—A. J. G.)

Many collectors of mosses have noticed a club-shaped white fungus growth arising from various species of mosses. Mrs. Britton states that this is *Typhula muscicola* Pers. and gives a list of localities and collectors.—A. J. G.

MOSSSES WITH A HAND-LENS, a Non-technical Handbook of the More Common and More easily Recognized Mosses of the North-Eastern United States, by A. J. Grout, Ph. D.

In the study of any branch of science the first steps are the most difficult, require the most persistent efforts on the part of the student, and are beset with the most discouragements. The recognition of these facts has in late years borne its legitimate fruits in the production of a large number of elementary works intended to assist beginners. Mosses with a Hand-lens is one of these, in fact the only one in its special field. Its author's professional training as teacher enabled him to know just how and where and when to give the needed assistance. Beginning the subject matter with two well-arranged keys, the one based mainly on structural characters, the other mainly on habitat, he proceeds to describe in language clear and simple and easily understood, one hundred of the commoner mosses, such as are not infrequently found in the eastern parts of the United States and Canada. Along with these descriptions are a large number of neatly executed illustrations, which are valuable in that they show at a glance the distinctive characters of the plants under consideration. Last but not least, is an illustrated glossary of bryological terms. This is an important part of the book, one that has evidently been prepared with considerable care, and may be consulted with advantage not only by beginners and amateurs, but by professionals as well.

In the preparation of a work like Mosses with a Hand-lens, it is not an easy task for the author to decide on what and how much to include. Whether the usefulness of Dr. Grout's book would have been increased by the treatment of a larger number of representative species is an open question, as is also whether the student will be able from these descriptions alone, without a knowledge of the minute anatomy of the plants, to make anything like satisfactory determinations of his gatherings. In whatever ways these questions may be answered, the fact remains that the descriptions and illustrations given in this work will often offer a clue to the beginner that he could not obtain from any other source, and by which he will be enabled, probably with the aid of an imperfect knowledge of the characters derived from the minute anatomy as given in the manuals, to work his way to satisfactory results.—G. N. Best.

CARL MUELLER'S GENERA MUSCORUM.

Dr. Carl Mueller died February 9, 1899, in Halle, Germany, at the ripe age of eighty years. In spite of this, death surprised this veteran bryologist in the midst of intense scientific activity, and he left some valuable manuscripts unpublished. The most important of these, his *Genera Muscorum Frondosorum*, on which he worked with the greatest devotion during the closing years of his life,

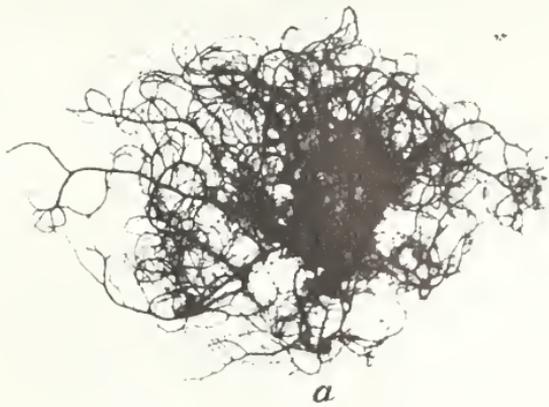


Plate IV. a. *Alectoria jubata* var. *chalybeiformis*. b. *Evernia prunastri*. c. *Ramalina calicaris* var. *fastigiata*. d. *Ramalina calicaris* var. *farinacea*.

has just appeared (January, 1901) from the publishing house of Eduard Kummer, Leipzig.* Dr. Schliephacke, first a pupil and then a life-long friend of the author, has written the preface, a bibliographical sketch, and, with the aid of Dr. Geheeb, has directed the publication of this posthumous work, which comprises 474 pages. In spite of its unfinished condition (it lacks the Orthotrichaceae of the Acrocarpi, and all the Pleurocarpi), it is a work which, by reason of its independent treatment of genera as plant groups, will enlist the lively interest of all botanists interested in the principles of system.

The author has been a most diligent worker for over sixty years, and has during all this time been an active student of the mosses of all continents; has described not hundreds, but literally thousands of species, not as a hasty, selfish species-monger, but as a master with an acumen and comprehension developed in a life-long devotion to these humble yet beautiful organisms. Think of him, writing in his eightieth year to a friend: "The joy to live for Bryology I am feeling in its full glory, though for the moment it has made me quite ill!" He had examined a collection of antarctic mosses, and had determined nearly 250 new species in it, and that only a few months before his death!

It is the comprehension of systematic and morphological relations, developed and tempered by much industry and long devotion, that the author has brought to bear upon the monumental work before us, monumental, even though it is incomplete. In the preface it is rightly characterized as the "testament of his bryological knowledge." From his commanding view-point, then, he discusses the systematic relations of genera. To quote his own words from page 8, where he reviews the Cleistocarpi, dwarfs among mosses: "That we have the right to consider them, on account of their diminutive size and simplicity, as those mosses with which we must begin the system, as some would have it, I doubt. Since in many families of plants, dwarfs occur by the side of giants, as for instance among the ferns in the case of species of *Hymenophyllum* and *Cyathea*, without permitting the former to be ranked as lower, just so here. There exists within one and the same family no ascending development; all forms are co-ordinate; and it is we ourselves that bring a system to their study in order to make possible a comprehensive view; and therefore all disputing about systems is barren. For the present at least, where only the very smallest part of the organic world lies revealed before us, we are unable to determine how the denizens of the plant world will finally marshal themselves in orderly array."

But the author dwells not only on the distinguishing characters of "groups" and genera; he does this with a skill and care very satisfying to the systematist, and a great deal more: he takes up the historical development and the geographical distribution of the species under the genera. And both style and matter of these discussions is such that every page of the volume, though dealing with abstruse scientific data, takes on the charm of a story dealing with matters

*Genera Muscorum Frondosorum. Classes Schisticarporum, Cleisticarporum, Stegocarporum completentia, exceptis Orthotrichaceis et Pleurocarpis, by Dr. Carl Mueller Hallensis, with a preface by Dr. Karl Schliephacke. Leipzig. Vorlag von Eduard Kummer, 1901. Price 12 M. = \$2.50.

human. The service this master has thus rendered to bryology will lead all to keep him in grateful memory, and pay him the respect he deserves for his unselfish devotion to science.

Only a brief notice of the more striking departures from current views is possible here. Every one will be struck with the position the author assigns to the Sphagnaceae, which he places after Leucobryaceae, Group 12, following with Funarioideae, Group 14. After a careful characterization of the group, he argues that there is no valid ground for separating these mosses from the Bryineae proper.

The other departure from contemporary views, is conditioned by his position as a "Centralist," to use Dr. Schliephacke's term, who considers that "decentralization, that is, the separation of larger genera into several smaller ones, has become, so to speak, a trait of modern times." Dr. Mueller held to fewer centers. As a result, many names recognized as of generic value by others, appear as section names under his genera. Whether his views are finally accepted or not, his discussions, including all possible criticisms, all available morphological and historical considerations, will prove of the greatest value to all moss students.—*John M. Holzinger.*

DISCELIUM NUDUM (Dicks.) Brid. IN NEW JERSEY.

During the latter part of November, 1896, while botanizing along the railroad about a mile above Stockton, N. J., my attention was attracted by a blueish-green protonemal growth which appeared in patches on the bottom of an excavation in the railroad bank. On the filaments of this growth were minute buds from which sporophytes were just commencing to shoot. Being unable to identify the plant at this time, a month later I visited the spot again, when I found the capsules, although quite immature, yet sufficiently developed to make a diagnosis possible, especially by the aid of the calyptras, which were clasping the stems just below the capsules. This was indeed the rare *Discelium nudum*, not before known from New Jersey.

The veteran bryologist, Mr. E. A. Rau, informs me that this moss was first collected many years ago in this country at Painesville, Ohio, by Dr. Beardslee, and that this remained the only locality until he collected it near Bethlehem, Pa., May 19, 1873. About two weeks later, Dr. Francis Wolle found it in another locality, not far, however, from Mr. Rau's. So far as is known, these were the only localities in this country for it until found in New Jersey. In Europe it appears to be nearly or quite as rare.

Discelium nudum is usually found along the line of excavations, especially rail and wagon roads, on a hard sandy clay substratum, in the basin-like depressions of which muddy water settles, and drying up, leaves a sedimentaceous layer. It is on this during the latter part of autumn that the protonemata appear, and although the capsules make their appearance during the early part of winter, they do not mature until the following April or May. When I visited the locality above referred to, about the middle of April, the greenish color of the plants

had disappeared, the plants themselves were mostly overturned by the winter's alternate freezings and thawings, and had I not known the exact spot, I would have had great difficulty in finding the moss. The following summer the banks unfortunately fell in, and in consequence our rarity disappeared.—*G. N. Best.*

THE PERISTOME—I.

BY A. J. GROUT.

The peristome, besides being one of the most beautiful of microscopic objects, is also one of the parts most carefully considered in classifying mosses. The details of the differences in development and structure of the various types of peristomes have never been presented in English in a popular form. M. Philibert in the *Revue Bryologique* has given a masterly presentation of the subject, but it is in French, and too extended and technical to be of popular interest.

This series of articles will be based largely on the work of Schimper and Philibert, but will in no sense be a translation of either. Free use will be made of Schimper's illustrations published in his various works, and these will be supplemented by original drawings.

THE simplest type of peristome is that of *Georgia* (*Tetraphis*), where the tissue which fills the operculum splits into four equal parts, as is shown in the accompanying figure. The operculum is composed of a single layer of cells, and is easily deciduous.

It is an interesting fact that in *Andreaea* and *Georgia*, which have a thalloid protonema indicating a close relationship to the hepatics, the capsule divides into four parts. In *Andreaea* the whole capsule dehisces as in the hepatics; in *Georgia*, only that portion of the tissue lying within the operculum. Prof. D. H. Campbell in his *Structure and Development of the Mosses and Ferns*, states that he considers this resemblance an accident. I am not so sure that this is the case. If he be right, the division of these capsules into four parts, and the division of all moss peristomes into multiples of four, may possibly be explained by the regularity of the divisions of the two-sided apical cell from which the sporophyte is developed. It will readily be seen that in *Georgia* no spores are found within the operculum. This is true of mosses having any other type of peristome. In all other types, the central tissue forms the columella, which in most cases shrinks up into a small piece of tissue upon the falling of the operculum.

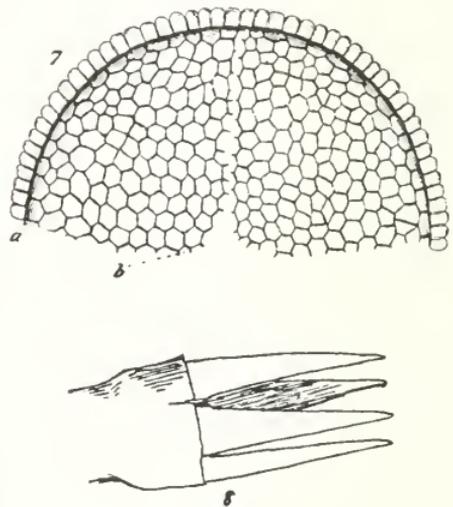


Fig. 1.

In *Georgia* the peristome apparently has no function except to provide an opening for the escape of the spores. In most other forms the peristome is so arranged as to in a manner regulate this escape.

EXPLANATION OF FIGURES.

Fig. 1. 7. Half of a section of the peristome and operculum of *Georgia* (*Tetraphis*): a. Operculum composed of a single layer of cells; b. Tissue which fills the operculum and which splits into four parts to form the peristome. 8. Peristome of *Georgia* x 40.

SOME FURTHER OBSERVATIONS ON BUXBAUMIA.

BY ELIAS J. DURAND.

The interest I have felt in the notes on *Buxbaumia* in the last number of THE BRYOLOGIST has prompted me to add some of my own observations on this genus. I shall never forget the pleasure I experienced when, one spring day eleven years ago, Professor Dudley first pointed out to me some of these little plants growing on a shady bank close by the campus. Ever since that time when in favorable localities, I have kept my eyes open for these little "elves."

The open woods bordering the ravines about Ithaca furnish most congenial habitats for *B. aphylla*. On the banks of any one of a half-dozen of our larger gorges, I can be sure of finding at least a few of the capsules in suitable spots. By Coy Glen I have found it every few rods for a distance of nearly two miles on both banks. Near one stump I can collect hundreds of specimens in their season. It is a spot which I always visit with my classes. Were I not afraid of bringing smiles of incredulity to the faces of your readers, I should tell how I once dug down at random through a foot of snow by the side of an old wood road, and found capsules in the first hole dug! This does not mean that the plants are scattered uniformly over the whole surface, but long practice gives one a sort of instinctive facility in knowing just where to look.

The habitat of this species is with us very characteristic. The plant always grows in open woods, on soil which has a damp blackish appearance, with a tinge of green due to the persistent protonema. Such spots often have a sparse growth of other mosses and lichens, but show no more traces of rotten wood than other woodland soil. I have never found *B. aphylla* on wood or logs. Neither have I been able to establish any uniformity in the direction of the capsules on level ground. On sloping banks, however, they always stand with their ventral sides down the hill, as Haberlandt long since pointed out.

The young sporophytes begin to appear early in September, when they are entirely covered by the thimble-shaped calyptras. The latter are ruptured by the elongation of the sporogonia exactly as in the other Bryineae. Growth is rather rapid until the last of October or the first of November, when the majority of the capsules are about one-half or two-thirds grown. Occasionally development is much later than these periods. During the cold months of winter there is little or no development of the capsules, which remain a bright green,

owing to the presence of chlorophyll in the tissues. With the warm days of late February or early March, growth begins again, and the color changes from green to brown as the plants mature. Usually by the middle of March or the first of April the spores are ready for dispersion. Sometimes in sheltered spots the capsules remain unbroken until summer. The spores may germinate at once, giving rise to a protonema which is in no way peculiar among the mosses.

Some authors have used the word "pseudopodium" in describing the seta of *Buxbaumia*. This term, as applied to *Sphagnum* and *Andreaea*, indicates a prolongation of the axis of the leafy gametophore, which bears the sessile capsule at its apex. The pedicel of *Buxbaumia* is, on the contrary, a part of the sporophyte as in the other Bryineae, and is, therefore, a true seta, with its lower end imbedded as a foot in the tissue of the much-reduced gametophore.

Buxbaumia indusiata Brid. also occurs with us, but is much rarer than *B. aphylla*. I first met with this species in October, 1893, in Enfield ravine, one of the largest of our glens. Since then it has been collected at a half-dozen other spots in the same gorge. In fact, I seldom visit this interesting place without seeing a few capsules. More recently I have found plants at single stations in both Buttermilk Ravine and Coy Glen. Besides these, I have seen specimens kindly sent me by Professor Dudley, and collected by him in Fall Creek and Cascadilla ravines, the latter station being actually on the University campus. We have thus within eight miles of Ithaca five different stations for this species, but, although I have searched the region pretty diligently, no others have been found.

With us *B. indusiata* always occurs on very rotten moist logs and stumps, often along with liverworts and other mosses. The wood is usually so badly decayed that it may be picked to pieces with the fingers. The individuals occur singly and widely scattered, and are very hard to see. The whole habits of our two eastern species are so totally different that no one ought to have the slightest difficulty in distinguishing them even without the aid of stomata. I have not been able thus far to obtain much information regarding the development of the rarer form. I have collected it only in the fully or nearly mature state, in October, November, December, April and May. Specimens may be found on the same log year after year.—*Botanical Department, Cornell University.*

BY ELIZABETH G. BRITTON.

Buxbaumia aphylla has the reputation of disappearing from its recorded stations, but on one old stump in the Hemlock Grove, in Bronx Park, I have collected it for four years successively, and last year there were as many as fifty fruiting plants. These did not come to maturity, however, as the first freezing cold weather killed all but a few. There was no snow to protect them. The pedicels remained for a year later. By the beginning of September, five new stalks were found; these had developed green capsules by November, and when last seen were still growing. This year there has been snow to cover them, and I took care to give them shelter with a few hemlock boughs. Mr. Williams found only two capsules growing out of the end of a "decorticated log," little decayed, and with no other mosses growing with them. It is the most unusual record for this species.

B. indusiata begins to develop earlier. In the Adirondacks I have collected well-formed capsules in August and September. Prof. C. H. Peck found it mature in October in the Catskills, and Mr. Durand at Ithaca, N. Y. It grows on decaying logs and stumps with other mosses, especially *Georgia pellucida*.

B. Piperi grows on moist banks and on decaying logs, and matures in the fall from August to November, and begins to form the capsules in March, according to Mr. J. B. Leiberger.—*New York Botanical Garden*.

MARCHANTIA AND CONOCEPHALUM.

BY WILLIAM C. BARBOUR.

The species selected for this opening paper upon the Hepaticae are common everywhere, but are easily mistaken, each for the other. *Marchantia polymorpha* L. here considered, is the only species of the genus which will be found by our readers unless they live in the Southern States. This species is widely distributed in North America, Europe and Asia, and has also been collected in Java and in the Azores Islands.

Conocephalum conicum (L.) Dumort. has practically the range of our *Marchantia*, with the addition of northern Africa. Both species are found growing on moist earth, though *Conocephalum* seems partial to damp shaded rocks. The thallus of each is prostrate upon the ground, and when the growth is vigorous, is much overlapped and interlaced.

The thallus of *Marchantia* is generally once or twice forked, from one to three (rarely more) inches in length, and of a rather peculiar dull green color. The midrib shows very plainly, is quite broad, dark beneath, and bears many root hairs. The surface is areolate, the cells being diamond-shaped and supplied with stomata. The species is dioecious, that is, the male and female



Fig. 1.

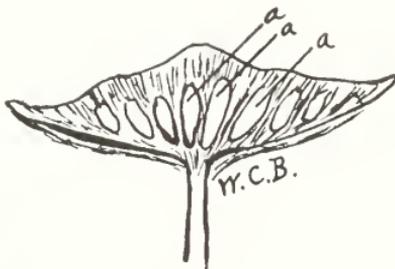


Fig. 2.

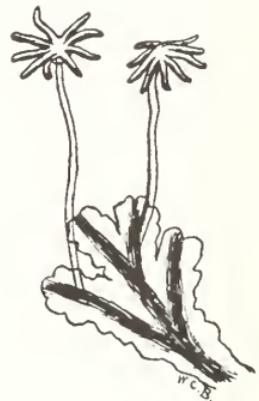


Fig. 3.

receptacles are borne upon separate plants. The male (Fig. 1) receptacle has something the form of a Japanese umbrella, being raised upon a stalk half or three-quarters of an inch above the surface of the thallus, and cut into eight

rounded lobes. On its top are seen a number of papillae. Underneath each papilla, imbedded in the surface of the receptacle, is an antheridium. These antheridia open by small lobes in the papillae. (Fig. 2.)

The female receptacle (Fig. 3) has a much longer stalk (1-2 inches), and is nearly hemispherical in form. It is divided nearly to the centre, thus forming eight or ten rays, under each of which is an involucre. These rays are covered with very fine scales. The involucre is oblong and inclose an ovate perianth. The capsule (sporogonium) is of a light brown color, and when fully developed, extends below the involucre.

In opening it divides into eight short segments, after the manner of some of the orders among the mosses. Beside the spores, the hepatic capsule contains other long, slender bodies, called elaters (Fig. 5), whose office is to aid in

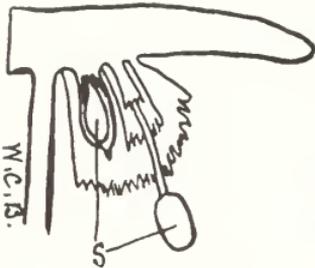


Fig. 4.



Fig. 5.



Fig. 6.

the distribution of the spores. In *Marchantia* the elater contains two spiral threads running its entire length, and so is said to be "bispiral." The sterile fronds of this species often bear gemmae (Fig. 6) in small cup-shaped receptacles, borne upon the surface of the thallus. The species is in good condition for collecting in late June or early July.

Conocephalum conicum has a thallus several times forked, and varies from yellowish-green to quite a dark shade, but is a brighter green than is *Marchantia*. The midrib appears narrower, but is quite prominent upon the under side of the thallus. The areolation (Fig. 7, b) is much larger than in *Marchantia*, is hexagonal instead of diamond-shaped (Fig. 7, a), and has pores so large that they can be easily seen with the naked eye. The antheridia are imbedded in the surface of the



Fig. 7, a.

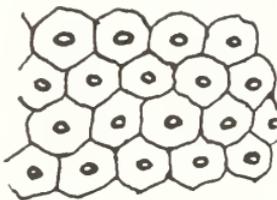


Fig. 7, b.

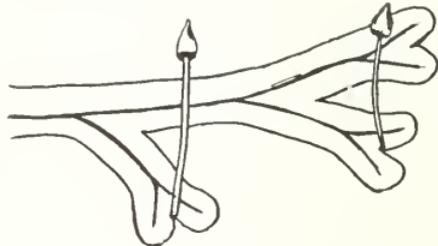


Fig. 8.

thallus instead of a special receptacle. The female receptacle (Fig. 8) is raised

upon a stalk one and one-half or two inches long. The stalk is rather fleshy, and arises from a concave disk at the fork of the thallus. The receptacle is convex, obtuse at the apex, and is cut into six short lobes. Beneath these lobes are the involucre and their capsules, which resemble somewhat those of *Marchantia*. This species also is dioecious, and has bispiral elaters. It should be collected about the first week in April.

EXPLANATION OF FIGURES.

- Fig. 1. Male plant of *Marchantia polymorpha* reduced.
 Fig. 2. Section of male receptacle of *M.* magnified; a, a, a, antheridia.
 Fig. 3. Female plant of *M.* reduced.
 Fig. 4. Section of part of female receptacle of *M. polymorpha* magnified; s, sporogonia, one not yet emerged from perianth. The outer fringe represents the involucre.
 Fig. 5. Portion of elater of *M. polymorpha*, showing spiral bands, magnified greatly.
 Fig. 6. Sterile thallus with gemmae.
 Fig. 7. Cells of thallus, with stomata magnified: a. *Marchantia*; b. *Conocephalum*.
 Fig. 8. Thallus of *Conocephalum conicum* with female receptacles, reduced.

LICHENS—ALECTORIA, EVERNIA, RAMALINA.

BY CAROLYN W. HARRIS.

(With Plate IV.)

In this second article on lichens, *Alectoria*, *Evernia* and *Ramalina* will be considered. They belong to the same family as the *Usneas*, the *Usneei*.

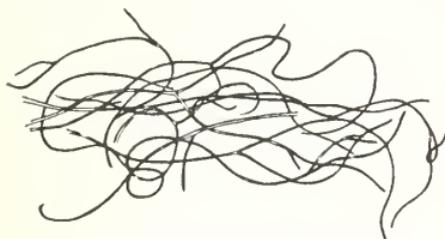


Fig. 1. *Alectoria jubata* var. *implexa* x 1.

In walking along country roads, you no doubt have noticed, on old fences or dead trees, little tufts of "black hair." These are *Alectorias*. The thallus is fruticose, rather rigid and short, again soft and pendulous. At the joints it is flattened, for the medullary cord is not solid like that of *Usnea*, but is soft and web-like; the flattening at the joints gives greater strength and tenacity to the thallus. Except in color, *Alectoria* resembles *Usnea*. It is not the gray-green

of the latter, but varies from light brown to almost black. In only one species is it at all green. The surface has a smooth, shiny appearance, as though it had been varnished. The apothecia are small and sessile; they are not surrounded by fine fibrils as in *Usnea*. They are usually the same color as the thallus, and have the same shiny appearance.

The most common form of the genus is *Alectoria jubata* L. var. *chaly-*

The magnification of figures 2 and 4 is twice too great, as figures were reduced $\frac{1}{2}$.

beiformis Ach. (Plate IV. a.) The thallus is round (terete) except at the joints, where it is flattened. In color it is almost black, shiny and rigid, and grows in tufts. The branches are finer at the tips, and of one color. Soredia are usually found, which are interesting on account of their shape. Instead of being in round, mealy-looking masses, seemingly sessile on the thallus as in *Usnea*, they are whitish, oval bodies, which seem to be imbedded in the thallus.

Alectoria jubata var. *implexa* Fr. (Fig. 1.) Thallus pendulous, quite soft, with many branches, which are intertangled and turn back on each other. It is a much lighter brown than *chalybeiformis*, and does not have the varnished appearance. While this species is found in the eastern States, it grows more luxuriantly in the far West, where with one or two other species it is generally called by travelers "Florida Moss," as it hangs from the trees in long masses

Alectoria ochroleuca (Ehhr.) Nyl. var. *sarmentosa* Nyl. (Fig. 2), is also found in the East, but is rare; in the West it is very common. The thallus is pendulous, but not as soft as in *implexa*. The color is a light, greenish-brown, sometimes straw-color. The branches are long and much divided. They do not turn back as in *implexa*. The apothecia are small, and dark chestnut in color.



Fig. 2. *Alectoria ochroleuca* var. *sarmentosa* x 2.

Alectoria Fremontii Tuckerm. (Fig. 3.) The thallus is a very dark brown, wavy and shiny, with few branches, which are quite straight until toward the

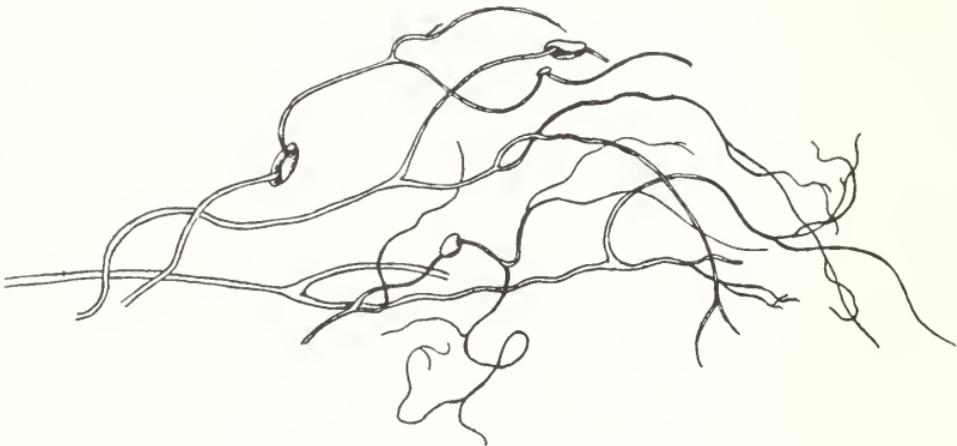


Fig. 3. *Alectoria Fremontii* x 2.

ends, where they grow much finer and are intertangled. The apothecia are small and yellow. This also is a western lichen.

EVERNIA, although belonging to the same family as *Usnea* and *Alectoria*, is quite different in its general appearance. The thallus is fruticose, soft, somewhat flattened and wrinkled. It is usually covered with soredia, which in some species are very mealy. The color is either light gray, greenish-gray, or lemon. *Evernia* has a medullary layer which is very cottony and soft. The apothecia are large and flat; in some species they are surrounded by coarse fibrils, in others they are free from them.

Evernia prunastri (L.) Ach. (Plate IV. b) is found quite generally, varying somewhat in appearance in different localities. It grows on trees. The thallus is pale green, flattened and furrowed. It is usually covered with soredia, which are green, not white as in *Alectoria*. The branching is angular, pointed or spike-like at the tips. Below, the thallus is channeled. The apothecia are very rare. They are lateral, namely, borne on the flat surface of the thallus.

Evernia furfuracea (L.) Mann. (Fig. 4.) The thallus, while flattened, turns under a little, giving the lower side a trough-like appearance. Branching is more frequent than in *prunastri*, and is more pinnate. The thallus, which is a light gray, is slightly rough or coral-like. Below it is black or has black spots on it. The apothecia are small and on the margin of the thallus. They are cup-shape and reddish-brown.

Evernia furfuracea var. *Cladonia* Tuckerm. is much like *furfuracea*, only much smaller and finer, and more brittle. This form is found in the mountains.



Fig. 4. *Evernia furfuracea* x 2 and x 4.

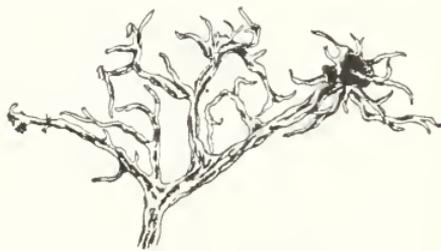


Fig. 5. *Evernia vulpina* x 1.

Evernia vulpina (L.) Ach. (Fig. 5.) Thallus flattened and wrinkled, bright lemon-color. The branches are long with attenuated tips. Apothecia large, reddish-brown, surrounded by spine-like branches. This striking lichen is found on the Pacific coast as far south as Lower California, and back in the mountains. By its color it attracts the notice of tourists, and is collected when the rarer and less conspicuous lichens are passed by.

RAMALINA, like *Evernia*, has a flattened thallus. It is fruticose, and in some species pendulous, is often strap-like and sparingly branched. The medullary layer is cottony, but cord-like, so is stronger and more rigid than that of *Evernia*. The apothecia vary in size, they are flattened or cup-shaped, occurring along the margin or on the flat surface of the thallus. Soredia when present are large and very mealy.

Ramalina calicaris (L.) Fr. var. *fastigiata* Fr. (Plate IV. c.) Thallus alike on both sides, pale green, rather rigid, cut into parallel strap-like portions with few branches. It grows in tufts from one to two inches long, is usually fertile. The apothecia are large and flattened, a little lighter green than the thallus.

Ramalina calicaris var. *fraxinea* Fr. The thallus, which is wide and long-lobed, suggests a bunch of small withered leaves, and is a dull green. The apothecia are small, and are borne on the flat surface of the thallus.

Ramalina calicaris var. *farinacea* Schaer. (Plate IV. d. and Fig. 6), has a fine, much-branched thallus, is a delicate green, covered with white, powdery,



Fig. 6. *Ramalina calicaris* var. *farinacea* x 2.

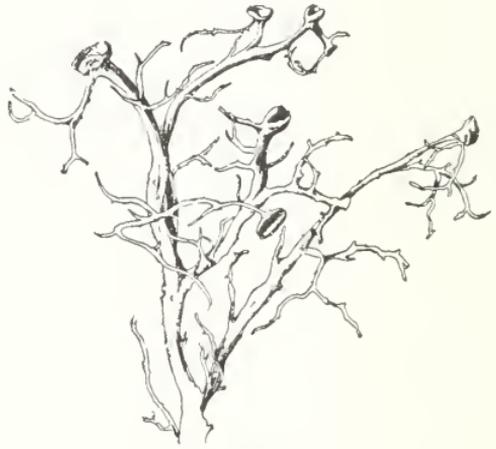


Fig. 7. *Ramalina rigida* x 2.

confluent soredia. The apothecia are lateral, but are rare. This species is usually found on rocks, growing in a mass.

Ramalina rigida Pers. (Fig. 7.) The thallus is slender, with irregular branches which are fine and stiff. The apothecia are medium in size, and from each extends a long, horn-like branch.

Ramalina reticulata Noehd. (Fig. 8.) In this handsome lichen of the far West, the thallus is elongated and pendulous, with many branches, which form a thick mat, hanging for several feet from the trees. The thallus is brownish-green; the longitudinal branches here and there unite and form a beautiful network, sometimes coarse, sometimes very fine and delicate.

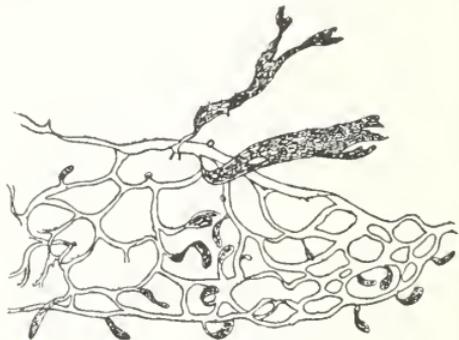


Fig. 8. *Ramalina reticulata* x 1.

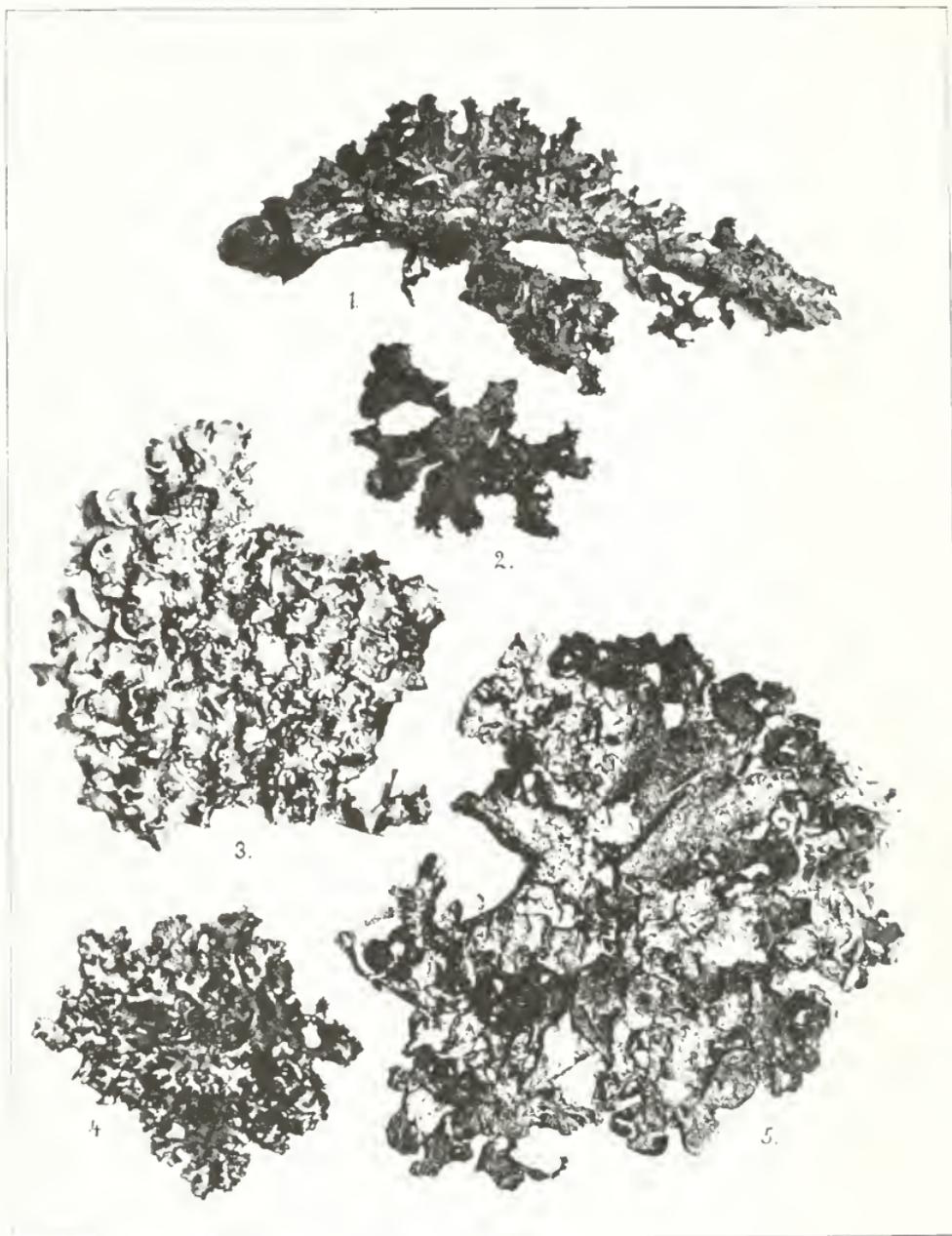


Plate V. 1. *Cetraria juniperina* 2. *C. juniperina* in fruit.
3. *C. Oakesiana* 4. *C. ciliaris* 5. *C. lacunosa*.

THE BRYOLOGIST.

VOL. IV.

JULY, 1901.

No. 3.

LICHENS—CETRARIA.

BY CAROLYN W. HARRIS.

(WITH PLATE V.)

To many lichenists the Cetrarias are the most interesting of the family, Usneei, to which they belong, because of their varied thallus, in some species resembling the foliaceous Parmelias, in others the fruticose Cladonias. The name Cetraria is derived from Cetra, meaning an ancient Spanish shield, which the apothecia are said to resemble.

The Cetrarias are very generally distributed. They are found all over the world, but are especially abundant in the northern part of America. All the European species are found here, and we have several which do not occur in Europe.

Generally Cetrarias choose trees for their substratum, but a few are found on rocks and earth. Rhizoids are few or wanting, even where the thallus is horizontal. Cilia are frequently present and in some species are very numerous. Soredia are rare, so the surface of the thallus is smoother in appearance than in the Parmelias. As they develop they become almost free from the substratum and after a hard rain may be found entirely detached.

The thallus varies from foliaceous to fruticose, the lobes are always flattened and rather broad. Generally the thallus is more brittle than in Parmelia, owing to the greater development of the cortical or outer layer, and the less cottony tissue of the medullary or inner layer of the thallus. In the ascendant varieties the thallus is compressed or channeled, in the foliaceous it is expanded and leaf-like. In color it varies, is bright yellow, greenish yellow or straw color, olive, brown, and even black. It is smooth on the under side.

The apothecia are medium to large in size, they are marginal or submarginal, the disk colored differently from the thallus. They are attached obliquely to the ends of the lobes of the thallus. In some species the apothecia are very rare, in others they are very abundant. The disk is thin, somewhat crenate or torn, ranging in color from light chestnut to dark reddish brown. In shape the apothecia are shield-like, but in some species become nearly round. They are flatter, less cup-shaped than in Parmelia.

CETRARIA LACUNOSA, Ach. (Plate V. 5.)—Thallus foliaceous, the lobes rounded and deeply lacunose, giving a pitted or wrinkled appearance. The margins are crenate, yet smooth. Above it is a light pearl color, sometimes with a slate colored tinge. When young it is white below, growing darker with age; is easily detached from the substratum.

*The April number was issued April 16th.

The apothecia are borne on the lobes of the thallus. They are usually abundant, somewhat elevated or pedicellate. The disk is light chestnut, growing darker with age, and perforated at the center. The margin, unlike *ciliaris*, is entire. When young the apothecia have the characteristic shield shape but as they develop they assume a round shape. *Cetraria lacunosa* grows on trees and old fence rails and while not so generally found as *C. ciliaris* is a very common species.

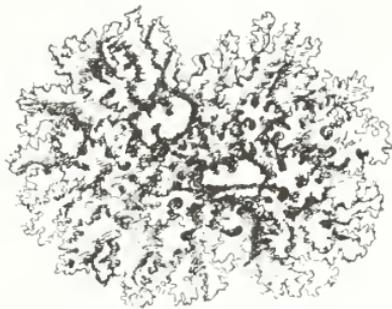


Fig. 1. *C. ciliaris* x I.

These are very distinct and numerous on the growing specimen, but disappear to some extent when pressed. When young the thallus is greenish gray turning to olive and lastly to dark brown with age. Beneath it is a greenish brown, with fibrils more or less numerous. The lobes of the thallus are narrow and many cleft.

The apothecia are marginal, rather large. The disk is a light chestnut color which turns, as it develops, to a dark reddish brown. The margins are crenulate, finely notched. This species is found on old rails and on trees, especially hemlocks and birches. It is very common throughout the Northern, Middle, and Southern States. It is easily distinguished from *Cetraria lacunosa*, with which it grows, by the many cilia on the lobes of the thallus. Sometimes the apothecia are so numerous and crowded that it is difficult to realize that they are on the margin of the thallus.

CETRARIA JUNIPERINA (L) Ach. (Plate V. 1 and 2.) Fig. 2 *C. Islandica* XI. —This is a striking lichen on account of its bright yellow thallus, which rivals in coloring *Evernia vulpina*. The narrow crisped lobes of the thallus give it a fluted appearance, it is sometimes pale yellow below, then again the same bright yellow as the upper surface.

The apothecia are submarginal, of medium size, and somewhat elevated. The disk is chestnut, the margin crenulate and often turned inward.

Cetraria juniperina, var. *Pinastri* Ach. is much like *C. juniperina*, but has more compressed lobes with curled margins, which are thickly covered with bright yellow soredia. Both forms are found on trees throughout the Eastern States. *C. Pinastri* is sometimes found on rocks farther North.

CETRARIA CILIARIS, Ach. (Plate V. 4, and Fig. 1.) This is the most generally distributed of all the *Cetrarias*. It is found in North and South America, Europe and Asia, is especially abundant in Japan. It is usually fertile, and on the same tree may be found dozens of specimens in all stages of growth.

The thallus is foliaceous with crenate or finely cut margins, which are fringed with cilia, as the specific name, *ciliaris*, indicates.

CETRARIA OAKESIANA. Tuckerm. (Plate V, 3.)—Thallus foliaceous and compact; it adheres more closely to the substratum than *C. ciliaris* and *C. lacunosa*. It is a light straw color, beneath it is brown. The lobes are finely cut and lie quite flat, except at the margins, where they are curled and are covered with white soredia.

CETRARIA ISLANDICA (L.) Ach. (Fig. 2.) Unlike *C. ciliaris* and *C. lacunosa* this species has a fruticose thallus; it is the familiar "Iceland Moss," and is alpine or subalpine in its habitat. It grows on the ground on our higher mountains, but is fertile only in the colder regions.

The thallus is erect and rather stiff, is channeled, with spine-like cilia along the margins. These are so regularly placed that they remind one of the "feet" of a centipede. In color the thallus is a light brown, growing darker at the base or point of attachment. Underneath it is almost white, and sometimes covered with soredia.

The apothecia, which are rare, are large and attached to the broadened lobes of the thallus. The disk is a dark chestnut, with entire margins.

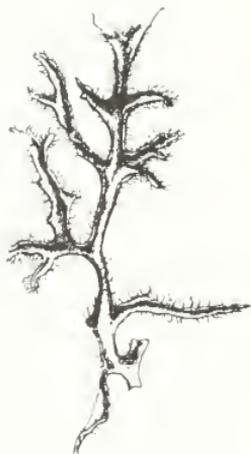


Fig. 2. *C. islandica* x I.

The apothecia are marginal, not common. The disk is chestnut usually with an irregular margin.

This species is generally found growing on trees, either living or dead; occasionally it occurs on rocks in an undeveloped form.



Fig. 3. *C. cucullata* x 2.

CETRARIA CUCULLATA (Bell.) Ach. (Fig. 3.) is found in alpine districts, and the mountains of the Eastern and Western States, on the earth, looking very much like a *Cladonia*.

The thallus is erect, the edges much rolled, forming a deep channel. The margins are very undulate. It is a light gray green, below it is the same color and very smooth.

Apothecia are very rare. They are large and adnate to the under side of the curled-over margins. The disk is chestnut with thin entire margin.

CETRARIA AURESCENS. Tuckerm. (Fig. 4.) This beautiful lichen is found on coniferous trees. The delicate green of the thallus, growing usually in round mats with the bright chestnut colored apothecia massed together, some tiny and cup shaped, others large and flat with crenulate margins, makes a very handsome picture on the branches of old hemlock trees.

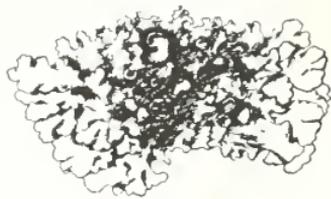


Fig. 4. *C. aurescens* x I.

The thallus is foliaceous and flat. The lobes are narrow and many cleft, with crisped margins. Beneath it is white with many fine soft fibrils of the same color, giving it a woolly appearance. The apothecia are on the margin of the inner lobes of the thallus. The outer edges of the thallus are usually free from apothecia. The disk is a light reddish brown.



Fig. 5. *C. nivalis* x I.

Apothecia are very rare. They are larger, with crenulate margins and in color are reddish yellow.

CETRARIA NIVALIS (L.) Ach. (Fig. 5.) The "Snow Lichen" is a mountain species, found on earth. The thallus is tufted, rather erect. The lobes are many cleft and are somewhat channeled, but not turned inward as in *C. cucullata*. It is straw color, a little darker at the base, which is smoother than the upper part of the thallus.

CETRARIA GLAUCA. (L.) Ach.—Some forms of *Parmelia perlata* are so like *C. glauca* that it is difficult to distinguish them by the thallus; then as the apothecia are very rare it makes the problem more difficult. *C. glauca* adheres to the substratum more closely than *P. perlata*. The latter usually has a more robust appearance and is found on rocks. *C. glauca* occurs on rocks, but more generally on trees. The upper surface of the thallus is a light straw color, below it is black and smooth. The ragged edges of the lobes are usually covered with soredia. Apothecia, when present, are large, subterminal, disk chestnut color with rough margins.

CETRARIA GLAUCA (L.) Ach. var. STENOPHYLLA, is found also in the mountains. The upper surface of the thallus is a grayish white, beneath it is black, but as the lobes turn over the effect on both sides is black and white. The lobes of the thallus are narrower than in *C. glauca* and are thickly covered with coral-like soredia.

CETRARIA ACULEATA (Schreb.) Fr. Thallus much tufted and fruticose, erect and very brittle, with spine-like branches which are covered with spinules. The color is a dark brown and the surface looks polished. In appearance it is much like a *Cladonia*. Apothecia are very rare. They are a little darker than the thallus and on the margins are fine spinules.

CETRARIA PLATYPHYLLA, Tuckerm. (Fig. 6.) Thallus foliaceous, rather rigid, leaf-like and much wrinkled. It is dark brown, rather paler beneath, with no fibrils. The lobes are round and slightly notched. The apothecia are medium, marginal, disk a little darker brown than the thallus, and the edges are rough. *C. platyphylla* resembles some of the Stictas in appearance.



Fig. 6. *C. platyphylla* x I.

CETRARIA ALEURITES. (Ach.) Th. Fr., is not a conspicuous Lichen, but is a common one in the Northern and Middle States, and is found in the mountains of the Southern States. It grows on trees and dead wood, especially on coniferous trees, and adheres closely to the substratum. The thallus is foliaceous, with deep clefts, and is usually covered with isidioid granules which at the center sometimes form a thick crust. It is straw color, in some specimens is greener than in others. Beneath it is paler and much wrinkled with brown fibrils. Apothecia are found on the margin of the thallus; they are a pale chestnut color, with granules on the margin.

SCAPANIA EVANSII N. SP.

By N. BRYHN.

In appearance not unlike the larger forms of *Scapania convexa* Scop. (*Sc. umbrosa* Dum.) *Dioicus*, the male plants mixed with the female, about 10 mm. high, with the leaves 2.25 to 2.5 mm. wide, *caespitose*, the tufts quite spread out, not very dense, below dark green, above yellowish- or ochraceous-green, very closely set with leaves.

Stem rigid, slightly and distantly branched, ascending or erect, on the under side densely covered with long hyaline radicles, dark colored, below blackish, 0.2 mm. thick, in cross-section round-oval, the peripheral cells with pigmented walls in one or two layers.

Leaves pellucid, but firm, quite densely imbricated, equal or subequal, spreading at a right angle with the stem, folded and sharply keeled, two-thirds to three-fourths divided into two unequal lobes; the keel of the leaves distinctly winged below the conduplicate angle of the lobes, the wing entire, two to four cells wide.

Posterior lobe of leaves obliquely obovate-oval, very slightly convex, hardly decurrent, with obtuse apex, and with margin throughout more or less densely dentate with small, sharp and slender teeth, each formed of a single cell.

Anterior lobe half as large, closely pressed against the stem and the posterior lobe, obliquely cordate-reniform, reaching well across the stem, strongly convex, its apex obtuse, the incurved margin finely and distantly dentate with small teeth.

Cells small, roundish-quadrate, strongly and uniformly thickened, without pronounced *trigones*; cuticle distinctly verruculose.

Perianth to 3 mm. high, at the apex 1.6 mm. wide, long-exserted, obconic, compressed, its cells strongly incrassate; its mouth decurved, truncate and wide, slit down on one side, minutely dentate or frequently entire.

At the apex of the uppermost leaves are numerous ochraceous, oval, one-celled *gemmae* collected into conspicuous clusters.

Type locality: Near Washington, District of Columbia, U. S. A., where Mr. J. M. Holzinger collected it abundantly in Rock Creek Park, associated with *Ditrichum pallidum*, kindly sending it to me under the name of *Scapania nemorosa* (determ. Evans.) To the distinguished hepatologist A. W. Evans, who has done me many kind favors in the past ten years, I have dedicated this species.

Scapania nemorosa (L.) Dum. and *Scapania gracilis* (Lindb.), species without doubt very closely related to it, are distinguished as follows:

Scapania nemorosa differs by its greater stature; by the size of all its parts; by its green color; by its more branching and flexuous stem, which is less rigid and less radiculose; by its accrescent leaves, which are less firm, distant, with anterior lobe usually apiculate, erect-spreading (not closely appressed), less convex, with posterior lobe strongly recurved and decurrent, both lobes closely dentate; by the larger, less incrassate cells; and by the mouth of the perianth hardly incised, and densely dentate.

Scapania gracilis differs by the greater length of its stem; by the anterior lobe of the leaves not being appressed, and the posterior lobe being only half as large as its corresponding anterior lobe and strongly convex, its upper margin reflexed and decurrent; by the marginal teeth of the leaves being broad at the base; likewise by the cells being more strongly incrassate; by the conspicuous *trigones*, by the mouth of the perianth being densely set with long and broad teeth, its cells very strongly incrassate.

Honefoss, Norway, March, 1901.

*NECROLOGY.

DIED—Prof. Henri Philibert, at Aix, Germany, on May 14, 1901, in his 79th year. Deceased was professeur honoraire at the Faculty of Letters in Aix, but he is also known as a bryologist of note. Both Science and Literature will join his bereaved family and friends in mourning his loss.

J. M. H.

*Readers of the *Bryologist* will recall the mention of Prof. Philibert in Dr. Grout's article on the persistence in the April *Bryologist*.

NEW AMERICAN MOSSES.

POHLIA (CACODON) POROSA LINDB. FILS.*

Bull. Torrey Bot. Club, **27**: 318. *pl.* 21, 1900.

“Dioicous; caespitose: Stems nearly 2cm. high, round in transverse section, 0.25mm. in diameter; cortical cells small, incrassate, brown; inner cells larger, yellow; central strand formed of very small hyaline cells; rufous-tomentose below, the rhizoids slightly papillose. Leaves ovate-lanceolate, acute, rigid, imbricate, green, concave, appressed when dry, not glossy, and not bordered, becoming brown when old; the lower leaves small, 0.6-1mm. long, margins plane; the upper leaves gradually larger and more crowded, margins reflexed, crenulate; nerve thick, 0.075-0.1mm. broad at the middle of the leaf, brownish at base and when old, vanishing below the apex, bi-convex, prominent on the back; cells small, incrassate, porose, irregular; the apical cells rhomboidal, 0.02-0.03mm. long and 0.005-0.009 broad; the median cells rectangular or sub-vermicular, about 0.05mm. long; the basal cells rectangular or quadrate, about 0.01mm. broad. Perichaetial leaves larger, about 2mm. long and 0.55mm. broad, from an oblong base, acute, margins reflexed throughout and crenulate; nerve vanishing in apex, thick, strongly flattened at base, the blade formed of 2-3 layers of cells; cells as in the other leaves: inner bracts somewhat obtuse, small, 0.05-1.4mm. long; margins plane, crenulate; cells highly porose, incrassate. Seta 1.5mm. high, red, 0.23mm. thick, geniculate towards the base, very smooth, flexuose when dry. Capsule subcylindrical, erect and symmetric; 2.5mm. high and 1mm. thick, brown, slightly constricted under the mouth when dry and deoperculate; exothecial cells irregularly quadrate and rectangular, walls more or less flexuose, not incrassate, 0.02mm. broad; stomata superficial; annulus broad, revolute. Teeth of the exostome 0.33mm. high, narrowly lanceolate, very acute, pale yellow, margined at apex, minutely papillose, articulations about 25; endostome imperfectly developed, hyaline, very smooth; cilia none or rudimentary; segments narrow, perforated, rarely equalling the teeth. Spores pellucid, green, very smooth, 0.017 (0.015-0.019mm.) Operculum 0.4mm. high, from a convex base, conic and obtuse. Male plants unknown.

A very beautiful species, most closely related to *Pohlia erecta* Lindb. (*Revue Bryologique*, **10**: 7-8, 1883), but differs in the better developed endostome, larger capsule, thicker costa, smaller, incrassate, porose cells, etc.”

“Hab. North America, Washington, Mt. Rainier, 8th Sept., 1898. Coll. by J. A. Allen. On moist ground, altitude about 6,500 ft. Kindly sent me by Mrs. Britton.”

*Translated for THE BRYOLOGIST by Miss Edith A. Warner.

TWO NEW VARIETIES OF BRACHYTHECIUM.

BY A. J. GROUT.

BRACHYTHECIUM RIVULARE LAXUM.—Plants very lax, sparingly branched; leaves distant, more loosely areolate than in the typical form; all but the lowest slenderly acuminate as in *B. rutabulum* but with the alar cells of *B. rivulare*. In habit this resembles robust forms of *Hypnum cordifolium*.

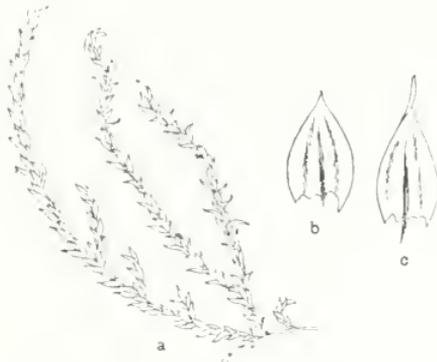


Fig. 1. *B. rivulare laxum* x 1; c, Stem leaf of the same x 5; b, Stem leaf of *B. rivulare* x 5.

Probably this is a good species, but as it has been collected but once and in a sterile condition, it seems best to await a fuller knowledge of the plant before giving it more than varietal rank. *B. rivulare* varies greatly in habit, but this is the only form with slenderly acuminate leaves that I have ever met with.

Avalanche Trail, Flathead Co., N. W. Montana, July 29, 1898. Coll. J. M. Holzinger and J. B. Blake.

BRACHYTHECIUM COLLINUM HOLZINGERI.—Leaves larger and more gradually acuminate than in the typical form, with broader cells; also less serrate primordial utricule very distinct.

Base of Sperry Glacier, N. W. Montana, July 25, 1898. Coll. J. M. Holzinger and J. B. Blake.

Types in herbarium of A. J. Grout.

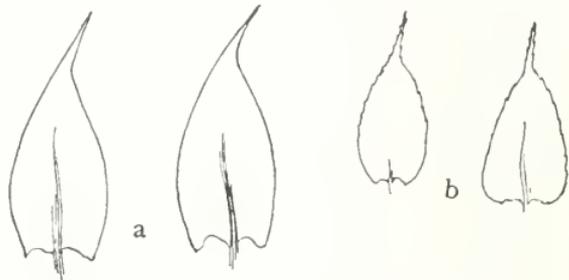


Fig. 2. a, Branch leaves of *B. collinum Holzingeri* x 20; b, Branch leaves of *B. collinum* x 20.

CURRENT BRYOLOGICAL LITERATURE.

RECHERCHES ANATOMIQUES SUR LES LEUCOBRYACÉES.

BY M. JULES CARDOT.

This work is a reprint from the Mémoires de la Société nationale des Sciences naturelles et mathématiques de Cherbourg, Tome XXXII, 1900. It comprises 84 pages of printed matter and 19 fine plates. The latter represent mostly leaf sections beautifully drawn with camera lucida, and are selected, according to the author, from upward of two thousand drawings made during

the two years occupied in this fascinating research. They represent the result of work on upward of 230 species, or forms considered as such, 176 of which are described, while the rest lie in the herbaria, bearing so far only *nomina nuda*. It is a joy to look upon such a masterpiece of manual skill and untiring scientific devotion, a model both in its mechanical aspect, and the scientific spirit which breathes from all its pages. It was "crowned" by the Academy in whose Memoirs it was first published, an honor which it well deserves.

According to the author the leaf structure furnishes the ground for separating this group into four tribes comprising nine genera. An excellent conspectus of characters is given at the close of the detailed discussions, summarizing the author's anatomical observations.

Mr. Cardot, in his introductory remarks, sums up the points which his researches have tended to establish as follows:

"1. A more exact knowledge of the anatomical structure of the leaf, heretofore described by all authors in a very inadequate manner. Not sufficient emphasis was laid on the fact that, in the majority of species, the leaf structure varies according to the level at which it is examined, and that in a manner constant for a given species. In this fact will be found good indications for the delimitation of species.

"2. Confirmation of the theory of Lindberg, who considered the leaf of the *Leucobryums* to be formed almost entirely of a very much dilated costa, while the majority of authors claim, wrongly, that it is deprived of costa.

"3. Indications, from the morphological and anatomical investigations, of characters which relate the *Leucobryaceae* on the one hand to the *Dicranaceae*, on the other hand to the genus *Syrrhopodon*.

"4. A more satisfactory and more natural delimitation of the generic groups by the aid of the anatomical structure of the leaf."

J. M. Holzinger.

THE EUROPEAN SPHAGNACEAE.

BY E. CHARLES HORRELL, F. L. S.

Mr. Horrell has recently issued in separate form his several papers on these mosses, reprinted from the Journal of Botany, April to December, 1900, and repaged consecutively, making it a very serviceable handbook for European students of this group. In the introduction the author gives a fairly complete bibliography of the group. Pp. 5-13 contain an excellent key to the species; and on pp. 39 to 41 is found a revised key to the *Cuspidatum* group. The treatment throughout is after Warnstorff. Of the fifty species (taking no account of the numerous varieties) which are treated and carefully described in this little volume, 35 are common to North America. And it is partly for this reason that this work is brought to the attention of American students. But the feature that commends itself most especially to the writer, is the description of the method of staining and handling these plants for successful study, given on pp. 3-4. The author's address is E. Charles Horrell, 49 Danby Street, Peckham S. E., London. J. M. H.

WEBERA PROLIGERA IN AMESBURY, MASS.

There is a small brook in this town about a mile in length, flowing through sandy land and emptying into the Merrimac river. For some distance from the head of this stream the banks are covered with various mosses, but I have never found any of the *Webera* group; the brook is then joined by another rivulet which has cut for itself a channel in the live sand some thirty feet in depth. These banks of wet sand are densely covered with *Webera proligera* (Lind) Kind. From this place on, both banks of the brook are covered with this moss, although hardly any fruit can be found anywhere. It is easy to see how this wonderful multiplication is brought about, for in the autumn one can find plenty of the peculiar bulbils which grow on the stem of this moss near its apex, but in the spring these growths are mostly gone. In the winter season the banks are covered with ice and snow and deposit them in the mud further down, thus producing plants all along.—*J. W. Huntington in Rhodora for April, 1901.*

In the Journal of the New York Botanical Garden for May, 1901, Mrs. Britton has a very interesting note on *Physcomitrium turbinatum* and its variations. Plants grown from earth potted in September in comparative darkness in the green houses with steam pipes overhead, matured capsules by January but the plants were small with setae about one cm. long. In January the pots were removed to more favorable positions with bottom heat and more light when spores from the same pots and undoubtedly of the same kind, developed plants with setae twice as long, of a lighter color, and with smaller and more turbinate capsules. These last in every way resembled the Louisiana specimens which have been called var. *Langloisii* R. & C. The roughness of the spore, the amount of thickening of the elongated cells around the mouth, the shape of the capsules and the amount of contraction below the mouth when, were all found to be dependent upon the stage of development reached by the plants before becoming dry and shrivelled. "So that the amount of rain in spring would alter and control these characters and cause considerable variation, even in the same patch." As these are just the characters upon which many varietal and specific distinctions are based, it is easy to see the importance of Mrs. Britton's observations. *A. J. G.*

NOTES ON RARE AND LITTLE KNOWN MOSSES.

BY J. M. HOLZINGER.

DITRICHUM ELATUM Kindb. For years I have collected near Winona a sterile moss, the generic relationship of which I could not satisfactorily determine. Not more successful were several of my bryological friends to whom I submitted it. To Mr. W. C. Nicholson is due the credit of placing it in the vicinity of *Ditrichum flexicaule densum* (Schimp.). There-

upon Dr. Best (who ought to have written this note) suggested that it might be *Ditrichum elatum* Kindb. And when I submitted the Minnesota plant to Dr. Kindberg, he very kindly looked it over, and recognized it as identical with his species. Subsequently, in an effort to determine the distinctive features of *Ditrichum flexicaule densum*, *D. flexicaule brevifolium* (= *D. elatum*), and *D. Macounii*, I received the following materials :

1. From Dr. Kindberg: *Ditrichum elatum* Kindberg, collected by J. Macoun at Devil's Lake, Canada, in 1891.
2. From the Columbia University Herbarium, through the courtesy of Mrs. E. G. Britton: *Ditrichum flexicaule densum*, from the following stations :

a. Switzerland, Jaeger, 1866;

b. Belgium, Gravet, 1875;

c. "Bärwalde," Ruthe;

d. Schwarzwald, Zickendrath, 1868;

e. Sweden, Schentz;

f. Scotland, Fowler, 1872;

g. *Ditrichum Macounii* Kindb., from British Columbia, Macoun, 1890.

3. From Mr. R. S. Williams: *Ditrichum flexicaule densum* (B. & S.) Braith, collected by him in 1898, in the Yukon region.

3. From the National Herbarium, through the courtesy of Dr. J. N. Rose: *Ditrichum flexicaule densum*, from—

a. Norway, Hagen, 1887.

b. Mt. Benson, Vancouver Island, Macoun (Can. Musc. 461).

c. *Ditrichum flexicaule brevifolium* Kindb. From Devil's Lake, Rocky Mts., Macoun, 1891.

4. From Mr. Jules Cardot: two plants, both from France, one coll. Cardot, 1883; the other coll. Madiot, 1882.

5. From Mr. W. E. Nicholson: two English plants; one coll. near Pecca Falls, H. N. Dixon, 1886; the other, from Northamptonshire, H. N. Dixon ("teste Braithwaite"), 1886.

6. In my own herbarium, I find *Ditrichum flexicaule densum*, from Germany, Schemmann, 1895; also from Norway, Dixon & Nicholson, 1900.

In a considerable series of *Ditrichum flexicaule*, the species in my herbarium, I find quite a variation, both toward the var. *longifolium*, and toward the var. *densum*. It is the latter forms alone that concern us here. Of these I select the following two,

1. Dr. Bryhn's plant, cfr., from Norway, June, 1900:

2. Mr. Jensen's plant, from Denmark, September, 1882.

These two plants are increasingly smaller than typical forms of the species. They also have increasingly smaller leaves.

Jensen's plant yields little, if anything, in both size and appearance to Canadian Musci 461; and Bryhn's plant stands squarely between these and the true species. And, with hardly an exception, the other plants cited above are smaller, in more dense cushions, with variously shortened leaf apex, and young shoots vigorous or slender, according to climatic conditions,

I find only two pronounced extremes in this reduction from the species. One of these is the variety *densum*, with longer leaf points; the larger forms of this occur all over Europe, and in North America; the slender forms include Fowler's plant from Scotland, Williams' from the Yukon region, and *Ditrichum Macounii*. The other of them is not so common, but occurs in England, in Northamptonshire, coll. Dixon ("teste Braithw."), in Canada, Rocky Mts. (*D. flexicaule brevifolium* = *D. elatum* Kindb), and abundantly in the upper Mississippi valley. It seems to me that Dr. Kindberg's first name *Ditrichum flexicaule brevifolium*, very appropriate for this short-leaved form, should stand. But I hardly think that either *D. elatum* or *D. Macounii*, will eventually stand as different species.

CLIMACIUM WEB. & MOHR. ITER SUEC. 96. 1804.

Large handsome mosses with a tree-like habit of growth from underground creeping stems (Fig. 1. a). Sometimes prostrate, or floating in very wet places. Stem and branches-bearing paraphyllia (*i. e.* branching filaments which are chlorophyll-bearing). The leaves are arranged evenly on all sides of the stems and branches and are all somewhat decurrent but vary greatly in shape and structure. The leaves figured are from the middle of well developed branches. The leaves of the main upright stems are very large, thin, with little chlorophyll, closely imbricated and clasping. Branch leaves smaller, of a different shape and texture, chlorophyllose. All our species are dioicous. The seta is long and smooth, twisted to the right when dry. Calyptra split on one side, long, reaching to the base of the capsule. Capsule erect, cylindric; operculum conic-rostrate with the beak often oblique; annulus none; peristome double; teeth linear-lanceolate, very long, closely articulate, minutely papillose, without the fine transverse lines on the lower part of the teeth that characterize the Hypnaceae; segments as long as the teeth, keeled, split between the articulations, often split to the apex when old, united at the base into a continuous narrow basal membrane, minutely papillose; spores minutely papillose.

Mosses of swampy woods and fields; fruiting with comparative infrequency. The systematic position of this genus is as yet undetermined. It certainly does not belong in the Isotheciae where it has previously been placed. The lack of transverse lines on the peristome teeth indicates that it is either not closely related to the Hypnaceae or else is a very highly modified member of that family. It has been placed with the Fontinalaceae but there is much to be said against this view. Perhaps a separate subfamily Climaceae of the Hypnaceae will be as satisfactory arrangement as can be made with our present knowledge. There are three species known to North America, one of which, *C. dendroides*, is common in Europe.

- | | |
|--|-----------------------|
| 1. Capsules 3 to 4 times as long as broad; median leaf cells | |
| 10 times as long as broad, | <i>C. dendroides.</i> |
| Capsules 5-6: 1; median leaf cells 2-7: 1, | 2. |

2. Plants of a distinctly tree-like habit: median leaf cells
5-7: 1, C. Americanum.
Plants growing in dense tufts so that the tree-like habit is
obscured, or prostrate and hypnoid in appearance;
median leaf cells 2-3: 1, C. Kindbergii
-

1. CLIMACIUM DENDROIDES (L.) WEB. & MOHR, l. c.

Plants bright green, 7-9 cm. high; branches spreading, flexuous; branch leaves loosely imbricate, 2 x 0.7 mm., the upper oblong lanceolate; lower ovate—lanceolate; denticulate at base, sharply serrate above, obtuse, bisulcate, costate nearly to apex; basal angles sometimes slightly enlarged;

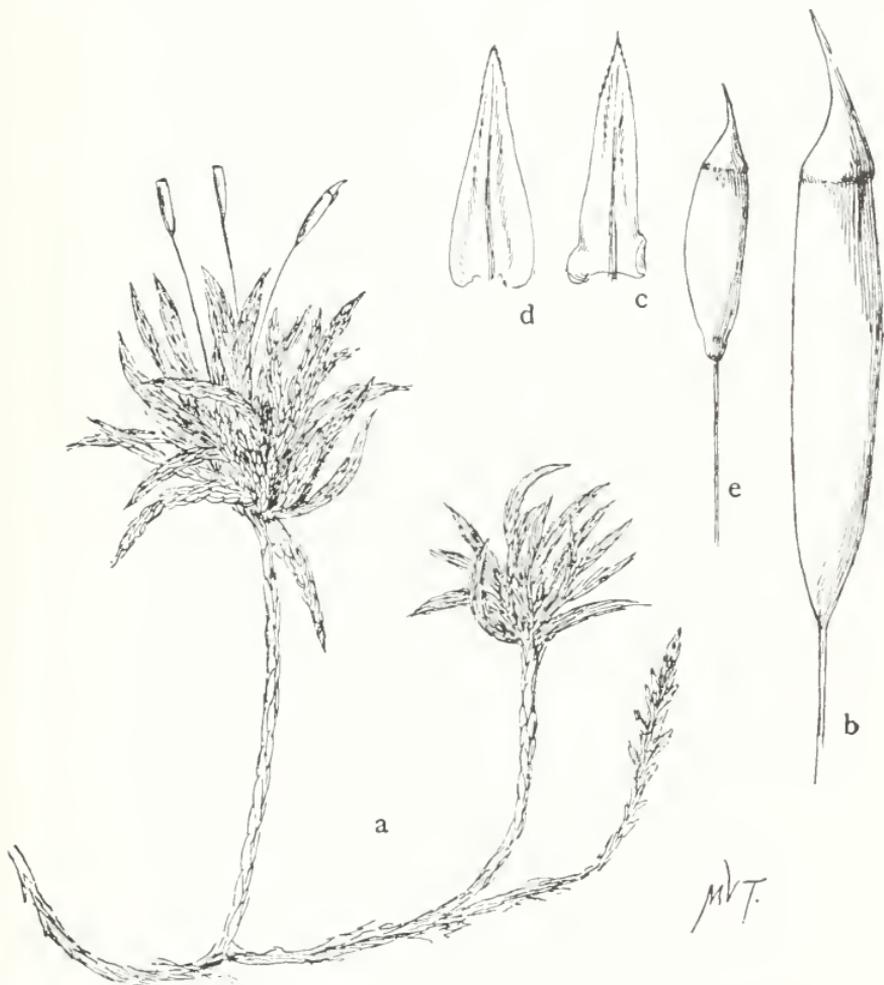


Fig. 1. a, *Climacium Americanum* x 1. b, Capsule x 10. c, Branch leaf x 10. d, Branch leaf of *C. dendroides* x 10. e, Capsule of the same x 10.

median cells linear-rhomboidal to linear hexagonal, 7-10:1; alar and apical cells much shorter and broader; stem leaves larger, 2-3 mm. long, ovate, entire, apiculate.

Inner perichaetial leaves oblong to oblong-ovate, slightly serrate at the apex, long acuminate, thinly costate, costa often short or wanting: leaf brownish yellow below: seta 2.5-3.5 cm. long, reddish brown; capsule lighter in color, cylindrical, about $\frac{1}{4}$ cm. long, 3-4:1; operculum often remaining attached to columella; peristome reddish-brown; spores 0.013-0.022 mm. in diameter, maturing in autumn.

Type locality European, probably Swedish.

Wet ground, borders of streams, swamps and lakes, especially in the mountains; more common than is indicated by Lesq. & James in the Manual. Ranging through the northern and western part of the continent from New Brunswick to St. Paul Island, Behring sea; south to New Jersey, Colorado and California. Not recorded from Pennsylvania or the North Central States.

A form from Oregon with "leaves narrowed at base, less serrate at apex, sometimes subentire" is called var. *Oregonense* by Renaud and Cardot.

2. CLIMACIUM AMERICANUM BRID. SP. MUSC. SUPPL. PART 2:45. 1812.

Plants bright green, 5-7 cm. high; branches usually straight and tapering; branch leaves closely imbricate, 2 x 1 mm.; upper oblong-lanceolate, *broadly auriculate*: lower ovate to ovate-lanceolate, denticulate below, sharply serrate above, more acute than in the last, bisulcate, costate nearly to the apex; leaf cells more nearly uniform than in *C. dendroides*; median cells oblong-hexagonal 5-7: 1; stem and perichaetial leaves as in *C. dendroides*. Seta 2-3 cm. long, brown: capsule cylindrical, brown, *about 6 mm long 5-6:1*; peristome reddish brown, teeth sometimes slightly perforated: spores 0.014-0.018 mm., maturing in autumn.

Distinguished from *C. dendroides* by its more closely imbricated leaves, broadly auriculate branch leaves, longer capsules and leaf cells.

Swamps, wet soil and rocks, rotten logs, etc.

This species is exclusively American. It is found in the northern and eastern States, ranging from Canada to North Carolina and probably south to the Gulf; west to Minnesota, Iowa, Illinois and Missouri. "Rocky mountains eastward," Röll in Hedwigia, 36: 46. 1897.

3. CLIMACIUM KINDBERGII (R. & C.) GROUT.

C. Americanum Kindbergii R. & C. Bot. Gaz. 15: 1890.

Plants *dark green, almost black*, below rarely lighter green, *growing typically in dense tufts or cushions* in very wet swamps, somewhat tree-like in habit, but growing so compactly together as to obscure the dendroid appearance. On the edges of pools and on sticks and stones, in pools the stems are decumbent, irregularly branching, often floating, dendroid secondary stems rarely present.

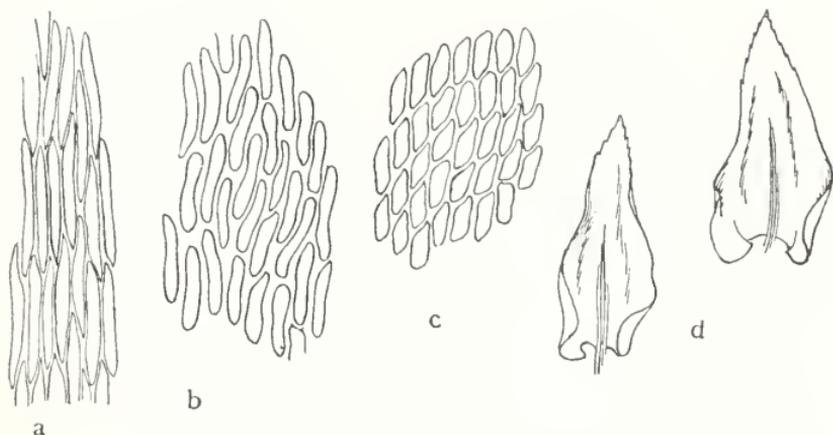


Fig. 2. a, Median leaf cells of *Climacium dendroides* x 250. b, Same of *C. Americanum* x 250. c, Same of *C. Kindbergii* x 250. d, Two branch leaves of *C. Kindbergii* x 10.

Stem leaves scattering, ovate; branch leaves ovate-lanceolate, somewhat auriculate, less differentiated than in *C. Americanum*, clasping by enlarged rounded basal angles, sulcate; areolation nearly uniform; median cells oblong-hexagonal, 2-3: 1. Seta usually much longer and more flexuous than in *C. Americanum*, capsule about the same as in that species, 2-4 cm. long; teeth of peristome usually more or less perforate.

EXSICCATI.—Austin Musc. Appal. 289: Ren. & Card. Musc. Am. Sept. Exsic. 238.

The specimens of Sull & Lesq. Musc. Bor. Am. Ed. 2, 42. in the Columbia College Herbarium are this variety as are also Drummond's Musc. Am. (S. States) 120.

A closer study of this form has convinced me that it is a good species closely related to *C. Americanum* as occasional forms with the short leaf cells and a dendroid habit or auriculate leaves are occasionally met with. The typical form seems most abundant along the coast and in the South, but in general this species has the range of *C. Americanum*, but is much less frequent inland than that species. Aquatic forms of the other two species may be confused with this.

Usually distinguished at a glance by its color and habit of growth: surely determined by the larger, proportionately broader branch leaves without the conspicuous auricles of *C. Americanum* yet more auriculate than *C. dendroides*, and specially by its very short leaf cells.

*The distinguishing characteristics of each species are printed in italic.

**The heavy faced numerals indicate volume numbers and the numerals immediately following the semicolon indicate pages.

CHAPTER NOTES.

Our President has been suffering from ill health since an attack of grip in the winter, and by advice of his physician has taken a trip to Europe, hoping that the rest and change will restore him to his former good health. Our good wishes go with him, and we earnestly hope he may receive all the benefits hoped for from the trip. Before leaving he prepared manuscript for a popular monograph of the *Thuidiums*, which will be published, with copious illustrations, in the October BRYOLOGIST. *A. J. G.*

Rev. W. W. Watts, Ballina, New South Wales, has sent a second package of eighty of the rarer Australian mosses, with several new species. These mosses are worth double the price asked (see October, 1900, BRYOLOGIST), each specimen containing plants in various stages of development where this is desirable, all with such complete data and withal so nicely set up, that it is a joy to handle them.—*A. M. S.*

Glycerine jelly as frequently purchased is too thin to make good keeping slides. It should be placed, uncorked, on the back part of a stove for several days till it has evaporated sufficiently to be quite hard when cooled. Then if care is taken not to place thick and thin sections on the same slide and just the right amount of jelly used, let the cover sink slowly by its own weight into place and do not use pins or clips or pressure of any kind, but place where the slides will harden and when thoroughly dried they will be found less likely to bubble than when dried under pressure.—*A. M. S.*

We would earnestly request members to be more particular in preparing their material to send in for identification. The following remarks apply to specimens sent Mrs. Harris and Mr. Barbour as well as the Secretary. To begin with, as a rule collect only well developed fruiting plants in good condition or in small stages where this is necessary to a satisfactory determination, and also collect enough of each kind to make use of after it is worked out. Then send, if possible, two good-sized specimens of each supposed species. If only one can be spared, or it is desired to have this one returned, mark this fact plainly on the packet. The following six items can be written on either a slip of paper or a label and slipped inside the wrapper or envelope, which is understood to be a temporary one. Do not paste the label on, unless you are sure the moss will not have to be transferred after sending through the mail. First, mark on each packet its name, if known, or any guess you may have. Second, state on what the moss, hepatic or lichen grew. Third, the locality of collection. Fourth, date of collection. Fifth, by whom collected. Then the one who makes the determination or verifies it will add as sixth his name, and thus make a valuable herbarium specimen out of what should otherwise be put in the fire.

The members should by this time have these rules fixed in mind and hereafter material sent in without all the above data will be returned to the sender without being named.—*A. M. S.*

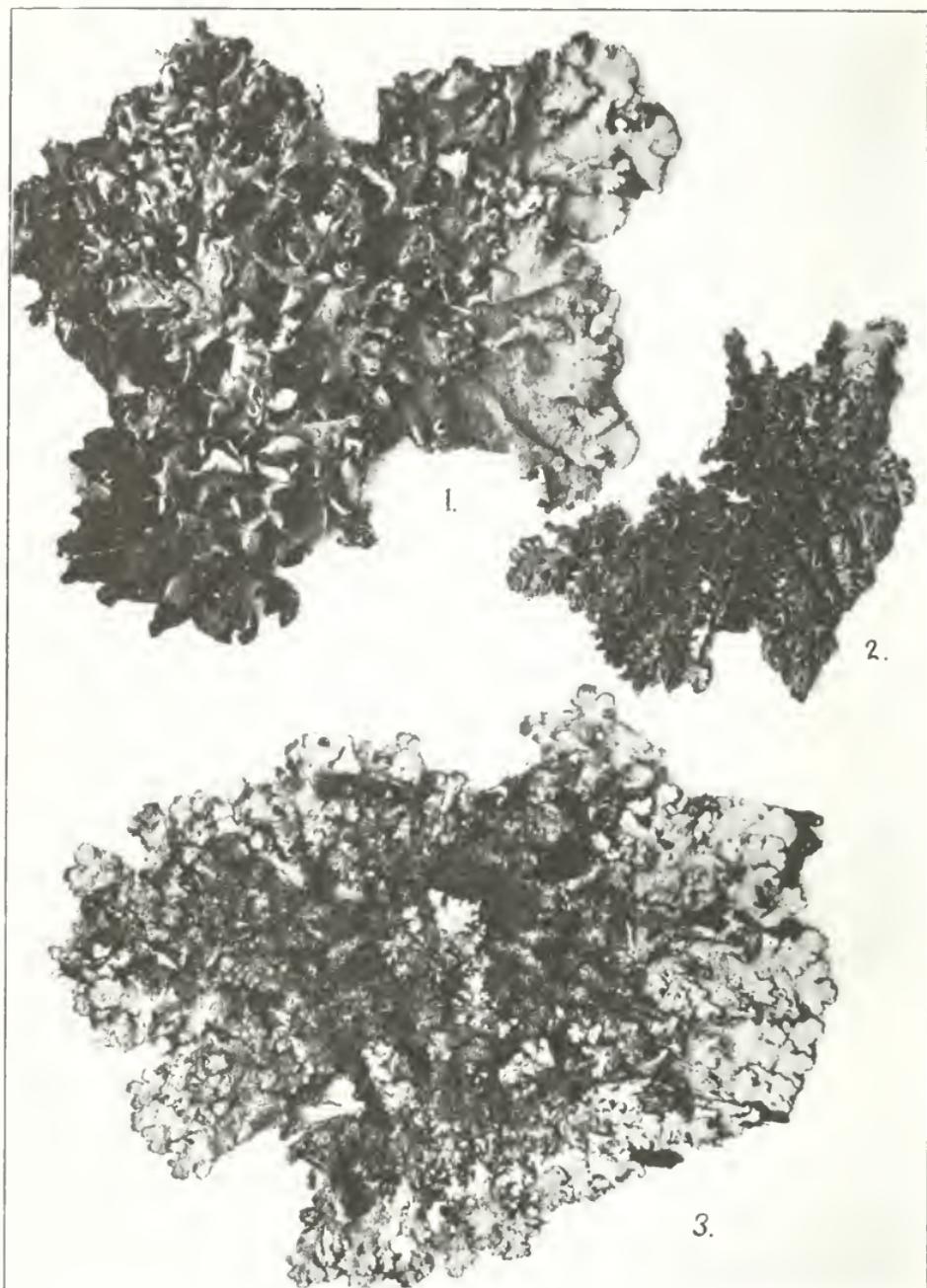


Plate VI. 1. *Parmelia perforata* 2. *P. colpodes*
3. *P. Borreri* var. *rudecta*.

THE BRYOLOGIST.

VOL. IV.

OCTOBER, 1901.

No. 4.

An index to the four volumes of THE BRYOLOGIST is being prepared and will be issued in connection with the January, 1902, number. It is suggested that all having files complete their sets and bind with this Index in one volume. Hereafter each year, of six numbers, will have its own Index.

LICHENS--PARMELIA.

BY CAROLYN W. HARRIS.

(WITH PLATE VI.)

The Parmelias are widely distributed, and the greater number are found in North America. In the vicinity of Chilson Lake, Essex County, New York, in the southeastern part of the Adirondaeks, eighteen species have been collected. No doubt as great a number could be found in other localities. On old apple trees, as well as on many of the other trees, will be found one of the commonest of the Parmelias, *P. caperata*. It grows in large, round mats, of a light pea green color, with a wrinkled surface, which is usually covered with soredia; it is rarely found in fruit. Specimens of *P. caperata* are often found a foot in diameter. On the rocks will be found another Parmelia which is very common, *P. conspersa*. Like *P. caperata* it is a delicate green, but the thallus is smoother and clings closely to the substratum. The apothecia, which are very common, are dark brown. These two Parmelias are readily identified and can be found in any country place where there are trees, stone walls, and rocks.

The thallus of the Parmelia is foliose, large, distinctly branched, and lobed. It is held to the substratum by black rhizoids. The medullary layer is composed of long loose filaments, like tow, which give it a soft woolly appearance. By breaking the thallus this can be seen with a good hand lens. The outer, or cortical layer is thin. The apothecia are scattered, but are usually more numerous at the centre. They are cup shaped, the disk generally chestnut or brown and the margin thin. The species vary in habit but are usually horizontal and leaf like. On many species are found soredia, generally the color of the thallus; this varies from gray or brown tinged with green to blue green and dark brown. In two or three species the thallus is almost black.

The Parmelias show the highest development of the thalline type. In many specimens there is a continued marginal growth, while the centre portion dies away. The name comes from Parma, meaning a buckler or round shield, with a rim, in allusion to the appearance of the apothecia.



Fig. 1. *Parmelia perlata*.

are not ciliated but are often covered with white soredia. Generally the under surface is smooth but occasionally black fibrils are present. The apothecia are large, the disk a greenish brown with entire margin, which when fully developed splits down to the centre of the cup. Apothecia are so rare that in a hundred specimens one in fruit may not be found. *P. perlata* is usually found on rocks, growing to a large size, often a foot in diameter. Occasionally it is found growing on trees or old logs.

PARMELIA PERFORATA (Jacq.) Ach. (Plate VI. 3).—The thallus and general appearance of this species closely resembles *P. perlata*, but can easily be distinguished from it by the cilia with which the margins of the lobes are covered; in some specimens they are very abundant, looking like a fringe of hair. This seems to be especially marked in the *P. perforata* found in the Southern States. The color is glaucescent, or blue sea green, with a whitish bloom. Beneath it is black, frequently covered in places with a bunch of black fibrils. The apothecia are abundant, and usually are very large. The disk is a dark chestnut color, the margin thin and entire. At the centre the apothecia are usually perforated, hence its specific name. It is found on trees and rocks, more often fertile on trees.

PARMELIA CRINITA Ach. Thallus the same in color as *P. perforata*, the lobes ciliated, but not so abundantly as in *P. perforata*. The thallus is usually densely covered with isidioid granules, or coral-like excrescences. Beneath it is black and fibrillose. The apothecia are not so common as in *P. perforata*; they are large and round, not perforated. While much like some specimens of *P. perlata* it can be distinguished from it by the isidioid growth on the upper side of the thallus, and the mat-like fibrils on the under side, also by the cilia on the margins. Its habitat is trees and rocks; the thallus of the rock form has usually finer cut lobes.

PARMELIA PERLATA (L.) Ach. (Fig. 1.) This species, while one of the most common of the Parmelias, is also one of the most confusing to the novice, as it is seldom found in fruit, and the appearance of the thallus closely resembles certain Cetrarias and Peltigeras. The thallus is much expanded, very leaf like, generally smooth, but sometimes crumpled, is greenish yellow, gray green, slate color and even light brown. Beneath it is black with reddish brown margins; these turn back in such a manner that they are often mistaken for apothecia by the beginner. The lobes



Fig. 2. *P. tiliacea*.

PARMELIA BORRERI TURN. While this is not an uncommon species it is not so generally found as the variety *rudecta*. The thallus is very rough and is often covered with white soredia which give it a speckled appearance. It clings quite closely to the trees or dead wood on which it is found. Is greenish brown in color, beneath is lighter, at the margins are white hair-like fibrils. The apothecia are large with entire margins, the disk dark chestnut.

PARMELIA BORRERI TURN, var. *RUDECTA*, Tuckm. (Plate VI. 1.)—In general appearance the variety is much like *P. Borreri*, only it is thickly covered with isidioid granules, the lobes are more divided and the margins are often broken, showing the woolly medullary layer. It does not cling so closely to the substratum. Underneath the thallus is light brown, and is covered thickly with short, dark fibrils. Apothecia are not frequent. Is found on trees, dead wood and rocks.

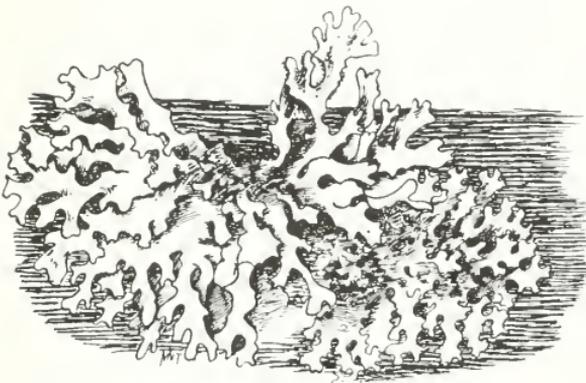


Fig. 3. *P. saxatilis*.

PARMELIA SAXATILIS (L.) Fr. (Fig. 3.) Thallus with many cleft, narrow, blunt lobes, more or less reticulated and lacunose, margins wavy with white soredia. The color is greenish or ashy gray, sometimes turning to reddish brown. Beneath it is black and well covered with black fibrils. The apothecia are medium in size with rather an irregular margin, the disk is chestnut.

PARMELIA SAXATILIS (L.) Fr. var. *SULCATA*, Nyl. This variety is distinguished from *P. saxatilis* by the presence of conspicuous rounded or oblong soredia, which become confluent, giving the surface of the thallus a mealy appearance. Beneath it is very black and covered with short stiff black fibrils. Is found on dead wood and rocks with *P. saxatilis*.

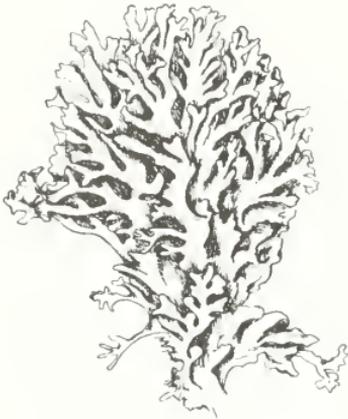


Fig. 4. *P. physodes*.

The lobes are somewhat convex, many and deeply cleft, usually overlapping each other. The apothecia, which are very rare, are large, the disk is reddish brown with an entire margin. The shape of the apothecium is more that of an urn than a cup.

PARMELIA COLPODES (Ach.) Nyl. (Plate VI. 2.) The thallus is flat and smooth in this species, with many cleft lobes, coriaceous, glaucescent in color. It is somewhat like *P. physodes* in appearance, but the lobes of the thallus do not turn over, they are flat and the whole effect is smoother. It is found on trees and old wood, is common in the Eastern and Southern States.



Fig. 5. *P. olivacea*.

is covered with isidioid granules. Apothecia are frequent and are dark brown with wrinkled margins. Beneath, the thallus is black with fine fibrils. *P. olivacea* grows on trees and is difficult to collect unless a part of the bark is taken. When scraped off and examined with a hand lens the lower cortical layer is seen to be very thin, the woolly medullary layer showing distinctly.

PARMELIA PHYSODES (L.) Ach. (Fig. 4.) This beautiful lichen is frequently found on the same dead limb of a white pine with *Cetraria lacunosa* and *C. ciliaris*. It is not often found in fruit, but is readily identified by its smooth delicately tinted gray green thallus, the lobes of which are finely cut, the margins slightly curled over showing the white soredia on the under side. Like the *Cetrarias* it is loosely attached to the substratum. It often grows around the small twigs of the dead limbs of hemlocks, giving them a hoary appearance. Beneath the thallus is almost black

PARMELIA OLIVACEA (L.) Ach. (Fig. 5.) As the specific name indicates this lichen is olive in color. When young it is a light olive, but grows darker as it develops, and is finally an olive brown. The lobes are flat and rounded, growing much like *P. caperata*, except that they adhere closely to the substratum. Often the upper part of the thallus

PARMELIA STYGiA (L.) Ach. The dark brown, almost black, of the thallus of this species is a distinguishing mark. It is smooth and shining, the lobes are linear, many cleft and contorted, with curved tips. Beneath it is black, with fine fibrils. The apothecia are not common, the disk is very dark chestnut, with granulate margin. This species is found on rocks in the higher mountains of the Eastern States. It is very abundant in Alaska.

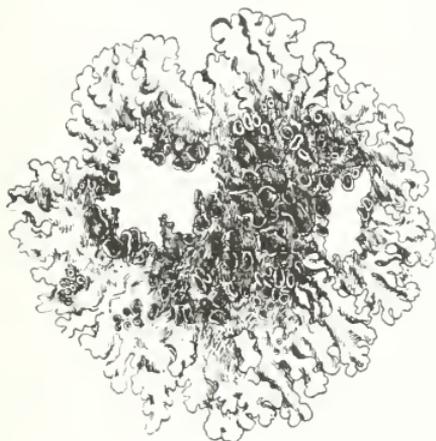


Fig. 6. (Reduced $\frac{1}{3}$.) *P. conspersa*.
the substratum, but when moist can be detached.

PARMELIA CONSPERSA (Ehrh.) Ach. (Fig. 6.) Thallus divided into slender lobes which are smooth and polished. At the centre are sometimes found greenish soredia, but more frequently apothecia are present; these vary in size, are sometimes very large. The disk is dark chestnut with entire margin when young, which becomes wavy and broken with age. Beneath, the thallus is usually very dark, with fine fibrils here and there. Found on rocks and stones in great abundance, and usually fertile. It clings closely to

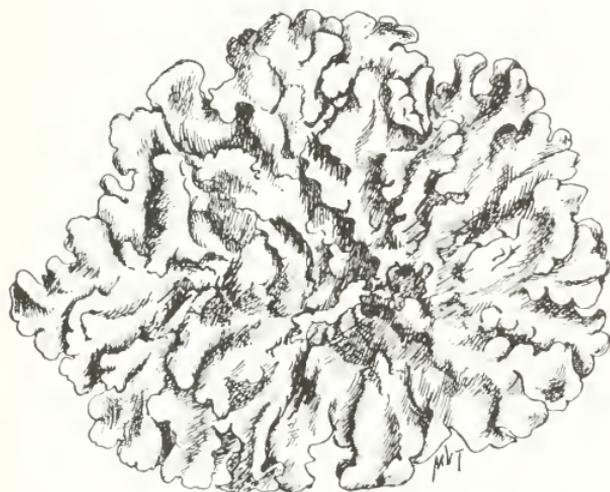


Fig. 7. *P. caperata*.
some black fibrils. Apothecia are rare, when present they are cup shaped with crenulate margins, which are often covered with isidioid granules. *P. caperata* is found on trees and rocks.

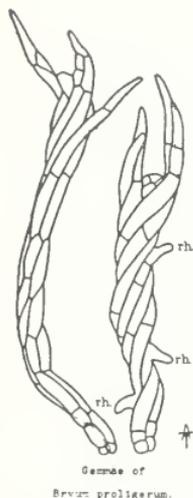
PARMELIA CAPERATA (L.) Ach. (Fig. 7.) This is one of our most conspicuous lichens. The thallus is leaf-like, growing naturally in round mats. It is a light pea green, undulate, wrinkled, usually covered, especially near the centre, with soredia which are a lighter green than the thallus. The lobes are rounded with entire tips. Beneath it is black except at the margin, where it is reddish brown; has

NOTES ON RARE AND LITTLE KNOWN MOSSES.

BRYUM PROLIGERUM (Lindb.) Kindberg. Br. Eu. & N. Am. **2**:384. 1897.

Webera proligeræ (Lindb.) Kindb. Enum. Bryin. Dovrens. App. no. 309. 1888.

This species has been included with *Webera annotina* Schwägr. by American authors and is still described with that species by Dixon in his Handbook of British Mosses. The "crowded, green, foliaceous, 2-3 pointed gemmæ," belong to *B. proligerum*. The several varieties and the foot-note indicate that British specimens still require more study. Although this species was fully described and contrasted with *W. annotina* by Limpricht in his Laubmoose, it was not until Correns figured and described it, that it began to be known in America. Neither Macoun's Catalogue nor Kindberg's Enumeration record it for North America, and Prof. Holzinger's note in THE BRYOLOGIST and



Mr. Huntington's in Rhodora give the only two published stations. This year I have found it at two widely separated localities in the Catskill and Adirondack Mountains of New York; it was fruiting at both stations. At Woodland Valley, near Phoenicia, it grew on the margin of a spring, while at Chilson Lake, Essex Co., it grew on wet crumbling roadside banks. Even with a low magnification the characteristic gemmæ may be recognized, and they are formed from April to November. The accompanying illustrations were made from fresh specimens on June 1st; they show the three and four pointed apex, and one shows three rudimentary rhizoids. They are magnified 120 times. A study of the material in our herbarium shows the following stations and distribution:

Stations—White Mountains, N. H., Oakes; James, 1866; Closter, N. J., Austin, 1866-1879; Charleston, S. C., J. D. Smith; Sand Lake, N. Y., Peck, 1864; Minnesota, Holzinger, 1897; Massachusetts, J. W. Huntington, 1900; Mt. Washington, Mass., Aug. Catskill Mountains and Adirondack Mountains, E. G. Britton, 1901; Vancouver Island, Macoun, 1875. The stations recorded in Macoun's Catalogue for *W. annotina* doubtless include several referable to this species.

Exciccati: Sull. & Lesq., Musci bor. Am. Ed. I. 180; Ed. 2. 271.

Austin, Musci App. no. 188.

Macoun, Canadian Musci, no. 162 in part.

ELIZABETH G. BRITTON.

SELIGERIA DONIANA (Sm.) C.M.

This moss stands in the manual as *Anodus Donianus* Br. & Sch., and was originally described as *Gymnostomum Donianus* Smith, because it has no peristome. But with this exception, this species is hardly distinguishable from *Seligeria pusilla* (Ehrh.) Br. & Sch., near which all recent authors

place it. Both species grow on limestone or sandstone rocks, in moist shady hollows or caves, and both are liable to be overlooked, being very minute, only two or three millimeters high. The manual gives only two North American stations for *Anodus Donianus*, one at Little Falls, N. Y., Peck; the other at Owen Sound, Canada, J. Macoun; but Austin also found it at Sparta, N. J., and Wilson Harris discovered two stations for it at Chilson Lake, Essex Co., N. Y., where it grows mixed with a blue-green alga, which is densely coated with lime, and covers the surface of the rock with a gray-green growth, readily mistaken for a lichen. Associated with them were some scattered plants of *Myurella Careyana*, *Gymnostomum rupestre* and *Leptobryum pyiforme*; the bright green leaves of *Seligeria* stood up among the grey-green alga filaments. The hemispherical or turbinate capsules are less than one-half a millimeter in length, and the pedicels seldom more than 2 mm., so that the description in the manual is somewhat misleading. They do not mature until late in summer; antheridia and archegonia were found on August 31st, 1900, and no capsules had developed on June 15th, 1901.

ELIZABETH G. BRITTON.

The two stations for *Seligeria Doniana* on Chilson Lake, referred to above by Mrs. Britton would be easily overlooked as the geologic formation is Laurentian, and one would not be prepared for the thin band of calciferous rock with an outcrop on the Island and another some mile further east in the Devil's Basin. This formation is a mixture of fine yellow silicious sand and magnesian carbonate of lime, which has a fine sparkling grain when fractured.

A specimen of the collection made June 15th, 1901, was sent to Prof. Bruce Finck, of Drake University, Iowa, to determine if possible the associated gray-green alga or lichen. He writes to Mrs. Harris, under date July 6th, 1901: "I found some young adult shoots of some moss but neither protonemata, fungus or lichen. I am not sure that protonemata are not present as I examined only low slide. The specimen is an alga near *Oscillaria*. I found numerous filaments with fine sheaths and occasional hormogones."

The specimens obtained August 31st, 1900, were on less weathered rock and were not associated with such a thick felt of alga or protonemata; the plants were more distinct.

ANNIE MORRILL SMITH.

PSEUDOCALIERGON Ren., A NEW SUBGENUS OF HYPNUM.

By F. RENAULD.

Translated by JOHN M. HOLZINGER.

Plants inhabiting swampy regions, forming loose tufts, some of the species having the general aspect of certain *Harpidia*, others reminding one of certain species of *Caliergon*. Stem without radicles. Leaves imbricated or distant, more rarely homotropous, *obtusely acuminate*, a character which distinguishes them completely from the two related sub-

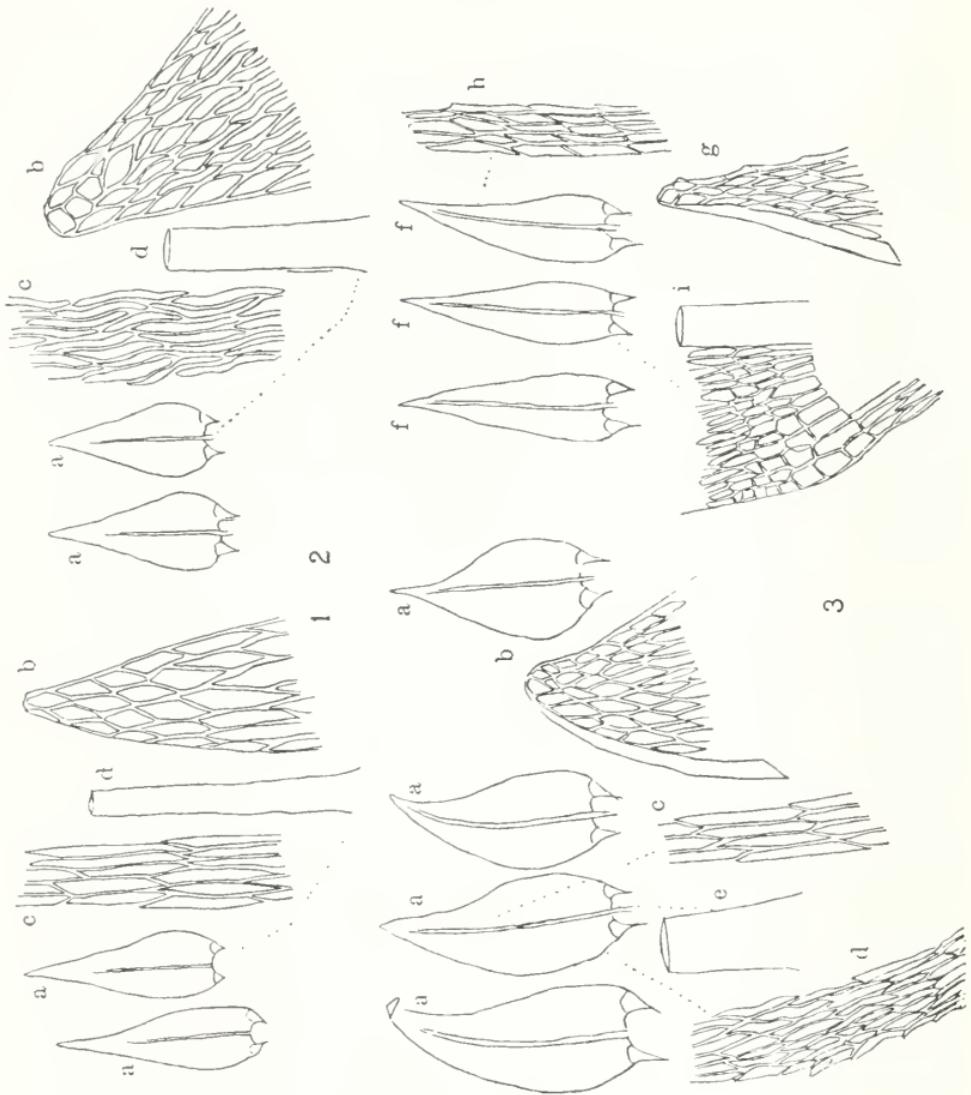


PLATE VII.

1.—*Hypnum pseudostramineum* C. Müll. a. Stem leaf x 16. b. Apex of leaf x 200. c. Middle cells x 200. d. Basal part of costa x 120.

2.—*Hypnum plesistramineum* Ren. a. Stem leaf x 16. b. Leaf apex x 200. c. Middle cells x 200. d. Basal part of costa x 120.

3.—*Hypnum Tundrae* Arnell a, a, a, a, Stem leaves x 16. b. Leaf apex x 200. c. Middle cells x 200. d. Marginal cells near base x 120. e. Basal part of costa x 120. f, f, f, Branch leaves x 16. g. Apex of branch leaf x 200. h. Marginal cells of same x 200. i. Auricles x 170.

genera, with a costa reaching or exceeding the middle of the leaf, but occasionally short and bifurcated; areolation close, cells linear, those of the apex short and enlarged, those of the angles hyaline and inflated, forming more or less well defined auricles.

At present this group comprises the four following species:

1. Stem pinnate, leaves strongly decurrent, lightly denticulate above the base, the branch leaves homotropous, auricles large, well defined,

H. Tundrae Arnell

1. Stem little branched or almost simple, leaves little decurrent, entire none homotropous, auricles ill defined.....2

2. Leaves spreading, distant, ovate-elliptical, contracted only toward the apex into a short, often inflexed acumen. *H. Bakeri* Ren.

2. Leaves gradually narrowed from the lower third into a straight, not inflexed acumen.....3

3. Leaves *loosely* imbricated, oblong-lanceolate, cells *straight* with *thin* walls..... *H. pseudostramineum* C. Müll.

3. Leaves *densely* imbricated, oval-lanceolate, almost deltoid; cells *flexuous* with *dense* walls..... *H. plesistramineum* Ren.

H. PSEUDOSTRAMINEUM C. Müll. A species very rare, and not well known, habitually confounded with various forms of *H. fluitans* (group amphibium) and of *H. aduncum* (groups Kneiffii and pseudofluitans) or referred as a variety to one or the other of these two species. I must in this connection rectify an error which I committed in the treatment of the Harpidia (*Muscologia Gallica*, Husnot), before I had been able to examine an authentic specimen of *H. pseudostramineum* C. Müll. I wrongly reduced this species to a synonym of *H. fluitans* var. *pseudostramineum* C. Müll. According to Dr. Sanio, Carl Müller has published in the *Bot. Zeitung* (1855) a description of *H. pseudostramineum* C. Müll. Schimper (Syn. ed. II. 736), who says he received from Hampe the original (type) specimen of C. Müller, places this plant in the subgenus Harpidium, with the remark: "*H. pseudostramineum* C. Müll Ms. teste Hampe," and he describes the leaves as "sharply acuminate (acute acuminata)."

Dr. Sanio (*Hedwigia*, 1887, Heft IV, V,) who had in his possession also an original specimen from C. Müller, gives a supplementary description of it in which he describes the leaves as "acute."

Thanks to the courtesy of my friend Warnstorf I have recently been able to examine an original (co-type) specimen collected by C. Müller himself in the type locality near Halle a/d Saale ("Dolauer Heide), in May, 1863, and to establish the fact that the leaves are obtusely acuminate, which distinguishes this plant from all forms of *H. fluitans* and *H. aduncum*. On the other hand it is completely separated from *H. stramineum* Dicks. by several characters and also by the dioicous inflorescence. In fact it is not satisfactorily referable either to the subgenus Harpidium or to Caliergon.

H. PLESISTRAMINEUM, Ren. A species closely related to the preceding, from which it differs by its very slender, almost simple stems, by its leaves

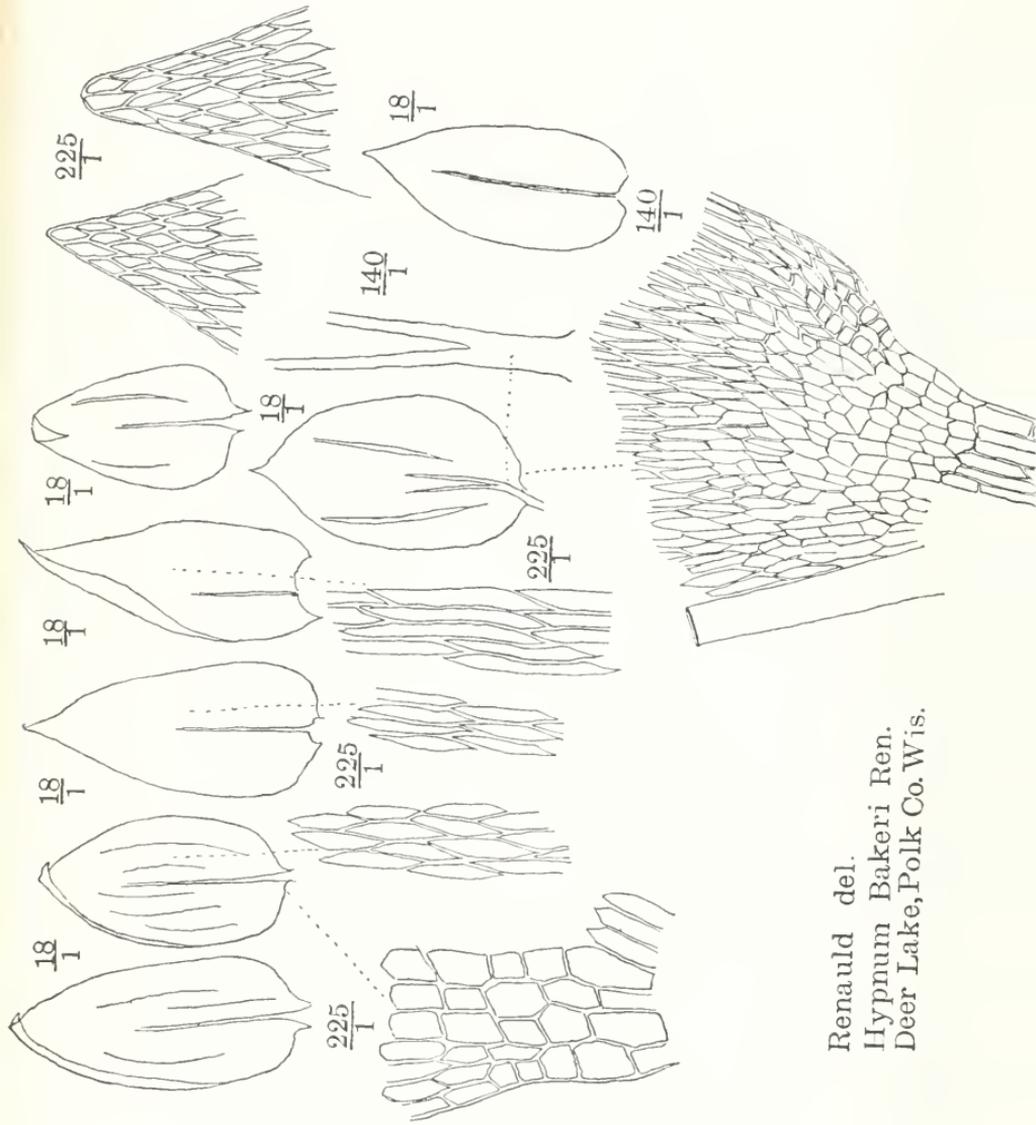


PLATE VIII.

Renauld del.
Hymnum Bakeri Ren.
Deer Lake, Polk Co. Wis.

being more crowded, more closely imbricated, oval at base, then lanceolate, and more shortly acuminate, more obtuse at the apex, with cells very flexuous with thicker cell walls. This species, which was collected in 1867 by Mr. W. H. Dall in Alaska, not far from the Yukon river, is described and figured in the Memoire, which the Messrs. Cardot and Theriot are publishing on the Mosses of Alaska, collected on the last expedition of Dr. Trelease.

H. TUNDRÆ Arnell in S. O. Lindberg at Arnell's *Musci Asiæ borealis*, is reported from several localities of the region of the Yenisei river in Siberia. The specimen from Verschiniskoje which Dr. Arnell has communicated to me, has the appearance of a *Harpidium* with pinnately branched stem and the leaves more or less homotropous (especially the branch leaves), obtusely-acuminate, with the apex often inflexed, and margin more or less denticulate, especially above the base. The inflorescence is dioicous.

HYPNUM BAKERI n. sp. Tufts very lax, pale-green, below reddish or discolored. Stem slender, without radicles, 8-10 cm. long, prostrate, sparingly branched. Leaves distinct, spreading in all directions; the comal ones ovate or oblong-elliptical, rolled up into an oblong, subacute bud, quite suddenly short acuminate, more rarely subapiculate, obtuse at the top, frequently subcucullate by the inflexed apex, more rarely quite long acuminate upward, at the base more or less contracted, indistinctly decurrent, occasionally plicate, very entire, 1.5-2 mm. long. Costa at the weak base 0.041 mm. wide, extending through three-fourths of the leaf, sometimes shorter, rather slender, dissolved below the middle, or else bifurcate. Leaf areolation pale, rather loose. Cells from middle of leaf linear-hexagonal, eight times as long as wide, or on smaller leaves six times as long as wide; apical cells shorter, subrhombic; alar cells quite numerous, a little larger, slightly dilated, quadrate, not forming auricles.

Type locality: Deer Lake, Polk Co., Wisconsin, U. S. A., in a sphagnum swamp. Coll. C. F. Baker, Nov., 1897.

This plant has a vague resemblance in appearance to the slender depauperate forms of *Hypnum cordifolium*. It differs from them by the form of the leaves, which are above narrowed into an obtuse point usually bent inward, are not cordate at base, and are hardly decurrent; by the cells of the leaves being often colored, numerous, not or hardly dilated, plane, not forming distinct auricles. *H. Bakeri* approaches *H. cordifolium*, from which it differs by the form of leaf apex, by the leaf base, which is not cordate, and by the closer areolation.

It has so far not been possible for me to examine *H. brunneofuscum*, C. Müll., from the peninsula of Tschuctschen in Bering Sea, which, judging from the description of the author (Bot. Centralblatt., 1883,) might be a *Pseudocaliargon*.

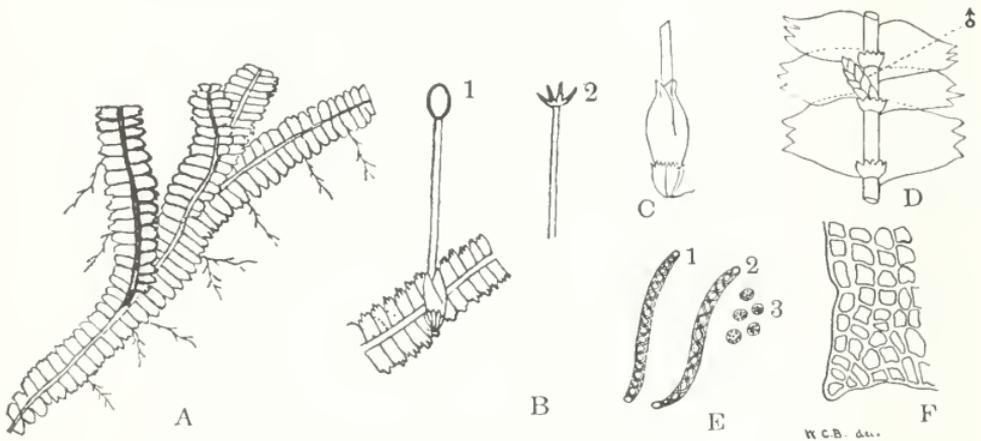
Finally, this subgenus is established to receive certain species as yet not numerous, but rare, and little represented in herbaria. They are found in boreal or subboreal regions. And it is reasonable to expect that further researches in the vast and incompletely explored regions of northern Asia and America will result in the discovery of other species of this group.

BAZZANIA.

BY WM. C. BARBOUR.

Though our first hepatics were of the distinctly thallose forms, and possessed nothing whatever which could be denominated "leaves," and though to follow a natural order, we would be confined to similar forms for some time to come, it has been thought wise, in the first few papers, to follow perhaps more the order in which the student would notice them.

Hence it is that we now leave the thallose forms like the *Marchantia* and the *Conocephalum* and consider one of the largest and most conspicuous of the "leafy" (foliose) forms—*BAZZANIA TRILOBATA* S. F. Gray.



A, Plant slightly magnified. B, (1) Part of female plant with capsule. (2) Capsule open. C, Perianth and involucre. D, Leaves enlarged; underleaves; antheridial branch on male plant. E, (1, 2). Elaters. (3). Spores. F, Cells from leaf apex.

This species is very widely and commonly distributed through the eastern section of the United States and Europe. It occurs on moist hillsides and in wooded swamps and its appearance is so distinctive that, once it is recognized, it is impressed upon the student's memory and is at once known thereafter. The plants are frequently from two to three inches in length and branch dichotomously two or three times.

The leaves of most of the foliose hepatics are arranged so as to lie nearly flat in two ranks (complanate); but while in many mosses the leaves may be secund, in the hepatics this form is rare. In addition to these two rows of leaves there is typically a third row on the under side of the stem, known as amphigastria or "underleaves."

The underleaves alternate with the others, thus making a three-ranked spiral. In some genera the spiral turns from left to right, and the upper margin of each leaf is covered by the lower margin of the one next above. This method of overlapping is known as the *succubous* arrange-

ment of leaves. In some genera, however, the spiral turns from right to left, and thus the upper margin of one leaf is made to lie upon the lower margin of the one above, and the arrangement is then called *incubous*:—the leaves of *Bazzania* are incubous.

The plants when living are a dark green in color, becoming rather brownish green when they are dried. Slender flagellæ arise from the under side of the stem, and sometimes attain the length of three-fourths, or even one inch. They may be seen in the figure. These flagellæ are covered with minute scales and have tiny teeth at the apex. The main leaves are alternate and arranged closely in two rows. They are ovate in general outline, with a broad truncate apex, which is strongly three-toothed, whence the specific name—*trilobata*—is derived. There are but two genera common in the eastern United States which have incubous leaves.

The other genus (*Kantia*) has leaves which are entire (except in one rare species) and is light green in color. So that incubous dark green leaves, with toothed apex furnish marks for easily distinguishing this genus.

The leaves in *B. trilobata* are slightly deflexed or sometimes quite complanate. The only other species of our territory (*B. deflexa* Underw.) has its leaves strongly deflexed, with narrow apex, 2-3 toothed or rarely entire. This latter is found only in the higher mountains. Its underleaves are roundish-quadrangular, somewhat recurved from the stem, and have from four to six teeth. The surface of all leaves is somewhat shining.

Bazzania is a dioicous genus. The male organs (called antheridia, as in the mosses) are borne in the axils of leaves on short antheridial spikes, which in turn spring from the axils of underleaves. They are seldom found. The archeogonia are borne on short branches, also from the axils of underleaves.

After the archeogonium has been fertilized there is developed a nearly cylindrical sheath, white in color, and slightly three-keeled. This is the perianth. The perichaetial leaves are small ovate scales with the upper margin variously incised. The fertilized archeogonium rapidly develops the sporogonium, with a rudimentary pedicel, and enclosed in a membranous sack, pointed at the apex and fastened at the base. This sack is the calyptra.

Soon the sporogonium bursts through the top of the calyptra, and passes on up through the perianth, borne upon a stalk of delicate white cellular tissue. It is now a shining, nearly globular body, dark brown in color. When it reaches a height of about a half inch above the perianth the capsule splits into four valves, allowing the dissemination of the spores. Contained in the capsule with the spores are elaters, with two slender spiral fibers, very like those previously described.

Sayre High School, Sayre, Pa.

So many of our readers are also interested in ferns that we feel justified in calling their attention to the latest and best book on the ferns, "Our Ferns in Their Haunts," by Willard N. Clute. Copiously illustrated with

colored plates, half-tones, and drawings that are both artistic and accurate, it is a delight to the eye. Containing all our species, described in a clear and interesting manner, it is a book that the amateur must have and the professional will have. The illustrated key is a feature novel and invaluable; the idea is so good that we hope to make use of it for the mosses. A. J. G.

NORTH AMERICAN THUIDIUMS.

BY G. N. BEST.

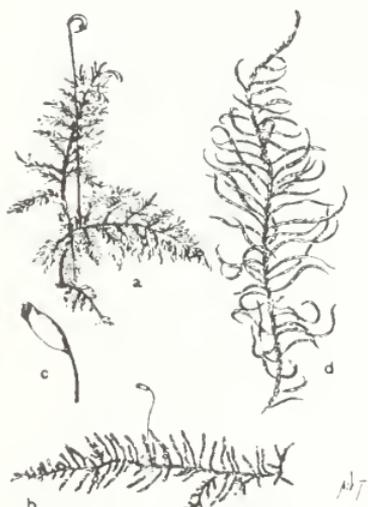


Fig. 1. a, *Thuidium delicatulum* x 1. b, *T. scitum* x 1. c, Capsule of the same x 5. *T. abietinum* x 1.

The Thuidiums are widely distributed and among the most common as well as the most beautiful of mosses. The stems of these plants are complanately branched, pinnate, bipinnate, rarely tripinnate. In most species the branches are so closely set as to give them a plumose appearance which is somewhat distinctive. Although multiform, the paraphyllia are more or less linear or filamentose, often divided and branched, but not foliose. The ovate-triangular stem leaves are usually papillose on both surfaces, unicostate, the costa passing the middle. The median leaf cells vary from roundish quadrate-hexagonal to rhombic-oblong; in two species linear-rhomboidal. The capsules, on smooth pedicels, are annulate, more or less curved. The opercula vary from conic to rostrate; the peristomes well developed; the endostomial band $\frac{1}{3}$ the length of the teeth with segments and cilia.

SYNOPSIS OF SPECIES.*

*The species mentioned in Lesquereux & James' Manual of the Mosses of North America and here omitted, are as follows: *Thuidium erectum* is *T. delicatulum*; *T. calypttratum* is a form of *T. microphyllum*; *T. Alleni* is a dubious sterile form probably of *T. delicatulum*; *T. remotifolium* is not a *Thuidium* and *T. tamariscinum* is not known from North America.

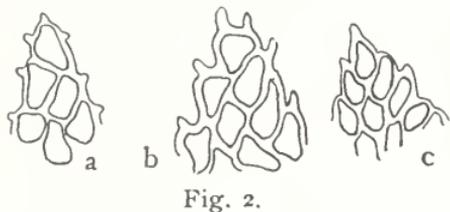


Fig. 2.

Apical cells of branch leaves crowned with 2-4 papillae (Fig. 2, a and b); median cells quadrate-hexagonal to oblong-rhomboidal (Fig 5).....A

Apical cells of branch leaves with a single terminal papilla (Fig. 2, c); median cells as in A. Paraphyllia numeros, branched.....B

Apical cells of branch leaves not papillose; median leaf cells linear-rhomboidal (Fig. 10). Paraphyllia long linear or filamentose (Fig. 3, c)...C

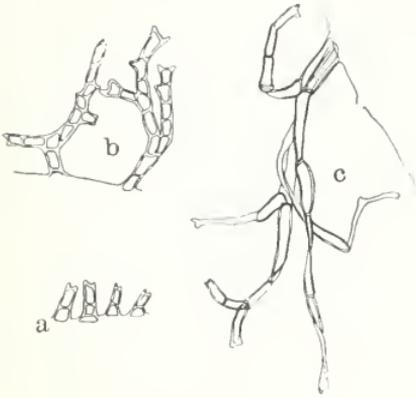


Fig. 3.

A.

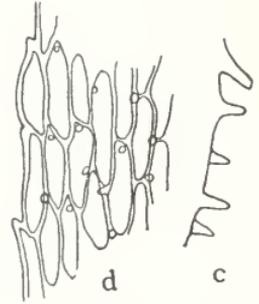


Fig. 10.

- Paraphyllia few, small, linear-oblong, 2-6 cells long (Fig. 3, a); branch leaves subcrispate-incurred when dry.....1
 Paraphyllia numerous, more or less branched (Fig. 3, b).....2

I



Fig. 4.

Plants very small, 1-2 cm.; stem and branches filiform, branches papillose (Fig. 4); growing in thin mats on limestone rocks..... *pygmaeum*.

Plants small, 2-4 cm., loosely caespitose; branches smooth; growing on the ground and rotten wood..... *minutulum*.

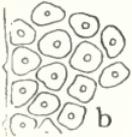
2



a

*Stems closely pinnately branched, branches terete-foliolate when dry.

Plants soft; leaf cells with 2-5 small papillae on each surface (Fig. 5, a)..... *scitum*.



b

Plants rigid; leaf cells with a single papilla on each surface (Fig. 5, b)..... *abietinum*.

**Stems loosely pinnately or bipinnately branched.

Fig. 5.



Fig. 7.



Fig. 6.

Pinnate or bipinnate; stem leaves spreading-recurved when moist (Fig. 6), costa subpercurrent; perichaetical bracts not ciliate....*recognitum*.

Bipinnate or tripinnate; stem leaves erect-spreading when moist (Fig. 7), costate to 4-5; perichaetical bracts ciliate*delicatulum*.

Bipinnate; stem leaves with a hyaline filiform acumination; perichaetical bracts scarcely ciliate.....*Philiberti*.

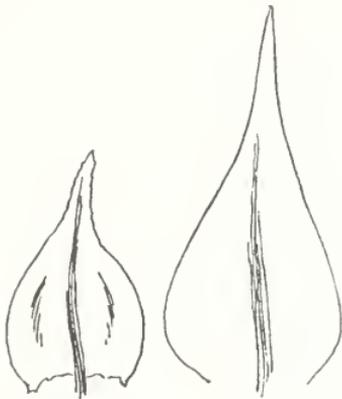


Fig. 8.

Fig. 9.

B.

Stem leaves (Fig. 8) roundish ovate, abruptly linear-oblong acuminate, margins erose-serrate.

Virginianum.

Stem leaves broadly ovate, long and narrowly acuminate, margins crenulate-serrulate or entire (Fig. 9).....*microphyllum*.

C.



Fig. 11.

Fig. 12.

Stem leaves plicate-striate, the decurrent base with one to three cilia (Fig. 11); branch leaves loosely appressed when dry*paludosum*.

Stem leaves sulcate, contracted to a decurrent subclasping paraphyllose base (Fig. 12); branch leaves subcrispate when dry.....*Blandowii*.

THUIDIUM PYGMÆUM Br. & Sch. For fineness and for beauty this little moss, appearing when dry like miniature embroidery, leads the Thuidiums. The paraphyllia, found only on the branches, are so small as easily to be overlooked. The median leaf cells of the triangular-ovate stem leaves are quadrate-hexagonal and the operculum of the asymmetric oblong-ovate capsule obliquely rostrate; monoicous; spores maturing in autumn. Canada, Ohio, New Jersey, and Pennsylvania.

THUIDIUM MINUTULUM (Hedw.) Br. & Sch. Although quite small this species differs from the preceding chiefly in being larger. Paraphyllia on both stems and branches; median leaf cells quadrate-hexagonal, the marginal somewhat larger; monoicous; capule oblong-oval, rough, slenderly rostrate.

Its usual habitat, in the northern part of its range, is rotten wood; in its southern, the ground. The spores mature in autumn. From New Brunswick to Minnesota and from Canada to Florida.

THUIDIUM SCITUM (Beauv.) Aust. This neat trim moss grows in mats on the roots and bases of trees. Stem leaves broadly triangular, auriculo-

cordate, narrowly acuminate; median leaf cells roundish hexagonal with 2 to 5 small bead-like papillae on each surface; monoicous; capsule cylindrical, straight, or but slightly curved; operculum conic-rostrate; spores maturing in autumn and winter. *Var. aestivale* (Aust.); stems not so closely pinnate; capsule oblong-cylindrical, inclined to horizontal; operculum shorter beaked—From Canada to North Carolina and from Vermont to Wisconsin.

THUIDIUM ABETINUM (L.) Br. & Sch. Plants rather large, stiff, in dense tufts, usually on rocks and stones, rarely on the ground; stem leaves broadly ovate, acuminate, deeply biplicate, margins serrulate; median leaf cells oval-rhombic; dioicous; capsule narrowly cylindrical, curved; operculum long conic. From Greenland to Virginia and from New Foundland to British Columbia. Fruiting in Colorado and Montana and fruiting freely in Alaska.

THUIDIUM RECOGNITUM (Hedw.) Lindb. Much difficulty has been experienced in discriminating between this and the following species. They not infrequently grow together. Intermediate forms, however, are rare, probably owing to the difference in their fruiting seasons. The broadly triangular, auriculo-cordate, abruptly acuminate stem leaves are sulcate when dry, spreading-recurved when moist, usually plane on the serrulate margins; costa subpercurrent, somewhat spreading at apex; median leaf cells oblong-rhombic, passing to oblong-linear in the acumen; dioicous; capsule cylindrical, curved; operculum rostellate. On the ground, rotten wood, stones and rocks. Spores mature in July. From Labrador to British Columbia southward, rare or absent on the Pacific slope and in the Gulf States.

THUIDIUM DELICATULUM (L.) Mitt. Stem leaves triangular-ovate, rather gradually acuminate, appressed when dry, erect-spreading when moist, margins serrate, more or less recurved; costa vanishing in the acumen; median leaf cells quadrate-oblong to oval rhombic; perichaetial bracts ciliate; dioicous; capsule cylindrical, curved; operculum conic-rostrate; spores maturing in winter. On the ground, rotten wood, stones and rocks. From Labrador to British Columbia southward through the United States, rare west of the Rocky mountains.

THUIDIUM PHILIBERTI Limpr. The distinguishing character of this rare species is the hyaline, filiform acumination of the stem leaves which are somewhat intermediate between those of *T. recognitum* and *T. delicatulum*; the median leaf cells are quadrate-oblong rather than oblong-rhombic; costa thin, disappearing above the middle; dioicous; capsule cylindrical, curved; annulus not clearly differentiated; operculum conic-rostrate; spores maturing in October. On swampy ground and about the base of small trees in wet places. New Jersey, Pennsylvania, Ontario and New Brunswick.

THUIDIUM VIRGINIANUM (Brid.) Lindb. (*T. gracile* var. *Lancastriense* S. & L.) Plants small, dark or dirty green, in open woods, on the ground or about stumps and roots of trees. Margins of the roundish ovate stem leaves erose-dentate below, serrate above; acumen of the branch leaves short, broad, sharply serrate; median leaf cells quadrate-hexagonal; mon-

NEW OR UNRECORDED MOSSES OF NORTH AMERICA.*†

By J. CARDOT AND I. THERIOI.

PHASCUM CUSPIDATUM Schreb. var. *AMERICANUM* Ren. & Card.

Is very close to the variety *piliferum* in the long excurrent costa and apex often colorless, but is distinguished from it by the shorter leaves, which are more papillose above, and by the very short, erect seta. Variety *mitraeforme* Limpr. is like it in the papillose leaves, but differs from it in the larger leaves, in the less excurrent costa, and in a mitriform calyptra.

Wisconsin: Madison, on ground in pastures, clover fields, and fallow ground (L. S. Cheney, 1893. Ren. & Card., Musci Amer. sept. exsicc., No. 267). Missouri: old fields near Emma (C. H. Demetrio, 1891). Illinois:—

Microbryum Floerkeanum var. *Henrici* Ren. & Card. in Bot. Gaz. 14: 91, 1899, from Kansas, leg. Henry, seems to be also a stunted form of the same moss. It has also the calyptra cuculate, a character which separates it from *Microbryum Floerkeanum*.

All the specimens we have received from North America as *Phascum cuspidatum* belong to this var. *Americanum*.

GYMNOSTOMUM CURVIROSTRE Hedw. var. *COMMUTATUM* Card. & Ther. (*Hymenostylum commutatum* Mitt., Musci. Ind. Or., p. 32. *Weisia curvirostris* var. *commutata* Dicks., Handb. Brit. Mosses, 212). Newfoundland (Rev. A. C. Waghorne).

This variety has long, narrow leaves, and the cells of the areolation are everywhere long and smooth. In the type, the upper areolation is composed of irregular cells, rectangular, quadrate, and triangular, with papillae.

GYMNOSTOMUM CURVIROSTRE Hedw. var. *SCABRUM* Lindb., Musci Scand. 22.

This form shows contrary variations to the preceding; the leaves are smaller, the cells quadrate, papillose; besides, the stem and nerve are generally covered with high papillae.

Missouri: Benton Co., on moist rocks along Indian Creek (C. H. Demetrio, 1893). Minnesota: Lewiston cave (J. M. Holzinger, 1889). Bear Creek (J. M. Holzinger, 1890). Wisconsin: Madison (L. S. Cheney, 1892. Ren. & Card. Musci Am. sept. exsicc. No. 269).

DICRANUM VIRIDE B. & S. var. *LAEVE* Ren. & Card.

Distinguished from the typical form by its much laxer habit and less crowded leaves, which are smooth at the back.

Newfoundland: Bay of Islands, old stump (Rev. A. C. Waghorne, 1895).

DICRANUM ANGUSTUM Lindb., Soc. pro Fauna et Fl. Fenn., 1880, et Rev. Bryol. 9; 83. 1882, Lindb. & Arn., Musc. As. Bor. 2: 80 (description very complete).

Northwest shore of Hudson Bay, lat. N. 63-65, long. 0.90.20 (G. Comes, 1893-1894). We found some stems of this rare species amongst specimens of *Aulacomnium turgidum*.

*Translated by MISS WARNER. †Condensed from Bot. Gaz. 30, July, 1900.

A polar moss, known only from some localities of North Finland and from Siberia. It is easily distinguished from *D. Bonjeani* DeNot (*D. palustre* B. & S.) by the leaves straight, not undulate, convolute, and entire, the thinner costa, the less porose cells, and the perichaetial leaves long piliferous.

NOTE—The Editors tried an experiment in Plate IX which has proved unsuccessful.

CORRECTIONS. In "making up" the pages of the July BRYOLOGIST two serious errors were made in Mrs. Harris article: page 42, eleventh line from the bottom, erase all after the parenthesis; page 43, the long lines between the two cuts, are descriptive of *Cetraria Oakesiana* and should follow the preceding description of that species: page 48, in the fourth line of the description of *Brachythecium collinum Holzingeri*, insert a semicolon between "serrate" and "primordial."

CHAPTER NOTES.

Do not forget the competition for the first century of North American Musci Pleurocarpi (See THE BRYOLOGIST for October, 1900.) Address all letters and packages to Dr. A. J. Grout, 360 Lenox Road, Brooklyn, N. Y. When renewing your subscription do not fail to note the increase in price.

ELECTIONS.

Forward your ballot for officers and amendments to Mrs. J. D. Lowe, Noroton, Conn., prior to Nov. 1st.

CANDIDATES.

For President—Dr. G. N. Best, Rosemont, New Jersey. Prof. J. M. Holzinger, Winona, Minn.

For Vice-Pres.—Mr. Warren Huntington, Amesbury, Mass. Miss E. A. Warner, 78 Orange St., Brooklyn, N. Y.

For Sec.-Treas.—Miss Harriet Wheeler, Chatham, N. Y. Miss Alice Crockett, Camden, Maine.

AMENDMENTS.

The following amendments to the Constitution are proposed:

Section 4 of Article 3 shall be amended so as to read: The regular yearly dues shall be one dollar and ten cents for all members.

Section 2 of Article 1 shall be amended to read as follows: The membership shall consist solely of active members. Members may be admitted at any time.

In answer to the circular letter of May 10th, 1901, sixty-two members responded, all heartily commending the proposed increase in Chapter dues consequent on changing THE BRYOLOGIST from a quarterly to a bimonthly publication. This takes effect Jan. 1st, 1902. The yearly Chapter dues will then be \$1.10, which covers a subscription to THE BRYOLOGIST and leaves a margin for postage and general expenses.

A. M. S.

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THE BRYOLOGIST

VOLUMES I—IV

1898, 1899, 1900, 1901

COMPILED BY

ANNIE MORRILL SMITH

BROOKLYN, N. Y.

1902

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