THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY

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NORTH AMERICAN MOSSES

HEPATICS AND LICHENS

VOLUME XXI

O. E. JENNINGS, Ph.D., Editor-in-Chief

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INDEX TO PLANT-NAMES

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ERRATA

Page 17, line 26, for *and* read and.
Page 24, line 16, for *Solarina* read *Solorina*.
Page 36, line 22, for *forma* read forma.
Page 60, line 27, for Ohioense read ohioense.
Page 61, line 10 from bottom, for *Ohioense* read *ohioense*.
Facing page 63, on Plate XXVI, for *Ohioense* read *ohioense*.
Page 90, line 1, for *Pytchocoleus* read *Ptychocoleus*.
Page 91, last line, for t opical read tropical.
Page 92, lines 5, 8, and 9, for *Keniae* read *keniae*.

VOLUME XXI NUMBER 1

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THE BRYOLOGIST

VOL. XXI JANUARY, 1918 NO. 1

THE RHACOMITRIUMS OF WESTERN NORTH AMERICA

[*Concluded*]

T. C. FRYE

4. RHACOMITRIUM CYCLODICTYON Card. & Ther. Proc. Wash. Acad. Sci. 4: 308. 1902.

Plants densely caespitose, small, blackish-brown or reddish-brown. Stems depressed, 6 cm. or less long, pinnately much-branched; branches crowded, erect, short, 3–5 mm. long; short tuft-like lateral branches wholly wanting. Leaves when dry suberect, hardly flexuous; when moist erecto-patent; up to 1.25 mm. long, up to .5 mm. wide, ovate-lanceolate, muticous; margin entire, revolute below, only 1 cell thick throughout; vein somewhat slender, 35–40μ

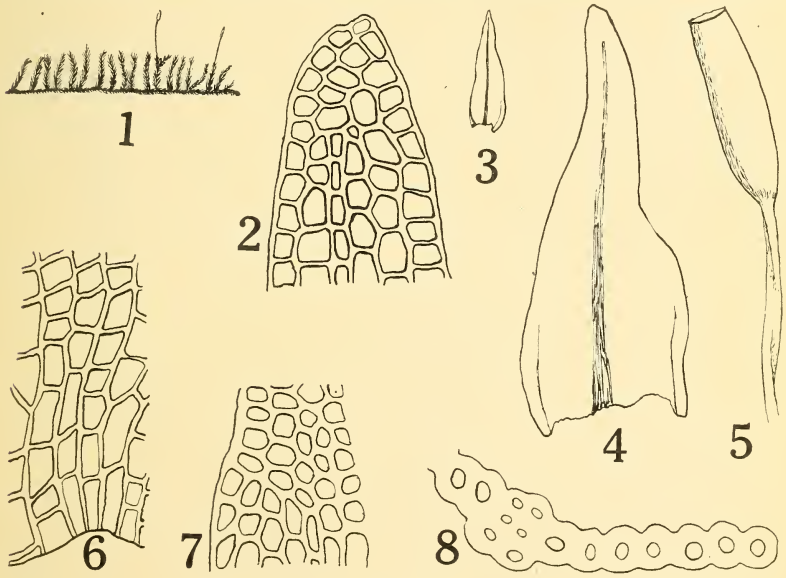

PLATE I

Rhacomitrium cyclodictyon. (1) Plant, ×1. (2) Leaf-tip, ×400. (3) Leaf, ×17. (4) Leaf, ×90. (5) Capsule, ×17. (6) Cells of leaf-base, ×400. (7) Cells of leaf-middle, ×400. (8) Part cross section of leaf near its tip, ×400.

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thick, vanishing below the apex, its cells in cross section subequal. Cells of leaf-base near the vein somewhat rectangular or sublinear, not sinuose; cells of leaf-tip and leaf-middle round or short-ovate, 8–12μ wide, incrassate at the side, smooth but convex on both sides of the leaf, very strongly convex on the upper side. Perichaetial leaves much larger than the others, at base somewhat subvaginate, long-acuminate, erect when moist. Seta short, purple but finally blackish, twisted to the right when dry, about 5 mm. long. Capsule erect, narrowly cylindric, 1.5 mm. long, .3 mm. in diameter. Spores minutely granulose, 16–17μ in diameter. Otherwise unknown.—Known only from Muir Glacier, Alaska.

Type material was kindly lent by the Missouri Botanical Garden. It contained only 2 capsules, both mature, without teeth. There was no mature calyptra nor lid. Cardot & Theriot evidently also lacked these. There is some doubt whether it is a *Rhacomitrium* at all. The leaf-cells look more like those of *Grimmia*, but the capsule is rather long for that genus. The final disposition of the plant will likely have to await specimens with peristome.

5. Rhacomitrium heterostichum (Hedw.) Brid. Mant. p. 79. 1819.

Plants green to grayish-green. Stems up to 6 cm. long; elongated branches none to few per plant, short tuft-like lateral branches none to fairly common.

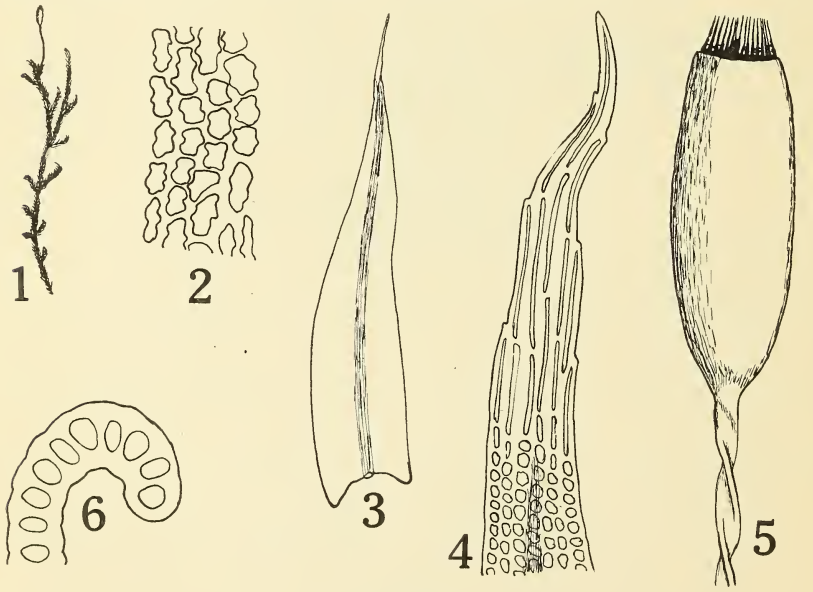


Plate II

Rhacomitrium heterostichum. (1) Plant, ×1. (2) Cells of leaf-middle, ×400. (3) Leaf, ×17. (4) Leaf-tip, ×200. (5) Capsule, ×17. (6) Cross section of margin in upper part of leaf, ×550.

Leaves lanceolate, about 2.4 mm. long, loosely appressed when dry, recurved when moist, nearly all hyaline pointed; surfaces nearly smooth; margin 1 cell thick throughout. Cells of leaf-tip isodiametric, of leaf-middle rectangular, of leaf-base linear. Dioicous. Calyptra somewhat rough on the beak. Seta 5–8 mm. long, twisted to the right. Capsule erect, cylindric or almost club-shaped, its body 2–2.4 mm. long; lid half as long as capsule-body, its beak straight; annulus of 2–3 rows of cells. Peristome-teeth .25–.45 mm. long, densely papillose, split to the base into 2 divisions. Spores 14–18μ in diameter.—Alaska and Yukon to Oregon and Colorado.

R. heterostichum together with *R. sudeticum*, *R. affine* and *R. macounii* constitute a very closely related group. It is doubtful whether the last 3 named are sufficiently distinct from *R. heterostichum* to merit specific rank. All differ from *R. heterostichum* in having the margin in the upper part of the leaf more than 1 cell thick.

6. Rhacomitrium sudeticum (Funk) B. S. G. Bryol. Eur., fasc. 25–28. 1845.

Plants green to blackish-green. Stems up to 15 cm. long; elongated branches few, short tuft-like lateral branches none to few. Leaves lanceolate, almost smooth, mostly with short denticulate hyaline points with or without surface denticulations; margin 2 cells thick at least in the upper part of the leaf. Cells of the leaf-tip round-quadrate, those below the leaf-middle gradually longer, of the leaf-base linear; marginal row at base quadratic to rectangular, almost hyaline. Dioicous. Seta 2–3 mm. long, twisted to the right. Capsule erect, oval, smooth, its body 1.2–1.5 mm. long; lid about $\frac{2}{3}$ the length of the capsule-body, straight-beaked. Peristome-teeth about .4 mm. long, densely papillose. Spores 10–18μ in diameter.

Macoun's numbers 156 from McLeod Lake, and 404 and 405 from Rogers Pass, distributed as *R. affine*, are referred here.

Typical.

1. None of the leaves with denticulations on the surface of the hyaline points.—Alaska and Yukon to Oregon and Idaho.

6a. **Rhacomitrium sudeticum occidentale** (R. & C.) n. comb. [*R. heterostichum occidentale* R. & C. Bot. Gaz. 15: 41, 1890; *R. occidentale* R. & C.; *R. brevipes* Kindb.; *R. micropus* Kindb.]

1. At least some of the leaves with denticulations on the surface of the hyaline points.—British Columbia to Oregon.

The surface denticulations seem to constitute about the only distinction that one can depend upon to separate the variety, and even that leaves one in doubt at times. The leaf-margin is 2 cells thick toward the tip. This removes it from *R. heterostichum* and allies it with the other members of this complex. It lacks the short tuft-like lateral branches of *R. affine*, and its leaf-tips are much more like those of *R. sudeticum* than like those of *R. macounii*. It is therefore placed as a variety of *R. sudeticum*. It might be recognized as a species; but the writer is inclined to believe that it, *R. sudeticum*, *R. affine*, and *R. macounii* are all largely if not entirely environmental forms of the same thing.

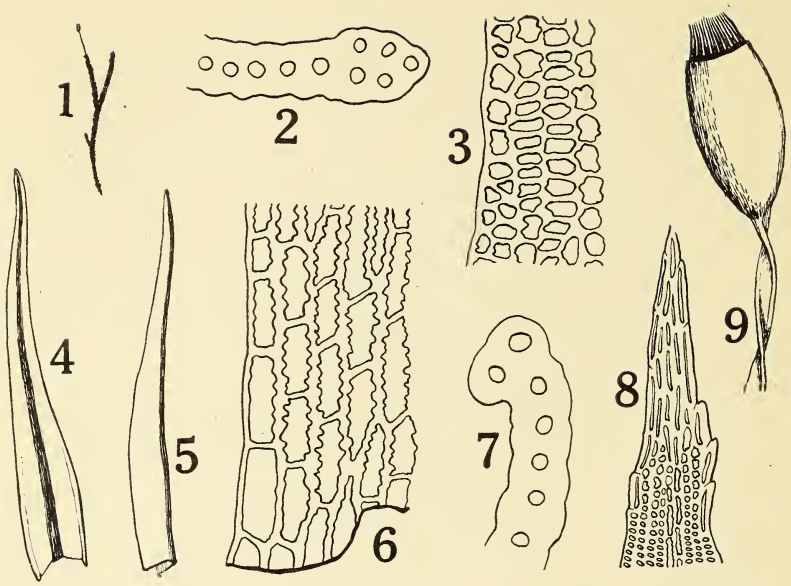


PLATE III

Rhacomitrium sudeticum. (1) Plant, ×1. (2) Cross section of leaf-margin near tip, ×550. (3) Cells of leaf-middle, ×400. (4), (5) Leaves, ×17. (6) Cells of leaf-base, ×400. (7) Cross section of leaf-margin between tip and middle, ×550. (8) Leaf-tip, × 200. (9) Capsule, ×17.

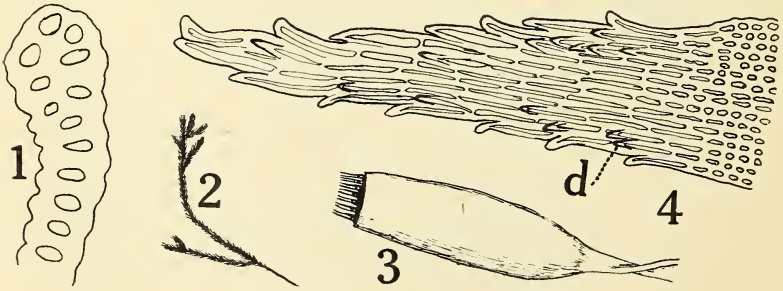


PLATE IV

Rhacomitrium sudeticum occidentale. (1) Cross section of leaf-margin near tip, ×550. (2) Plant, ×17. (3) Capsule, ×17. (4) Leaf-tip; (d) Surface denticulation, ×200.

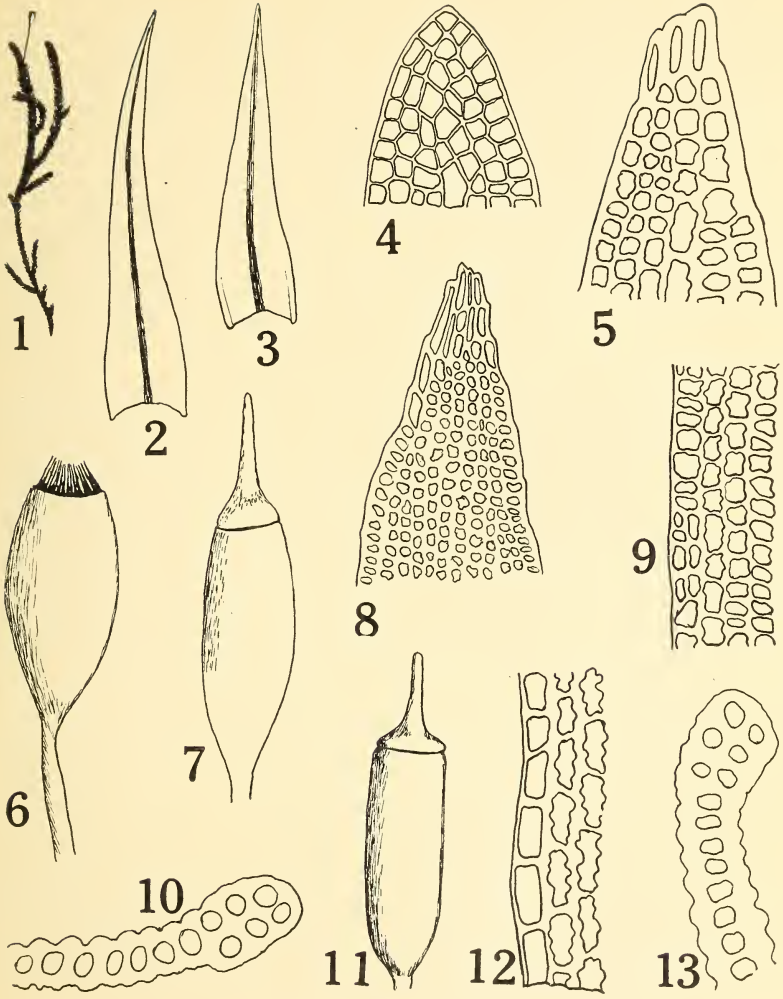


PLATE V

Rhacomitrium macounii. (1) Plant, ×1. (2), (3) Leaves, ×17. (4) Leaf-tip without hyaline point, ×400. (5) Leaf-tip with hyaline point of only 3 cells, ×400. (6), (7) Capsules, ×17. (8) Leaf-tip with typical hyaline point, ×200. (9) Cells of leaf-middle, ×400. (10) Cross section of leaf-margin near tip, ×400. (11) Capsule, ×17. (12) Cells of leaf-base, ×17. (13) Cross section of leaf-margin in upper part, ×550.

7. Rhacomitrium macounii Kindb. Bull. Torr. Bot. Club 16: 93. 1889. [*R. alternatum* C. M. & Kindb.; *R. robustifolium* Kindb.]

Plants green to brownish or blackish. Stems up to 7 cm. long; elongated branches few or none, short tuft-like lateral branches none or occasional. Leaves ovate-lanceolate; when dry loose, crispate, nearly erect; when moist recurved; apex obtuse to acuminate; hyaline tip none, or short and smooth; margin of opaque portion entire, 2 cells thick toward the apex, erect on one side, erect or revolute on the other; costa extending to the apex or nearly so. Cells somewhat sunken over the lumen; those near the leaf-tip isodiametric; those of the leaf-middle a little longer than wide; those of the leaf-base linear, sinuose; lower marginal row quadrate to rectangular, some of them hyaline. Seta twisted to the right, about 5 mm. long, smooth, straight, or nearly erect and contorted. Capsule oblong, dark brown, not striate; its body about 1.8 mm. long. Peristome-teeth orange to brown, perforate or cleft to below the middle, smooth, about .26 mm. long.—British Columbia to Oregon.

An examination of co-type material kindly lent by Professor J. M. Macoun shows that the leaf-margins are two cells thick near the tip instead of 1 cell thick throughout as described by Kindberg. Also the leaves are hardly smooth; the surface is quite sunken over the cell cavities. The larger plants usually show fewer recurved leaves when dry, and constitute what is known as *R. robustifolium*. But the leaf and capsule characteristics agree very closely. Here is referred Macoun's number 245 from Mt. Arrowsmith, Vancouver Island, and distributed as *R. robustifolium*.

8. Rhacomitrium affine (Schleich.) Lindb. Acta Soc. Sci. Fenn. 10: 552. 1875. [*R. alopecurum Brid.; R. heterostichum alopecurum* Huebn.; *R. obtusum* Brid.; *R. affine obtusum* Limpr.; *R. heterostichum gracilescens* B. S. G.; *Grimmia obtusum* Lindb.]

Plants green to yellowish brown. Stems up to 5 cm. long; elongated branches few, short tuft-like lateral branches many. Leaves lanceolate, nearly smooth, recurved when moist; apex obtuse to acuminate, muticous to hyaline-pointed; margin denticulate along hyaline point, otherwise entire, 2 cells thick toward tip. Cells of leaf-tip mostly isodiametric although some longer, of the leaf-middle rectangular, of the leaf-base linear; alar cells few, small, isodiametric; vein disappearing somewhat below the apex. Dioicous. Calyptra somewhat rough on the beak. Seta 4–6 mm. long, twisted to the right. Capsule 1.7–2.4 mm. long, cylindric; lid ⅓–½ the length of the capsule-body; annulus of 2–3 rows of cells. Peristome-teeth .25–.32 mm. long, densely papillose, divided to below the middle into 2 divisions.—Alaska to Washington.

The lack of hair points on some plants does not seem to warrant a variety. The gradation is close. It is very likely that the amount of hyaline tip depends upon the conditions under which the plant is growing; apparently drought favors more and longer hyaline tips.

Here are referred Macoun's number 98 from Unalaska, Alaska, and his number 622a from Nova Scotia.

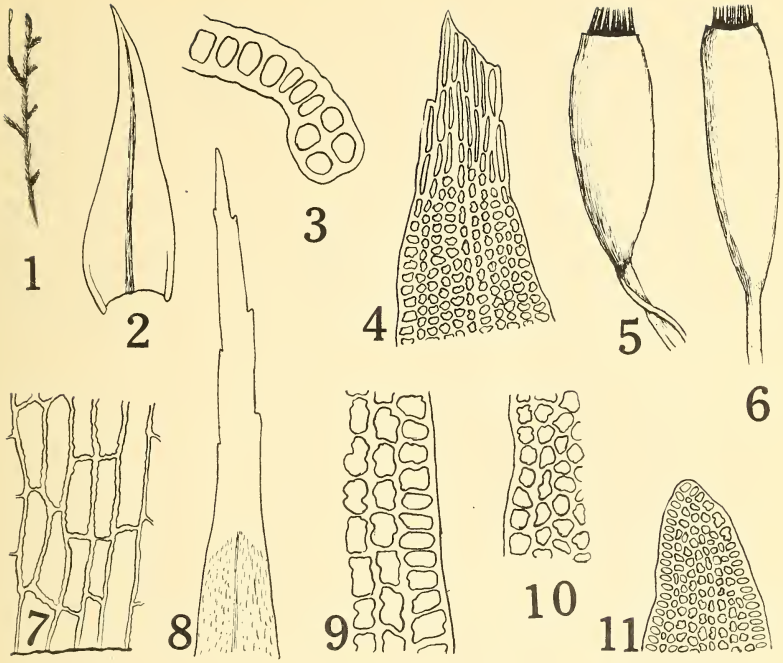


PLATE VI

Rhacomitrium affine. (1) Plant, ×1. (2) Leaf, ×17. (3) Cross section of leaf-margin near tip, ×550. (4) Leaf-tip, ×200. (5), (6) Capsules, ×17. (7) Cells of leaf-base, ×400. (8) Leaf-tip showing one of the longer hyaline points, ×100. (9) Cells of the leaf-middle, ×400. (10) Cells from near leaf-tip, ×400. (11) Leaf-tip, ×200.

9. RHACOMITRIUM VARIUM (Mitt.) L. & J. Manual Mos. N. Amer. p. 150. 1884. [*R. canescens lutescens* L. & J.; *R. speciosum* R. & C.; *R. oreganum* R. & C.]

Plants dirty-green to yellowish-green, rather coarse. Stems up to 5 cm. long; elongated branches none to few, short tuft-like lateral branches none to many. Leaves lanceolate, muticous or hyaline-pointed; muticous ones obtuse, entire; hyaline point short, somewhat denticulate, usually present on upper leaves of branches but sometimes wholly lacking throughout the plant; margin 1 cell thick throughout. Upper opaque cells 1–4 times as long as wide, most of them elongated in the leaves having hyaline points; middle and basal cells 1–2 times as long as wide. Dioicous. Calyptra long-subulate, slightly rough at apex. Seta 10–14 mm. long, twisted to the right, smooth. Capsule cylindric, erect, smooth, somewhat plicate when very old; body 3.3–3.8 mm. long; lid nearly as long; annulus of 3 rows of cells. Peristome-teeth nearly smooth, 1.5–1.7 mm. long. Spores 12–18μ.—Alaska to California.

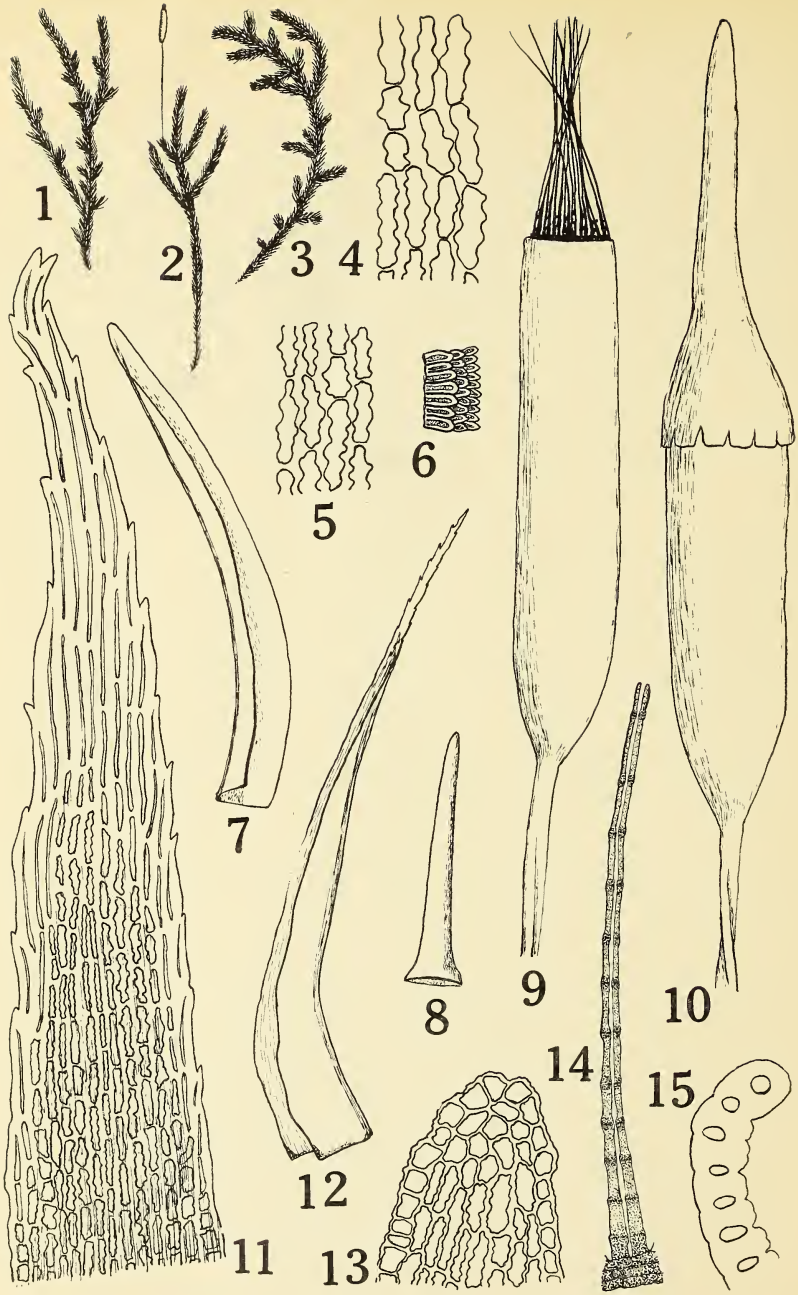


PLATE VII

Rhacomitrium varium. (1), (2), (3) Plant, ×1. (4) Cells of leaf-base, ×400. (5) Cells of leaf-middle, ×400. (6) Annulus, ×105. (7) Leaf, ×25. (8) Lid, ×17. (9), (10) Capsules, ×17. (11) Leaf-tip, ×300. (12) Leaf, ×25. (13) Leaf-tip, ×400. (14) Split tooth of peristome, ×400. (15) Cross section of leaf margin near tip, ×400.

The longer plants are the most yellowish, but there is a gradual gradation. Some plants have many tuft-like lateral branches but most of them have several. Most plants have hyaline points on the leaves at the branch-tips, but some have all of the leaves muticous. The striking characteristic is the long capsule. The variability of the species has been the cause of considerable confusion in our western *Rhacomitriums*. The cells of the marginal row near the leaf-tip are isodiametric, so are also often a few cells in the tips of the muticous leaves; but otherwise opaque cells of the leaf-tips are nearly all 2 or more times as long as wide. This has been confusing in keys based on leaf-cells. C. Mueller was in error in reporting the annulus lacking.

10. RHACOMITRIUM CANESCENS (Weis) Brid. Mant. p. 78. 1819.

Plant yellowish-green or grayish-green. Stems up to 10 cm. long; elongated branches none to few, short tuft-like lateral branches none to rather numerous. Leaves lanceolate, papillose on both sides, usually most of them with hyaline points; hyaline point papillose, dentate, up to half the length of the leaf; papillae not paired, over the cell-cavity; margin 1 cell thick throughout. Green cells of the leaf-tip 1–2 times as long as wide, of the leaf-middle scarcely longer, of the leaf-base 4–6 times as long as wide. Dioicous. Calyptra very warty. Seta 7–25 mm. long, smooth, twisted to the left. Capsule elliptic, about 2 mm. long; lid as long as or longer than the body of the capsule. Peristome-teeth 1.3–1.6 mm. long, finely papillose, split to the base. Spores 8–10μ.

10a. RHACOMITRIUM CANESCENS ERICOIDES (Web.) B. S. G. Bryol. Eur., Fasc. 25–28, 1845. [*R. ericoides* Brid.]

1. Most of the leaves with hyaline points.
   2. Plants yellowish green.
      3. Short tuft-like lateral branches very numerous.—Alaska to Oregon and Montana.

TYPICAL.

1. Most of the leaves with hyaline points.
   2. Plants green, not greatly yellow.
      3. Short tuft-like lateral branches not very numerous.—Alaska and Yukon to California and Montana.

10b. RHACOMITRIUM CANESCENS EPILOSUM Milde, Bryol. Siles. p. 160. 1869. [*R. canescens muticum* Vent.; *R. canescens muticum* Kindb.]

1. None of the leaves with hyaline points, or a few with very short ones.
   2. Plants green, not greatly yellow.
      3. Short tuft-like lateral branches not very numerous.—Alaska to Washington.

Macoun's descriptions of *Rhacomitrium canescens muticum* do not agree. In Bull. Torr. Bot. Club 17: 272, 1890, the costa is said to be wanting; in Cat. Canadian Pl. 6: 77, 1892, the costa is said to be excurrent. Examination shows it to be excurrent in the longest leaves, and not reaching the apex in the shorter ones. There is nothing in the description to separate it from *R. canescens epilosum* Milde; and while material of *R. canescens epilosum* has not been accessible, it is very likely that it is the same as Kindberg's var. *muticum*.

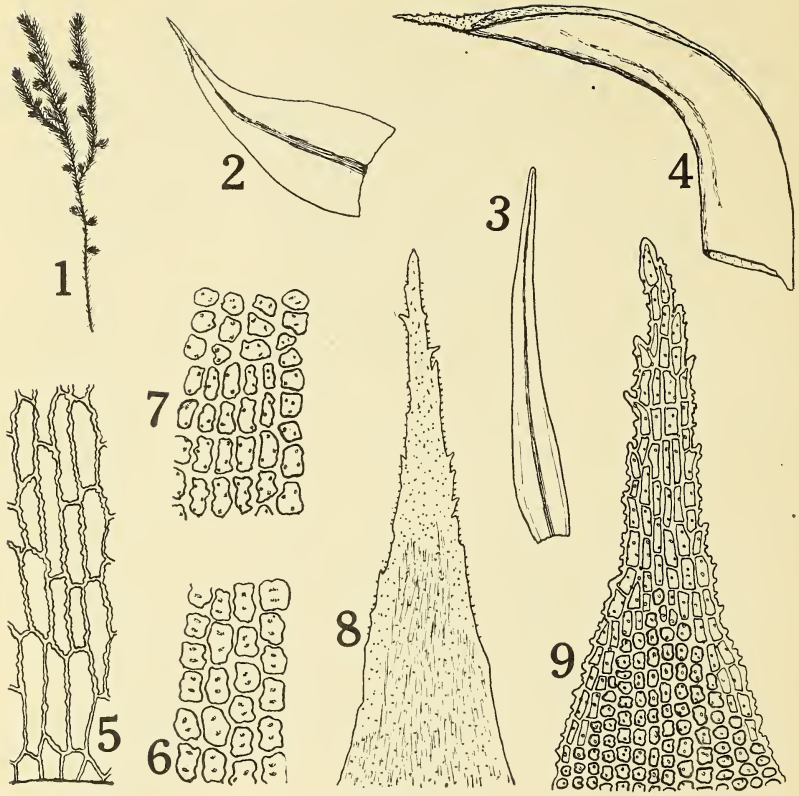


PLATE VIII

Rhacomitrium canescens. (1) Plant, ×1. (2), (3) Leaves, ×17. (4) Leaf, ×25. (5) Cells of leaf-base, ×400. (6) Cells of leaf-middle, ×400. (7) Green cells of leaf-tip, ×400. (8) Leaf-tip, ×105. (9) Leaf-tip, ×200.

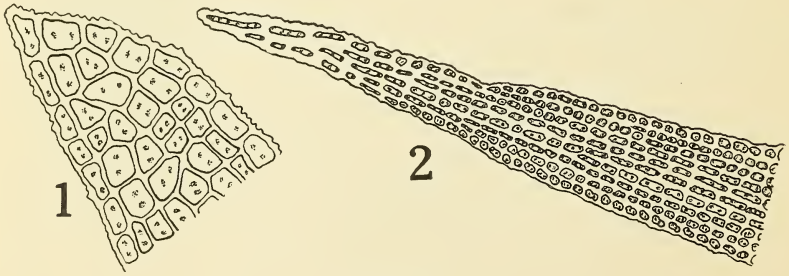


PLATE IX

Rhacomitrium canescens epilosum. (1) Tip of rather blunt leaf, ×400. (2) Tip of rather pointed leaf, ×200.

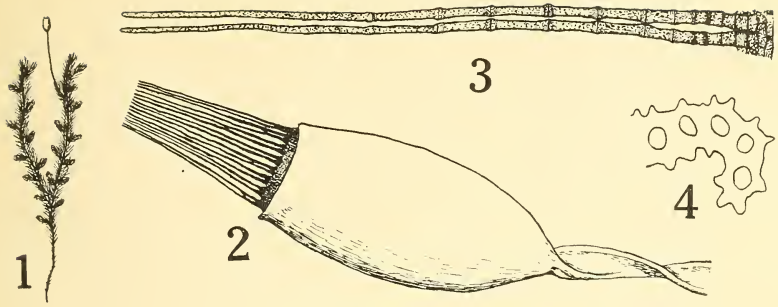


PLATE X

Rhacomitrium canescens ericoides. (1) Plant, ×1. (2) Capsule, ×23. (3) Peristome-tooth, cleft, ×80. (4) Cross section of leaf-margin just below hyaline tip, ×400.

11. RHACOMITRIUM LANUGINOSUM (Ehrh.) Brid. Mant. p. 79. 1819. [*R. hypnoides* Lindb.]

Plants green to grayish green. Stems up to 20 cm. long; short tuft-like lateral branches many, or else these elongated so there are many elongated branches. Leaves lanceolate, up to 5 mm. long, often secund, loosely appressed when dry, recurved when moist, hyaline pointed; hyaline point long, papillose on both surfaces, erose; margin only 1 cell thick throughout. Green cells of the leaf-tip 3–8 times as long as wide except the isodiametric marginal row, those near the hyaline cells papillose, the others merely sunken over the cell cavity; cells of the leaf-middle 4–8 times as long as wide, of the leaf-base 6–10 times as long as wide. Dioicous. Calyptra somewhat rough at beak. Seta 3–7 mm. long, rough toward the base, twisted to the left. Capsule ovate, its body about 1.5 mm. long, smooth; annulus of 4–5 rows of cells; lid about 1 mm. long, straight, red. Peristome-teeth split almost to base, up to .9 mm long, very papillose, not swollen at the joints. Spores 9–12μ.—Alaska and Yukon to Oregon and Idaho.

12. RHACOMITRIUM MICROCARPUM (Schrad.) Brid. Mant. p. 79 (in part), 1819. [*R. ramulosum* Lindb.; *R. heterostichum microcarpum* Boul.]

Plants light-green to blackish-green or brownish. Stems up to 5 cm. high; elongated branches few, short tuft-like lateral branches many. Leaves loosely appressed when dry, divergent or somewhat recurved when moist, lanceolate; hyaline point present on nearly all leaves, short or long; margin only 1 cell thick throughout. Cells convex on the leaf-surface, more so on the upper side; green cells near the hyaline tip 2–5 times as long as wide, gradually longer toward the leaf-base; modified alar cells often 1–2 rows, hyaline, square or short-rectangular. Dioicous. Calyptra somewhat rough at tip. Seta 4–5 mm. long, twisted to the right. Capsule cylindric, its body 1.8–2.1 mm. long, yellowish to brownish; lid with somewhat diagonal beak, almost half as long as the capsule-body. Peristome-teeth up to .6 mm. long, finely papillose, yellowish-red,

divided nearly to base into 2 parts. Spores 10–14μ.—Alaska and Yukon to Oregon and Montana.

In very dry situations the hyaline points are sometimes much longer than the typical eastern form.

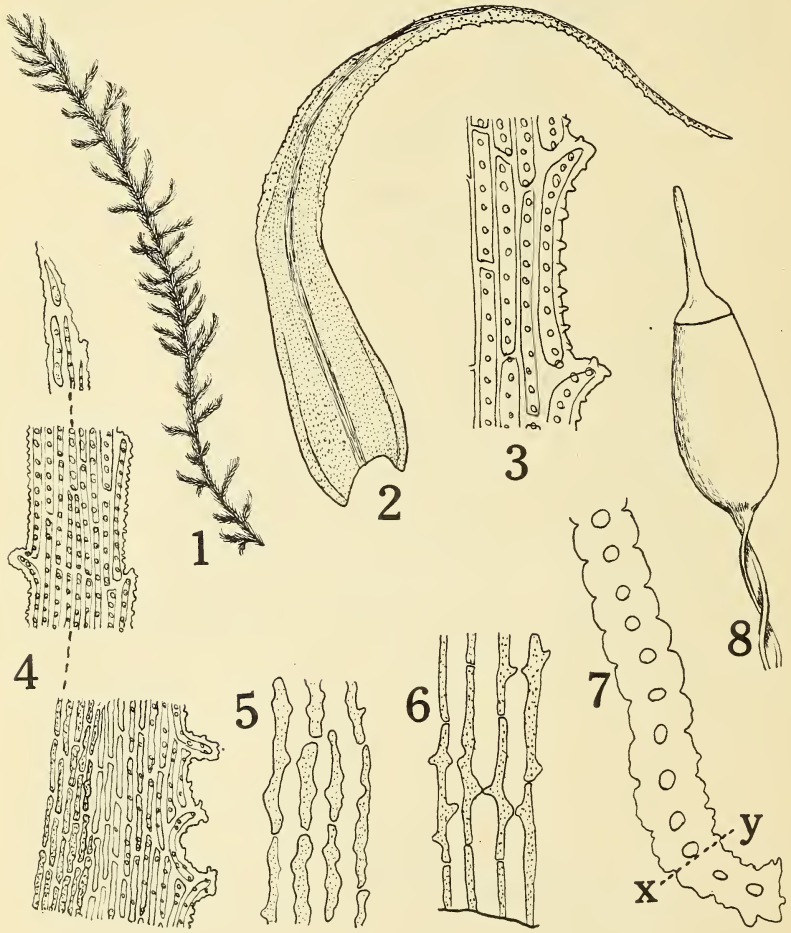


PLATE XI

Rhacomitrium lanuginosum. (1) Plant, ×1. (2) Leaf, ×17. (3) Margin of hyaline leaf-tip, ×400. (4) Parts of leaf-tip, ×200. (5) Cells of leaf-middle, ×400. (6) Cells of leaf-base, ×400. (7) Cross section of leaf-margin at base of hyaline tip; xy, boundary line between green and hyaline portions, ×550. (8) Capsule, ×17.

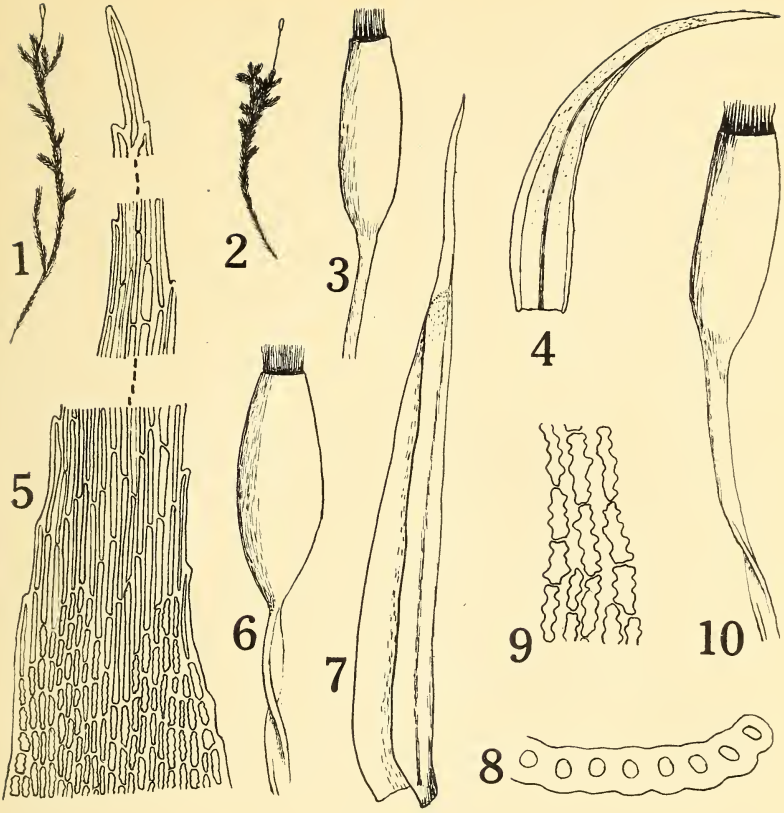
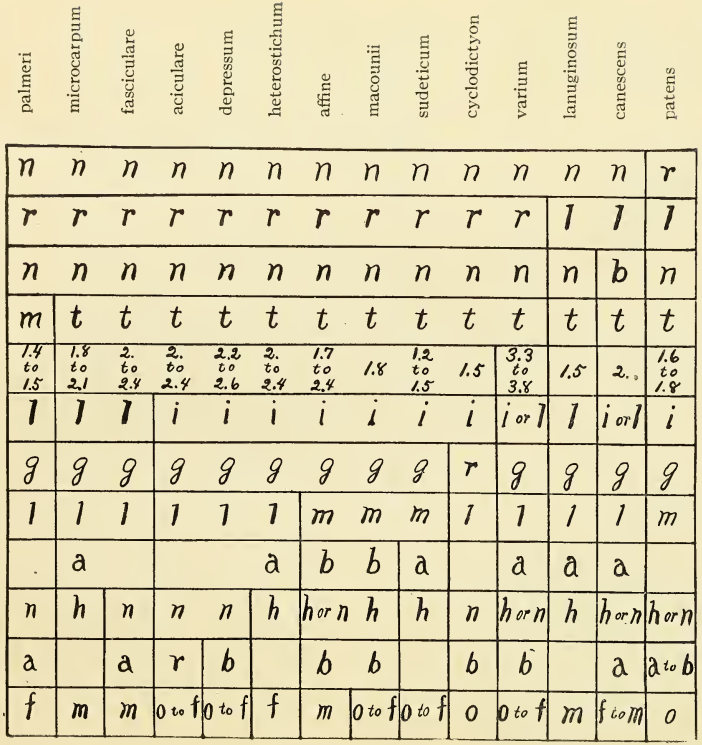


PLATE XII

Rhacomitrium microcarpum. (1), (2) Plants, ×1. (3) Capsule, ×17. (4) Leaf, ×17. (5) Parts of leaf-tip, ×200. (6) Capsule, ×17. (7) Leaf, ×17. (8) Cross section of leaf-margin near hyaline point, ×550. (9) Cells of leaf-middle, ×400. (10) Capsule, ×17.

13. RHACOMITRIUM PALMERI Kindb. Rev. Bryol. 23: 19. 1896. [*R. microcarpum palmeri* Kindb.; *R. tenuinerve* Kindb.]

Plants densely tufted. Stems 2–3 cm. long; elongated branches none or few, short tuft-like lateral branches none to few. Leaves blackish to yellowish-green when dry, keeled, hardly papillose, nearly smooth, long-pointed, the upper faintly crisped when dry; hyaline point wholly lacking in all the leaves; margin entire, 1 cell thick throughout; vein faint, vanishing far below the apex. Cells narrow, 2–8 times as long as wide; alar cells large, rectangular. Seta mostly immersed, about 5 mm. long, twisted to the right, smooth. Capsule-body 1.4–1.5 mm. long, oval, about .6 mm. wide. Peristome-teeth deeply cleft, about .25 mm. long.—Alaska and British Columbia.



Leaves with (r), or without (n), longitudinal ridges on vein beneath ?

Seta twisted to the left (l), or to the right (r) ?

Green cells papillose on both sides (b), or on neither (n) ?

Leaf-vein ending near the middle (m), or near the tip (t) ?

Length of capsule-body in mm. ?

Green cells near leaf-tip isodiametric or nearly so (i), or longer (l) ?

Plants reddish (r), or green to blackish (g) ?

Leaf-margin one (l), or more than one (m), cells thick toward tip ?

Hyaline leaf-tips acute (a), or blunt (b) ?

Some (h) or no (n) leaves of branch-tips with hyaline points ?

Muticous leaves of branch-tips rounded (r), or blunt (b), or acute (a) ?

Short tuft-like lateral branches none (o), or few (f), or many (m) ?

This table is a key and comparison when used horizontally, beginning at the top.

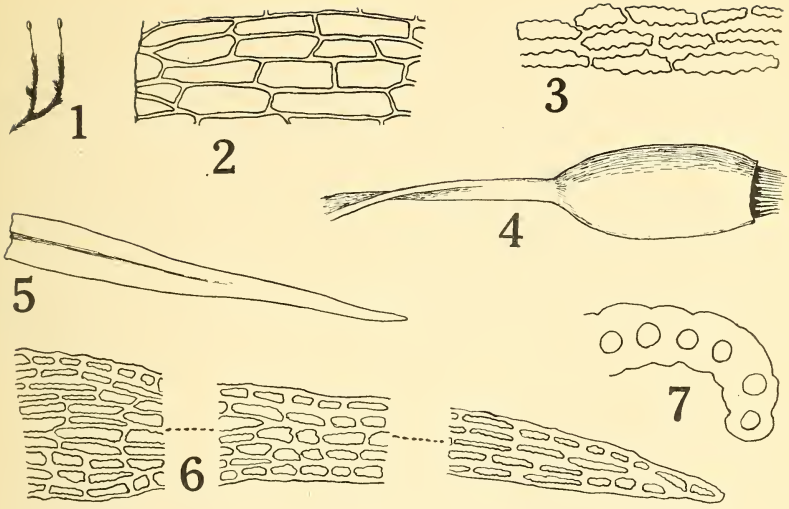


PLATE XIII

Rhacomitrium palmeri. (1) Plant, ×1. (2) Cells of the leaf-base, ×400. (3) Cells of the leaf-middle, ×400. (4) Capsule, ×17. (5) Leaf, ×17. (6) Parts of leaf-tip, ×250. (7) Cross section of leaf-margin near tip, ×550.

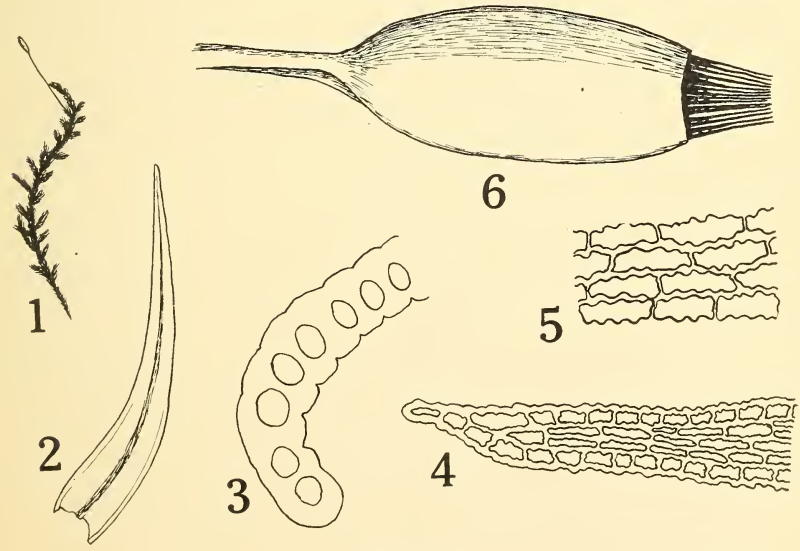


PLATE XIV

Rhacomitrium fasciculare. (1) Plant, ×1. (2) Leaf, ×17. (3) Cross section of leaf-margin near apex, ×550. (4) Leaf-apex, ×200. (5) Cells of leaf-middle, ×400. (6) Capsule, ×17.

14. Rhacomitrium fasciculare (Schrad.) Brid. Mant. p. 80. 1819.

Plants dirty-green or brownish. Stems up to 12 cm. long; elongated branches none to several, short tuft-like lateral branches numerous. Leaves lanceolate, without hyaline point, gradually narrowed to a blunt tip; margin 1 cell thick throughout; vein extending to within a few cells of the apex; surfaces somewhat sunken over the cell-cavities. Upper leaf-cells 3–4 times as long as wide, middle and lower ones 4–6 times. Dioicous. Calyptra rough throughout. Seta 4–12 mm. long, twisted to the right. Capsule-body 2–2.4 mm. long; lid ⅔ the length of the capsule-body. Peristome-teeth .6 mm. long, split into 2 parts nearly to base, densely papillose. Spores 12–16μ.—Alaska and Yukon to Washington and Montana.

Limpricht in Rabenhorst's Kryptogamen-Flora says the seta is twisted once to the left just below the capsule. The material examined showed no twist to the left.

University of Washington,
Seattle, Wash.

NOTES ON RECENT BRYOLOGICAL LITERATURE

Dr. Alexander W. Evans[1] has recently revised the hepatic genus *Herberta*, giving a short historical sketch, a discussion of the morphology, and a critical revision of the species. Of the four species recognized, two, *H. adunca* (Dicks.) Gray, and *H. Sendtneri* (Nees) Evans, are wholly European, while *H. Hutchinsiae* (Gottsche) Evans, and *H. tenuis* Evans occur in North America. All the species are fully figured.

In the November issue of the Torrey Bulletin[2] a new hepatic, *Lejeunea minutiloba*, is described and figured. Its nearest relatives are *L. floridana* Evans and *L. glaucescens* Gottsche. The author states that the new species is to be expected in Florida and Mexico.

We clip the following from Science. N. S. xlvi. Nr. 1197: "The eighth number of the *Proceedings of the National Academy of Science* contains . . . *Growth of Isolated Sporophytes of Anthoceros:* Douglas Houghton Campbell, department of Botany, Leland Stanford University. The young sporophyte of *Anthoceros Pearsoni*, separated from its association with the gametophyte, is capable of limited growth in length and is able to mature normal spores and elaters from the young sporogenous tissue."

Sr. Machado,[3] whose work we have already noticed, contributes to the last issue of Broteria a running account of the bryology of the Sierra Estella and of the Sierra Geres, with a list of 100 mosses and 5 hepatics. In the same issue Father

[1] Alexander W. Evans. Notes on the Genus Herberta, with a Revision of the species known from Europe, Canada, and the United States. Bull. Torr. Club. **44:** 191–222. *pl. 8. figs. 1–29.* (Ap. 1917).

[2] Alexander W. Evans. A new Lejeunea from Bermuda and the West Indies. Bull. Torr. Bot. Club. **44:** 525–528. *pl. 24.* (Nov. 1917.)

[3] Antonio Machado. Notas de Briologia Portuguesa. Broteria. **15:** 49–63. (Aug. 1917.)

Luisier[1] begins an account of the bryology of Madeira, giving a short account of the geography and floral zones of the Island, and an extended historical account of the progress of the botanical exploration relating to the mosses and hepatics. This account contains lists of the species added to the island flora in each successive publication with critical notes upon many of them, and closes with a bibliography of 34 titles. A continuation of the series is promised.

The results of the study of the collection of lichens made by Dr. J. A. Cushman in Jamaica in 1912, have been published by Dr. L. W. Riddle[2] in the *Torrey Bulletin*. The list includes the description of two new species, *Buellia rinodinospora* and *Chiodecton leiostictum*, with a plate, a detailed list with notes of those species that have not previously been recorded, with four new combinations, and a revision of the North American species of *Megalospora* with keys, ranges, and various notes. Five species and six varieties are recognized in the genus, six new combinations and one new name being made.

E. B. C.

Mr. R. S. Williams has published[3] an important paper on the mosses which he collected in the Philippines between October, 1903, and August, 1905, at various localities, some of which were at considerable elevations. Altogether the list contains 240 species, in 118 genera, and, of these, 27 species and 3 genera are described as new. Many of the genera in the list are familiar to bryologists of America or western Europe, the new species being embraced in the following genera: *Dicranella, Rhabdoweisiella, Campylopus, Dicranodontium, Syrrhopodon, Hyophila, Macromitrium, Pseudopohlia, Pohlia, Bryum, Garovaglia, Jagerinopsis, Barbella, Neckera, Himantocladium, Clastobryum, Thuidium, Ctenidium, Elmeriobryum, Stereodontopsis, Isopterygium, Trichosteleum, Rhaphidostegium, Pleuropus, and Oxyrrhynchium.* The three new genera are *Rhabdoweisiella, Pseudopohlia*, and *Stereodontopsis.* The paper is illustrated by forty-three good figures, on four plates, and the descriptions of the new species, comprising usually two hundred words or more, are commendably complete and intelligible.

O. E. J.

Hold the Lens on Your Thumb.—H. T. Guessow has recently described[4] a convenient method of holding the hand-lens while examining minute objects, particularly in the field. He uses a narrow flat piece of metal bent into a nearly complete circle so that it fits over the thumb around the middle or base of the thumb-nail. Put on with the open part of the ring above, the flat part of the handle or case of the ordinary folding doublet, Coddington lens, etc., can be slipped under the ends of the clip. The lens can be thus held in the left hand

[1] A. Luisier. Les Mousses de Madère. Broteria. **15**: 81–98. *map.* (Aug. 1917.)

[2] Lincoln W. Riddle. Some Noteworthy Lichens from Jamaica. Bull. Torr. Club. **44**: 321–330. *pl. 21.* (July 1917.)

[3] Williams, R. S. Philippine Mosses. Bull. N. Y. Bot. Gard. **8**: 331–378. Pls. 171–174. July 10, 1917. (Issued separately in advance, July 23, 1914.)

[4] Guessow, H. T. A Thumb Clip for Use with Magnifiers. Phytopathology **7**: 451–452. Dec., 1917.

with the specimen, lens on thumb, specimen between fingers, thus leaving the right hand free for the use of forceps or needle. By lifting the thumb, the right focal distance may be obtained for the lens. The clip can be given more spring by slightly rolling up its edges. If this device is useful for dissecting out diseased spots on a leaf it ought also to be useful to the bryologist in working with peristomes, antheridia, archegonia, etc.—O. E. J.

LICHENS OF THE MT. MONADNOCK REGION, N.H.—No. 10[1]

Thomas Durfee

These lichens were determined by the late Dr. H. E. Hasse. All the specimens are fertile.

Genus: Urceolaria Ach.

177. Urceolaria scruposa (L.) Ach. Five specimens.

Genus: Lecidea Ach.

178. Lecidea albocoerulescens (Wulf.) Ach. Two specimens.
179. L. enteroleuca Ach. Three specimens.
180. L. flavidolivens (Tuck.) Fink. Two specimens.
181. L. granulosa (Ehrh.) Schaer. Two specimens.
182. L. lapicida Ach. Ten specimens.
183. L. melancheima Tuck. Three specimens.
184. L. peliaspis Tuck. Four specimens.
185. L. turgidula Fr. One specimen.
186. L. varians Ach. Seven specimens.
187. L. viridescens (Schrad.) Ach. One specimen.

Genus: Biatorina Mass.

188. Biatorina atropurpurea (Schaer.) Mass. One specimen.
189. B. cyrtella (Ach.) Th. Fr. Two specimens.

Genus: Bilimbia De Not.

190. Bilimbia hypnophila (Ach.) Th. Fr. One specimen.

Genus: Bacidia De Not.

191. Bacidia chlorantha (Tuck.) Fink. One specimen.
192. B. fuscorubella (Hoffm.) Arn. Two specimens.
193. B. rubella (Hoffm.) Mass. Three specimens.

Middlesex School, Concord, Mass.

ANNUAL REPORTS—SULLIVANT MOSS SOCIETY—1917

Report of the Election of Officers for the Year 1918

Whole number of votes cast, 10.

All the votes cast were for the persons nominated by the Executive Committee, as published in the November Bryologist. The officers for the year 1918 are thus as follows:

[1] No. 9 of this series was published in the Bryologist **20**: 99. Nov., 1917.

President, Mrs. Elizabeth G. Britton.
Vice-President, Mrs. Annie Morrill Smith.
Secretary-Treasurer, Mr. E. B. Chamberlain.

GEORGE B. KAISER, *Judge of Elections.*

Report of the President

The continuance of the war has reduced our chances for communication with European Bryologists, though Dr. Brotherus of Helsingfors, Finland, H. N. Dixon of England, and M. Theriot of France, have sent us letters, specimen. and reprints. Dr. Felippone continues to make discoveries in the Argentines Dr. Rusby and Dr. Pennell have been collecting in Colombia and we have received a small collection from Venezuela, made by Dr. J. N. Rose. Dr. Carl Skottsburg of the University of Upsala has made large collections in the Islands of Juan Fernandez and Easter Island off the coast of Chile including many mosses and lichens. Dr. Evans, besides revising the genus Herberta in the Bulletin of the Torrey Botanical Club, has contributed part 7 of his notes on North American Hepatics to the BRYOLOGIST. Dr. Howe has also printed some notes on Riccia and Miss Lorenz has continued her contributions to New England records. Dr. Riddle is busy with the lichens and Mr. Williams is putting these collections of the New York Botanical Garden in order. Dr. Evans, Dr. Howe, Dr. Riddle, and myself have enumerated the species of our respective groups for the Flora of Bermuda now in press.

A notable event at our last annual meeting was the history of the early years of the BRYOLOGIST and the Sullivant Moss Society given us by Mrs. Smith. Dr. Grout has described and figured a new fossil *Camptothecium* and distributed numbers 450–475 of the Musci Pleurocarpi. Prof. Holzinger has issued numbers 351–375 of the Acrocarpi. Dr. Frye has published two illustrated keys of Western Mosses and Dr. Jennings has given an interesting extension of range for *Pterygophyllum acuminatum.* Dr. Andrews has written the seventh of his notes on *Sphagnum* and has been assisting Prof. John B. Porter of McGill University, in the determination of peat-mosses suitable for surgical dressings. At the New York Botanical Garden exchanges have been continued with several of our West Indian correspondents and collections have been received from Dr. Small and Mr. S. Rapp, from Florida and from Brother Victorin in Quebec. The various curators of the Society have continued their work and devotion to its collections and Prof. Chamberlain has given us some interesting reviews. The offerings by members have been of value and the Society is to be congratulated on its continued welfare and prosperity.

ELIZABETH G. BRITTON, *President.*

NEW YORK BOTANICAL GARDEN.

Report of the Secretary-Treasurer

The Secretary is pleased to announce to the members of the Sullivant Moss Society that, in spite of mounting prices and the many demands which are constantly coming upon all, the condition of the Society is such that we may look

forward with considerable confidence to the new year. Our membership and subscription lists have increased, but few losses have occurred, receipts have been larger than last year, and it has been possible somewhat to reduce the costs of THE BRYOLOGIST without impairing its quality.

Ten new members have joined the Society since the publication of the last annual report. Several memberships have ceased through death or other causes, so that the total now stands at 134. Present conditions do not warrant the publication of a complete address list, but elsewhere in this issue there is a list of additions and corrections designed to bring up to date the list published in January, 1916. Copies of the earlier list will be supplied freely to all who wish for them, on application to the Secretary.

While so many members are engaged in the pressing duties made necessary by the Great War, it is but natural that hobbies should suffer. The Secretary, therefore, feels that it is a matter for congratulation that the total of Offerings made through the columns of the magazine has been increased over that of last year. Fifteen mosses, fourteen lichens, aad two hepatics, most of them uncommon, have been offered by nine different members. There is still room for growth in the department, however. Owing to the serious condition of oceanic transportation, all attempts at foreign exchanges have been abandoned, though they will be resumed as soon as conditions warrant. The same conditions have greatly hampered the matter of the exchanges of magazines that the Society is fortunate in possessing, two whole mailings having been lost in transit abroad.

While the total expenditures of the Society have been greater than last year, it has been possible, through the sale of the Hasse Lichens and the cutting down of the editions of the magazine, to allot more money to the magazine itself, resulting in an increase in the number of pages in the volume, and in the number of plates. In this connection, however, the warmest thanks of the Society are due to Dr. Frye for his generosity in coöperating with the editors in defraying certain costs.

There is one subject, however, to which the Secretary must return in each annual report: the need for short articles and notes. Will not each member try to send in at least one item? As stated last year, THE BRYOLOGIST is *your* magazine, *you* determine its character and content, and *your* coöperation is essential to its success.

In conclusion, the Secretary extends to all members his best wishes and heartiest greetings for the coming year.

SUMMARY OF ACCOUNTS

RECEIPTS

Balance on hand, December 1, 1916	$78.58
Dues for current year	181.66
Subscriptions for current year	71.82
Arrears collected, dues and subscriptions	4.10
Dues and subscriptions for coming year, already paid	15.20
Sales of back numbers	35.00
Receipts from advertising and incidentals	19.40
Receipts from sales of Hasse Lichens	42.00
	$447.76

EXPENDITURES

Printing and stationery	$14.40
Postage, bank fees, and incidentals	13.33
Herbarium expenses	3.08
Express charges	3.02
Labels for Hasse Lichens	11.36
Plates for BRYOLOGIST	64.10
Intelligencer Printing Co., 6 issues of BRYOLOGIST and Index	275.26
	$384.55
Cash on hand at close, November 30, 1917	63.21
	$447.76

Respectfully submitted,
EDWARD B. CHAMBERLAIN, *Secretary-Treasurer.*

Report of the Moss Department for 1917

During the past year eighty-five specimens have been mounted for the Moss Herbarium, adding fifteen species new to the collections, which now contain 4065 specimens, representing 1194 species and varieties belonging to 257 genera.

Contributors of much material have been: again Mrs. E. G. Britton, who has presented many mosses from the southern United States, and Dr. A. J. Grout, who has sent duplicates of his collections in Colorado. Other contributors have been Mrs. E. M. Dunham, Mr. J. M. Grant, Miss D. J. Levy, Mrs. Rachel L. Lowe, Mr. E. B. Chamberlain, Mr. J. Evans, Miss Helen E. Greenwood, Mrs. D. W. Jackson, and others. A fine collection of mosses collected in Washington by Mr. Grant has not yet been mounted and other material is to be reported later.

Again we request that desirable material for exchange be sent wherever possible by our members. Species other than the very common ones are always welcome and the Curator is ever ready to undertake the work of determination for those who wish to have their mosses named. May the coming year be a profitable one bryologically for the continued growth of our members' herbaria and also of the herbarium of the Sullivant Moss Society!

GEORGE B. KAISER, *Curator.*

GERMANTOWN, PA., DEC. 16, 1917.

Report of the Curator of the Hepatic Herbarium

This has been a lean year in the history of the hepatic herbarium. Only 112 specimens have been added. The number of specimens in the herbarium is 4789.

Prof. N. L. T. Nelson gave a fine lot of packets from Florida representing the southern species of Frullania, Sphaerocarpus, and Lejeunea groups. Miss Lorenz supplied the new species found in New England during the year.

We are glad to receive some 20 packets from the collections of J. Macoun. Mrs. M. E. Williams contributed a fine lot of duplicates and 23 addition to the

herbarium. Prof. H. Dupret gave 14 specimens from Canada. Stewart H. Burnham kept up his collections to date from Northern New York.

Other contributors were Mrs. M. E. Lowe, A. W. Evans, S. Rapp, Mrs. D. W. Jackson, Mary Adams Noble, Helen S. Greenwood, A. H. Brinkman, J. A. Ellis, B. O. Walden, Geo. E. Pendleton, and J. Evans of Grand Orchard, Wash.

The curator has accepted a commission in the Medical Officers Reserve Corps. While he is in army service, Miss C. C. Haynes of Highlands, New Jersey, has consented to take charge of the hepatic department. Contributions and all correspondence relative to hepatics should be sent to her address.

Some unfinished business will necessarily be left till after the war.

The curator wishes here to express his heartfelt appreciation of the fine courtesy in the friendships brought into his life by his association with the members of the Sullivant Moss Society.

GEO. H. CONKLIN, *Curator.*

SUPERIOR, WISC., DEC., 1917.

Report of the Lichen Department for 1917

As proposed in the report for 1916, the Lichen Department has distributed during the year four fascicles of *Lichenes Exsiccati*, these being duplicates of Dr. Hasse's large collections. During the coming year we plan to distribute again the same number of fascicles, and, as in 1917, one fascicle in March, one in June, one in September, and one in December. A representation of the specimens offered has been added to the herbarium, which now numbers 3260 specimens.

The sets of specimens offered to subscribers have all been taken. The Curator will now be pleased to hear from such members as have wanted to buy specimens in lots of twenty-five, fifty, or one hundred. All members more or less interested in lichens should take advantage of this offer. A nucleus of one hundred specimens will be an incentive to the further study of this interesting class of plants.

During the year more of the original packages of material have been looked over, and, in all probability, it will be possible to issue three centuries of specimens. It is hoped that in the coming year all of the material will have been sorted, after which a complete report will be given.

We have been remembered by a number of our members, to all of whom we here express our thanks and appreciation. Some have sent specimens for the herbarium; some have contributed to our exchange department; Miss Alma G. Stokey sent specimens from Massachusetts; Mrs. M. A. Noble, some from Florida; Mr. E. C. Wurzlow, some from Louisiana; Miss Helen E. Greenwood, some from Maine; Mr. B. O. Wolden, although not yet a member, some from Iowa; and Dr. O. E. Jennings, some from his part of the country. Besides sending specimens for the herbarium, the following members contributed to our exchange department: Dr. Albert C. Herre, Mr. Severin Rapp, Dr. Wm. H. Weigmann, and Mr. Roy Latham. A hurried note from Mr. Latham tells of

his call to the colors. Members will miss his contributions to the exchange department. We stand with you, Mr. Latham, and wish you the best of luck!

Let us hope that the interest manifested during the past year will continue unabated.

CHARLES C. PLITT, *Curator.*

BALTIMORE, MD., DEC. 17, 1917.

ADDRESS LIST—SULLIVANT MOSS SOCIETY

The list below brings up to the date of January 20, 1918, the list published in January, 1916. Several of the names have been published in scattered issues, but are given here for convenience in reference. In all such cases parenthetical reference is given to the earlier publication.

ADDITIONS

Mr. A. T. Beals, (Ja. '17).....71 West 23d St., New York City
Mrs. Ruth H. Burritt.....16 Prospect Drive, Yonkers, N. Y.
Miss Eloise Butler (S. '16).....720 Fourth St., Minneapolis, Minn.
Miss M. Edna Cherrington, (Jy. '16).....96 Gordon Ave., Hyde Park, Mass.
Mr. J. Evans, (Jy. '16).....Box 62, Grant Orchards, Wash.
Mr. J. M. Grant, (S. '16).....Montesano, Wash.
Mr. E. R. Grose, (Ja. '17).....Glenville, W Va.
Mr. Herbert M. W. Haven.....500 Forest Ave., Portland, Me.
Mrs. David W. Jackson.....Bartville, Pa.
Mrs. L. M. Keeler.....Scarsdale, N. Y.
Miss Myrtle H. Lewis, (Ja. '17).....Rockwell Ave., Naugatuck, Conn.
Mrs. Frank E. Lowe, (Ja. '17).....24 Brattle St., Worcester, Mass.
Mr. Otto McCreary.....Agricultural Experiment Station, Geneva, N. Y.
Mr. Ralph S. Nanz, (Ja. '17)....N. Y. State College Agriculture, Ithaca, N. Y.
Miss Frances E. Newland, (S. '16).....321 Court St., Utica, N. Y.
Mrs. Mary A. Noble, (Ja. '17).....Inverness, Fla.
Mrs. Harold R. Robertson, (S. '16).....136 Buffum St., Buffalo, N. Y.
Miss Barbara Schmidt.....Box 43, Harrison, N. Y.
Miss Aravilla Taylor.....The Frances Shimer School, Mt. Carroll, Ill.
Dr. Wm. H. Wiegmann (Ja. '17).....436 East 5th St., New York City

WITHDRAWALS

Miss Cora H. Clarke
Miss H. Mary Cushman
Rev. John Davis
Mr. R. S. Gray
Mr. Charles P. Heffinger
Mr. Henry Herrman
Mr. E. J. Hill
Mr. J. Warren Huntingdon
Dr. H. S. Jewett
Mr. Alfred C. Kinsey
Miss Mildred Nothnagel
Dr. Lewis Sherman
Mr. C. M. Shipman
Mrs. Mary E. Williams

Changes of Address

Miss Alice E. Dacy.....98 Hemmenway St., Boston, Mass.
Mr. N. Iwasaki.....Shimobuchi, Oyodomura, Yoshinogun, Naraken, Japan
Miss Mary F. Miller.....Box 203, R. F. D. 1, Roslyn, Va.
Mrs. Frank C. Smith, Jr.....47 West St., Worcester, Mass.
Mrs. Thomas Spencer.....1628 Alameda Ave., Lakewood, Cleveland, Ohio
Mr. Hollis Webster.....11 Little Hall, Cambridge, Mass.

Important Notice

As we go to press, word comes that Dr. Conklin, who has so long conducted the Hepatic Department, has entered the Army Medical Service. During his absence, all matters relating to the Hepatic Department should be sent to Miss C. C. Haynes, Highlands, N. J.

EXCHANGE DEPARTMENT

Offerings—To Members of the Sullivant Moss Society only. Return postage should accompany the request:

Mr. Charles C. Plitt, 3933 Lowndes Ave., Baltimore, Md.—*Solarina saccata* (L.) Ach., collected by Mr. Plitt in Maryland.

Mr. A. T. Beals, 71 West 23d Street, New York City.—*Andreaea rupestris* (L.) Hedw., top of Schimemunk Mt., Cornwall, N. Y., and *Bruchia Sullivantii* Aust., Farmingdale, N. Y., collected by A. T. Beals.

Miss Daisy J. Levy, 403 West 115th Street, New York City.—*Philonotis caespitosa* var. *laxa* (Warnst.) Loeske & Warnst.

Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.—*Orthodontium gracile* Schimp., *c. fr.*, Sussex, England, W. E. Nicholson, collector; *Porotrichum alopecurum* Mitt., *c. fr.*, Ireland, C. H. Waddell, collector; *Calliergon trifarium* Kindb., *st.*, Connecticut, G. E. Nichols, collector.

VOLUME XXI NUMBER 2

MARCH, 1918

THE BRYOLOGIST

JOURNAL OF THE

SULLIVANT MOSS SOCIETY

Conducted and Published for the Society by

O. E. JENNINGS, Ph.D., Editor-in-Chief

Associate Editors

ABEL JOEL GROUT, Ph.D.

GEORGE N. BEST, M.D. JOHN M. HOLZINGER, M.S.

ALEXANDER W. EVANS, Ph.D. LINCOLN W. RIDDLE, Ph.D.

and the

Advisory Board Officers of the Society

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THE BRYOLOGIST

Bimonthly Journal of

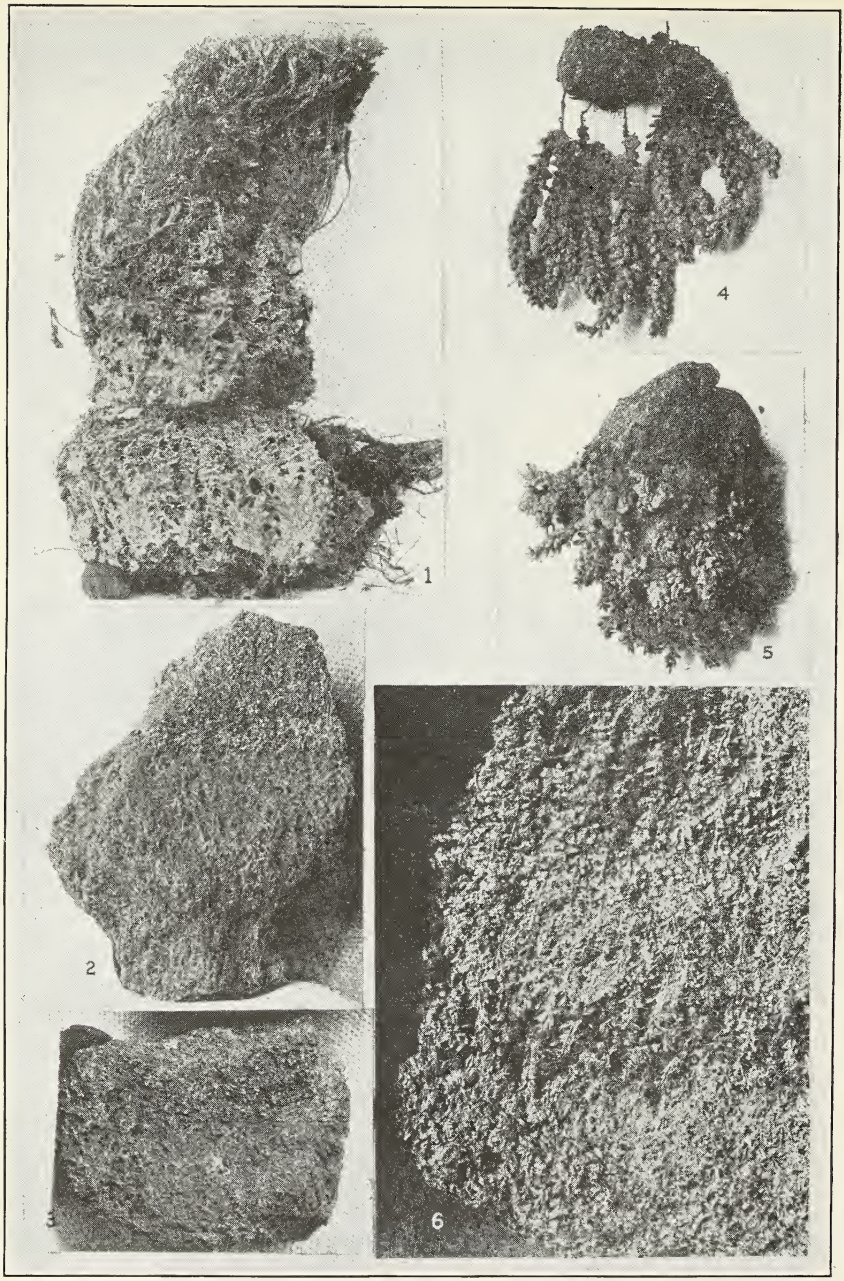
THE SULLIVANT MOSS SOCIETY

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

Subscription in the United States, $1.25 per year; in all other countries, $1.35. Society membership, 25 cents additional. Single copies, 25 cents. Vols. I-XX, 1898-1917, $20.25.

TEN YEAR INDEX, $1.00

Checks, except New York City, MUST contain 10 cents extra for collection fee. Manuscripts should be sent to Dr. O. E. Jennings, Carnegie Museum, Pittsburgh, Pennsylvania. Forms close on the first of the month prior to that of publication. Subscriptions and advertisements should be sent to Dr. O. E. Jennings, Carnegie Museum, Pittsburgh, Pennsylvania, or to Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.



Didymodon tophaceus (Brid.) Jur., forming travertine (*See* Explanation, p. 27)

THE BRYOLOGIST

VOL. XXI MARCH, 1918 NO. 2

MOSSES AS ROCK BUILDERS[1]

W. H. EMIG

The history of the travertine now to be found in the Arbuckle Mountains of the south-central part of Oklahoma begins with the removal of the Cretaceous strata from the underlying Paleozoic rocks during the Pleistocene age; a cycle of erosion that reduced the ancient mountains to a plateau radially dissected by short streams with small flood plains, rapids, and waterfalls. Some of these waterfalls were altered by the accumulations of the recent deposits of soft limestone—travertine—to such an extent that the falls attained a maximum height of 60 to 100 feet, and a width of 100 yards to nearly a half mile. The physiographic factors that have influenced the growth of these recent deposits have been aided in their work, to a considerable extent, by the presence of certain water plants, especially the tufted growths of the mosses *Didymodon tophaceus* (Brid.) Jur. and *Philonotis calcarea* Sch.

The dense tufts of *Didymodon* are more commonly distributed along the moist ledges extending across the shallow streams. From an examination of the various travertine ledges, plants of *Didymodon* evidently had a greater share in the building of this kind of rock than the plants of *Philonotis*. A third species of water moss, *Octodiceras Julianum* Brid., was also found in small quantities in three different locations. The long branched moss stems fixed the tangled masses of algae, *Oedogonium* and *Vaucheria*, to the rock surfaces of the rapids or cascades. These little mats of plants bend with the undulating surface of the running water and apparently stretch like rubber. The water evaporates from the more exposed plant surfaces; carbon dioxide gas diffuses into the air; the minerals held in solution concentrates in the plant mass; while calcium carbonate slowly crystallizes about the filaments in a manner very much like the formation of crystals about strings that are suspended in a saturated solution of cane sugar. The young plants at the surface of the water continue to grow, but the incased filaments gradually decay, leaving behind small calcareous tubules arranged like a mass of coarse fiber.

The incrustations about plants of the water moss *Didymodon* are more evident than those formed about algae or the mosses *Octodiceras* and *Philonotis*. The dense moss tufts, projecting one to four inches above the surface of the water at the margin of waterfalls, are always saturated like a sponge. As the water evaporates from the leaves and stems, most of the free carbon dioxide escapes

[1] Contribution from the Department of Botany, University of Pittsburgh.

The January number of the BRYOLOGIST was published March 15, 1918.

into the air and only a comparatively small amount of free carbon dioxide or the carbon dioxide derived from the bicarbonates in solution is used by the mosses during the process of photosynthesis. The change of equilibrium, induced by the loss of carbon dioxide from the mineral water, is followed by a separation of calcium carbonate in such a manner as to place a white crystalline covering on the outer surfaces of the plants. The transition from the moss plant to incrustation, Plate XV, fig. 1, and finally to compact limestone, Plate XV, fig. 2, is a very slow development. The moss leaves and stems with their initial covering of crystals, Plate XV, fig. 1, serve as centers for the continued formation of travertine. In the interstices of this coral-like mass, the gradual accumulation of calcite gives rise to a hard but cavernous limestone. The fractured, longitudinal surfaces of the hardened travertine often show impressions or casts which indicate the position of the original moss leaves. Cross sections of the same travertine, Plate XV, fig. 3, reveal small and regular canals which have changed but little since the decay of the incrusted moss stems.

By the action of the same physical and chemical agents described above, another type of travertine is produced if the moss *Didymodon* happens to grow suspended from the projecting ledges of waterfalls. Under these conditions the incrustations follow the development of the moss to within a few m.m. of the growing tips, transforming the leaves into rounded calcareous beads, Plate XV, fig. 4, which are finally cemented together into a soft mass of travertine. Fractured longitudinal surfaces of the hardened travertine, as shown in fig. 6, presents the arrangement of calcareous beads, which in all essentials are like the rounded masses of calcium carbonate as represented in fig. 4. Thus the type of travertine formed by the moss *Didymodon* depends largely on the original position of the growing plants. If the moss appears in erect tufts, Plate XVI, fig. 1, on the exposed surfaces of rapids, the travertine formed is like that shown in Plate XV, fig. 2; but if the plants grow suspended from overhanging ledges of waterfalls, Plate XVI, fig. 2, the travertine is like that represented in Plate XV, fig. 6.

In the newly formed cavernous deposits, water mosses, and filamentous and unicellular algae are usually present. The most active deposition, 3 to 5 inches during a single summer, takes place in the presence of *Vaucheria*. But the development of travertine about moss plants will not exceed one inch per year under the most favorable circumstances; for as soon as the interior of certain tufts have hardened, the water currents will be diverted through other less resistant channels. The various streamlets shift from place to place on account of the unequal development and incrusting of the mosses. The growth of each separate moss tuft is intermittent.

The mosses, however, are not the primary factors in the building of the travertine falls. If boulders collect in the channels so as to form a series of rapids, then the water mosses growing in the shallow currents will aid in the cementing of the boulders into a conglomerate dam. In addition, the travertine deposits have modified the appearance of practically all of the natural falls of the Arbuckle Mountains. On Honey Creek at the present site of Turner

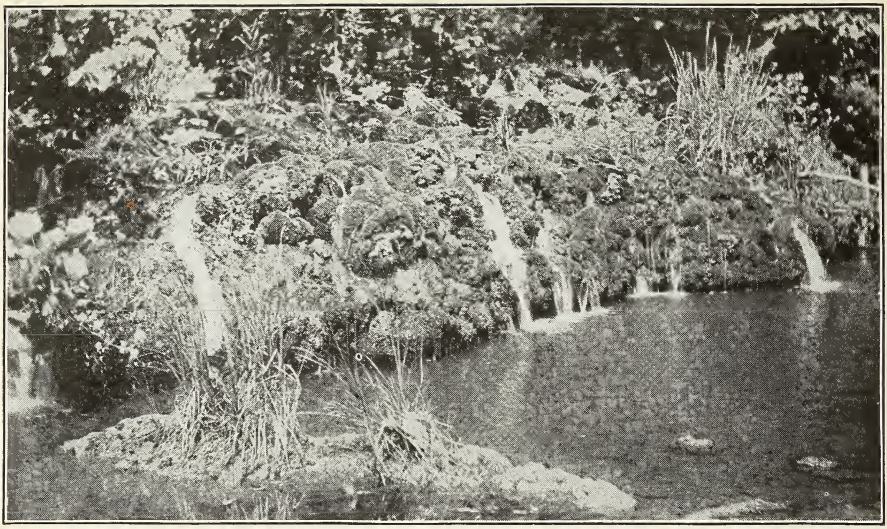


FIG. 1.—A travertine falls on Falls Creek, Oklahoma; tufts of *Didymodon* and *Philonotis* covering the greater part of the falls.

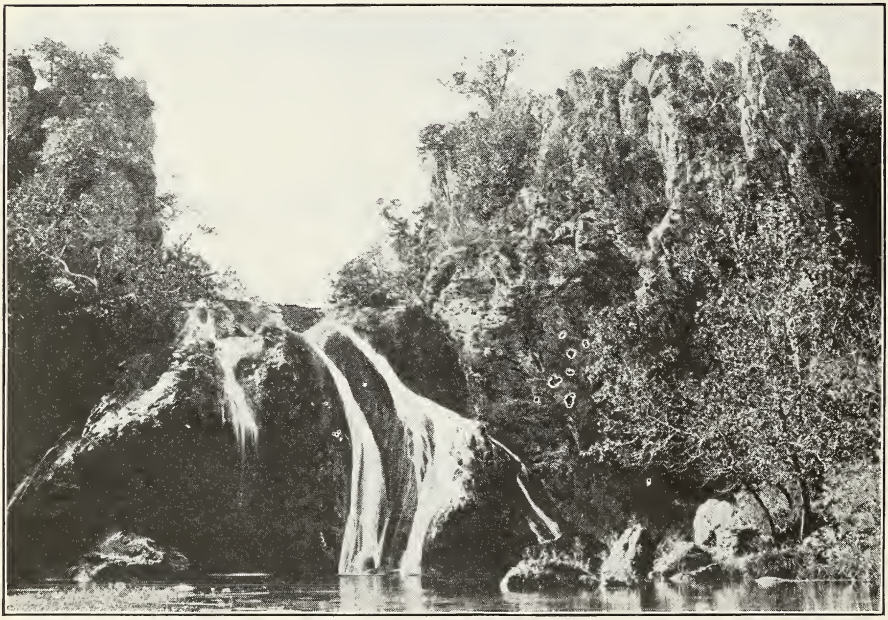


FIG. 2.—Turner Falls, on Honey Creek near Davis, Oklahoma; a travertine falls developing on plants of algae and mosses. (After Emig: Travertine Deposits of Oklahoma. Okla. Geol. Surv. Bull. **29**: 21. 1917).

Falls, Plate XVI, fig. 2, the calcareous deposits are 60 feet thick immediately above the natural fall, but as they extend upstream for a distance of 150 yards, they gradually diminish to only a few feet in thickness. At one time travertine covered completely the present Turner Falls, which are about one-eighth their former size. During the last extensive erosion cycle, the unwashed formation on either side of the main channel was unaltered, but as the soft portions of the rocks crumbled away, the channel became deeper, the fissures in the travertine opened and were extended into a deep gorge. In spite of successive erosions, the travertine continues to grow by the aid of algae and mosses. The mosses act only indirectly in the precipitation of calcium carbonate, principally by supplying a larger absorptive and adsorptive surface for the evaporation of the calcareous water.

EXPLANATION OF PLATE XV

Didymodon tophaceus (Brid.) Jur. × ½

1. Recent travertine showing the mode of travertine formation about moss plants that grow in erect tufts.
2. Longitudinal section of hardened travertine showing the petrified moss plants.
3. Cross-section of hardened travertine showing the minute canals left by the decay of the moss stems.
4. Recent travertine showing the mode of travertine formation on pendent moss plants.
5. Recent travertine formed by mosses and unicellular algae.
6. The type of travertine that develops on pendent plants of *Didymodon*.

University of Pittsburgh, Pittsburgh, Pa.

MOSSES FROM FLORIDA COLLECTED BY SEVERIN RAPP

Elizabeth G. Britton

The last collection sent to us by Mr. Severin Rapp from the vicinity of Sanford, Florida, contains some very interesting species, including one tropical genus, new to the United States, *Jagerinopsis* Broth., and the extension northward of one tropical *Dicranella* determined by Mr. Williams as *D. subinclinata* Lorentz, heretofore known only from Cuba, Mexico and Panama to South America. This station in Florida and one of our own collections from the Isle of Pines, Cuba, are additions to its range as given in N. A. Flora. It grows "on clay banks along creeks" and may be looked for in the same habitats as its more common relative, *D. L'Herminieri* (*D. leptotrichoides R. & C.*). *D. heteromalla orthocarpa* also has been found, but is rare in *Florida*, and *Mnium cuspidatum* seems to reach its southern range in this state. Excellent specimens of such common species as the following were also collected: *Bruchia Donellii* and *B. Ravenellii*, *Trematodon longicollis*, *Leucobryum albidum* (Brid.) Lindb. (*L. sediforme*), *Syrrhopodon floridanus*, *Weisia longiseta*, *Funaria flavicans*, three Southern varieties of *Physcomitrium turbinatum*, two Ephemerums, and *Brachymenium Wrightii* (Sull.) Broth., all in excellent fruit. Several Archidiums—*A. alternifolium*, (sent as *A. Ravenellii* and *A. tenerrimum*) and *A. Donellii*—show that this genus varies in Florida as much as other northern species do in that moist warm climate.

The following pleurocarpous species were received: *Amblystegium floridanum* and *irriguum*, *Entodon Drummondii*, *Campylium chrysophyllum* mixed with *Haplocladium microphyllum*, *Neckera Jamaicensis* (Gmel.) E. G. B. (*N. undulata Hedw.*), *Rhizogonium spiniforme*, *Rhynchostegium serrulatum* and *Clasmatodon parvulus*. The rarer species are *Cyclodictyon varians* (Sull.) Broth., from "muddy places in Hammock"; *Callicostella scabrida* (Hook.) Jaeger. (*Hookeria Cruceana* Duby.); *Ectropothecium caloosiense* (Aust.) Britt., and **Sematophyllum subpinnatum** (Brid.) E. G. B. or **Raphidostegium subpinnatum** (*R. Kegelianum*). This species is common in the West Indies, reaching its northern range in Florida.

An undescribed species of *Jagerinopsis* also occurs in Cuba, but so far has only been found sterile; I have called it *J. squarrosa* in reference to its spreading leaves, a character which it shares with other species of the genus.

ADDITIONS TO THE LIST OF BRYOPHYTES FROM CAPE BRETON[1]

George E. Nichols

Two years ago the writer published an account of the bryophytes of Nova Scotia, with special reference to Cape Breton Island.[2] Since then, two more summers have been occupied in the botanical exploration of northern Cape Breton, and in this connection thirteen bryophytes heretofore unrecorded from there have been collected.[3] A list of these is given below. Except where otherwise indicated the various species apparently are unknown from the peninsula of Nova Scotia.

1. Lophocolea minor Nees. French River *1834*.

2. Scapania curta (Mart.) Dumort. Aspy Bay *2024*.

3. Anthoceros levis L. Middle River *2015*.

4. Sphagnum capillaceum (Weiss) Schrank. Mt. Smoky *1763*. This has also been recently collected near Annapolis, Nova Scotia, by Professor J. B. Porter. The var. *tenellum* (Schimp.) A. L. Andrews was reported in the previous paper.

5. Sphagnum Dusenii C. Jens. Ingonish Barrens *2001*.

6. Swartzia inclinata Ehrh. Aspy Bay *2014*.

7. Tortula mucronifolia Schwaegr. Aspy Bay *2008*. Recorded also from Nova Scotia (Macoun).

8. Tortula ruralis (L.) Ehrh. Aspy Bay *1807*.

9. Bryum fallax Milde. Barrasois *1806*.

10. Bryum inclinatum (Sw.) Br & Sch. Aspy Bay *2012;* Cape North *1805*. Recorded also from Nova Scotia (Macoun).

11. Calliergon giganteum Schimp. French River *1815;* Aspy Bay *1837*.

[1] Contribution from the Osborn Botanical Laboratory.

[2] Bryologist **19**: 38–47. 1916.

[3] To the species recorded in this paper may be added *Jungermannia lanceolata*, *Ulota phyllantha*, and *Encalypta contorta*, not previously collected by the writer though listed by Macoun.

12. Buxbaumia aphylla L. Barrasois *1820*.

13. Polytrichum piliferum Schreb. Wreck Cove *1816*. Recorded also from Nova Scotia (Macoun).

These additions bring the number of species of bryophytes recorded as having been collected in Cape Breton up to 361: 96 liverworts and 265 mosses. The bryophyte flora of the province of Nova Scotia as a whole is now known to include 408 species: 105 liverworts and 303 mosses. The writer is indebted to Dr. A. W. Evans, Dr. A. L. Andrews, and Mrs. E. G. Britton for assistance in determining various species.

Sheffield Scientific School of Yale University.

LICHENS OF THE BERKSHIRE HILLS, MASSACHUSETTS

Stewart H. Burnham

Two lists of lichens are enumerated below. Bash Bish Falls in the southwestern part of Berkshire county, near Copake Iron Works, N. Y., was visited the afternoons of Aug. 1, 1908, and July 3, 1909. No special attention was given to collecting lichens; however, this wild rocky gorge supports rather a rich lichen flora as well as many fine mosses.

Mt. Greylock, in northern Berkshire county, was visited on the following dates: July 4–5, 1908; May 29–31, and Oct. 9–10, 1909; and May 28–30, 1910. It is the highest land in the state of Massachusetts, 3505 feet above the level of the sea. The open rocky summit is fringed with forests of balsam fir, *Abies balsamea* (L.) Mill.; yellow birch, *Betula lutea* Mx. f.; and small trees of mountain ash, *Sorbus americana* Marsh. The trunks of these trees, old decaying wood, and the earth in sheltered situations, is the habitat of a rich and noticeable lichen flora.

A few of the lichens have been determined by Dr. L. W. Riddle, of Wellesley College, and some by Mr. G. K. Merrill, of Rockland, Maine.

Bash Bish Falls Lichens

Alectoria chalybeiformis (L.) S. F. Gray.
Buellia petraea (Flot., Koerb.) Tuck. Rocks; determined by Mr. Merrill.
Cladonia furcata (Huds.) Schrad.
C. *furcata racemosa* (Hoffm.) Flk.
C. *papillaria* (Ehrh.) Hoffm. Prospect Rock.
C. *rangiferina* (L.) Weber.
C. *uncialis* (L.) Fr. A variety of this composite species.
Leptogium tremelloides (L. f.) S. F. Gray. Determined by Mr. Merrill.
Parmelia caperata (L.) Ach.
P. *crinita pilosella* (Hue) Merrill.
P. *perlata* (L.) Ach. Prospect Rock and elsewhere.
P. *rudecta* Ach. (*Parmelia Borreri rudecta* (Ach.) Tuck.)

P. saxatilis (L.) Fr.
P. sulcata Tayl. (*Parmelia saxatilis sulcata* Nyl.)
Peltigera canina (L.) Hoffm.
Pertusaria multipuncta (Turn.) Nyl. On trunks of *Betula lutea*.
Physica aquila detonsa Tuck.
Pyxine sorediata (Ach.) Fr.
Ramalina farinacea (L.) Ach. On rocks.
Umbilicaria Dillenii Tuck. Prospect Rock.
U. Muhlenbergii (Ach.) Tuck. Lookout Rock.
U. pustulata (L.) Hoffm. Prospect Rock.

Mt. Greylock Lichens

Alectoria chalybeiformis (L.) S. F. Gray. On rocks at the summit.
Baeomyces roseus Pers. Wilbur's Park.
Biatora granulosa (Ehrh.) Poetsch.
B. uliginosa (Schrad.) Fr. Determined by Dr. Riddle.
B. viridescens (Schrad.) Fr. On old balsam stump at the summit with *Icmadophila*.
Cladonia alpestris (L.) Rabenh. Stony Ledge.
C. cariosa cribrosa (Wallr.) Wainio.
C. cristatella Tuck. On rotten coniferous wood at the summit and elsewhere.
C. fimbriata (L.) Hoffm. A variety of this composite species.
C. furcata (Huds.) Fr. Woods west of Stony Ledge.
C. furcata racemosa (Hoffm.) Flk. Bellowspipe Trail and in the woods west of Stony Ledge.
C. gracilis (L.) Fr. A variety of this composite species.
C. ochrochlora ceratodes Flk. On balsams and rotten logs at the summit; determined by Mr. Merrill.
C. papillaria (Ehrh.) Hoffm. Stony Ledge.
C. squamosa (Scop.) Hoffm. On rotten logs at the summit; a variety of this composite species.
C. sylvatica (L.) Rabenh. Stony Ledge and at the summit.
C. verticillata Hoffm.
Evernia furfuracea Cladonia Tuck.
Graphis scripta (L.) Ach. On trunks of yellow birch.
Icmadophila aeruginosa (Scop.) Mass. On old balsam stump at the summit. [*Baeomyces aeruginosus* (Scop.) DC.]
Lecanora subfusca (L., Nyl.) Ach. On balsams, yellow birch and mountain ash at the summit; determined by Mr. Merrill.
Lecidea platycarpa Ach. On balsams and rocks at the summit; determined by Mr. Merrill and Dr. Riddle.
Lobaria amplissima (Scop.) Arn. Fine specimens on the trees along the Bellowspipe Trail. [*Sticta amplissima* (Scop.) Mass.]

L. pulmonaria (L.) Hoffm. On trees along the Bellowspipe Trail and at the summit.

Lopadium pezizoideum (Ach.) Koerb. On balsams at the summit; determined by Mr. Merrill. [*Heterothecium pezizoideum* (Ach.) Flot.]

Mycoblastus sanguinarius (L.) Th. Fr. On balsams at the summit, more common than the preceding species; determined by Mr. Merrill. [*Heterothecium sanguinarium* (L.) Flot.]

Pannaria lanuginosa (Ach.) Koerb.

Parmelia caperata (L.) Ach. On trunks of yellow birch and at the summit.

P. cetrata Ach. On the trunk of a fallen butternut, *Juglans cinerea*, where the North Adams road enters the forest at the base of Mt. Williams.

P. crinita pilosella (Hue) Merrill. On the trunk of the fallen butternut with the preceding species and elsewhere.

P. dubia (Wulf.) Schaer. On yellow birch at the summit. (*Parmelia Borreri* Tuck.)

P. exasperata (Ach.) D. N. On balsams, mountain ash and yellow birch at the summit. (*Parmelia olivacea aspidota* Ach.)

P. olivacea (L.) Ach. Fruiting specimens on balsams and mountain ash at the summit.

P. olivaria (Ach.) D. N. On balsams, yellow birch and mountain ash at the summit; determined by Mr. Merrill.

P. perlata (L.) Ach. On balsam trunks.

P. pertusa (Schrank.) Schaer. On balsam trunks.

P. physodes (L.) Ach. On balsam trunks at the summit and at the campgrounds in the Hopper.

P. rudecta Ach. Fruiting specimens.

P. saxatilis (L.) Fr. On balsams and mountain ash at the summit.

P. sulcata Tayl. On the trunk of the fallen butternut at the base of Mt. Williams; also at the summit on balsams, yellow birch, and mountain ash.

Pertusaria communis Lam. & DC. Determined by Mr. Merrill.

P. globularis Ach. On balsams.

P. globulifera (Turn.) Nyl. On balsam trunks; determined by Mr. Merrill.

P. velata (Turn.) Nyl. On yellow birch; determined by Mr. Merrill.

P. Wulfenii Lam. & DC. Determined by Mr. Merrill.

Peltigera aphthosa (L.) Willd.

P. canina (L.) Hoffm.

Physcia aquila detonsa Tuck. On balsams.

Platysma ciliare (Ach.) Nyl. (*Cetraria ciliaris* Ach.)

P. lacunosum (Ach.) Nyl.

P. Oakesianum (Tuck.) Nyl. On balsams and mountain ash at the summit; at the camp grounds on yellow birch and balsams.

Pyxine sorediata (Ach.) Fr. On balsams at the summit.

Stereocaulon paschale (L.) Fr. On rocks at the summit and on Stony Ledge.

Umbilicaria Muhlenbergii (Ach.) Tuck. Rare on rocks at Stony Ledge. No Umbilicarias were seen about the summit.

Usnea florida (L.) Hoffm. On balsams at the summit.

HUDSON FALLS, N. Y.

"THE CATKIN-HYPNUM, WITH LONG HOSES."

"Hypnum julaceum, perichaetio setas paene aequante."

In this quaint manner Prof. James Dillen,[1] of Oxford University, in the middle of the 18th Century, described the species which we now know as *Leucodon julaceus* (L.) Sull. and which Linnaeus,[2] who in many cases, simply gave binomials to the Dillenian descriptions, without having seen the specimens, called *Hypnum julaceum* L. The specimens which Dillenius described and figured, were collected in Pennsylvania and Virginia by the three Johns, Bartram, Clayton and Mitchell.

Of the *Leucodons* we have three species: two are endemic and have been frequently figured, described and compared, but strangely enough no mention seems to have been made of one characteristic of *Leucodon julaceus*, which to me is its most marked feature. Aside from the differences in the leaf-points, as figured in the BRYOLOGIST for January, 1902, *L. julaceus* may be known at once by the rounded, swollen, mamillose cells of the dorsal part of the apex, which, even in the young leaves of the apical branches, are unlike those of the other species of the genus. *Leucodon brachypus* rarely shows a slight trace of it, but in *L. julaceus* their character is unmistakable.

Austin, in his Musci Appalachiani, issued number 260 as a stoloniferous form of this species, collected on Red Cedars, Palisades of New Jersey; this "*forma stolonifera*" as he called it, varies considerably in the size and shape of its leaves and has since been collected by Sullivant and Kellerman in Ohio, by Dr. Small at Conewago, Pennsylvania, by myself in the Dismal Swamp of Virginia, by Dr. R. M. Harper in Georgia, by Bush in Missouri, and by Chapman and John Donnell Smith in Florida. It seems to be only on the young stems of the plants, where the terminal growths have not reached complete development, that the leaves instead of being crowded and imbricate, as on the branches, are much smaller and more acuminate, as on the decumbent creeping stems of the older plants.

E. G. BRITTON.

NEW YORK BOTANICAL GARDEN.

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[1] Dill. Hist. Musc. 2: 321. t. 41. f. 56. 1741.

[2] Hypnum julaceum L. Sp. pl. 2: 1130. 1753.

A STATION FOR EPHEMERUM NEAR NEW YORK CITY

Daisy J. Levy

For a number of years the woods of Pelham Manor, a small village immediately north of Pelham Bay Park, on Long Island Sound, have been my favorite collecting grounds. The particular locality explored is rather thickly wooded, a brook on one side of it and on the other low ground, rather wet, owing to inundations from the Sound.

On Sunday, September 9, 1917, I came upon a patch of *Fissidens taxifolius*, a moss often before collected in these woods, but this colony being particularly interesting in that the plants grew in broken patches from about five inches to a foot or more square. Becoming curious as to the ecological factors concerned I sought about for the protonemal growth, eventually finding a small patch with what appeared to be protonema, but which was discovered, upon examination with the hand lens, to be one of the minute forms of mosses. After further microscopical study the moss was determined as *Ephemerum serratum* var. *angustifolium* Schimp., this conclusion being based upon the facts that the spores were smaller than in *E. serratum* Hampe, and that the leaves were much narrower and more distinctly serrate. After having been kept for four months in a preparation of glycerine and alcohol the material was sent to Dr. Nichols, who pronounced it *E. serratum*, but too much shrunken for exact determination, while together with it he found *E. crassinervium* and with it another form "somewhat puzzling in its smoother leaves and papillose calyptra."

New York City.

REVIEWS

"The American Species of Marchantia"[1]

by Alexander W. Evans

In this monograph we have a clear and able treatment of the American species of Marchantia which has been much needed and which will be highly appreciated by students of the Hepaticae.

In the Introduction there is given a history of the treatment of the species of the genus as reported from America, this account having been extricated from the much involved and confused reports. Into the melting pot went all the species accredited to America by various botanists, nothing being taken for granted. The keen eye of the master having detected flaws in some of the old points of contact in comparisons and descriptions, these were dropped for more reliable characters, and it was then found, after the most careful examination and after various reductions to synonymy and the placing of five doubtful species at the close of the paper, that nine species, including a new one, could be retained.

Part II, Morphological Notes on the Genus, contains many statements by Goebel, Leitgeb, Schiffner, Stephani, Mueller, and others, which are examined

[1] Trans. Conn. Acad. Arts and Sciences **21**: 201–313. March, 1917.

and criticized, while the author's own observations form no small part of the twenty pages and, with constant references to figures, present a most valuable contribution..

The following citation of a paragraph from these Notes shows just which characters seem most trustworthy and which are used to form the framework: "In the present paper the morphology of Marchantia will be treated largely from the standpoint of the taxonomist. In other words the parts of the plant which yield the most distinct and constant specific characters will be primarily considered. These parts include the epidermis and the epidermal pores, the compact ventral tissue, the ventral scales, the rhizoids, the receptacles, and the cupules. The photosynthetic layer, the sexual organs, and the sporophyte, although yielding important generic characters, are less helpful when the individual species are considered. For the sake of completeness, however, a brief account of the sporophyte will be included."[2]

Part III, Description of Species. After a full and most helpful key, come the descriptions, followed in most instances by the long lists of specimens examined from different localities in North and South America, also an up-to-date synonymy and many critical and valuable notes. The figures illustrating the species are most concrete, the fragile scales and appendages, anatomical details, etc., showing the most delicate and skilful handling of the needles.

The amount of work involved in the preparation of this paper can be somewhat appreciated by running through the list of herbaria examined: those of the New York Botanical Garden, including the Mitten and Underwood herbaria; Harvard University, including those of Taylor and Sullivant; the United States National Herbarium; and Yale University, including those of Eaton and the author's private herbarium; several specimens from the Montagne and Boissier herbaria, including a number of types; and the private herbarium of C. C. Haynes.

The new species is *M. breviloba* Evans and it has been several times collected in the island of Jamaica.

The whole list of species is as follows:

Section I. Astromarchantia

Marchantia polymorpha L.
M. Berteroana Lehm. & Lindenb.
M. plicata Nees & Mont.

Section II. Chlamidium

M. paleacea Bertol.
M. breviloba Evans
M. domingensis Lehm. & Lindenb.
M. papillata Raddi
M. Bescherellei Steph.
M. chenopoda L.

The three species that are known in the United States are *M. polymorpha*, *M. paleacea* (Arizona), and *M. domingensis*, which replaces one of the synonyms, *M. disjuncta* Sulliv., by which name we have so long known it.

Caroline Coventry Haynes

Highlands, New Jersey.

[2] *op. cit.*, page 209.

On the Unsymmetric Structure of the Leaves of Mnium spinosum

In a pamphlet recently received M. Jacques Pottier[1] presents some interesting observations upon the structure of the costa of *Mnium spinosum*, a species that in Europe occupies something of the position here taken by *M. spinulosum*. Since some material collected for embryological purposes was not in satisfactory shape, the author tried to utilize it for morphological study. Being struck with the decidedly one-sided development of the leaf first examined, M. Pottier made a careful study of a few leaves to ascertain, if possible, the cause. Because of the large amount of labor required, it was impossible to make detailed studies of more than two leaves, but similar conditions were observed in all leaves examined. Beginning at the apex, over 350 transverse sections were made from definitely ascertained regions of the leaf, proceeding in regular order toward the base; the sections were then drawn under a camera lucida and studied in detail with especial reference to the position and origin of the various cellular elements in the costa.

The costa in this species is composed of several layers of cells, containing large cells (guides), smaller stereid cells, and a central strand of small parenchyma cells. These all seem to arise from repeated divisions of a single layer of rather large cells, new walls being formed both horizontally and perpendicularly. If the axis of morphological symmetry be taken as a line passing between the two middle guides of the central row and in the plane of their division wall, it is seen that this line is not perpendicular to the upper surface of the leaf, and that the greater mass both of the stereids and of the central strand usually lies either to the right or to the left of it. Serial sections show that this displacement alternates from right to left, with intermediate portions that are more nearly symmetrical. Furthermore this one-sidedness is apparently associated with the sinuosities of the costa, being to the right when the nerve bends to the right of the median line and vice versa. The alternations of right and left asymmetry seem to be more numerous in the apical and extreme basal portions of the leaf than in the median part.

M. Pottier suggests that the sinuosities of the nerve arise from the fact that the leaf is formed from a single apical cell cutting off new cells in two planes, that the resulting displacements of costal elements come from the compressions and expansions associated with this bending of the nerve, and that the greater abundance of the alternations of asymmetry in the upper and lower portions is connected with the fact that these regions are the ones where the least intercalary growth occurs in the elongation of the leaf.

E. B. C.

MISCELLANEOUS NOTES

Dr. Alma G. Stokey, of Mt. Holyoke College, writes us that in the recent fire that destroyed the building in which the botanical department was located,

[1] Jacques Pottier. Sur la dissymetrie de structure de la feuille du *Mnium spinosum* (Voit) Schwaegr. pp. 1–16, with 28 figures in 7 unnumbered plates. Berne, Büchler & Co. 1917.

all the collections and most of the botanical library were burned. Dr. Stokey writes that the donation of duplicate material from members of the Society would confer a very great favor upon the College. In the way of herbarium material it is especially hoped that a representation of the commoner species from New England can be secured: mosses, lichens and hepatics are needed, as well as other forms. We are certain that all that is necessary is to bring to the notice of members of the Society this chance to pass along the help they have received themselves.

E. B. C.

NOTICE TO MEMBERS

Since the report of membership was published in the January issue, Miss Eva M. Fling, 220 Prospect Street, Morgantown, West Virginia, has become a member of the Society.

The members are requested to note especially that the address of the Moss Curator, Mr. Geo. B. Kaiser, *has changed to* 232 West Mt. Pleasant Ave., Mount Airy, Philadelphia, Penna.

EXCHANGE DEPARTMENT

Offerings—*To members only.* Return postage should accompany the request.

Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.—*Grimmia patens* B. & S., *c. fr.*, from Switzerland; *Cinclidotus fontinaloides* P. Beauv., *forma*, simulating *C. riparius*, see Dixon & Jameson Handbook, p. 248, both collected by Mr. Rhodes.

Mr. S. Rapp, Sanford, Florida.—*Fissidens falcatulus* R. & C., and *Neckera undulata* Hedw., both collected in Florida by Mr. Rapp, this being the first record of fruiting specimens of *F. falcatulus* for the United States.

Miss Daisy J. Levy, 403 West 115th St., New York City.—*Dicranum longifolium* Ehrh., collected by Miss Levy at Lake George, N. Y.

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THE BRYOLOGIST

VOL. XXI MAY, 1918 NO. 3

ILLUSTRATED KEY TO THE WESTERN SPHAGNACEAE[1]

T. C. FRYE

SPHAGNUM, Peat Moss

Plants grayish when dry. Branches usually tufted. Leaves veinless. Leaf-cells of 2 quite different kinds, the large hyaline ones with spiral or ring-like thickenings in their walls, the narrow long green ones alternating with the hyaline ones and so narrow that they might be mistaken for the walls of the hyaline ones. Calyptra irregularly torn. Capsule elevated by a false stalk which is a modified branch. Lid deciduous. Peristome none. Plants of undrained bogs; or on high mountains and in cool regions growing in damp places in almost any situation. (Gk. *sphagnos*, some kind of moss.)

KEY AND COMPARISON OF SPECIES

A. Cortical cells of the stems and branches with spiral thickenings (see Pl. XVII, fig. 2). GROUP 1

AA. Cortical cells of the stems and branches without spiral thickenings (see Pl. XIX, fig. 1).

B. Branches in tufts of 6–12. GROUP 2

BB. Branches in tufts of 1–6.

C. Green cells of the branch-leaves in cross section not exposed on either surface, the cell-cavity elliptic (see Pl. XVIII, fig. 12). GROUP 2

CC. Green cells of the branch leaves in cross section exposed exclusively or more broadly on the outer side (see Pl. XVIII, fig. 14), or if with central cell-cavity and about equal exposure on the 2 sides (see Pl. XIX, fig. 8) then the plants brownish-green rather than reddish-green.

D. Stem-leaves not fimbriate nor lacerate, small, pointed (Pl. XIX, fig. 3). GROUP 2

DD. Stem-leaves fimbriate or lacerate, large or small, pointed to rounded (see Pl. XX, fig. 5). GROUP 3

CCC. Green cells of the branch-leaves in cross section exposed exclusively or more broadly on the inner side (Pl. XXII, fig. 13), or if with central cell-cavity and about equal exposure on the 2 sides (Pl. XXI, fig. 9) then the plants reddish-green rather than brownish-green. GROUP 4

[1] The arrangement and condensed nature of this paper prevents acknowledgment to various authors whose works have been found useful, except perhaps the most admirable treatment of the genus by A. L. Andrews in Flora of North America.

The March number of the BRYOLOGIST was published April 30, 1918.

GROUP 1

1a. Green cells of the branch-leaves in cross section with elliptic or oval cell-cavity, not exposed on either surface or slightly on the inner.

2a. Hyaline cells bulging outward about ⅛ their thickness, their walls smooth where applied to the green cells; (3) stem-leaves wide at apex.

Sphagnum magellanicum[2] Brid.—Alaska to Calif.; eastern N. Amer.

1a. Green cells of the branch-leaves in cross section lenticular to truncately elliptic, usually about equally exposed on both surfaces.

2b. Hyaline cells bulging outward about ¼ their thickness, their walls smooth to densely papillose where applied to the green cells; (3) stem-leaves narrow at apex.

Sphagnum papillosum Lindb.—Alaska to Wash.; eastern N. Amer. (Pl. XVII)

1b. Green cells of the branch-leaves in cross section an isosceles-triangle narrower than equilateral, exposed on the inner surface only.

2a. Hyaline cells bulging outward about ¼ their thickness, their walls smooth where applied to the green cells; (3) stem-leaves wide at apex.

Sphagnum palustre L.[3]—Alaska to Calif.; eastern N. Amer. (Pl. XVII)

1b. Green cells of the branch-leaves in cross section an equilateral triangle, exposed on the inner surface only.

2b. Hyaline cells bulging outward about ½ their thickness, their walls strongly papillose to fibrillose where applied to the green cells; (3) stem-leaves rather narrow at apex.

Sphagnum imbricatum Hornsch.[4]—Alaska; eastern N. Amer. (Pl. XVIII)

GROUP 2

1a. Branches in tufts of 6–12; hyaline cells of branch-leaves very finely papillose where applied to the green cells, bulging more on the outer than on the inner surface; (2) green cells of the branch-leaves in cross section with widest exposure on outer side, or equally on the 2 sides, (3) in cross section truncately elliptic; (4) hyaline cells of the branch-leaves bulging hardly at all on the inner surface, (5) with 1–8 pores on the outer surface and 1–4 on the inner.

Sphagnum wulfianum Girg.—Vancouver Island, B. C.; eastern N. Amer. (Pl. XVIII)

1b. Branches in tufts of 2–6; hyaline cells of the branch-leaves smooth where applied to the green cells, bulging more on the inner than on the outer surface.

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[2] *S. medium* Limpr.; *S. intermedium* Russ.

[3] *S. cymbifolium* Ehrh.; also American specimens which have been referred to *S. turfaceum* Warnst.

[4] *S. austini* Sull.

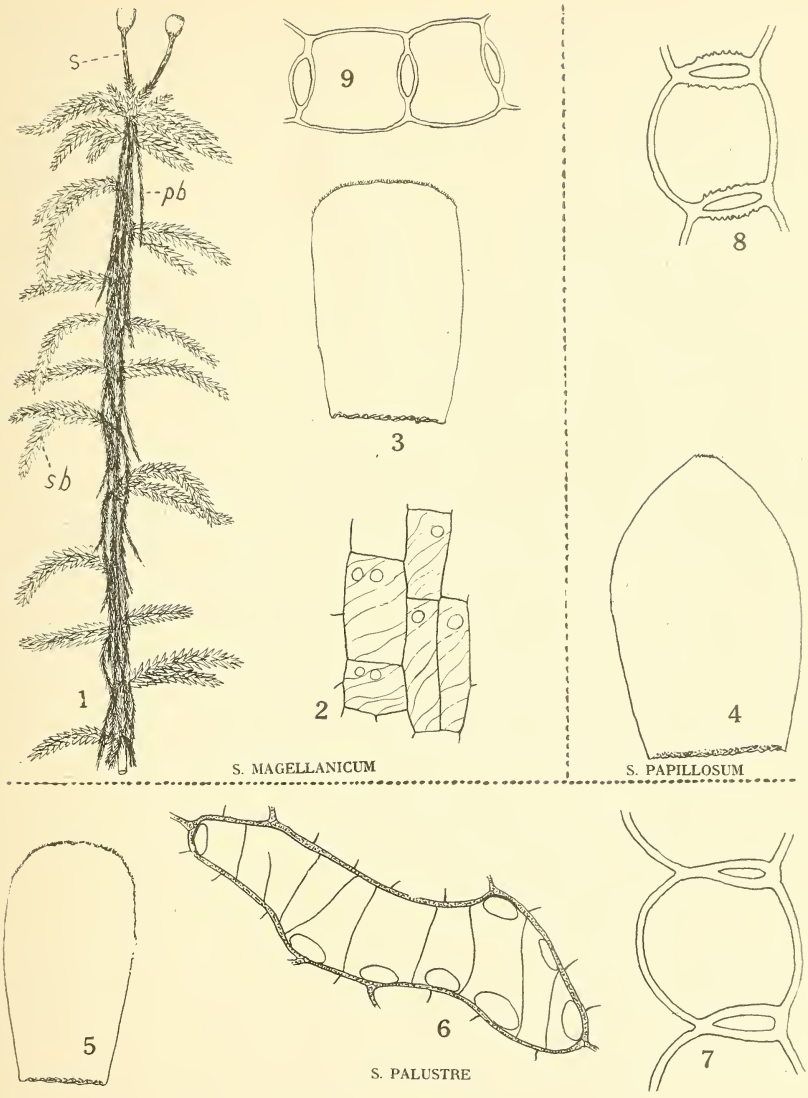

PLATE XVII

(1) Plant; *s*, stalk-like branch bearing capsule; *sb*, spreading branch; *pb*, pendent branch; × 1. (2) Cortical cells of stem showing spiral thickenings and pores, × 125. (3, 4, 5) Stem-leaves, × 22. (6) Hyaline cell from middle region of leaf of spreading branch, showing pores on outer side, × 343. (7, 8, 9) Portions of cross sections of leaves of spreading branches, × 400.

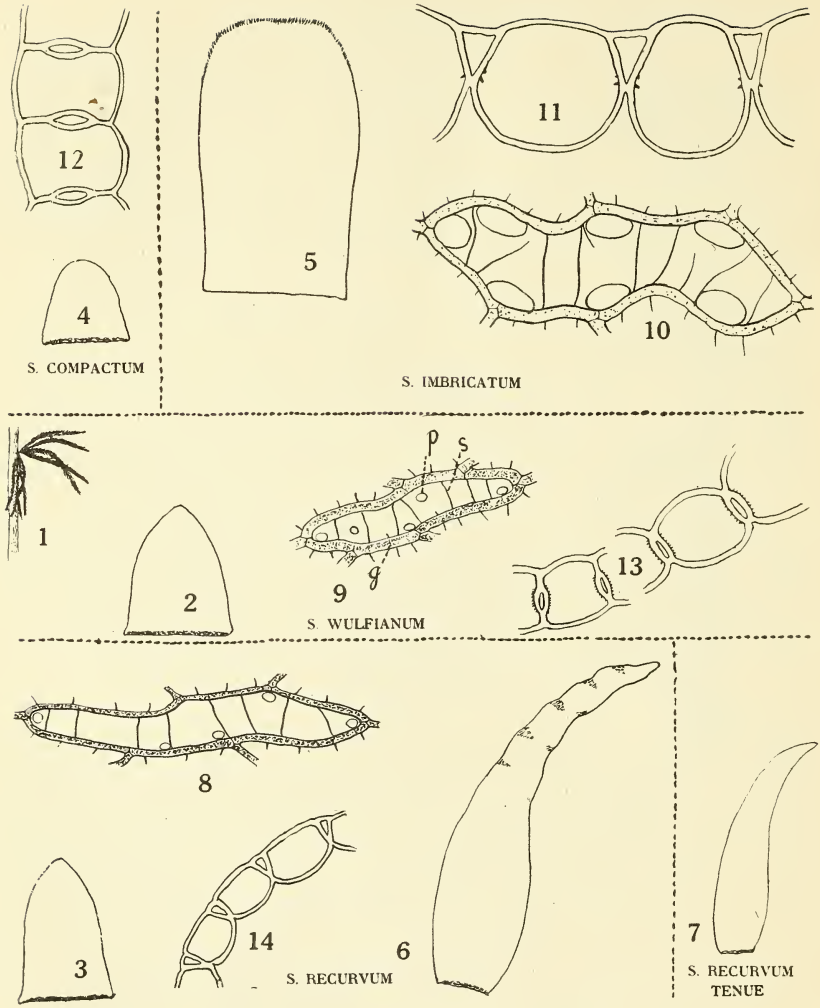

PLATE XVIII

(1) Portion of plant showing spreading and pendent branches, × 1. (2, 3, 4, 5) Stem-leaves, × 22. (6, 7) Leaves of spreading branches, × 33. (8) Hyaline cell from middle region of leaf of spreading branch, showing pores on *inner* side, × 343. (9, 10) Hyaline cells from middle regions of leaves of spreading branches, showing pores on outer side, × 343. (11, 12, 13, 14) Portions of cross sections of leaves of spreading branches; *g*, green cell; *p*, pore; *s*, spiral thickening; × 400.

2a. Green cells of the branch-leaves in cross section wholly included, (3) elliptic; (4) hyaline cells of the branch-leaves bulging about 1/5 their thickness or less on the inner surface, (5) with 4–8 pores on the outer surface and usually 3 on the inner.

Sphagnum compactum DC.—Alaska to Wash.; eastern N. Amer. (Pl. XVIII)

2b. Green cells of the branch-leaves in cross section with widest exposure on outer side, or not at all exposed on inner side.

3a. Green cells of the branch-leaves in cross section triangular.

4a. Hyaline cells of the branch-leaves bulging about 1/4 their thickness or less on the inner surface, (5) with 2–6 pores on the outer surface and 4–7 on the inner.

6a. Branch-leaves undulate toward their tips.

Sphagnum recurvum Beauv.—Alaska to Wash. and Colo.; eastern N. Amer. (Pl. XVIII)

6b. Branch-leaves not undulate.

Sphagnum recurvum tenue Kling.—Alaska to Wash. and Idaho; northern N. Amer. (Pl. XVIII)

4b. Hyaline cells of the branch-leaves bulging about 1/2 their thickness or less on the inner surface, (5) with 0–3 pores on the outer surface and 0–3 on the inner.

Sphagnum tenellum Pers.[5] Alaska to B. C.; northeastern N. Amer. (Pl. XIX).

2b. Green cells of the branch-leaves in cross section with widest exposure of the outer side but also exposed on the inner side.

3b. Green cells of the branch-leaves in cross section trapezoidal; (4) hyaline cells of the branch-leaves bulging 1/6 their thickness or less on the inner surface, (5) with 5–12 pores on the outer surface and mostly none on the inner.

Sphagnum dusenii Jens.—Alaska.[6] (Pl. XIX).

2b. Green cells of the branch-leaves in cross section with widest exposure on the outer side, or equally on the 2 sides.

3c. Green cells of the branch-leaves in cross section truncately elliptic; (4) hyaline cells of the branch-leaves bulging 1/8 their thickness on the inner surface, (5) with 10–20 pores on the outer surface and 1–4 on the inner.

Sphagnum subsecundum Nees[7]—Wash. to Mex.; eastern N. Amer. (Pl. XIX)

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[5] *S. molluscum* Bruch.

[6] Univ. Calif. Pub. Bot. **2**: 313. 1907.

[7] *S. contortum* Schultz; *S. platyphyllum* Sull.; *S. rufescens* Limpr.; *S. obesum* Wils.; *S. dasyphyllum* Warnst.; *S. plicatum* Warnst.; *S. Orlandense* Warnst.; *S. mobilense* Warnst.; *S. simile* Warnst.

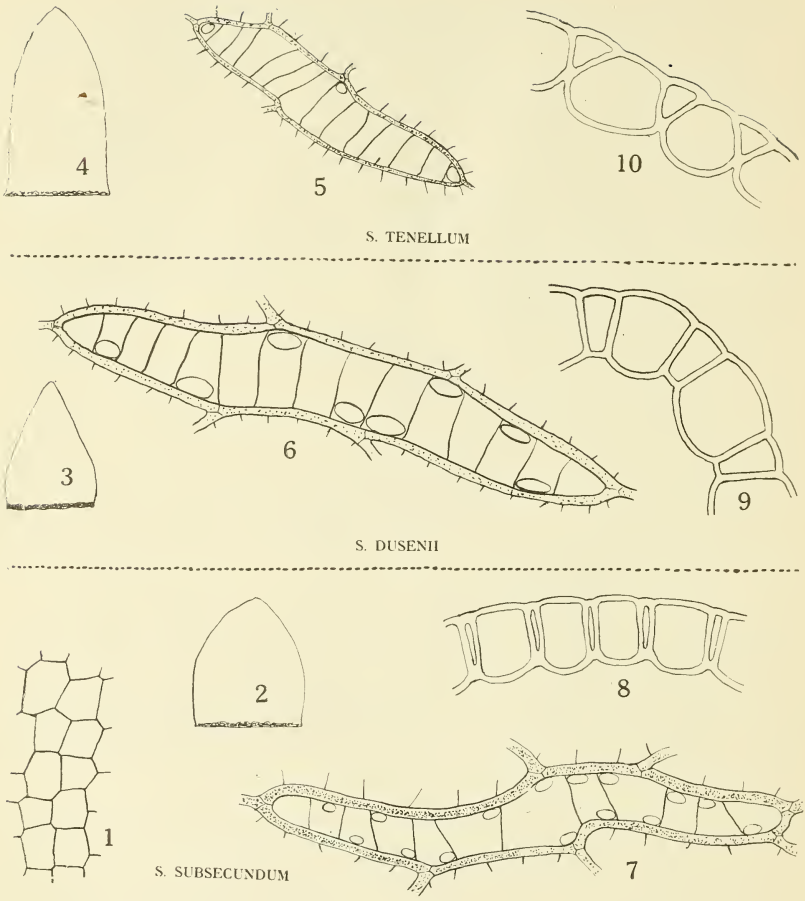


PLATE XIX

(1) Cortical cells of the stem, × 125. (2, 3, 4) Stem-leaves, × 22. (5) Hyaline cell from middle region of leaf of spreading branch, showing pores on *inner* side, × 343. (6, 7) Hyaline cells from the middle portions of the leaves of spreading branches, showing pores on *outer* side, × 343. (8, 9, 10) Portions of cross sections of leaves of spreading branches, × 400.

GROUP 3

1a. Green cells of the branch-leaves in cross section about equally exposed on the 2 surfaces, truncately elliptic; hyaline cells of the branch-leaves bulging more on the outer side; (2) stem-leaves longer than wide, mediumly large, (3) somewhat lacerate at tip; (4) hyaline cells of the branch-leaves with 6–14 medium-sized pores on the outer side and 2–8 pores on the inner.

Sphagnum angstroemii Hartm.—Alaska; Yukon (Pl. XX).

1b. Green cells of the branch-leaves in cross section exposed only on the outer side or much less on the inner side, triangular or trapezoidal; hyaline cells of the branch-leaves bulging more on the inner side.

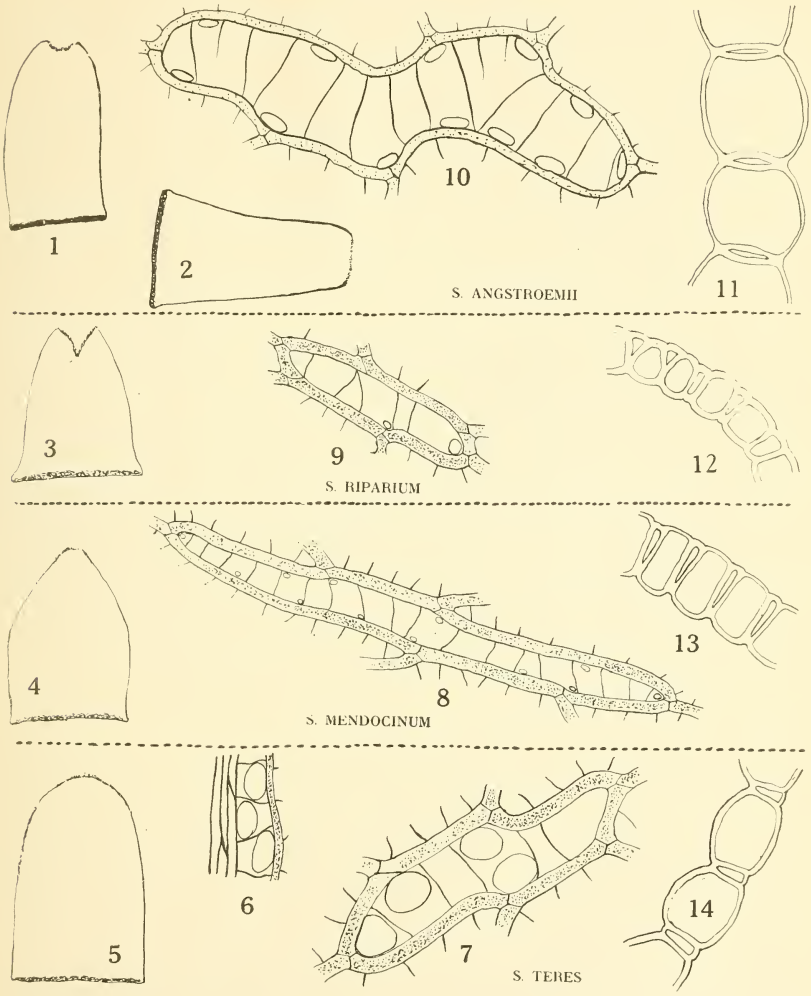


PLATE XX

(1, 2, 3, 4, 5) Stem-leaves, × 22. (6) Margin of branch-leaf, × 250. (7, 8, 9, 10) Hyaline cells from the middle regions of leaves of spreading branches, showing pores on outer side, × 343. (11, 12, 13, 14) Portions of cross sections of the leaves of spreading branches, × 400.

2a. Stem-leaves rather longer than wide, rather large.

3a. Stem-leaves with 1 deep rent in the middle at the tip; (4) hyaline cells of the branch-leaves with 2–5 small pores on the outer side and 0–10 large ones on the inner.

Sphagnum riparium Angstr.—Alaska to B. C.; northeastern N. Amer. (Pl. XX).

3b. Stem-leaves slightly lacerate at tip, without a rent.

4a. Hyaline cells of the branch-leaves with 15–20 small pores on the outer side and 5–15 small ones on the inner.

Sphagnum mendocinum Sull. & Lesq.—B. C. to Calif. and Idaho (Pl. XX).

3b. Stem-leaves weakly lacerate-fimbriate at tip, without a rent.

4a. Hyaline cells of the branch-leaves with 3–6 large pores on the outer side and 1–4 large ones on the inner.

5a. Branch-leaves ovate-lanceolate, usually imbricate.

Sphagnum teres (Schimp.) Angstr.[8]—Alaska to Calif. (Pl. XX).

4b. Hyaline cells of the branch-leaves with 1–10 medium-sized pores on the outer side and 0–10 medium-sized ones on the inner.

5b. Branch-leaves ovate-hastate, usually squarrose.

Sphagnum squarrosum Crome—Alaska to Calif. and Colo.; northeastern N. Amer. (Pl. XXI)

2b. Stem-leaves rather wider than long, rather small, (3) very slightly lacerate at tip; (4) hyaline cells of the branch-leaves with 7–8 small pores on the outer side and 3–4 rather small ones on the inner.

Sphagnum balticum Russ.[9]—Alaska; Greenland.

2c. Stem-leaves wider than long, large, (3) widely lacerate at tip; (4) hyaline cells of the branch-leaves with 1–4 small pores on the outer side and 1–4 medium-sized ones on the inner.

Sphagnum lindbergii Schimp.—Alaska to B. C.; northeastern N. Amer. (Pl. XXI).

Group 4

1a. Outer walls of the surface cells of the stem porose, normally with 1 pore per cell.

2a. Stem-leaves fimbriate-lacerate both at sides and at tip; (3) hyaline cells of the branch-leaves bulging $\frac{1}{8}$–$\frac{1}{3}$ their thickness on the outer side; (4) plant yellowish-green or brownish-green; (5) outer surface of branch-leaves with rather small elliptic pores.

Sphagnum fimbriatum Wils.[10]—Alaska to Calif. and Wyo.; northeastern N. Amer. (Pl. XXI).

2b. Stem-leaves fimbriate-lacerate only across the broad truncate tip; (3) hyaline cells of the branch-leaves bulging $\frac{1}{5}$–$\frac{1}{3}$ their thickness on the

[8] *S. squarrosulum* Sull.

[9] This is not illustrated for lack of material.

[10] *S. microphyllum* Warnst.; *S. bolanderi* Warnst.

outer side; (4) plant yellowish-green or brownish-green; (5) outer surface of the branch-leaves with rather small elliptic pores.

Sphagnum girgensohnii Russ.[11]—Alaska to Oreg.; northeastern N. Amer. (Pl. XXII).

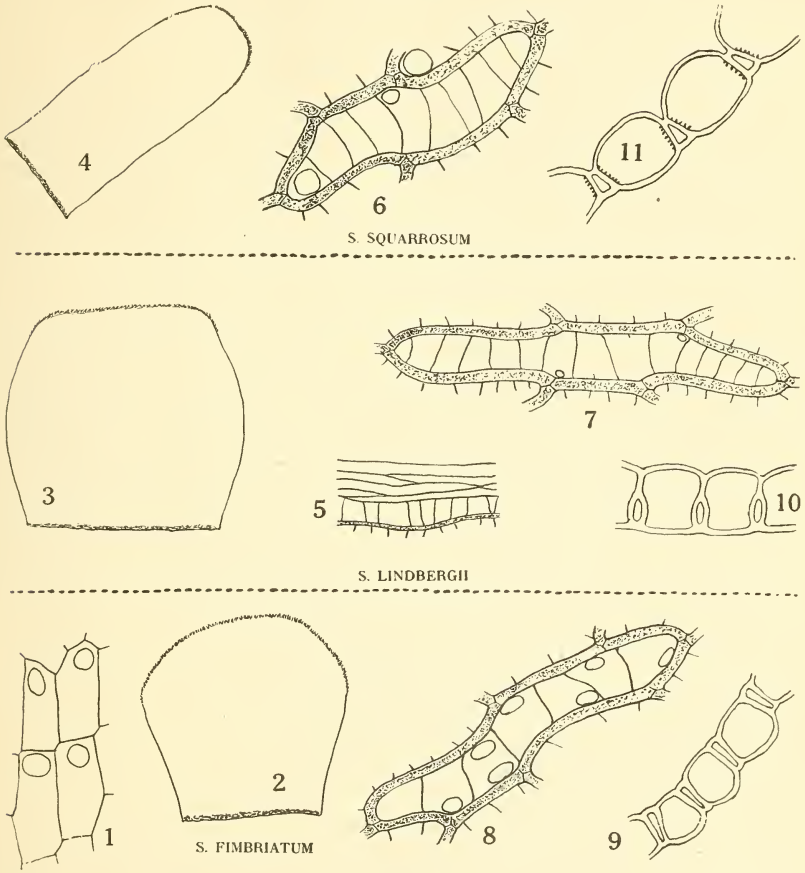


PLATE XXI

(1) Cortical cells of the stem, × 125. (2, 3, 4) Stem-leaves, × 22. (5) Margin of branch-leaf, × 250. (6, 7, 8) Hyaline cells from the middle regions of leaves of spreading branches, showing pores on outer side, × 343. (9, 10, 11) Portions of cross sections of leaves of spreading branches, × 400.

[11] *S. mehneri* Warnst.

2c. Stem-leaves only slightly lacerate at the narrowed tip, or not at all lacerate; (3) hyaline cells of the branch-leaves bulging ⅛–¼ their thickness on the outer side; (4) plants reddish-green or merely green; (5) outer surface of the branch-leaves with large elliptic pores.

Sphagnum robustum (Russ.) Roell.[12]—Alaska to Wash. and Colo.: northeastern N. Amer. (Pl. XXII).

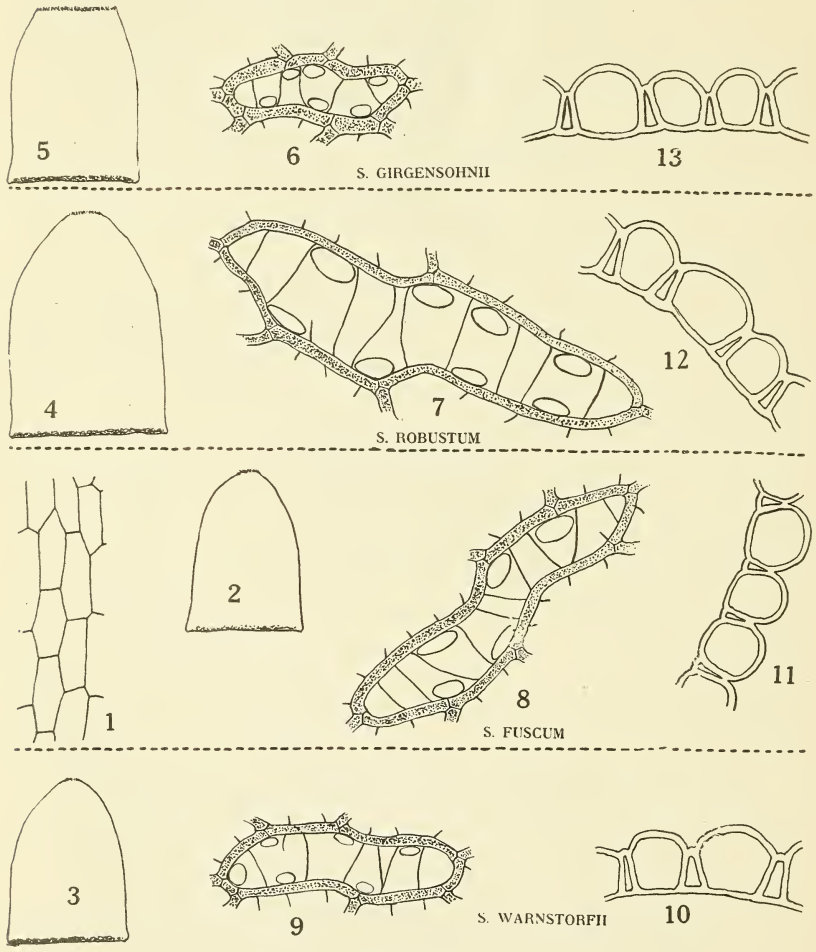


PLATE XXII

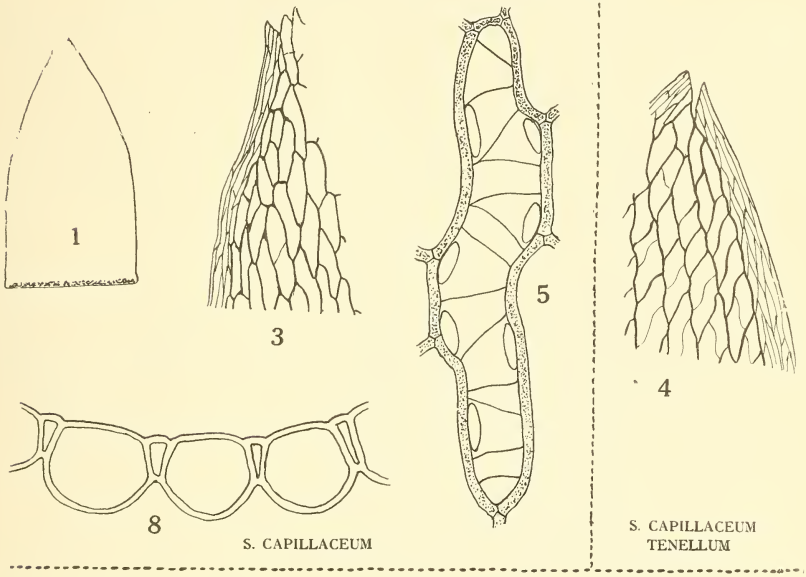
(1) Cortical cells of the stem, × 125. (2, 3, 4, 5) Stem-leaves, × 22. (6, 7, 8, 9) Hyaline cells from the middle regions of leaves of spreading branches, showing pores on outer side, × 343. (10, 11, 12, 13) Portions of cross sections of leaves of spreading branches, × 400.

[12] *S. russowii* Warnst.

1b. Outer walls of the surface cells of the stem normally without pores; (2) stem-leaves not or only slightly lacerate at tip.

3a. Hyaline cells of the branch-leaves bulging 1/8–1/2 their thickness on the outer side.

4a. Plants brownish-green rather than reddish-green; (5) outer surface of the branch-leaves with rather large elliptic pores.



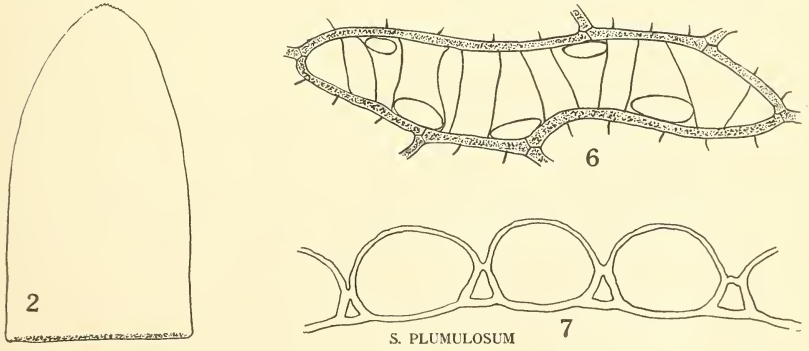


PLATE XXIII

(1, 2) Stem-leaves, × 22. (3, 4) Portions of tips of stem-leaves, × 32. (5, 6) Hyaline cells from middle regions of leaves of spreading branches, showing pores on outer side, × 343. (7, 8) Portions of cross sections of leaves of spreading branches, × 400.

Sphagnum fuscum (Schimp.) Kling.[13]—Alaska to Wash. and Colo.; northeastern N. Amer. (Pl. XXII).

4b. Plants reddish-green rather than brownish-green.

5a. Outer surface of the branch-leaves with small roundish strongly-ringed pores at ½–⅔ the distance from the leaf-base.

Sphagnum warnstorfii Russ.—Alaska to Colo.; northeastern N. Amer. (Pl. XXII).

5b. Outer surface of the branch-leaves with much larger and more elliptic pores.

6a. Most of the hyaline cells of the upper halves of the stem-leaves not divided by fibrils.

Sphagnum capillaceum (Weiss.) Schrank.[14]—Alaska to Wash. and Colo.; northeastern N. Amer. (Pl. XXIII).

6b. Most of the hyaline cells of the upper halves of the stem-leaves divided by fibrils.

Sphagnum capillaceum tenellum (Schimp) Andr.[15]—Alaska to Wash.; northeastern N. Amer.

3b. Hyaline cells of the branch-leaves bulging ½–⅔ their thickness on the outer side; (4) plant greenish or brownish or somewhat purplish; (5) outer surface of the branch-leaves with large elliptic pores.

Sphagnum plumulosum Roell.[16]—Alaska to Calif.; northeastern N. Amer. (Pl. XXIII).

University of Washington, Seattle.

JAGERINOPSIS SQUARROSA, N. SP.[1]

E. G. Britton

Plants bright green, glossy, climbing on trees; primary stems slender, decumbent and rooting, with small appressed bract-like leaves, which are only .5–1 mm. long, lanceolate-acuminate, ecostate, and entire, or with a short faint costa; secondary stems stout, erect, red, simple and unbranched, 1–2 cm. rarely 4–5 long, rarely tapering off into slender flagellate innovations; leaves crowded, spreading, 1.5–2 mm. long x 1–1.33 mm. wide, rarely wider than long, broadly ovate or cordate, carinate or concave; apex variable, acute or acuminate, serrulate, not subulate, often recurved; margins minutely and obscurely serrulate to base, each marginal cell ending in a small tooth; costa variable, single, and broadest at base, or forking at apex, or rarely double and short, usually extending to less than ½ the length of the leaf, rarely ¾; basal cells largest, irregular and porose; alar cells slightly different, denser and yellow or brown with thick walls, median and apical cells narrowly linear-vermicular, 27–54μ long by 2–4μ wide; all porose and smooth. Dioicous? only female plants seen. Archegonia in small lateral buds about 1 mm. long, with acuminate, serrulate, ecostate leaves and few paraphyses.

[13] *S. vancouveriense* Warnst.

[14] *S. acutifolium* Ehrh.

[15] *S. rubellum* Wils.; *S. tenellum* Kling.

[16] *S. subnitens* Russ. & Warnst.

[1] See Bryologist 21: 27. 1918.

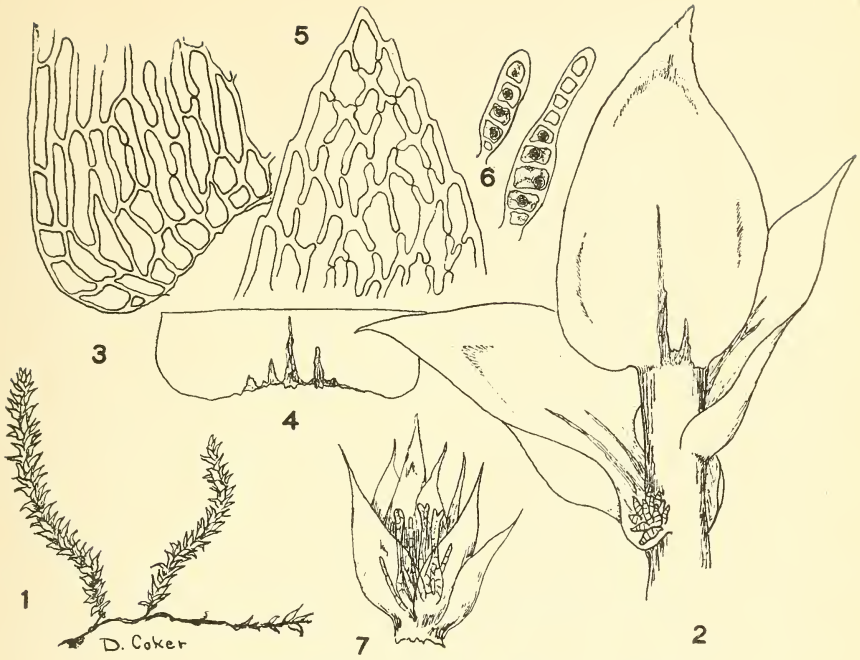


PLATE XXIV. *Jagerinopsis squarrosa* E. G. Britton.

1. Plant, natural size. 2. Part of stem enlarged, showing the clasping base of leaves and axillary clusters of propagulae. 3. Alar and basal cells of one leaf, enlarged. 4. Portion of the base showing variation in the costae. 5. Apical porose cells of leaf also enlarged. 6. Two of the septate brood-bodies. 7. Archegonial bud with small lanceolate perichaetial leaves.

Habitat: On trees. Conspicuous for the squarrose leaves; known only with female inflorescence.

Type locality: Sierra de las Yeguas, San Diego de los Baños, Pinar del Rio, Cuba, (*Jagerinopsis Cubensis* n. sp. MS in Hb.), June 28, 1915, South Slope of Sierra de los Helechales, Banao Mts., Santa Clara, Bros. Leon and Clement, Aug. 1915. Also on Magnolias near Sanford, Florida, S. Rapp. 1917.

Very closely related to *Jagerinopsis scariosum* Ltz. from Panama and perhaps identical, but the leaves of "*Meteorium scariosum* Ltz." from Panama are described as being "*shortly bicostate.*" Our specimens from Cuba and Florida are rarely shortly bicostate or they may have the vein forking either at the base or the apex, but usually it is single and ending in the middle of the leaf.

We have had the following note from H. N. Dixon:

"Mr. Gepp writes: 'We have in Herb. Hampe some scraps of *Neckera* (*Pilotrichella*) *scariosa* Lorentz, Chiriqui in Panama: M. Wagner, April, 1858. Fruct. ignot. [C. Müller's M. S.].'"

"I see from Lorentz Moss-Stud. that this is the original plant. I found none at Kew."

We have not seen the original specimens.

New York Botanical Garden, New York City.

SOME EXTENSIONS OF RANGES

Lincoln W. Riddle

The following extensions of ranges seem of sufficient interest to be put on record:

1. Dirina repanda (Fr.) Nyl. This is a lichen of calcareous rocks, always growing within the influence of the ocean winds. The center of distribution is around the shores of the Mediterranean Sea, but it extends northward in Europe to a few stations on the coast of England. There is a specimen in the Tuckerman Herbarium from the Hawaiian Islands, but the species has not hitherto been known from America. Recently, however, I have received specimens from the following stations in the Bahama Islands: Vicinity of Nassau, New Providence Island, collected by A. E. Wight, Jan. 9, 1905; Haynes Road, Great Exuma Island, collected by N. L. Britton and C. F. Millspaugh, Feb. 22–28, 1905, *no. 3033;* Cunningham Hill, Long Cay Island, collected by L. J. K. Brace, Dec. 7–17, 1905, *no. 4149.*

2. Lecidea cinnabarina Sommerf. (*Biatora* Fr.) This is a boreal species. In the western part of North America it has been known as far south as the mountains of Washington and Oregon. It has never been recorded from California, but in April, 1917, Professors Margaret C. Ferguson and Mabel A. Stone found it growing on the twigs of a Live Oak on the outskirts of the campus of Stanford University, Palo Alto, California.

3. Cetraria Fendleri Tuck. This species was based on material collected by Fendler in New Mexico. It is known from a number of localities in the coastal plain region of the Gulf States and up the Atlantic Coast as far as southeastern Massachusetts, where it was recorded by Willey from Nantucket, Martha's Vineyard, New Bedford, and Weymouth. It also extends up the Connecticut River Valley as far as Amherst, where it was collected by Tuckerman. I have found it at two stations considerably farther to the northeast: Pepperell, August, 1909 (only a few miles from the New Hampshire line); Ipswich sand-dunes, Nov. 21, 1910. In both of these cases, the plants were growing on the branches of *Pinus rigida*, and it is probable that the *Cetraria* may be expected to turn up as far north as York County, Maine.

4. Physcia leucomela (L.) Michx. The northernmost stations known for this tropical lichen are at Penn Yan, in the region of Seneca Lake, and Jordanville, in the Mohawk Valley, New York. In New England it has been found in southern Connecticut, and a single specimen is recorded from the New Bedford region, by Willey. In August, 1908, while collecting in the famous bog at Monkton, in the Champlain Valley of Vermont, where the tropical *Usnea angulata* has long been known to grow, I was fortunate enough to find good specimens of *Physcia leucomela*, growing with the Usnea.

Wellesley College, Wellesley, Mass.

CURRENT LITERATURE

In the December issue of *Rhodora*, Dr. Evans[1] continues his series of notes upon hepatics, bringing up to date the local flora records for the New England States, and giving more detailed accounts of certain species. There is a note upon the probable identity of *Sphenolobus ascendens* Warnst. with *Lophozia porphyroleuca*, and a discussion of the distinctive features, ranges, synonomy and general history of *Riccia Frostii*, Aust., *Scalia Hookeri* (Lyell) Gray, *Harpanthus Flotowianus* Nees, and *Calypogeia fissa* (L.) Raddi. All these species have recently been found within the limits of New England.

In the same journal Dr. Howe[2] has published a list of seven species of lichens that are additions to the two lists of Nantucket lichens previously published by him in *Rhodora*.

In the December issue of *Broteria* there is a continuation of Senhor Sampaio's[3] lists of Portuguese lichens. There is an annotated list of fifty species or varieties, and a list of new localities for species mentioned in previous lists. One new variety is published in *Alectoria*, and the descriptions of six new species, recently published in "Annaes scientificos da Academia polytechnica do Porto, Vol. XII," are given in full. In the last case, however, there are apparently some changes of name, so that there are three new combinations in the present article.

"Because there was an older *Thamnium* Klotsch, the moss of that name must receive another. *Thamnobryum* may be suggested."

With this introduction, Dr. Nieuwland[4] makes new combinations for eight species of the genus *Thamnium*. Of these species five are American, one is British and local, and two are Sumatran (according to Brotherus).

E. B. C.

Sullivant Moss Society Note

When it was announced that the 1918 meeting of the American Association for the Advancement of Science would be held in Boston, plans were made immediately for holding a meeting of the Sullivant Moss Society at the same time and place. Recently, however, word has come from the Secretary of the Association that the Committee on Policy has changed the place of the meeting from Boston to Baltimore, and that it is planned to make the meeting a limited one, in the sense that the programme will be largely confined to definite working problems relating to the war. In view of this decision of the main association,

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[1] Alexander W. Evans. Notes on New England Hepaticae—XIV. Rhodora, **19**: 263–272. (Dec., 1917.)

[2] R. Heber Howe, Jr. A Further Note on the Lichens of Nantucket. Rhodora, **20**: 40. (Feb., 1918.)

[3] Gonçalo Sampaio. Liquenes novos para a flora portuguesa. (3a Serie.) Broteria, **15**: 128–145. (Dec., 1917.)

[4] J. A. Nieuwland. Critical Notes on New and Old Genera of Plants—X. Am. Midl. Nat. 5: 50–51. (Mch., 1917.)

and of the present conditions in general, the advisory council of the Moss Society has decided that it is inadvisable to attempt any formal meeting at Baltimore this year.

EDWARD B. CHAMBERLAIN,
Secretary.

Exchange Department

Offerings—To *members only*. Return postage should accompany the request.

Mr. Edward B. Chamberlain, 18 West 89th St., New York City.—*Leskea tristis* Cesat., st., collected at Colebrook, Conn., by Dr. G. E. Nichols.

Dr. W. H. Emig, Department of Botany, University of Pittsburgh, Pittsburgh, Pa.—*Octodiceras Julianum* Brid., *Philonotis calcarea* Schimp., and *Didymodon tophaceus* (Brid.) Jur., all sterile, collected August, 1917, by W. H. Emig, in the Arbuckle Mts., Oklahoma.

Mr. A. T. Beals, 71 West 23rd St., New York City.—*Rhacomitrium sudeticum* (Funck) B. & S., and *Blindia acuta* (Huds.) B. & S., sterile, both collected by A. T. Beals near Lake Bigsby, Olmsteadville, N. Y., 1917.

Notice

Just as this issue of the BRYOLOGIST goes to press, after many delays, Mr. Chamberlain writes that in a letter just received from Mr. P. G. M. Rhodes, in England, there is the following announcement:

"The British Moss Exchange Club sends fraternal greetings to the Sullivant Moss Society. Members of the latter Society that chance to be in Britain, are invited to communicate with Mr. W. Ingraham, B.A., 6 Sycamore Terrace, Clifton, Yorks., who will put them in touch with local bryologists, if there be any in or near the place where they are stationed."

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JOURNAL OF THE

SULLIVANT MOSS SOCIETY

Conducted and Published for the Society by

O. E. JENNINGS, Ph.D., Editor-in-Chief

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All material for identification should be sent to the respective curators, also all correspondence relating to the Exchange Department.

THE BRYOLOGIST

Vol. XXI July, 1918 No. 4

WAR WORK FOR BRYOLOGISTS[1]

George E. Nichols

Until quite recently, sphagnum has not been generally considered as possessing any particular economic value, except in connection with the formation of peat, where its importance is well recognized. To be sure, it is used quite extensively by florists and nurserymen as packing material for plants, and locally it is employed for stable litter and bedding, as well as for various other purposes. But its value in surgical work, while recognized many years ago in Germany, has been little appreciated outside of that country, and it is only recently that this phase has come into prominence. At the present time sphagnum is being used to a vast extent, particularly by the British Red Cross, in place of absorbent cotton in surgical dressings. According to Professor Hotson,[2] the present British output of sphagnum dressings amounts to a million per month. And while the sphagnum was advocated primarily as a war substitute, there is little question that it will retain a permanent position as a standard material for absorbent surgical dressings.

For use in absorbent pads, the sphagnum is not merely equal to absorbent cotton—it is superior to it. According to Professor Porter,[3] sphagnum pads surpass cotton pads in the following important particulars: (1) they absorb liquids much more rapidly: about three times as fast; (2) they take up liquids in much greater amounts: a cotton pad will absorb only five or six times its weight of water, as compared with sixteen, eighteen, and even as high as twenty-two times, for a sphagnum pad; (3) they retain liquids much better: which means, of course, that the dressings need be changed less frequently; (4) they distribute the absorbed liquids more uniformly throughout their mass; (5) they are cooler and less irritating, yet at the same time fully as soft; (6) they can be produced at much less expense.

The structural peculiarities of the sphagnum plant, which enable it to take up and retain liquids, are, of course, familiar to all moss students and require only brief comment. Suffice it to say that whereas in a cotton pad liquids for the most part are merely held within a tangle of threads, in the sphagnum we have a highly efficient absorbing system. The ability of the sphagnum in this respect can be attributed to three features: (1) the presence of the large, color-

[1] Contribution from the Osborn Botanical Laboratory.

[2] Hotson, J. W. Sphagnum as a surgical dressing. 1–31. *f.* 1–18. Northwest Division of the American Red Cross. Seattle. 1918.

[3] Porter, J. B. Sphagnum surgical dressings. Internat. Journ. Surgery **30**: 129–135. *f.* 1–8. 1917. Distributed as a separate by the Canadian Red Cross.

The May number of The Bryologist was published July 30, 1918.

less, porous cells in the leaves and frequently also in the stem and branches; (2) the close overlapping of the leaves on the branches; (3) the sponge-like matting of the pendent branches around the stem.

Sphagnum moss was officially adopted by the American Red Cross as a standard surgical dressing material early in March of this year, but the enterprise here has not yet attained the magnitude which it is reasonable to expect that it will in the near future. For one thing, the project here is comparatively new and our American army surgeons, accustomed to using absorbent cotton, seem reluctant to adopt the substitute, notwithstanding that its superiority has been conclusively demonstrated. But another very serious handicap to the sphagnum enterprise in this country is the lack of exact knowledge regarding our resources of surgical sphagnum. In the Pacific Northwest, largely through the efforts of Professor Hotson and his associates, the situation is now well in hand; but in the east, while we know in a general way that the material is here, we have all too few exact data regarding sources of supply. It is primarily with the object of eliciting information on this subject from bryologists, who of all people should be best qualified to furnish it, that the present article is written. The writer is associated with the Department of Development of the American Red Cross in the capacity of Botanical Adviser on Sphagnum and will be pleased to examine any specimens of material which may be submitted.

For the benefit of those who may be willing to coöperate, it should be emphasized that there is a great difference in different lots of sphagnum when it comes to the selection of material for use in surgical dressings. First of all, different species differ greatly in their capacity for absorption, degree of softness, etc. Thus, of the forty species of sphagnum native to North America, only those belonging to the *Inophloea* group (the group which includes *S. papillosum*, *S. palustre*, *S. imbricatum*, *S. magellanicum*, etc.) have been found wholly satisfactory. Species of the *Compactum* group (*S. compactum*, *S. strictum*) have not been tried out, but ought to furnish excellent material. *S. squarrosum* seems excellent as to foliage and probably is open to objection only on account of its usually wiry stem. The species in the remaining groups, comprising about three-quarters of our native sphagnum flora, are virtually useless for surgical purposes, although some of them may be employed to a limited extent for special purposes or in combination with material of the more suitable species.

Speaking in general, it can be said that the more robust species of sphagnum are superior to the more delicate; forms with large leaves, dense foliage and close-set branches are greatly preferable to those with small leaves, skimpy foliage and scattered branches. Harsh, stiff, or brittle forms must be avoided. In this connection it should be further pointed out that not only is there a wide range of variation in the suitability of different species of sphagnum for surgical use, but in that of the same species from different regions or from different habitats within the same region. Thus, the average quality of material from the humid districts of western Washington and Vancouver is much higher than anything that has been seen from the east. In grading his western material,

Professor Hotson (*l c.*) regards *S. imbricatum* as the most desirable species for surgical work, with *S. palustre* second, and *S. papillosum* third. In the east the order of excellence appears to be exactly reversed, *S. papillosum* being regarded as by far the best species (see Porter, *l c.*). Further, the sphagnums attain their optimum growth in bogs, and, when present, the best qualities of surgical sphagnum almost invariably frequent the wettest parts of a bog. This is true even in the humid northeast, but it is even more so in regions where climatic conditions are less congenial. The same species (e. g. *S. papillosum*) may grow throughout a bog, yet it may attain the requisite degree of luxuriance only in the wettest, quakiest parts of the bog; elsewhere, not only will it be poor in quality, but the chances are that it will be more or less intimately mixed with undesirable species. In searching for surgical sphagnum, it is a good rule to avoid wooded swamps, for while sphagnums usually are present in abundance in such places, for various reasons the material generally is of too poor quality to be of surgical value. Bogs which are densely populated by heaths or other bushy growth likewise furnish unfavorable conditions, except locally, where there are wet, open depressions. The same may be said of bogs that are densely overgrown with sedges or grasses so much so as to give them the aspect of a meadow. *S. papillosum* in particular, requires plenty of sunlight as well as plenty of water. In bogs which have been flooded, as frequently happens through the damming of a lake, the better grades of sphagnum have usually been drowned out. *S. papillosum* seems especially sensitive to any change of environment. Along the coast in eastern Maine, the lumberman has thus been responsible for the extermination of much of the surgical sphagnum which formerly occupied the "flowage" swamps bordering many of the lakes and streams. During a recent trip of investigation in this region, the most ideal conditions for *S. papillosum* were found to be in low, wet, quaky bogs along the borders of well-drained ponds or small lakes, and in similar situations along slow streams. In favorable situations of this sort, this moss may comprise the bulk of the vegetation, building up broad cushions, often a foot high, and forming a more or less continuous ground cover. From a distance the most conspicuous plants in such an area are the "cranberry grasses" (*Carex filiformis, C. oligosperma*), which, on closer inspection, are usually found to form a rather scanty, open growth. Cranberries (*Vaccinium macrocarpon*) are practically always present, together with a scattering of low shrubs, such as sweet gale (*Myrica Gale*) and various heaths. Considered from the standpoint of the ecologist, it can be said that not only are bogs which have arisen through the intervention of a floating mat most favorable to surgical sphagnum, but *S. papillosum* in particular is far more likely to flourish in a bog where the mat-forming pioneers are sedges than in one where the pioneers are shrubs.

Taken as a group, the sphagnums are much more widely distributed in cool, humid regions than in warm, relatively dry regions. From a climatic point of view, the most favorable regions in the east are eastern Maine and the country lying to the northeast, along the coast: the region in which raised bogs are encountered. The best eastern material thus far collected in quantity came

from Cape Breton Island, Nova Scotia. But even in the interior, good material apparently is not lacking: fine specimens of *S. papillosum* have recently been received from Michigan. Except in regions where the climate is congenial, however, it is to be expected that sphagnums of surgical value will be very local in their distribution.

In conclusion, information is particularly sought regarding the occurrence in quantity of *S. papillosum*, since this species, as already pointed out, has proven the most uniformly adapted to surgical use. *S. papillosum*, to a limited degree, of course, can be recognized by its very robust habit and its commonly yellowish brown to brown pigmentation. Information regarding *S. palustre*, *S. imbricatum*, and *S. magellanicum*, where these appear sufficiently luxuriant to be of use, will also be welcome, but these, particularly the last named, tend to be of too poor quality (too much stem in proportion to foliage, stem too stiff, etc.) to meet the requirements.

Sheffield Scientific School, Yale University.

NOTES ON RADULA OBCONICA SULL.

Annie Lorenz

There are but few references to this interesting species in American hepatic literature. Sullivant's original description, copied by Underwood in his catalog of North American Hepaticae, (**7**, p. 44) was in the 1848 edition of Gray's Manual (**6**, p. 688), but it was not there illustrated. The figures appeared in the second edition, 1856, drawn by Isaac Sprague. While they are very small, and lacking in critical detail, they give a good impression of *R. obconica's* branching habit, and its general similarity to *R. complanata*. In fact, the two species are very closely related, the chief reason for separating them being the difference in their methods of vegetative reproduction.

The plant is of a more copiously branching and slender aspect than *R. complanata*, and it is found in moister situations than either that or *R. tenax*, on rocks in brooks, damp places near waterfalls, dripping rocks, etc. Sullivant gives its habitat as cedar trees, but Austin first notes its occurrence on rocks in his exsiccatae. In New England it usually occurs on rocks, being found upon both granitic and trap rocks.

As *R. obconica* has been but scantily described or figured, the following description has been compiled mainly from Sullivant and Stephani (**4**). The latter, of course, is not familiar with it in the field, so the writer has been obliged to differ with him on a few minor points. He says the species is heteroicous; it should be regarded rather as proterandrous, as the ♂ bracts are developed on the branch before the ♀ bracts. He gives the bracts as "hardly smaller than the stem-leaves"; the contrary is true of the New England material; also he makes no mention of the method of vegetative reproduction in either this or any other species of *Radula*. Müller, also, does not consider the method of vegetative reproduction as a specific diagnostic character.

Stevens (**5**), in 1910, studied the discoid gemmae in *R. complanata*, and Miss Williston (**9**), in 1912, discussed several species of *Radula*, all of which

have gemmae of the type which grow to a specific size and are then shed before germination commences.

Description of *Radula obconica*

Radula obconica Sullivant. Gray's Manual, Ed. 1, 1848.
Delin. Gray's Manual, Ed. 2, 1856.
Exsic. Aust. Hep. Bor. Amer. no. 88.

Monoicous, small, dark olive-green, coloring-matter imparting a yellowish green tint to water, like other *Radulae*, rather stiff, growing upon damp rocks or bark. Stem about 1 cm. long, indefinitely pinnate-branching. Stem-leaves hardly imbricated, almost flat, conduplicate, nearly horizontally spreading, very ovate, 0.86 mm. long, 0.65 mm. wide, apex obtuse, free about halfway to base and covering the stem. Lobule small, subquadrate, 0.27 mm. long, 0.23 mm. wide, obliquely truncate at apex, with an obtuse or acute angle at base, entirely adnate, upper margin (parallel to the stem) 0.2 mm. long, keel obliquely spreading, slightly arched, 0.4 mm. long, with smooth sinus terminating at the margin of the leaf. Leaf-cells hexagonal, upper 18μ in diameter, basal a little longer, trigones almost none. Perichaetial bracts a little larger than the stem-leaves, spatulate, with rounded apex, lobule shorter, very similar, apex truncate. Perianth with innovations on each side, clavate-oblong, 2 mm. long, mouth repand, entire, shortly bilobed. Perigonial bracts hypogynous, bracts in few pairs, deeply saccate, upper lobe rather gradually rounded, the under lobe very shortly truncate. Vegetative reproduction by means of caducous brood-leaves producing leafy shoots.

Habitat. Wet rocks, or tree trunks.

Distribution. Somewhat more southerly than the common species, according to the material in the herbaria of Dr. Evans, the New York Botanical Garden and the writer. Stations are as follows:

Vermont: Llana Falls, Salisbury. (A. L.).
Massachusetts: Bare Rock Falls, Sheffield. (A. L.).
Connecticut: *Litchfield:* Watertown, (A. L.); *Fairfield:* Redding, (Evans); *New Haven:* Mt. Carmel, (Evans), Hamden, (Evans), New Haven, (Evans), North Branford, (Evans), Oxford, (Harger), Guilford, (A. L.); *Middlesex:* Killingworth, (Nichols); *New London:* North Stonington, (Evans).
Pennsylvania: Delaware Water Gap, (Garber).
New Jersey: "Rare," (Austin).
District of Columbia: Washington, (Holzinger); Georgetown, (Coville).
Virginia: Nicks Creek, (Mrs. Britton and Miss Vail).
North Carolina: Salem.
Georgia: Tallulah and Toccoa Falls, (Underwood and Seymour).
Ohio: Champaign County, (Miss Biddlecome); Columbus, (Sullivant).
Arkansas: Boston Mts., Swain, (W. H. Emig).

R. obconica produces caducous brood-leaves in precisely the manner described by the writer in 1912 in *Frullania* (**2**), except that rhizoids have not been observed on the shed leaves. These leaves are "Brüchblätter", and not "Brutblätter", as they do not break off at any particular place. Goebel (**1**, p. 674, f. 632) figures a Radula from Brazil which has similar leaves breaking off at a specific spot.

A marginal cell on the shed leaves of *R. obconica* darkens, enlarges, and the cell-wall thickens, though not as noticeably as in *Frullania*. This enlarged cell divides by a horizontal wall, forming an inner and an outer cell. The outer one divides by a wall perpendicular to the leaf-margin, these divide in turn, and one side cuts out a triangular apical cell. The shoot develops directly from this, its first leaves being rudimentary, but it soon forms regular leaves with lobules, and is then easily detached from the parent leaf.

The cell-masses are not produced in as great abundance as in *Frullania*, but were observed on perhaps half of the specimens studied. They occur upon ♂ bracts as well as upon the leaves; none were observed upon the lobules.

The habitat has no apparent effect upon the production of brood-leaves, for while all the New England material examined by the writer grew on rocks, some particularly fine specimens were found on Miss Biddlecome's Ohio plants growing upon Juniperus.

The accompanying figures are drawn mainly from material collected by Dr. Evans in Connecticut, and the writer would thank him for lending his material of *R. obconica* for these investigations.

HARTFORD, CONNECTICUT, MARCH, 1918.

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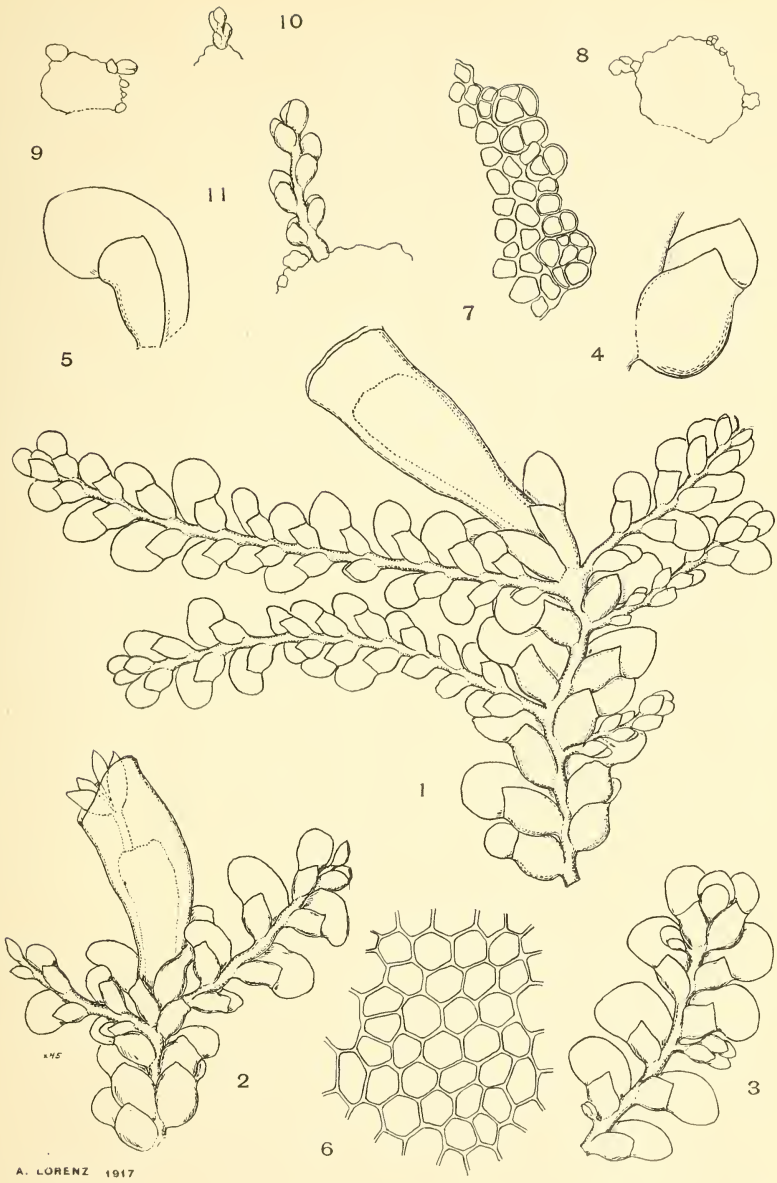
PLATE XXV. EXPLANATION OF FIGURES

Radula obconica Sullivant

1. Plant with perianth. ×22½.
2. Plant with perianth. ×22½.
3. Sterile shoot. ×22½.
4. Sterile bract. ×43½.
5. Sterile bract. ×43½.
6. Leaf-cells. ×285.
7. Marginal cells. ×285.
8. Leaf with cell-masses. ×43½.
9. Leaf with cell-masses. ×43½.
10. Leafy shoot. ×43½.
11. Leafy shoot. ×43½.

All figures drawn by the writer from material from Mt. Carmel. Branford and N. Stonington, Conn. (A. W. E.), and Mt. Washington, Mass. (A. L.).



Radula obconica Sullivant

OCTODICERAS JULIANUM BRID. VAR. OHIOENSE, NEW VARIETY[1]

W. H. Emig

Octodiceras Julianum Brid., a water moss of Fontinalis-like habit, is quite common attached to submerged boulders and rocks, in the rapids of Washita River where the river cuts through the Arbuckle Mountains of Oklahoma. Only a few plants of *Octodiceras*, much branched and four to six inches long, were found in the clear calcareous streams of this region. The water of the Washita River is clear for about two months during the late summer, but during the remainder of the year the water is muddy, more especially since the recent clearing of the local forests with its accompanying erosion of the exposed soil. During the next few years this change in the turbidity of the river water may have a decided influence on the continued growth and habit of these plants. The moss stems, much branched and usually about two inches in length, occur in small compact clusters at the base of which the rhizoids are flattened into small discs that serve as holdfasts. The dark green, flexible, and submerged sprays of mosses appear from a distance like growths of the alga *Cladophora*. A minute examination of the moss soon reveals its identity.

Specimens of this moss from Oklahoma were compared with a number of specimens, which had been determined as *Octodiceras Julianum* Brid., in the herbarium of the Carnegie Museum at Pittsburgh. In this collection there was one specimen—collected by Prof. L. S. Hopkins on August 20, 1909, in Portage County, Ohio—which, although sterile, was in certain respects different from the species. The more apparent differences of the new variety and the species are illustrated in figures 1, 2, and 3 of Plate XXVI. In the following table the several points of variation between the species and the new variety are indicated.

Octodiceras	Julianum Brid.	var. Ohioense
Length of leaf	3.85–4.05 mm.	4.85–5.05 mm.
Width of leaf at widest part	.32 mm.	.52 mm.
Number of cells across widest part of leaf	20–24	30–36
Width of leaf above vaginant lamina	.23 mm.	.39 mm.
Width of costa	.02 mm.	.02 mm.
Diameter of average cell near the center of the leaf between margin and costa, rounded-hexagonal	.012–.02 mm.	.016–.024 mm.
Cells at base of leaf near midrib, rectangular	.01×.02 mm.	.016×.03–.04 mm.
Length of vaginant lamina	1.35 mm.	1.80 mm.
Costa ends below apex	.16 mm.	.16 mm.
Along the midrib—Leaf cells are uniformly	rounded hexagonal	One or more rows of elongated rectangular cells.
At margin	Cells uniform with no indication of a margin	Several rows of small cells that give the appearance of an indistinct margin.

[1] Contribution No. 2, Botanical Department of the University of Pittsburgh.

The moss described above as a new variety is not given the rank of new species since it was not in fruiting condition. In the published illustrations and descriptions of *Octodiceras* there were found certain details at variance with the characteristics of the actual specimens. A correcton of these details are here considered a noteworthy addition and are illustrated in figures 4, 5, and 6 of Plate XXVI. There is also considerable confusion in regards to the true relationship of *Octodiceras Julianum* Brid., with the closely related species of *Fissidens* in which genus *Octodiceras* is often placed by certain bryologists. *Octodiceras Julianum* Brid. as it occurs in Oklahoma, is found submerged in running water throughout the year. In this respect it differs in habit from the species of *Fissidens*, which are found floating in quiet water, in moist places, or on surfaces that are dripping wet. Since *Fissidens Hallianum* Sull. and Lesq. is most frequently classed with *Octodiceras* under the synonym *Conomitrium* or as a subgenus of *Fissidens*, the differences between these two species will be given in the table that follows. These points of variance apply equally as well to a comparison of *Octodiceras* with the genus *Fissidens* as a whole.

Octodiceras Julianum Brid.	*Fissidens Hallianum* Sull. and Lesq.
Habitat.....submerged aquatic	floating or in moist places
Seta of capsule...same length or shorter than capsule	much longer than the capsule
Calyptra.....mitriform	cucullate
Dehiscence of operculum.....equatorial	above center of capsule
Peristome.....16 truncate teeth	16 subulate-lanceolate teeth

Octodiceras (okto—eight, dis keras—two horned, referring to the sixteen teeth) with a mitriform calyptra, a reduced peristome, and the equatorial dehiscence of the operculum should rank as a genus distinct from *Fissidens* in which genus the species have a cucullate calyptra, an operculum that dehisces above the center of the capsule, and a peristome of more or less perfect teeth.

University of Pittsburgh,
Pittsburgh, Pennsylvania.

Explanation of Plate XXVI

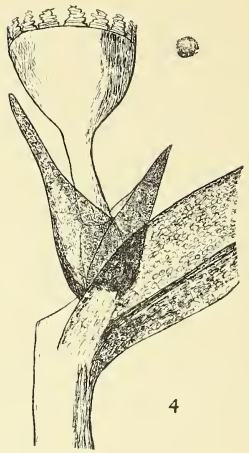
a. *Octodiceras Julianum* Brid., entire plant, ×1.
1. " " " portion of leaf above vaginant lamina, ×200.
2. " " " portion of leaf just below apex, ×200.
3. " " " var. *Ohioense* Emig, portion of leaf above vaginant lamina, ×200.
4. " " " capsule and spore, ×50.
5. " " " peristome, ×200.
6. " " " capsule and calyptra, ×40.

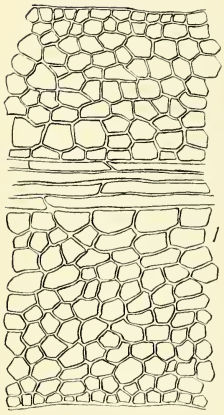
A COLLECTION OF MOSSES FROM NORTH CAROLINA

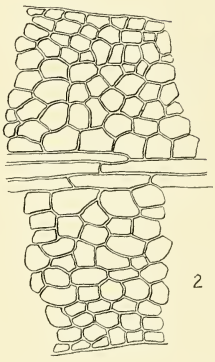
A. LeRoy Andrews

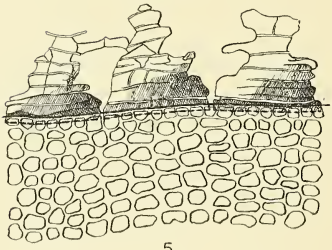
As supplementary to the list of hepatics published several years ago,[1] the following list of mosses may be of interest. In this case I have not taken the

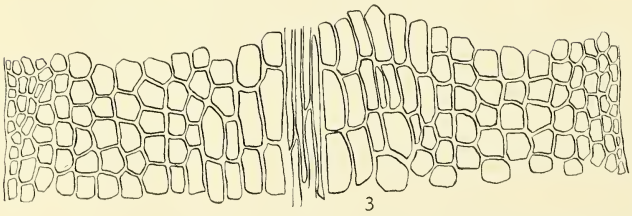
[1] The Bryologist, **17**: 58ff 1914.











Octodiceras Julianum Brid., and var. *Ohioense* Emig

same pains to include all the species represented under each number, but have for each taken only the plant making up the bulk of the collection, unless there was something else of particular interest or in great quantity found with it. As to nomenclature, that of the *North American Flora* has been followed so far as it extends; beyond that the names are such as will be generally recognized. They are not meant to express conviction as to generic limits, natural relationships, or priority of names, but rather for the most part a lack of such conviction:

1. "Collected by Geo. F. Atkinson at Blowing Rock, Watauga and Caldwell Counties, Aug. 19–Sept. 22, 1901. Blue Ridge Mountains, altitude, 3500–5000 feet."

Georgia pellucida (L.) Rabenh. 10971.
Catharinaea angustata Brid. 11000, 11028, 11041, 11043.
Pogonatum tenue (Menz.) E. G. B. 10978.
Polytrichum ohioense R. & C. 10967, 10968, 10993, 11004, 11015, 11031, 11037.
Ceratodon purpureus (L.) Brid. 11023.
Dicranella heteromalla (L.) Schimp. 10965, 10969, 10986, 10990, 11001, 11006, 11014, 11038, 11039, 11044, 11045, 12150.
Dicranum flagellare Hedw. 10974, 10985, 11007, 11027, 11029, 11051a, 11053, 11062, 11076.
Dicranum fulvum Hook. 11046.
Dicranum scoparium (L.) Hedw. 11010, 11022, 11052, 11071, 11074.
Leucobryum glaucum (L.) Schimp. 10977, 11079.
Rhabdoweisia crispata (Dicks.) Kindb. 10983.
Fissidens subbasilaris Hedw. 11069.
Weisia viridula (L.) Hedw. 10979.
Ulota ulophylla (Ehrh.) Broth. 11032.
Ulota Hutchinsiae (Sm.) Hamm. 11036, 11048.
Hedwigia albicans (Web.) Lindb. 11016, 11033.
Bryum argenteum L. 10966.
Rhodobryum roseum (Weis) Limpr. 11021, 11067.
Mnium cuspidatum (L.) Leyss. 11019.
Mnium affine Bland. 11040, 11067.
Philonotis fontana (L.) Brid. 11049.
Leucodon brachypus Brid. 10984, 10999, 11030, 11033, 11082.
Anomodon rostratus (Hedw.) Schimp. 10964, 11026, 11068.
Anomodon attenuatus (Schreb.) Hüben. 11020.
Anomodon apiculatus B. & S. 11042.
Thuidium scitum (Beauv.) Aust. 11081.
Thuidium delicatulum (L.) Mitt. 11034, 11051.
Entodon cladorrhizans (Hedw.) C. M. 11017.
Rhynchostegium serrulatum (Hedw.) J. & S. 10994.
Sematophyllum carolinianum (C. M.) E. G. B. 11013.
Sematophyllum recurvans (Michx.) E. G. B. 11008, 11009, 11066, 11084.

Hypnum chrysophyllum Brid. 11035.
Hypnum reptile Michx. 11018.
Hypnum imponens Hedw. 11005, 11047.
Hypnum Crista-castrensis L. 10995.
Hypnum rugosum Ehrh. 11085.
Eurhynchium strigosum (Hoffm.) B. & S. 11025.
1a. Same label, collected 1889.
Polytrichum commune L. 7337.
1b. Same locality, collected by E. J. Durand, July 20–Sept. 14, 1901.
Georgia pellucida (L.) Rabenh. 12116.
Catharinaea angustata Brid. 12115.
Pogonatum tenue (Menz.) E. G. B. 12113.
Polytrichum ohioense R. & C. 12108, 12109.
Dicranella heteromalla (L.) Schimp. 12112.
Dicranum flagellare Hedw. 12106.
Dicranum scoparium (L.) Hedw. 12107.
Ulota Hutchinsiae (Sm.) Hamm. 12110.
Rhodobryum roseum (Weis) Limpr. 12098.
Mnium punctatum (L.) Hedw. 12119.
Fontinalis dalecarlica Schimp. 12097.
Fontinalis Lescurii Sull. 12117.
Leucodon brachypus Brid. 12111.
Neckera pennata (L.) Hedw. 12118.
Hypnum reptile Michx. 12114.
Hypnum imponens Hedw. 12105.

2. "Collected by Geo. F. Atkinson in Watauga County, on trip from Blowing Rock, via Aho, Boone, return by Boone Road, Sept. 7, 1901. Blue Ridge Mountains, altitude, 2500–3000 feet."

Catharinaea undulata (L.) W. & M. 11389.
Polytrichum ohioense R. & C. 11302, 11322, 11386.
Ditrichum pusillum (Hedw.) Timm. 11341.
Dicranella heteromalla (L.) Schimp. 11343, 11355, 11368.
Dicranella rubra (Huds.) Kindb. 11364.
Dicranum flagellare Hedw. 11370.
Dicranum fulvum Hook. 11317, 11321, 11361.
Dicranum scoparium (L.) Hedw. 11305, 11346, 11390.
Fissidens subbasilaris Hedw. 11334.
Fissidens cristatus Wils. 11379.
Grimmia pennsylvanica Schwaegr. 11332.
Pohlia elongata Hedw. 11341.
Rhodobryum roseum (Weis) Limpr. 11339.
Mnium punctatum var. *elatum* Schimp. 11308.
Climacium americanum Brid. 11338, 11373.
Forsstroemia trichomitria (Hedw.) Lindb. 11357.
Neckera pennata (L.) Hedw. 11347.

Anomodon apiculatus B. & S. 11298, 11331, 11387.

Thuidium delicatulum (L.) Mitt. 11306, 11323, 11348, 11362, 11363.

Sematophyllum recurvans (Michx.) E. G. B. 11303, 11315, 11335, 11340, 11344, 11358.

Hypnum chrysophyllum Brid. 11382.

Hypnum reptile Michx. 11300, 11303, 11360.

Hypnum imponens Hedw. 11309, 11313.

Hypnum nemorosum Koch. 11350, 11384.

Hylocomium brevirostre (Ehrh.) B. & S. 11381.

Hylocomium splendens (Hedw.) B. & S. 11354.

Homalotheciella subcapillata (Hedw.) Card. 11376.

Brachythecium acuminatum (Hedw.) Kindb. 11311.

Brachythecium plumosum (Sw.) B. & S. 11316, 11351.

Brachythecium oxycladon (Brid.) J. & S. 11374.

Eurhynchium strigosum (Hoffm.) B. & S. 11312, 11327, 11353.

Eurhynchium graminicolor (Brid.) R. & C. 11304.

2b. Same trip, collected by E. J. Durand.

Neckera pennata (L.) Hedw. 12100.

Thuidium delicatulum (L.) Mitt. 12101.

Hypnum chrysophyllum Brid. 12102.

3. "Collected by Geo. F. Atkinson on Grandfather Mountain, Watauga, Caldwell and Mitchell Counties, Sept. 10 and 11, 1901. Blue Ridge Mountains, altitude, 3500–6000 feet.'

Sphagnum magellanicum Brid. 11664.

Sphagnum quinquefarium (Lindb.) Warnst. 11659, 11660, 11661, 11662, 11663, 11665, 11666, 11667, 11668, 11669, 11670, 11671, 11672, 11673, 11674, 11675, 11676, 11677, 11678, 11679, 11680, 11681, 11682, 11683, 11684, 11685, 11687, 11688, 11689, 11690, 11691, 11692, 11693, 11694.

Andreaea rupestris (L.) Hedw. 11432.

Georgia pellucida (L.) Rabenh. 11486.

Catharinaea angustata Brid. 11962.

Polytrichum ohioense R. & C. 11473, 11496, 11503, 11504, 11974.

Dicranella heteromalla (L.) Schimp. 11411, 11433, 11438, 11443, 11445, 11461, 11465.

Dicranodontium denudatum (Brid.) E. G. B. 11396, 11487.

Dicranum fulvum Hook. 11444, 11458, 11981.

Dicranum fuscescens Turn. 11429, 11436, 11446, 11457, 11476, 11481, 11482.

Dicranum scoparium (L.) Hedw. 11418, 11437, 11479, 11492, 11500, 11970, 11989.

Dicranum longifolium Hedw. 11401, 11439.

Leucobryum glaucum (L.) Schimp. 11686.

Rhabdoweisia crispata (Dicks.) Kindb. 11606.

Fissidens cristatus Wils. 11963, 11971.

Ulota Hutchinsiae (Sm.) Hamm. 11488.

Pohlia elongata Hedw. 11988.
Pohlia nutans (Schreb.) Lindb. 11497.
Rhodobryum roseum (Weis) Limpr. 11964.
Mnium punctatum (L.) Hedw. 11983.
Mnium affine Bland. 11990.
Aulacomnium heterostichum (Hedw.) B. & S. 11994.
Bartramia pomiformis (L.) Hedw. 11399.
Fontinalis Lescurii Sull. 11958.
Leucodon brachypus Brid. 11977.
Neckera pennata (L.) Hedw. 11597, 11975.
Anomodon apiculatus B. & S. 11959.
Thuidium delicatulum (L.) Mitt. 11985.
Pylaisia Schimperi Card. 11978.
Plagiothecium denticulatum (L.) B. & S. 11477, 11502.
Plagiothecium sylvaticum (Huds.) B. & S. 11434, 11494.
Plagiothecium striatellum (Brid.) Lindb. 11464.
Sciaromium Lescurii (Sull.) Broth. 11966.
Sematophyllum carolinianum (C. M.) E. G. B. 11459.
Sematophyllum recurvans (Michx.) E. G. B. 11395, 11414, 11454, 11463, 11477, 11495.
Hypnum reptile Michx. 11405, 11430, 11608, 11960, 11979.
Hypnum imponens Hedw. 11991, 11992.
Hypnum Crista-castrensis L. 11403, 11498.
Hypnum Schreberi Willd. 11440.
Hylocomium brevirostre (Ehrh.) B. & S. 11968, 11993.
Hylocomium splendens (Hedw.) B. & S. 11419.
Eurhynchium strigosum (Hoffm.) B. & S. 11953, 11961.

4. "Collected by Geo. F. Atkinson near Shulls Mills, N. C., Sept. 13, 1901. Blue Ridge Mountains, altitude, about 3000 feet."

Polytrichum ohioense R. & C. 12049.
Webera sessilis (Schmid.) Lindb. 12058.
Dicranum longifolium Hedw. 12053.
Leucobryum glaucum (L.) Schimp. 12052.

5. "Collected by Geo. F. Atkinson along Caney River, on lower slope of Mt. Mitchell, Yancey County, Sept. 15–16, 1901. Black Mountains, altitude, 3000–4000 feet."

Georgia pellucida (L.) Rabenh. 11708.
Catharinaea angustata Brid. 11747, 11750.
Catharinaea undulata (L.) W. & M. 11699.
Polytrichum ohioense R. & C. 11719.
Webera sessilis (Schmid.) Lindb. 11727.
Dicranum fulvum Hook. 11710, 11730.
Dicranum scoparium (L.) Hedw. 11714, 11745.
Rhacomitrium aciculare (L.) Brid. 11723, 11755.
Bartramia pomiformis (L.) Hedw. 11703.

Climacium americanum Brid. 11695.
Leucodon brachypus Brid. 11698, 11700, 11721, 11748.
Forsstroemia trichomitria (Hedw.) Lindb. 11717.
Neckera pennata (L.) Hedw. 11707.
Thamnium alleghaniense (C. M.) B. & S. 11722, 11731.
Anomodon rostratus (Hedw.) Schimp. 11713.
Anomodon apiculatus B. & S. 11712, 11729, 11732, 11734, 11740, 11752.
Thuidium delicatulum (L.) Mitt. 11716, 11720, 11728, 11735, 11739, 11743.
Hypnum curvifolium Hedw. 11742.
Hylocomium brevirostre (Ehrh.) B. & S. 11718, 11751.
Brachythecium plumosum (Sw.) B. & S. 11696, 11701.
Eurhynchium strigosum (Hoffm.) B. & S. 11738.

6. "Collected by Geo. F. Atkinson near Spruce Pine, N. C., Sept. 15 and 17, 1901. Blue Ridge Mountains, altitude, about 3000 feet."

Sphagnum palustre L. 12050, 12051.
Sphagnum quinquefarium (Lindb.) Warnst. 12056, 12057.

7. "Collected at Chapel Hill, N. C., Feb. 26, 1888."

Fissidens cristatus Wils. 12133.
Ptychomitrium incurvum (Schwaegr.) Sull. 12138.

Ithaca, N. Y.

REVIEW OF LITERATURE

In the *Kew Bulletin*[1] there has recently appeared a note on a long obscure moss name. Inasmuch as the *Bulletin* is not so readily accessible to most members, we reprint the note in full:

"**Chatubinskia,** *Rehmann.*—During his travels in South Africa in 1875 to 1877, Dr. Rehmann collected a large number of mosses and hepaticae, which he distributed in sets accompanied by printed labels bearing details as to the habitat and in most cases also the determination. Amongst the mosses were many proposed new species, of which descriptions were not published at the time, but this was done in some cases by Dr. Carl Mueller in Hedwigia, xxxviii, pp. 52–155 (1899), while others were merely enumerated in the Revue Bryologique 1878, pp. 69–71, and in General Paris' Index Muscorum, but up to the present time no general list of this valuable collection has appeared. No. 595, collected in the Transvaal, was regarded by Rehmann as a new genus, for which he proposed the name *Chatubinskia africana*, which up to the time of the recent issue of T. R. Sim's Handbook of the Bryophyta of South Africa (p. 199) had been neither described nor identified. The specimen at Kew shows that this is not a moss, but the almost cosmopolitan hepatic, **Herberta juniperina,** *Spruce*, in Trans. Bot. Soc. Edinb., xv, p. 342 (1885); *Jungermannia juniperina* Sw. Fl. Ind. Occ., p. 1855 (1806); *Schisma juniperinum*, Dmrt. Comm. Bot., p. 114 (1822); *Sendtnera juniperina*, Nees in Gott., Lindenb. et Nees, Syn. Hepat., p. 239 (1844).

The locality given on Rehmann's label is: "Transvalia; in silvis primaevis mont. Lechlaba in latere meridionali in summi montis Snellskop ad arborum truncos."

[1] C. H. W. Chatubinskia, Rehmann. Kew Bulletin of Misc. Information, 1917. No. 9 and 10. pp. 339–340.

Dr. Andrews[2] has recently described a new hybrid moss from material collected on the surface of fine silt that had been pumped upon a fresh marsh at Ithaca, N. Y., in the progress of reclamation work. The antheridial parent was *Physcomitrium turbinatum*, and the archegonial, *Physcomitrella patens*. Both parents, with various species of *Physcomitrium* and *Aphanorrhegma*, were abundant in the vicinity. Dr. Andrews gives a detailed description of the sporophyte, and mentions other cases of hybridism which have been described in mosses.

Four new species of *Lejeuneae* are described by Dr. Evans[3] in a recent issue of the *American Journal of Botany*. The four are: *Cololejeunea contractiloba*, *Lejeunea cladogyna*, *Euosmolejeunea parvula*, and *Ptychocoleus heterophyllus*, all from Florida. Besides detailed descriptions and figures of these species, there are extended critical notes upon the relationships and distribution of the plants described, a description (with figure) of *Lejeunea longifissa* Steph., and additional descriptive note upon *Rectolejeunea Maxonii* Evans.

E. B. C.

EXCHANGE DEPARTMENT

Offerings—*To members only*. Return postage should accompany the request. It is better to send a *stamp*, rather than a stamped envelope; many of the latter do not fit specimen packets.

Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.—*Breutelia arctuata* Schimp., *st.* Coll. Mr. Rhodes, in Wales. *Dicranoweisia cirrhata*, Lindb., *c. fr.* Coll. Mr. Rhodes, in England.

Dr. Wm. H. Wiegmann, 436 East 5th Street, New York City.—*Dicranum rhabdocarpum* Sull., Coll. Dr. Jos. Bequaert, in Arizona.

Mr. Frank E. MacDonald, 417 California Avenue, Peoria, Ill.—*Dicranella heteromalla* Schimp., *Dicranella varia* Schimp., and *Catharinaea angustata* Brid., all *c. fr.* from Illinois.

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[2] A. LeRoy Andrews. Bryological Notes IV.—A New Hybrid in Physcomitrium. Torreya, **18**: 52–54. (March, 1918.)

[3] Alexander W. Evans. Noteworthy Lejeuneae from Florida. Am. Journ. Bot. **5**: 131–150. *figs. 1–5.* (March, 1918.)

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O. E. JENNINGS, Ph.D., Editor-in-Chief

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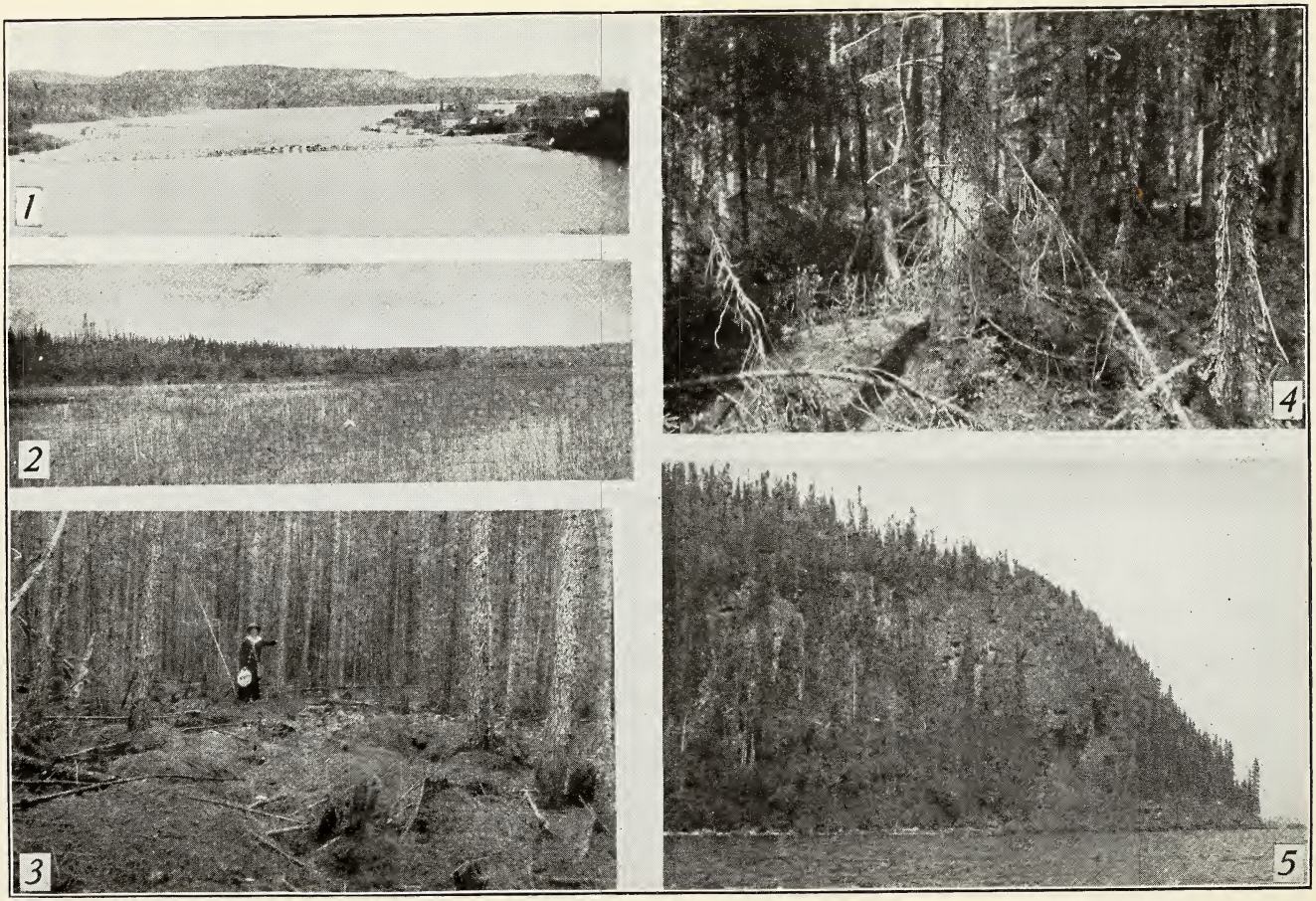
All material for identification should be sent to the respective curators, also all correspondence relating to the Exchange Department.



CHARACTERISTIC PLANT HABITATS, NIPIGON REGION, ONTARIO
Figs. 1 and 3 near Nipigon; 2, 4, and 5 at north end of Lake Nipigon. *See* Explanation of Plate, p. 78

THE BRYOLOGIST

VOL. XXI SEPTEMBER, 1918 NO. 5

NOTES ON THE MOSSES OF NORTHWESTERN ONTARIO. I. SPHAGNUM

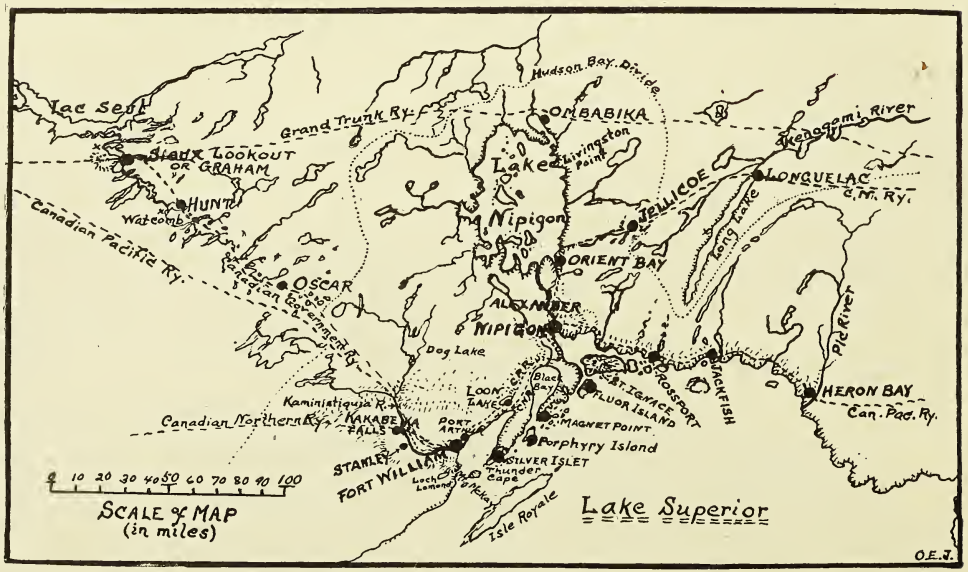
O. E. JENNINGS

It has been my intention for some time to begin the publication of a series of notes relating to the bryophytes collected by my wife and me during the five summers we have spent in the delightfully wild and little botanized region to the north and northwest of Lake Superior. During these expeditions we have spent most of the time "roughing it," pitching our tent at some point for from two to three or four weeks and from this station working the surrounding territory, sometimes so far from our tent as to necessitate sleeping out and returning to the tent next day. During the first season, Mr. R. H. Daily was with us most of the summer, but otherwise we worked by ourselves, without the services of either cook or guide. Altogether during the summers of 1912, 13, 14, 16, and 17, we have established ourselves at twenty-one stations, some of these places having been worked two or three times at different seasons. The region thus covered extends for about two hundred miles along the "North Shore" of Lake Superior and out onto many of the islands and peninsulas, and from there northeast to the north end of Long Lake on the Kenogami River (Hudson Bay drainage); north to the north end of Lake Nipigon, about a hundred miles north of Lake Superior; and northwest to Sioux Lookout, nearly two hundred miles from Lake Superior. The whole territory embraced within these points is perhaps twice the size of the state of New Jersey, and our field numbers, including all kinds of plants, have mounted to nearly eighteen thousand.

In articles in the *American Fern Journal*[1] the natural features of the regions visited have been described to some extent. The region along the north shore of Lake Superior and to the north around what is really one of our *six* "Great Lakes," Lake Nipigon, is rough enough to be termed mountainous. Thunder Cape and St. Ignace Island along the north shore of Lake Superior rise to over twelve hundred feet above its waters, while especially around the southern end of Lake Nipigon steep knobs and even vertical cliffs rise precipitately out of the water to a height of several hundred feet. This Nipigon and North Shore region is covered very largely with a thick cap of Keewenawan diabase which has faulted in wide gaps or which has broken down vertically producing pali-

[1] Jennings, O. E. Notes on the Pteridophytes of the North Shore of Lake Superior. Amer. Fern Journ. **3**: 38–48. June, 1913; same title—II. **4**: 68–73. Apr.–June, 1914; Notes on the Pteridophytes of Northwestern Ontario, Amer. Fern Journ. **5**: 33–39, May, 1915; An annotated List of the Pteridophytes of Northwestern Ontario. Amer, Fern Journ. **8**: 38–50 and 76–88. Apr.–June and July–Sept., 1918.

The July number of THE BRYOLOGIST was published September 16, 1918.



PORTION OF NORTHWESTERN ONTARIO

Map showing by black dots the localities in northwestern Ontario which were used one or more times as bases or stations from which to botanize the surrounding territory during the years 1912, 13, 14, 16, and 17. No attempt has been made to include on this map the hundreds of smaller lakes and streams.

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sades such as those forming the main attraction of the magnificent scenery towards the mouth of the Nipigon River. This diabase country is wild and rough—a wilderness of mountain, cliff, talus-slope, bog, lake, and rushing waters with frequent waterfalls, practically all in forest, although burned over in places. It is a botanists' and sportsmen's paradise, but woe to him who is not able to live in a tent or to pack things on his back over rough trails, or whose nerves are not equal to the test of the hordes of black flies by day, "no-see-ums,"[2] at dusk and daybreak, and mosquitoes by night!

The forests in this region consist of but few types. Black spruce occurs everywhere in the mature muskegs and also in crevices on the cliffs and more barren rocky surfaces where soil is scanty or none. On the burned-over areas, of course, the white birch and trembling aspen prevail, while in favorable situations, where a rather deep forest soil has accumulated, the forest is nearly pure balsam and spruce, or, more usually, a mixture of these trees with white birch and trembling aspen and an undergrowth of mountain ash and moose maple (*Acer spicatum*).

To the east of Lake Nipigon the country is less rough, there being much glacial till and sand-plain between the rock hills, though still with numerous lakes and bogs, the spruce muskeg covering large areas. To the northwest of Lake Superior, along the line of the Canadian Government Railway, about thirty miles from Fort William, there is a mountain range which, with its similar altitude and rounded contours, reminds one of the ranges of the Allegheny Mountains, though with some very steep cliffs and rocky gorges. Beyond this range, farther northwest, the country becomes rather monotonous with wide stretches of spruce muskeg and lakes and ponds innumerable, bounded by flat stretches of Banksian pine sand-plain or by glacial moraines, or by low knobs of rock made round and smooth by glaciers.

The following list enumerates the specimens of Sphagnum collected during the years 1912, 1913, and 1914. These were identified for us by Dr. A. LeRoy Andrews. While not yet worked over, the 1916 and 1917 specimens will not likely show much in addition, other than to extend the areas of some of the species eastward from Lake Nipigon to Jellicoe and Long Lake, and to add further localities within the general area covered by the three years' collections reported herewith. The ranges given for the species and the order of sequence and the nomenclature in the list is that adopted by Andrews in the *North American Flora*. All specimens were collected by O. E. and Grace K. Jennings, unless otherwise stated. The numbers in parenthesis are the writer's field-numbers for his Ontario collections.

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[2] Minute blood-sucking flies variously known as Midges, Sand-flies, Punkies, or No-see-ums, belonging to the genus *Culicoides*. These pests were especially annoying at our station at Orient Bay, Lake Nipigon. The "Black Fly" of the North Woods is a dark-colored, hump-backed, short-legged fly (genus *Simulium*) about half as long as a house fly. It bites with a lance-like cut from which blood flows, especially along the edge of one's hat-band, under the collar, and around the wrists. This pest is much worse during the first half of the summer, and especially after a wet spring and its favorite habitat is a black spruce-sphagnum muskeg. See Miall's *Aquatic Insects* for some interesting reading concerning the life of the Black Fly.

Annotated List of Species

1. *Sphagnum magellanicum* Brid. (*S. medium* Limpr.).

Margin of pond, Silver Islet, Thunder Cape, June 23, 1912 (No. *336*) O. E. Jennings & R. H. Daily; Bog margin of twin lakes 1 mile south of Nipigon, July 2, 1912 (*634*) O. E. Jennings & R. H. Daily; Spruce muskeg west of Heron Bay R. R. Station, July 20, 1912 (*1355*) O. E. Jennings & R. H. Daily; Open bog near Porphyry Island lighthouse, July 23, 1913 (*3689*); Spruce muskeg at Fort William Mission, Sept. 5, 1913 (*5208*, *5210*); Open bog at Orient siding, south end of Lake Nipigon, July 2, 1914 (*6160*); Boggy margin of little lake between Orient Bay and Virgin Falls, south end of Lake Nipigon, July 8, 1914 (*6335*) and July 19, 1914 (*6537*); Spruce muskeg on gentle slope at north end of Ombabika Bay, north end of Lake Nipigon, Aug. 17, 1914 (*7046*); Muskeg at east end of Pelican Lake, Graham, Sept. 5, 1914 (*7481*). Macoun reports it from Lake Nipigon[3].

The distribution of this species is: "Labrador southward to Alabama and Florida; [Central Pennsylvania—O. E. J.]; Michigan; Minnesota; California; Vancouver Island to Alaska; Bermuda; also in Europe, Asia, and South America."[4] In common with a considerable number of other plants occurring in northwestern Ontario, this species, as far as its distribution is known, has in North America a range which may be likened to an hour-glass, wide at both ends and narrowing down in the middle. However, the abundant occurrence of this species in practically all parts of the region visited would indicate that its range may extend much farther to the north in the middle portion of Canada.

It is of interest at the present time to note that this is practically the only one of the good surgical sphagnums occurring in northwestern Ontario.[5] Not having in mind this practical use of the moss when collecting the specimens,

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[3] Macoun, in Catalogue of Canadian Plants, Part VI—Musci. 1892 (Geol. & Nat. Hist. Surv. Canada), reports the following sphagnums from the general region covered by our expeditions. The reports are taken verbatim from the Catalogue without any attempt being made to straighten out the synonymy, nor to verify the reports according to more modern treatments of the genus:

1. *S. Girgensohnii* Russ. "On the portage path, four miles east of Kakabeka Falls, west of Lake Superior." "Peat bog, Newboro, near Kingston, Ont. (*Prof. Lawson*)."

2. *S. fuscum* var. *fuscescens* Warnst. "In a swamp near the Pic, Lake Superior."

3. *S. acutifolium* var. *pallescens* Warnst. "In the hollows of granite rocks on a small island off the northeast coast of Lake Superior, nearly opposite the lower end of Michipicoten Island."

4. *S. acutifolium* var. *rubrum* Warnst. "Peat bogs, Lake Nipigon, Ont. (*Macoun*)."

5. *S. teres* var. *squarrosulum* Lesq. "In a swamp 15 miles west of Port Arthur, Lake Superior (*Macoun*)."

6. *S. compactum* var. *subsquarrosum* Warnst. "Bogs along Nipigon River, Ont."

7. *S. subsecundum* Nees. "Bogs, Lake Nipigon, Ont."

8. *S. cymbifolium* Ehrh. Very common in peat bogs throughout Ontario, but seldom separated from the variety," i. e. var. *laeve* Warnst.

9. *S. medium* var. *laeve* f. *purpurascens* Russ. "Peat bogs along Lake Nepigon."

[4] Andrews. A. LeRoy. North American Flora.

[5] Nichols, G. E. War Work for Bryologists. Bryologist **21**: 53–56. July, 1918.

Hotson, J. W. Sphagnum as a Surgical Dressing. Science, N. S. **48**: 203–208. Aug. 30, 1918.

I did not note the relative abundance of this species. Gathering together my various ecological notes and other data it appears quite certain, however, that *S. magellanicum* occurs in considerable quantity throughout most of the region but it is practically always closely associated with a number of other species and practically always occurs with *Myrica* or *Chamaedaphne*, or in black spruce muskegs, in each case likely to be mixed with twigs and other foreign matter. Generally speaking, this would not likely be a good region for extensive gatherings of the moss for surgical purposes, but I have no doubt that careful search among the bogs of the North Shore district of Lake Superior would reveal here and there supplies of good quality.

1*a*. *Sphagnum magellanicum* Brid.—The form called by Warnstorf *S. subbicolor* Hampe.

Bog margin of little lake one-half mile north of Rossport, July 15, 1912 (*1158*) O. E. Jennings & R. H. Daily; Margin of Perry Pond, Silver Islet, July 13, 1913 (*3507*); In alder thicket along rivulet in deep spruce-balsam woods, Porphyry Island, Lake Superior, July 23, 1913 (*3692*).

2. *Sphagnum compactum* D. C. (*S. rigidum* Schimp.).

Near Rossport, July 14, 1912 (*1053b*) O. E. Jennings & R. H. Daily. Bogs along Nepigon River, according to Macoun (*see* footnote, p. 72). With a reported range (*North American Flora*) of "Greenland; Labrador southward to Florida and Alabama; [also central Pennsylvania—O. E. J.]; Illinois; Vancouver Island to Alaska; also in Europe and Asia." The additional stations extend the mid-continental range of the species considerably to the north.

3. *Sphagnum Wulfianum* Girg.

In dark, moist Balsam-Spruce-Thuya-Birch woods, between granite hills one mile northwest of Heron Bay R. R. station, July 22, 1912 (*1447b*) O. E. Jennings & R. H. Daily; Spruce muskeg on top of mountain south of Nipigon, Aug. 27, 1912 (*2336*, *2326b*, *2327*) O. E. & G. K. Jennings and R. H. Daily; Under spruce at margin of bog, Porphyry Island, Lake Superior, July 26, 1913 (*3803*); Little muskeg on glacial till north of Ombabika Post, Aug. 17, 1914 (*6756*); Forming the high mounds in spruce muskeg at head of Ombabika Bay, north end of Lake Nipigon, Aug. 17, 1914 (*7038*), see *Pl. XXVII, fig. 4*.

In the regions visited, *S. Wulfianum* seems to be almost always prominently associated with the black spruce, often forming mounds of considerable size. North of the head of Ombabika Bay, in the extensive spruce muskeg covering the gently ascending slope, the mounds were often three or four feet in diameter and as much as a foot high. In North America the reported range of the species is from Greenland and eastern Canada to Connecticut; New York; Minnesota; and Vancouver Island. It is also reported from Siberia and northern Europe, and its abundance in the Lake Superior and Lake Nipigon districts would indicate a considerable mid-continental range in America to the northwards.

4. *Sphagnum squarrosum* Crome.

In spruce muskeg margin of lakelet, Ft. William Mission, June 19, 1912 (*180*) O. E. Jennings & R. H. Daily; Exposed top of Sleeping Giant, Thunder Cape, June 27, 1912 (*426*) O. E. Jennings & R. H. Daily; Under spruce-alder

thicket along margin of cold rivulet, Porphyry Island, L. Superior, July 23, 1913 (*3692*) and July 26, 1913 (*3796*); Maloney Harbor, Black Bay Peninsula, Lake Superior, Aug. 17, 1913 (*4871*); Boggy woods east side Loon Lake, Sept. 9, 1913 (*5268*); In boggy woods along trail west of Sioux Lookout, Sept. 7, 1914 (*7538*).

From arctic regions ranging along the North American coasts as far south as New Jersey and California, the species has been found inland in central Pennsylvania, Ohio, Michigan, Wisconsin, and Minnesota, and our records show it rather general along the northwest shore of Lake Superior and to the northwest of there. However, we did not get it from Nipigon nor east of there along the North Shore, nor from the Lake Nipigon district. It occurs closely associated with the black spruce in muskegs and with alders fringing cold rivulets.

5. *Sphagnum teres* (Schimp.) Angstr. (*S. squarrosulum* Lesq.).

Mixed with other sphagnums in boggy margin of small lake between Orient Bay and Virgin Falls, south end Lake Nipigon, July 19, 1914 (*6540*). Macoun reports it along the Nipigon River (*see* footnote, p. 72.) Ranging south along the coasts to New Jersey and California, this species has been found inland in Pennsylvania, New York, Michigan, and Colorado, so that the Lake Nipigon station marks a still farther extension of range northwards in the interior of the continent.

6. *Sphagnum recurvum* Beauv. (*S. amblyphyllum* Warnst.).

Marginal bog of Six-mile Lake, Thunder Cape, Aug. 5, 1912 (*1829*) O. E. & G. K. Jennings & R. H. Daily; Ft. William Mission bog, Sept. 5, 1913 (*5204*); Boggy margin of little lake between Orient Bay and Virgin Falls, south end Lake Nipigon, July 19, 1914 (*6538 & 6542*); Along wet woods trail west of Sioux Lookout, Sept. 7, 1914 (*7527*); Bog at western edge of Graham, Sept. 7, 1914 (*7578*).

According to *North American Flora*, this species ranges from "Labrador southwards to Florida and Louisiana; Colorado; Washington to Alaska; also in South America, Europe, and Asia, and reported from Africa." No mention is made of any stations in the Great Lakes region, although it occurs commonly in northwestern Pennsylvania. Our collections would indicate a considerable mid-continental range for it, especially northwards.

6a. Sphagnum recurvum var. *tenue* Klingr. (*S. parvifolium* Warnst.).

Boggy margin of lake near Ft. William Mission, June 19, 1912 (*179 & 184*) O. E. Jennings & R. H. Daily; Spruce muskeg west of Heron Bay R. R. station, July 20, 1912 (*1356*) O. E. Jennings & R. H. Daily; In small open bog with *Sarracenia*, *Iris*, *Chamaedaphne*, etc., Orient siding, south end Lake Nipigon, July 2, 1914 (*6161*, *6180*, *6181*); Open bog at western edge of Graham, Sept. 7, 1914 (*7585*).

In North America this species ranges from Greenland to Pennsylvania, and from Washington to Alaska, occurring inland in central Pennsylvania, Michigan, Minnesota, Nebraska, Montana, and Idaho. Our collections show it to have a rather general distribution in northwestern Ontario also. It usually occurs in rather open bogs with *Sarracenia*, *Iris*, Cassandra, etc.

7. *Sphagnum subsecundum* Nees. (*S. contortum* Schultz, *S. laricinum* Spruce).

Boggy woods near shore, Edwards Island, Lake Superior, July 24, 1913 (*3731*); In *Myrica* bog at mouth of creek, Orient Bay, Lake Nipigon, July 18, 1914 (*6506*). Macoun also reports it for Lake Nipigon. Dr. Andrews notes that *No. 3731* is the form called by Warnstorff, *S. contortum* Schultz.

With a distribution from Greenland and Labrador to Florida, Louisiana, and Mexico, and from California to Washington; also Europe and Asia, and "regarded as cosmopolitan," our collections would indicate it, for the North Shore and Lake Nipigon regions, as a rather rare moss occurring near the edges of large bodies of water.

8. *Sphagnum Girgensohnii* Russow. (*S. strictum* Lindb.).

Together with the *subbicolor* form of *S. magellanicum* (*No. 1153*), this forms most of the open bog margin of a lakelet one-half mile north of Rossport, July 15, 1912. O. E. Jennings & R. H. Daily; Boggy woods at margin of Perry Lake, Silver Islet, Thunder Cape, July 7, 1913 (*3423*); Alder swamp near Grassy Lake, Silver Islet, July 16, 1913 (*3536*); Margin of pond in woods, Fluor Island, Lake Superior, Aug. 16, 1913 (*3966*); Periodically dry pocket on unforested rocky top of knob, Little Fluor Island, Aug. 7, 1913 (*4002*); same island, Aug. 9, 1913 (*4030*); Spruce muskeg at head of Ombabika Bay, north end of Lake Nipigon, Aug. 14, 1914 (*6907, 6910, 7045*); Rock pocket on bare top of Sioux Lookout Mount, Sept. 4, 1914 (*7398*); Open bog at western edge of Graham, Sept. 7, 1914 (*7576*). Reported by Macoun: "On the portage path, four miles east of Kakabeka Falls, west of Lake Superior." (*See* footnote, p. 72.)

Distributed from Greenland and Labrador to New Jersey and Pennsylvania; in West Virginia; Ohio; Minnesota; and from Oregon to Alaska; also Europe and Asia, our collections show it to have a quite general distribution in northwestern Ontario.

9. *Sphagnum robustum* (Russow) Roell. (*S. Russowii* Warnst.).

On spray-swept rock shore of Lake Superior, three miles northwest of Rossport, July 15, 1912. O. E. Jennings & R. H. Daily (*1121*); On steep granite slope, south side of Jackfish Island, Lake Superior, July 19, 1912 (*1260*) O. E. Jennings & R. H. Daily; Grassy bog at upper end of Grassy Lake, Silver Islet, Thunder Cape, July 9, 1913 (*3465d*); With *S. magellanicum* (*3689*) in bog near Porphyry Island lighthouse, Lake Superior, July 23, 1913; Along wet portage in spruce forest on North Ombabika Peninsula, Lake Nipigon, Aug. 19, 1914 (*7184c, 7190*).

"Greenland and Labrador to Massachusetts and New York; Colorado; Montana; Idaho; reported from Washington; also in Europe and reported from Asia." Evidently also rather generally distributed along the North Shore and northward around Lake Nipigon.

10. *Sphagnum fuscum* (Schimp.) Klingr.

Bog at Ft. William Mission, June 19, 1912 (*185, 186*) O. E. Jennings & R. H. Daily; North face of cliff in deep woods, Silver Islet, Thunder Cape, June 23, 1912 (*310s*) O. E. Jennings & R. H. Daily; Spruce muskeg west of Heron Bay

R. R. station, July 20, 1912 (*1354*, *1357*) O. E. Jennings & R. H. Daily; Spruce bog two miles northwest of Current River Park, Port Arthur, Aug. 2, 1913 (*1728*); Swampy spot between sandhills three miles southeast of Stanley, June 30, 1913 (*3200*); Base of old stump, shore Surprize Lake, Thunder Cape, July, 1913; Boggy spruce woods east side Edwards Island, Lake Superior, July 24, 1913 (*3731*); Forming dense, rounded, brownish-green mounds in outer edge of bog near encircling black spruce forest, Porphyry Island, July 26, 1913 (*3791*); Grassy bog, Grassy Lake, Thunder Cape, July 9, 1913 (*3459*); Spruce muskeg, Maloney Harbor, Magnet Point, Lake Superior, Aug. 17, 1913 (*4827*, *4844*); In bog at Fort William Mission, Sept. 5, 1913 (*5205*); Forming with *No. 5238* (*S. capillaceum*) mounds in spruce muskeg, east side Loon Lake, Sept. 9, 1913; Boggy margin of little lake between Orient Bay and Virgin Falls, south end Lake Nipigon, July 19, 1913 (*6539*); Open bog western outskirts of Graham, Sept. 7, 1914 (*7581*, *7582*). Macoun reports *S. fuscum* var. *fuscescens* Warnst. from "Swamp near the Pic, Lake Superior." (*See* footnote, p. 72.)

Recorded from Europe and Asia, this species ranges south along North American coasts to Connecticut and New York in the east and Washington in the west. Inland it occurs in Michigan and Minnesota, Montana and Colorado, and our collections show it general along the north shore of Lake Superior, and north to Lake Nipigon and northwest to Sioux Lookout. We did not find it, however, at the northern end of Lake Nipigon. It usually forms dense mounds at the outer edges of bogs or associated with the black spruce.

11. *Sphagnum Warnstorfii* Russow.

Bog margin of lakelet near Ruby, southeast of Nipigon, July 2, 1912 (*667*) O. E. Jennings & R. H. Daily; Open bog, Sawbill Lake, Thunder Cape, June 27, 1912, O. E. Jennings & R. H. Daily; Deep woods southwest of Silver Islet, Thunder Cape, Aug. 4, 1912 (*1812*) O. E. & G. K. Jennings & R. H. Daily; Grassy bog, upper end Grassy Lake, Thunder Cape, July 9, 1913 (*3466*) and in alder fringe (same place); Marginal bog, Perry Pond, Silver Islet, July 13, 1913 (*3508*); Spruce muskeg, Maloney Harbor, Magnet Point, Lake Superior, Aug. 17, 1913 (*4870*, *4823*); Wet meadow in advance of muskeg, two miles east of Loon Lake, Sept. 14, 1913 (*5386*); Deep woods in narrow rocky gorge, Orient, southeast corner Lake Nipigon, July 6, 1914 (*6305*); Alder thicket, mouth of creek, Orient Bay, July 18, 1914 (*6502*); Boggy margin of cove, Rangers' Point, Orient Bay, July 21, 1914 (*6551*); Muskeg at edge Ombabika Bay, north end Lake Nipigon, Aug. 15, 1914 (*6994*); Open bog margin, head Ombabika Bay, Aug. 17, 1914 (*7033*); Spruce muskeg at west end of Pelican Lake, Graham, Sept. 5, 1914 (*7478*, *7479*, *7480*).

"Greenland and Labrador to Connecticut and New York; [northwestern Pennsylvania—O. E. J.]; Michigan; Minnesota; Colorado and northward in Rocky Mountains to Alaska; also in Europe and reported from Asia." Our collections show it generally distributed in Ontario, at least from the northwestern shore of Lake Superior from Fort William to Nipigon, and north and west from there, but we did not find it along the North Shore at any of the stations east of Nipigon.

12. *Sphagnum capillaceum* (Weiss) Schrank, Baier. (*S. acutifolium* Ehrh.). *Thuya-Larix-Picea* bog, along outlet of depression, Silver Islet, Thunder Cape, June 23, 1912 (*348*) O. E. Jennings & R. H. Daily; Wooded talus slope of mountain south of Nipigon, July 2, 1912, O. E. Jennings & R. H. Daily; In hollow on rounded bare rock knob near Lake Helen Mission, Nipigon, July 8, 1912. O. E. Jennings & R. H. Daily (*818*); Dense spruce-sphagnum muskeg at Pays Plat, July 15, 1912 (*1981*) O. E. Jennings & R. H. Daily; Steep granite slope, side south Jackfish Island, Lake Superior, July 19, 1912 (*1264*) O. E. Jennings & R. H. Daily; Dense spruce-sphagnum muskeg around Ruby Lake, four miles southeast of Nipigon, Aug. 25, 1912 (*2269*) O. E. & G. K. Jennings & R. H. Daily; Boggy woods towards top of Porphyry Island, Lake Superior, July 23, 1913 (*3634*); Edwards Island, forming a large part of ground cover together with black spruce, July 25, 1913 (*3741*); Spruce woods on top of knob, Little Fluor Island, Aug. 3, 1913 (*3840*); Under spruce-birch cover on islet near Fluor Island, Aug. 4, 1913 (*3924*); Forms mounds on bare bluff above Fluor Island channel, Aug. 10, 1913 (*4043, 4043a*); Forming mounds in spruce muskeg east of Loon Lake, Sept. 9, 1913 (*5238, 5239, 5240*); Boggy woods east of R. R., Loon Lake, Sept. 9, 1913 (*5249*); Wet meadow at edge of muskeg in old lake basin, two miles east of Loon, Sept. 14, 1913 (*5387*); Muskeg on glacial till north of Ombabika Post, Aug. 9, 1914 (*6726*) and Aug. 10 (*6790, 6795, 6796b, 6799*); Alder thicket along stream in burn, Ombabika Post, Aug. 11, 1913 (*6801*), near shore of Ombabika Bay, Aug. 13 (*6898b*); Floor of great spruce muskeg at head of Ombabika Bay, Lake Nipigon, Aug. 14, 1914 (*6911, 6914*); Floor of spruce woods along portage on North Ombabika Peninsula, Aug. 19, 1914 (*7184, 7184b*); Open bog at west edge of Graham, Sept. 7, 1914 (*7572, 7575, 7579*); Along lake shore at Sioux Lookout, Sept. 3, 1914 (*7315*).

Recorded from Europe, Asia, and South America, this species occurs in North America from Greenland and Labrador to Virginia and central Pennsylvania; also Wisconsin and Minnesota; Colorado; and from Washington to Alaska. This was collected more often than any other species during our expeditions and can safely be said to be the most common sphagnum in that part of Ontario, at least. In many of the mature black spruce-sphagnum muskegs this species really forms the floor, often nearly pure over considerable patches, and sometimes forming also rather distinct mounds. In the extensive and beautiful example of a well-developed black spruce muskeg covering the gentle slope at the head of Ombabika Bay, at the north end of Lake Nipigon, the spruces reach a fair size, forming a dense and rather dark forest cover, while the floor for acres and acres is a deep bed of billowy sphagnum into which one sinks nearly to the knees, or, perhaps, breaks through a twiggy mat to "bark his shins" on some buried tree trunk. The real floor of this forest consists of *Sphagnum capillaceum*, but there is more or less of a mixture of *S. Girgensohnii* and *S. magellanicum*, while the highest mounds are composed of *S. Wulfianum*. See *Pl. XXVII, fig. 4*.

Carnegie Museum, Pittsburgh, Pennsylvania

Explanation of Plate XXVII

1. Along the Nipigon River, looking south from Nipigon. Palisades show at right, while at base of the mountain at extreme left is the bog shown in Fig. 3.

2. Looking north from north end of Ombabika Bay, L. Nipigon; a gentle glacial till slope covered with spruce-sphagnum muskeg, as shown in Fig. 4.

3. Spruce-sphagnum muskeg southeast of Nipigon. *S. capillaceum* forms most of this floor in a deep bed (*No. 2269*).

4. Spruce-sphagnum muskeg north of Ombabika Bay, L. Nipigon. Contains *Sphagnum magellanicum* and *S. Girgensohnii*, most of the floor being covered with *S. capillaceum* above which rise mounds of *S. Wulfianum*.

5. Locomotive Island, Ombabika Bay, north end of L. Nipigon. Angular blocks of Keewenawan diabase supporting thin stunted forest of black spruce. Most talus slopes in Nipigon region are of this character.

(Photographs by O. E. and Grace K. Jennings)

ELLEN HUTCHINS—A BIOGRAPHICAL SKETCH

W. H. Pearson

Professor Evans having dedicated a new hepatic, *Herberta Hutchinsiae*, to the memory of Miss Hutchins, a short sketch of her life and work may not be unacceptable to the readers of the Bryologist There have been many women who have distinguished themselves in the realm of science, and amongst those of the early part of the last century in the domain of botany stands pre-eminently the name of Miss Hutchins. Robert Brown, one of the greatest of British botanists, established the genus *Hutchinsia* in her honor; Sir Joseph Paxton, in referring to the genus, says, "in compliment to Miss Hutchins, an accomplished Irish cryptogamist." *Hutchinsia petrea* is one of our early flowering cruciferous plants, found in limestone districts, and I always feel a thrill of pleasure when I see it on wall or rocks in some of our picturesque valleys in Derbyshire and Wales. Miss Hutchins was the first to find the rare and beautiful hepatic, *Jubula Hutchinsiae*, which Sir William Jackson Hooker named after the discoverer.

Readers of Professor Evans's severely scientific description of *Herberta Hutchinsiae* would scarcely imagine that such an apparently dry subject could conjure up remembrances which stir the blood, but I treasure as one of my most valued possessions a microscopic slide of *Scapania purpurascens*, given me to mount nearly forty years ago by Dr. Carrington, from specimens collected by Miss Hutchins. It is still a beautiful object, having retained its color for over one hundred years.

In a valuable contribution to the "Proceedings of the Royal Irish Academy" for 1915, by Canon Lett, on a "Census Report on the Mosses of Ireland," a chronological list of Irish muscologists is given, Miss Hutchins having the place of honor so far as length of description is concerned, and I cannot do better than give the Canon's account of her life and work, with the hope that it may encourage other women to study this delightful field of botany:

"Miss Ellen Hutchins, daughter of Thomas Hutchins, was born in 1785 at Ballylickey, between Bantry and Glengarriff, in the County of Cork, and died in 1815, and was buried in Bantry churchyard. She was educated in Dub-

lin, and when her school time was ended, her health was found to be unsatisfactory. Dr. Whitley Stokes, a friend of her family, who was consulted about the case, recommended her being left in his care. It was so arranged, and she soon recovered. When finally leaving for home, Dr. Stokes advised her to live in the open air as much as possible, and to this end to take up the study of some branch of natural history, by preference that of botany, which was his own specialty, and he offered to lend her books into which she had been dipping whilst in his house, where also she had become acquainted with Mr. Mackay, of Glasnevin Gardens, and Mr. Dawson Turner, of Yarmouth. This would provide exercise and fresh air and quiet occupation while indoors.

"She became an ardent student of mosses, hepatics, lichens, and algae, which abounded on the hills, in the glens, or in the sea, around Bantry and Glengarriff. She discovered many rare species of all these in the neighborhood near her home, and made many drawings for Turner's 'Fuci.'

"A trait in her character was her natural modesty, which was so great that for some time she objected to her name being published as the collector of the rare plants she had found.

"Sir James Smith wrote of her that 'she could find almost anything.' Turner, in the conclusion of his 'Fuci' (1819), laments her untimely death at the early age of 30 years, and says by it he has been deprived of a most able assistant, and botany had lost a votary as indefatigable as she was acute, and as successful as she was indefatigable. Sir William J. Hooker, in 'Muscologia Britannica' (1827), acknowledges assistance received from Miss Hutchins in the preparation of that work.

"David Moore writes in the introduction to his 'Synopsis of the Mosses of Ireland,' Proceedings of Royal Academy (1872), that William Wilson notices in his 'Bryologia Britannica' some species of mosses which were not included by Dr. Taylor in Part 2 of Mackay's 'Flora Hibernica,' but which Wilson had found when examining the herbaria of Dawson Turner and Sir William J. Hooker, to whom these plants had been sent by the late Miss Hutchins, of Bantry, 'whose name is well known to all cryptogamic botanists, both here and abroad.' To form some idea of her great success amongst the Hepaticae, we have only to consult the pages of Hooker's 'Jungermanniae,' where her name is more or less connected with nearly every rare species contained in that grand work."

In the Journal of Botany, February, 1912, page 63, under the title, "Eighteenth Century Women Botanists," is reprinted from a little-known work, "Primitiae Florae Essequeboensis," of G. F. W. Meyer, published in 1818, page 199, a tribute to the botanical work of Miss Hutchins. She is described as having lately died at "Bontajae," in Ireland, which is no doubt intended for Bantry. Allusion is made to the hepatic, *Jungermannia* (*Frullania*) *Hutchinsiae*, as having been named after her; mention is made of her fervent love of the study of cryptogamic botany, notwithstanding all its difficulties, and of her having found many plants new to English botany. The remarkable collection of plants which she had made, together with a large number of beautiful drawings and notes on the plants, passed into the possession of Dawson Turner,

and are now in safe keeping at Kew. Taylor, in Mackay's "Flora Hibernica," gives Miss Hutchins as the collector of eleven rare mosses in Ireland. In Braithwaite's "British Moss Flora" are several records of mosses collected by Miss Hutchins at "Belfast" and in the "North of Ireland," in the year 1801.

Manchester, England

FURTHER NOTES ON JAGERINOPSIS, BROTH.

E. G. Britton

Through the kindness of M. I. Theriot, we have received a specimen of *Jagerinopsis scariosa* (Lor.) Broth., named by Brotherus, and collected by Don Jimenez at Alajuela, Costa Rica, in January, 1910. In a letter dated August 28, M. Theriot states that, judging from the figures in the Bryologist[1], *J. scariosa* differs from *J. squarrosa* in having its leaves less spreading, the veins more often double (though occasionally a leaf has a simple vein), the cells more lax at the summit of the leaves; but the sum total of these characters is very slight. The specimens that he sends bear out these statements, but it may be added that the plants are coarser and larger, resembling much more closely *J. brasiliense* (Mitt.) Broth.; the leaves are larger and broader than in *J. squarrosa* E. G. B., much more glossy, and the apical cells longer and narrower and much less porose. The alar cells are very similar in both these species and are less thickened and not yellow in color as they are in *J. Brasiliense* and *J. Ulei* (C. M.) Broth. The costa seems to be variable in all of them. It must be remembered that no fruit has been found on any of these species except *J. Ulei*, as far as we are aware, and it is possible that fruiting plants may show other differences than those at present known. According to Brotherus,[2] *J. Ulei* has a very peculiar peristome, with short lanceolate thickened teeth, varying in length, and having irregular projections on each joint. The capsules are borne on short stalks from lateral buds above the middle of the stems, and the perichaetial leaves are longer and narrower, with more acuminate points. We hope the fruit of *J. squarrosa* may soon be found either in Florida or in Cuba.

N. Y. Botanical Garden, October 2, 1918.

"CHATUBINSKIA" A FURTHER CORRECTION

H. N. Dixon

"**Chatubinskia**, *Rehmann.*" A still further correction is necessary in regard to this. The name is cited in a *Kew Bulletin* note from T. R. Sim's "Handbook of the Bryophyta of South Africa," where the name is given as above. But the name should properly be "**Chalubinskia.**" It is given in honor of Prof. Tytus Chalubinskia, of Warsaw, author of "Grimmiae Tatrenses" (War-

[1] **21**: 49, Plate 24.

[2] Engl. & Prantl. Pflfam. fasc. 224, p. 790, fig. 591.

saw, 1882). Mr. Gepp writes that the Czechs have two modified "l's," this one being printed by the Poles like a "t" with the cross oblique, and it is this modified "l" which has given rise to the transcription "Chatubinskia."

17 St. Matthews Parade, Northampton, England.

THE AMERICAN RED CROSS WANTS INFORMATION[1]

Regarding Supplies of Surgical Sphagnum

George E. Nichols

Sphagnum moss is being used by the Allied armies on an enormous scale as a substitute for absorbent cotton in surgical dressings. The British are using nearly 1,000,000 sphagnum dressings every month. The Canadian Red Cross is making over 200,000 per month. The American Red Cross, in March, 1918, officially adopted sphagnum as a standard dressing material, and it is now being used in many American military hospitals.

As yet, for various reasons, the number of sphagnum dressings that is being called for in this country is comparatively small. The raw material from which these are being made is secured mainly from the Pacific Northwest, where there are large supplies of excellent moss. But it is anticipated that at any moment the call may come for the American Red Cross to furnish sphagnum dressings in immense quantities. In order to be able to do this, raw material must be available in large amounts. Where are we going to get it? To be sure, there is an abundance of it in the Pacific Northwest. But our eastern chapters must not be compelled to depend on this: transportation is too uncertain and too expensive.

Here is the problem! Unquestionably, there is plenty of good surgical sphagnum to supply our needs right here in the east. But there is this difficulty: Until very recently the surgical value of sphagnum was not realized in this country, although it has been used in Germany since 1880. Consequently, nobody has searched for it particularly. Hence, while we know that there is plenty of it scattered about here and there throughout much of the east, we do not know (except for a limited number of localities) where to place our hands on it. Our problem, then, is to locate definitely as many good sources of supply for surgical sphagnum as is possible. And we must do it now! When the demand comes for sphagnum dressings in vast quantities, we must be prepared to provide the goods at once. It will be too late then to start in exploring.

Can you help? There may be enough good moss in your neighborhood to at least satisfy your local needs. You may even find enough to warrant the collection of raw material for shipment to less favored communities. You can only find out by prospecting. Locate the bogs and explore them.

Here are a few pointers. Surgical sphagnum commonly is very local in its occurrence. It grows in bogs, but may be absent from nine out of every ten. The tenth bog may be full of it. Wet, quaky bogs, open and mossy or with scattered grasses and bushes, are best. Dry, firm bogs, bushy or wooded, are least favorable.

[1] *See* note, bottom p. 84.

What we want now, then, is information. Do not attempt to collect material in bulk at this time, but do collect good, generous samples of representative material and submit them to us for examination. We want accurate and reliable information regarding the location, size, and accessibility to roads of every bog that contains surgical moss, and regarding the quality, purity, and amount of the material present.

Notes on Surgical Sphagnum

How to recognize sphagnum moss—Sphagnum is one of the largest of the mosses. Like all mosses, a sphagnum plant consists of stem, leaves, and "roots." Its distinguishing characters are as follows: (1) Color—pale green when wet, nearly white when dry; or commonly some shade of red, pink, yellow or brown; never a true leaf-green. (2) Plant consists of a main stem which bears many branches. Branches are short and grow scattered along the stem, standing out from it at right angles. Toward the tip of the stem they are clustered, forming a compact rosette. (3) Leaves are very small, almost scale-like, and more or less spoon-shaped.

Where the sphagnum grows—Sphagnum may grow in any swamp, but the best quality grows in bogs. A bog is a peculiar type of swamp, which often develops in wet, undrained depressions or around the edges of ponds. Its surface is commonly quaking. Its vegetation differs from that of ordinary swamps in the abundance of cranberries and other "heaths," and usually of pitcher plants and black spruce, and in the luxuriant development of the sphagnum mosses.

How to distinguish surgical from non-surgical sphagnum—Only a few of the forty kinds of sphagnum found in this country are of surgical value. Examine the sphagnums in almost any bog and you will find two quite distinct classes. Class I: Plants comparatively robust, with stout branches and large leaves. Class II: Plants comparatively delicate, with more slender branches and smaller leaves. Only the sphagnums of Class I are of surgical value. There are four important species in this class: *Sphagnum papillosum*, *S. palustre*, *S. magellanicum*, and *S. imbricatum*. These are of value in the order named. They can be distinguished from one another roughly by color. *S. papillosum*, by far the best one, may be green, but ordinarily it is brownish—from yellow-brown to dark brown. It is never pink or purple. *S. palustre* is usually a pale greenish-white. *S. magellanicum* may be green, but commonly it is pink to purple-red. *S. imbricatum* is usually green. Note: the sphagnums of Class II exhibit similar variation in color, so that color alone cannot be relied on.

When growing under certain conditions, any of the four sphagnums named may be too stiff-stemmed, too sparsely branched, or too thinly leaved to be of surgical value. The three species last named are ordinarily useless on this account. But growing under other conditions any of the four may be soft-stemmed, closely branched ("bushy"), and densely leaved. Material like this is best for surgical work, and it is largely because it commonly has this habit

that *S. papillosum* holds the place of first importance. It is only in very wet places and under exceptionally favorable conditions that the other three sphagnums acquire the soft, bushy habit.

How to prepare sphagnum samples for assay purposes—First of all, in collecting select a characteristic specimen: one that really is a fair sample of the area of moss that it is intended to represent. Try to include only one kind of sphagnum in each sample—don't get a mixture. Pull up a good, generous double-handful, pick out any "weeds," squeeze out the water, and wrap it up in a piece of newspaper. Tag the package with a number, so that you will know just where it came from. Collect plenty of samples from different areas, and make each one good and big—it will be as light as a feather when dry, parcel post rates are low, and large samples are easier to judge than small ones. When you get it home, loosen each bunch up with your fingers and spread it out in the air to dry. When nearly or quite dry, separate each sample into two lots and ship one of these to headquarters for examination, keeping the other (numbered in duplicate) for reference. For mailing, samples can be wrapped in newspaper or wrapping paper.

Send for a sample of surgical moss, if you are in any doubt as to what to look for. Specimens for examination can be sent to George E. Nichols, Botanical Adviser on Sphagnum, Yale University, New Haven, Conn.

POROTRICHUM NOT THAMNOBRYUM

Elizabeth G. Britton

In the May Bryologist, Professor Chamberlain records the changes proposed by Dr. Nieuwland[1] for the genus *Thamnium* Br. & Sch.

The truth of the matter is that there is no need for another generic name, as *Porotrichum* (Brid.) Mitt. is quite sufficient for both groups of species. It is a refinement of *hair-splitting* to attempt to separate so large and characteristic a genus, which may be recognized by macroscopic characters, on microscopic differences in the markings of the teeth, *which do not hold constant!* Anyone who has studied the key and illustrations given by *Brotherus*[2] and then turned to the genus *Porotrichum* and found that the key breaks down in various ways, will realize that it is a most troublesome and needless separation of a perfectly natural group of species, which furthermore are most generally found sterile.

Braithwaite[3] says: "This large genus of 175 species appears to connect the *Hypnaceæ* with *Neckeraceæ*, having the peristome of the former, but the habit and aerolation of the latter. The newer name *Thamnium* cannot be main-

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[1] J. A. Nieuwland. Critical Notes on New and Old Genera of Plants—X. Am. Midl. Nat. **3**: 50–51. 1917.

[2] Teeth of the outer peristome striate. 51. *Thamnium.*
Teeth of the outer peristome papillose or striate only below. 47. *Porotrichum.*
Engler & Prantl. Pfl. fam. fasc. 226, p. 852, 859. 1906, figs. 629–633.

[3] British Moss-flora **3**: 197. 1903.

tained; it only differs from *Porotrichum* by the cernuous capsule and presence of cilia in the endostome, and besides had already been used for two genera of lichens and one of *Ericaceae*." The synonymy is as follows:

Porotrichum (Brid.) Mitt. J. L. Soc. **12**: 20, 458. 1869.
Climacium (*Porotrichum*) Brid. Bryol. Univ. **2**: 275. 1827.
Thamnium Br. & Sch. Bryol. Eu. fasc. **49**: 51. 1852. Not Klotzsch, 1838.
Thamnobryum Nieuw.

New York Botanical Garden.

SULLIVANT MOSS SOCIETY NOTES

The following changes are supplementary to the address list of the Society, which appeared in the January, 1918, issue of The Bryologist:

New Members

Mr. T. J. Fitzpatrick.....Bethany, Nebr.
Miss Eva M. Fling.....220 Prospect St., Morgantown, W. Va.
Mr. Walter E. Flowers.....Locke, Wash.
Mrs. J. M. Fox.....“Wakefield,” Logan, Philadelphia, Pa.
Lektor Dr. Hj. Möller.....Stocksund, Sweden

Change of Address

Mr. E. R. Grose.....Sago, W. Va.
Miss Aravilla Taylor.....5744 Kenwood Ave., Chicago, Ill.

EXCHANGE DEPARTMENT

Offerings—*To members only.* Return postage should accompany the request. It is better to send a *stamp*, rather than a stamped envelope, which might not be of the right size for the specimen.

Rev. H. Dupret, Seminary of Philosophy, Montreal, Canada.—*Drepanocladus aduncus* var. *polycarpum* and var. *intermedius* B. & S. [*Hypnum aduncum* var. *polycarpum* (Bland.) Bry. Eur., and var. *intermedium* W. P. Schimp.] Collected by Rev. Dupret, in Quebec.

The rather sudden termination of hostilities possibly relieves to a considerable extent the immediate urgency of the call of the Red Cross for information regarding supplies of surgical sphagnum, but the communication printed on pages 81–83, this issue, contains so much of interest and value to bryologists that we have proceeded with its publication.—Editor.

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O. E. JENNINGS, Ph.D., Editor-in-Chief

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All material for identification should be sent to the respective curators, also all correspondence relating to the Exchange Department.

THE BRYOLOGIST

VOL. XXI NOVEMBER, 1918 NO. 6

A REMINISCENCE OF THE LATE DR. EMIL LEVIER

WM. EDW. NICHOLSON

There must be many bryologists on both sides of the Atlantic who cherish pleasant memories of the genial botanist of Florence and Bagni di Bormio, the late Dr. Emil Levier. Florence, the very name of which suggests flowers, and how appropriately no one who has seen it in April can deny, has produced many botanists, especially in the field of Bryology, particularly noteworthy being Micheli and Raddi, whose friends have made such a mark on the generic names of the frondose hepatics.

I had been in correspondence with Dr. Levier for many years, but it was not until May, 1910, when I was passing through Florence on my return from a short holiday in southern Italy, that I had an opportunity of meeting him. I was only staying for one night in Florence, and shortly after my arrival I called at 16 Via Jacopo da Diacetto, the address which had long been familiar to me, and received a most cordial welcome from Dr. and Mme. Levier, whom I found in their little garden, in the center of which grew a very fine specimen of the palmetto, *Chamaerops humilis*, seven or eight feet high. In another part of the garden was a large autumn flowering species of *Clematis* sent to Dr. Levier by Mr. W. Gottan from Mussoorie (N. W. Himalaya), *nom fatidique*, as he playfully said apropos of the wealth of mosses found there. They most hospitably invited me that evening to dinner, which we had in a delightful room panelled with carved cinque-cento oak, which I understood had been collected by Dr. Levier's uncle. Mme. Levier had been in England, where she had been very much struck by the magnificent trees in some of the private parks, where, indeed, the trees do compare rather favorably with the somewhat stunted specimens which, for the most part, one sees in Italy.

Dr. Levier was very far from well at the time of my visit, as he was suffering from heart trouble which he attributed largely to indiscretion in smoking. His herbarium, of which he showed me several sheets, among which I remember some particularly fine ones of *Schistocheila appendiculata* (Hook.) Dum. and a species of *Barbella*, was magnificently mounted, everything being on large separate sheets and in most cases very amply represented. The method was laborious, entailing more time and labor than most of us can afford, and on his own admission had cost him many thousands of hours. He expressed great dislike of the practice of mounting mosses and hepatics in envelopes, which, he maintained, were not calculated to preserve them so well as the open sheets; and he illustrated this by the fact that he had found the specimens of *Riccia*

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mounted on open sheets by Micheli in a much better state of preservation than those of Raddi in envelopes, though the latter were collected nearly a hundred years later. Indeed, he grew quite warm on the subject of *ces sacrées enveloppes*, as he ventured to call them.

We were talking about botanizing in Spain, where he had done some work in the past with Boissier and Leresche, and about the roughness of the accommodation in any place at all off the beaten track. Dr. Levier, however, maintained that for dirt and discomfort it was hard to beat the usual run of accommodation in the Abruzzi, in his own country, where a rich and interesting district is rendered almost inaccessible to the ordinary traveller from this cause.

It is unfortunate that it has never been possible to publish the monograph on the genus *Riccia*, towards which he had accumulated a large amount of material, as he had an almost unique knowledge of the genus, and the neighborhood of Florence afforded him opportunities for observing a large number of species in the field.

It was not very long after I saw him that he passed away on the 26th of October, 1911. An interesting account of him, with an excellent photograph, was published by Signor Sommice in the Nuovo Giornale botanico italiano for January, 1912.

Lewes, Sussex, September 27, 1918.

Certain Organic Substances Assimilated by Ceratodon purpureus.— In recent years it has been emphasized that organic materials accumulating in the soil through the activities of plants and animals may have much to do with the fertility of the soil and may, to some extent, control the character of the native vegetation. Recent work by Robbins[1] has a bearing on these questions. Servettaz[2] found some mosses, particularly *Hypnum purum*, able to live and become slowly green when grown in the dark and furnished with sugar or certain other organic substances, and able to assimilate considerable sugar in the light. Von Ubish, in 1913, found that *Funaria hygrometrica* protonema, when grown in darkness on nutrient agar containing peptone and glucose, formed large starch grains, but without the peptone and glucose the grains were small. Robbins found that with *Ceratodon purpureus:* "In test tubes on a nutrient agar containing glucose the growth in the light was four or five times as luxuriant as on the nutrient agar lacking glucose." Grown in the dark the protonema was a dark reddish brown and, out of several sugars tried, the best development was on levulose. Robbins concludes that this moss can absorb and utilize organic carbon and he suggests that if suitable organic compounds are in the soil solution, the moss may be able to use them advantageously.

O. E. J.

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[1] Robbins, William J. Direct Assimilation of Organic Carbon by *Ceratodon purpureus*. Bot. Gaz. **65**: 541–551. June, 1918.

[2] Ann. Sci. Nat. Bot. IX, **17**: 111–124. Pls. 4, figs. 11. 1913.

SULLIVANT MOSS SOCIETY EXCHANGE LIST OF HEPATICAE FOUND IN THE UNITED STATES, CANADA, AND ARCTIC AMERICA

Compiled by Miss Caroline Coventry Haynes

from various sources

Revised by Dr. Alexander W. Evans

Sequence follows Engler & Prantl for the Families and Genera, the species being alphabeted.

Ricciaceae

Riccia
albida Sulliv.
americana M. A. Howe
arvensis Aust.
Austini Steph.
Beyrichiana Hampe
californica Aust.
Campbelliana M. A. Howe
catalinae Underw.
Curtisii (Aust.) James
dictyospora M. A. Howe
Donnellii Aust.
Frostii Aust.
glauca L.
hirta Aust.
McAllisteri M. A. Howe
nigrella DC.
sorocarpa Bisch.
trichocarpa M. A. Howe

Ricciella
crystallina (L.) Warnst.
fluitans (L.) A. Br.
Huebeneriana (Lindenb.) Dumort.
membranacea (Gottsche & Lindenb.) Evans
Sullivantii (Aust.) Evans

Ricciocarpus
natans (L.) Corda

Oxymitra
androgyna M. A. Howe

Marchantiaceae

Corsinia
marchantioides Raddi

Targionia
hypophylla L.

Peltolepis
grandis Lindb.

Sauteria
alpina (Nees & Bisch.) Nees

Clevea
hyalina (Sommerf.) Lindb.

Plagiochasma
rupestre (Forst.) Steph.
Wrightii Sulliv.

Reboulia
hemisphaerica (L.) Raddi

Grimaldia
californica Gottsche
fragrans (Balb.) Corda

Neesiella
pilosa (Hornem.) Schiffn.
rupestris (Nees) Schiffn.

Cryptomitrium
tenerum (Hook.) Aust.

Asterella
Bolanderi (Aust.) Underw.
californica (Hampe) Underw.
echinella (Gottsche) Underw.
fragrans (Nees) Trevis.
gracilis (Web. f.) Underw.
Lindenbergiana (Corda) Lindb.
Palmeri (Aust.) Underw.
tenella (L.) Beauv.
violacea (Aust.) Underw.

Conocephalum
conicum (L.) Dumort.

Lunularia
cruciata (L.) Dumort.

Dumortiera
hirsuta (Swartz) Nees

Bucegia
romanica Radian

Preissia
quadrata (Scop.) Nees

Marchantia
domingensis Lehm & Lindenb.
paleacea Bertol.
polymorpha L.

Metzgeriaceae

Sphaerocarpos
cristatus M. A. Howe
Donnellii Aust.
hians Haynes
texanus Aust.

Geothallus
tuberosus Campb.

Riella
americana Howe & Underw.

Riccardia
latifrons Lindb.
major (Nees) Lindb.
multifida (L.) S. F. Gray
palmata (Hedw.) Carruth.
pinguis (L.) S. F. Gray
sinuata (Dicks.) Trevis.

Metzgeria
angusta Steph.
conjugata Lindb.
crassipilis (Lindb.) Evans
fruticulosa (Dicks.) Evans
furcata (L.) Dumort.
hamata Lindb.
myriopoda Lindb.
pubescens (Schrank) Raddi
uncigera Evans

Pallavicinia
Blyttii (Mörck) Lindb.

Flotowiana (Nees) Lindb.
hibernica (Hook.) S. F. Gray
Lyellii (Hook.) S. F. Gray

Pellia
epiphylla (L.) Corda
Fabroniana Raddi
Neesiana (Gottsche) Limpr.

Blasia
pusilla L.

Fossombronia
cristula Aust.
foveolata Lindb.
lamellata Steph.
longiseta Aust.
salina Lindb.
Wondraczeki (Corda) Dumort.

Sçalia
Hookeri (Lyell) S. F. Gray

Jungermanniaceae

Gymnomitrium
concinnatum (Lightf.) Corda
corallioides Nees
crenulatum Gottsche
obtusum (Lindb.) Pears.
revolutum (Nees) Philibert

Marsupella
apiculata Schiffn.
aquatica (Lindb.) Schiffn.
arctica (Bergr.) Bryhn & Kaal.
Bolanderi (Aust.) Underw.
condensata (Angstr.) Kaal.
emarginata (Ehrh.) Dumort.
groenlandica C. Jens
sparsifolia (Lindb.) Dumort.
sphacelata (Gieseke) Dumort.
Sullivantii (De Not.) Evans
ustulata (Huben.) Spruce

Nardia
biformis (Aust.) Lindb.
Breidleri (Limpr.) Lindb.
compressa (Hook.) S. F. Gray
crenulata (Smith) Lindb.
crenuliformis (Aust.) Lindb.
fossombronioides (Aust.) Lindb.
Geoscyphus (DeNot.) Lindb.
hyalina (Lyell) Carringt.
Lescurii (Aust.) Underw.
obovata (Nees) Carringt.
scalaris (Schrad.) S. F. Gray

Gyrothyra
Underwoodiana M. A. Howe

Prasanthus
suecicus (Gottsche) Lindb.

Arnellia
fennica (Gottsche) Lindb.

Jungermannia
Allenii Clark
atrovirens Dumort.
Bolanderi Gottsche
caespiticia Lindenb.
cordifolia Hook.
danicola Gottsche
lanceolata L.
pumila With.
sphaerocarpa Hook.
Rauana Steph.
riparia Tayl.
Schiffneri (Loitles.) Evans

Jamesoniella
autumnalis (DC) Steph.
heterostipa Evans

Anastrophyllum
Reichardti (Gottsche) Steph.

Lophozia
alpestris (Schleich.) Evans
attenuata (Mart.) Dumort.
badensis (Gottsche) Schiffn.
barbata (Schreb.) Dumort.
bicrenata (Schmid.) Dumort.
Binsteadii (Kaalaas) Evans
confertifolia Schiffn.
elongata (Lindb.) Steph.
excisa (Dicks.) Dumort.
Floerkei (Web. & Mohr) Schiffn.
grandiretis (Lindb.) Schiffn.
guttulata (Lindb. & Arnell) Evans
harpanthoides Bryhn & Kaal.
Hatcheri (Evans) Steph.
heterocolpa (Thed.) M. A. Howe
Hornschuchiana (Nees) Schiffn.
incisa (Schrad.) Dumort.
inflata (Huds.) M. A. Howe
Jenseni K. Müll.
Kaurini (Limpr.) Steph.
Kunzeana (Hüben) Evans
longiflora (Nees) Schiffn.
longidens (Lindb.) Macoun
lycopodioides (Wallr.) Cogn.
marchica (Nees) Steph.
Mildeana (Gottsche) Schiffn.
Muelleri (Nees) Dumort.
murmanica Kaal.
obtusa (Lindb.) Evans
porphyroleuca (Nees) Schiffn
quadriloba (Lindb.) Evans
quinquedentata (Huds.) Cogn.
Rutheana (Limpr.) M. A. Howe
Wenzelii (Nees) Steph.
Vahliana (Nees) Macoun
ventricosa (Dicks.) Dumort.
violascens Bryhn & Kaal.

Mesoptychia
Sahlbergii (Lindb. & Arnell) Evans

Anastrepta
orcadensis (Hook.) Schiffn.

Sphenolobus
exsectaeformis (Breidl.) Steph.
exsectus (Schmid.) Steph.
groenlandicus (Nees) Steph.
Hellerianus (Nees) Steph.
Michauxii (Web.) Steph.
minutus (Crantz) Steph.
politus (Nees) Steph.
saxicola (Schrad.) Steph.
scitulus (Tayl.) Steph.

Plagiochila
alaskana Evans
arctica Bryhn & Kaal.
asplenioides (L.) Dumort.
Austini Evans
columbiana Evans
floridana Evans
Fryei Evans
ludoviciana Sulliv.
Smallii Evans
Sullivantii Gottsche
undata Sulliv.
virginica Evans

Pedinophyllum
interruptum (Nees) Pears.

Mylia
anomala (Hook.) S. F. Gray
Taylori (Hook.) S. F. Gray

Clasmatocolea
Doellingeri (Nees) Steph.
exigua Steph.

Lophocolea
alata Mitt.
bidentata (L.) Dumort.
cuspidata (Nees) Limpr.
heterophylla (Schrad.) Dumort.
Leiboldii Steph.
Martiana Nees
minor Nees

Chiloscyphus
fragilis (Roth) Schiffn.
pallescens (Ehrh.) Dumort.
polyanthos (L.) Corda
rivularis (Schrad.) Loeske
Webberianus Steph.

Harpanthus
Flotowianus Nees
scutatus (Web. & Mohr) Spruce

Geocalyx
graveolens (Schrad.) Nees

Cephalozia
affinis Lindb.
ambigua C. Massal.
bicuspidata (L.) Dumort.
catenulata (Hüben.) Spruce

connivens (Dicks.) Lindb.
curvifolia (Dicks.) Dumort.
fluitans (Nees) Spruce
Francisci (Hook.) Dumort.
Lammersiana (Hüben.) Spruce
leucantha Spruce
Loitlesbergeri Schiffn.
Macounii Aust.
macrostachya Kaal.
media Lindb.
pleniceps (Aust.) Lindb.

Hygrobiella

laxifolia (Hook.) Spruce

Cephaloziella

arctica Bryhn & Douin
bifida (Schreb.) Schiffn.
biloba (Lindb.) K. Müll.
Bryhnii (Kaal.) Schiffn.
byssacea (Roth) Warnst.
elachista (Jack.) Schiffn.
elegans (Heeg) K. Müll.
floridae Douin
grimsulana (Jack) K. Müll.
Hampeana (Nees) Schiffn.
Limprichtii Warnst.
ludoviciana Douin
myriantha (Lindb.) Schiffn.
obliqua Douin
papillosa (Douin) Schiffn.
spinicaulis Douin
striatula (C. Jens.) Douin
Sullivantii (Aust.) Evans
Turneri (Hook.) K. Müll.

Odontoschisma

denudatum (Mart.) Dumort.
elongatum (Lindb.) Evans
Gibbsiae Evans
Macounii (Aust.) Underw.
prostratum (Swartz) Trevis.
Sphagni (Dicks.) Dumort.

Calypogeia

acuta Steph.
arguta Nees & Mont.
fissa (L.) Raddi
Neesiana (Massal. & Carest.) K. Müll.
paludosa Warnst.
sphagnicola (Arn. & Perss.) Warnst. & Loeske
suecica (Arn. & Perss.) K. Müll.
Sullivantii Aust.
Trichomanis (L.) Corda

Bazzania

Pearsoni Steph.
tricrenata (Wahl.) Trevis.
trilobata (L.) S. F. Gray

Pleuroclada

albescens (Hook.) Spruce

Lepidozia

filamentosa (Lehm. & Lindenb.) Lindenb.
reptans (L.) Dumort.
sandvicensis Lindenb.
setacea (Web.) Mitt.
sylvatica Evans

Blepharostoma

arachnoideum M. A. Howe
trichophyllum (L.) Dumort.

Temnoma

setiforme (Ehrh.) M. A. Howe

Anthelia

julacea (L.) Dumort.
Juratzkana (Limpr.) Trevis.

Herberta

Hutchinsiae (Gottsche) Evans
tenuis Evans

Ptilidium

californicum (Aust.) Underw. & Cook
ciliare (L.) Nees
pulcherrimum (Web.) Hampe

Trichocolea

tomentella (Ehrh.) Dumort.

Diplophyllum

albicans (L.) Dumort.
apiculatum (Evans) Steph.
argenteum (Tayl.) Spruce
gymnostomophilum Kaal.
imbricatum (Howe) K. Müll.
incurvum Bryhn & Kaal.
obtusifolium (Hook.) Dumort.
ovatum (Dicks.) Steph.
plicatum Lindb.
taxifolium (Wahl.) Dumort.

Scapania

aequiloba (Schwægr.) Dumort.
americana K. Müll.
apiculata Spruce
Bolanderi Aust.
compacta (Roth) Dumont.
convexula K. Müll.
cordifolia K. Müll.
curta (Mart.) Dumort.
cuspiduligera (Nees) K. Müll
dentata Dumort.
Evansii Bryhn
glaucocephala (Tayl.) Aust.
heterophylla M. A. Howe
irrigua (Nees) Dumort.
Kaurini Ryan
nemorosa (L.) Dumort.
Oakesii Aust.
obliqua (Arnell) Schiffn.
paludicola Loeske & K. Müll.
paludosa K. Müll.
spitzbergensis (Lindb.) K. Müll.
subalpina (Nees) Dumort.
uliginosa (Swartz) Dumort.
umbrosa (Schrad.) Dumort.
undulata (L.) Dumort.

Radula

arctica Steph.
australis Aust.
Bolanderi Gottsche
complanata (L.) Dumort.
flaccida Lindenb. & Gottsche
Hallii Aust.
Lescurii Aust.
obconica Sulliv.
polyclada Evans
Sullivantii Aust.
tenax Lindb.

Pleurozia

purpurea (Lightf.) Lindb.

Porella

Bolanderi (Aust.) Pears.
laevigata (Schrad.) Lindb.
navicularis (Lehm & Lindenb.) Lindb.
pinnata L.
platyphylla (L.) Lindb.
platyphylloidea (Schwein.) Lindb.
rivularis (Nees) Trevis.
Roellii Steph.
Swartziana (Web.) Trevis.
wataugensis (Sulliv.) Underw.

Diplasiolejeunea

Rudolphiana Steph.

Cololejeunea

Biddlecomiae (Aust.) Evans
contractiloba Evans
diaphana Evans
Macounii (Spruce) Evans
minutissima (Smith) Schiffn.
setiloba Evans
subcristata Evans
tuberculata Evans

Leptocolea

Jooriana (Aust.) Evans

Aphanolejeunea

sicaefolia (Gottsche) Evans

Lejeunea

cavifolia (Ehrh.) Lindb.
cladogyna Evans
flava (Swartz) Nees
floridana Evans
glaucescens Gottsche
longifissa Steph.
patens Lindb.
pililoba Spruce
spiniloba Lindenb. & Gottsche

Microlejeunea

bullata (Tayl.) Evans
Cardoti (Steph.) Evans
laetevirens (Nees & Mont.) Evans
Ruthii Evans
ulicina (Tayl.) Evans

Cheilolejeunea

decidua (Spruce) Evans
polyantha Evans

Rectolejeunea
Berteroana (Gottsche) Evans
Brittoniae Evans
Maxonii Evans
phylloloba (Nees & Mont.) Evans

Euosmolejeunea
clausa (Nees & Mont.) Evans
duriuscula (Nees) Evans
parvula Evans

Taxilejeunea
erosifolia Steph.
obtusangula (Spruce) Evans

Ceratolejeunea
cubensis (Mont.) Schiffn.
integrifolia Evans

Leptolejeunea
elliptica (Lehm & Lindenb.) Schiffn.

Drepanolejeunea
bidens (Steph.) Evans

Harpalejeunea
ovata (Hook.) Schiffn.

Crossotolejeunea
bermudiana Evans

Brachiolejeunea
bahamensis Evans
corticalis (Lehm. & Lindenb.) Schiffn.

Pytchocoleus
heterophyllus Evans

Lopholejeunea
Muelleriana (Gottsche) Schiffn.
Sagraeana (Mont.) Schiffn.

Caudalejeunea
Lehmanniana (Gottsche) Evans

Mastigolejeunea
auriculata (Wils. & Hook.) Schiffn.

Leucolejeunea
clypeata (Schwein.) Evans
conchifolia Evans
unciloba (Lindenb.) Evans
xanthocarpa (Lehm. & Lindenb.) Evans.

Jubula
pennsylvanica (Steph.) Evans

Frullania
arietina Tayl.
Asagrayana Mont.
Bolanderi Aust.
Brittoniae Evans
californica (Aust.) Evans
catalinae Evans
chilcootiensis Steph.
cobrensis Gottsche
cucullata Lindenb. & Gottsche
Donnellii Aust.
eboracensis Gottsche
franciscana M. A. Howe
gibbosa Nees
inflata Gottsche
Kunzei Lehm & Lindenb.
mexicana Lindenb.
nisquallensis Sulliv.
Oakesiana Aust.
obcordata Lehm & Lindenb.
plana Sulliv.
Rappii Evans
riojaneirensis (Raddi) Spruce
riparia Hampe
saxicola Aust.
Selwyniana Pears.
squarrosa (R. Bl. & N.) Dumort.
Tamarisci (L.) Dumort.
Wrightii Aust.

Anthocerotaceae

Notothylas
Breutelii Gottsche
orbicularis (Schwein.) Sulliv.

Anthoceros
carolinianus Michx.
crispulus (Mont.) Douin
Donnellii Aust.
fusiformis Aust.
Hallii Aust.
laevis L.
Macounii M. A. Howe
Pearsoni M. A. Howe
phymatodes M. A. Howe
punctatus L.
Ravenelii Aust.

NOTES ON RECENT BRYOLOGICAL LITERATURE

Sphagnum as a Surgical Dressing.—Under this title Professor J. W. Hotson, University of Washington, Seattle, has written an excellent popular article in *Science*.[1] It is noted that the most promising fields for surgical sphagnum are along the northern Pacific and Atlantic coasts. Among the uses of sphagnum are enumerated: peat, as fuel; packing, by nurserymen and florists; as insulating material; as packing around raw fruits, such as grapes; for manufacture of papers, such as wall-paper, wrapping paper, and building paper, especially in Sweden; stable bedding; dressings for wounds of domestic animals; mixed with wool, used for cloth in Germany; used with good results as a so-called fertilizer because of its water-holding properties. Hotson notes that it has been used to some extent as a surgical dressing by the Hudson Bay Company, and in the Napoleonic and Franco-Prussian and Russo-Japanese wars.

Dr. C. W. Cathcart, an Edinburgh surgeon, began experimenting with sphagnum in one of the Scottish hospitals in 1914, publishing results in the

[1] Hotson, J. W. Sphagnum as a Surgical Dressing. Science, N. S., **48**: 203–208. Aug. 30, 1918.

Scotsman, and also formed an organization for collecting and preparing the moss for use in Edinburgh. The British War Office accepted sphagnum pads as "official" dressings in February, 1916, and such dressings have grown in popularity until in the summer of 1918 Scotland alone has been asked to supply 4,000,000 pads per month. In America, Dr. J. B. Porter, McGill University, Montreal, began work with surgical sphagnum in 1916, an organization was effected under the Canadian Red Cross, and in January, 1918, the British War Office asked Canada for 20,000,000 pads. The National Red Cross of America later took up the idea, giving the Seattle Chapter a preliminary order for 50,000 pads in March, 1918.

In collecting sphagnum for surgical dressings a small handful at a time should be taken, shaken lightly to free it of sticks, etc., the water gently squeezed out if wet, then put in a bag. The moss is sometimes usable to considerable depth—the beginning of partial decay at the lower end of the stem determining the limit. The moss is then spread out to dry and later is sorted, preferably before entirely dry, otherwise it will have to be moistened again. Prof. Hotson gives a detailed account of the method of preparation of the American dressing. Briefly stated, this dressing consists of a piece of Zorbik or Scot tissue (wood-pulp paper) on which is placed a layer of sphagnum and then a thin layer of non-absorbent cotton, then the edges of the tissue are folded over these and another layer of cotton placed over the fold. This pad is enclosed in a piece of gauze with the folds on the cotton side of the pad and the ends folded in "muff-wise." The British pad is simply a flat bag of English "long-cloth" filled with a layer of moss and sewed shut. O. E. J.

The Mosses collected by the Smithsonian African Expedition, 1909-1910[2]—Under this title, H. N. Dixon publishes an annotated list of the eighty-three numbers of specimens of mosses collected on the African expedition by Dr. Edgar A. Mearns, the actual number of species being forty-eight. "As would be expected in the tropical region of Africa, the bulk of them were at high altitudes, only seven numbers being below 2,000 meters, five of these at 1,350 meters, the remaining two at 1,950 meters. Of the rest, the largest proportion (between 65 and 70), came from the 'giant heath zone' of Mt. Kenia, at about 3,630 meters." Only eight species were in fruit.

Dixon discusses at some length the questions of plant geography involved, the relationships of this alpine African moss flora being, for the most part, with that of the arctic and cold temperate regions of the northern hemisphere. Many of the species are dioicous or sterile and thus not so likely to have arrived at their African station by a chance distribution of spores, and the author concludes "that a more continuous land area under colder and more hygrophytic conditions than Engler admits[3] is postulated by the known facts, and that the prac-

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[2] Smithsonian Miscellaneous Collections, **69**: (No. 12): 1-28. Pl 1 & 2. Oct. 8, 1918.

[3] Engler, A. Plants of the North Temperate Zone in their transition to the high mountains of t opical Africa. Annals of Botany **18**: 523-540. 1904.

tically total absence of any counter-exchange from Africa to Europe presupposes something much more definite in the way of *southerly* migration than has hitherto been recognized, difficult as it may be to trace the land connection that would have provided the necessary bridge of transit."

Twelve new species are described and figured: *Sphagnum Keniae*, *Hymenostylium crassinervium*, *Leptodontiopsis elata*, *Rhacomitrium defoliatum*, *Bryum plano-marginatum*, *Philonotis speirophylla*, *Breutelia stricticaulis*, *Polytrichum Keniae*, *Hygroamblystegium procerum*, *Calliergon Keniae*, *Isopterygium sericifolium*, and *Rhynchostegiella Keniae*, the types of these being in the U. S. National Herbarium. Two new varieties are described: *Aulacomnium turgidum* var. *papillosum*, and *Neckera complanata* var. *maxima*. The other species represented in the collections were: *Sphagnum Pappeanum* C. M., *S. Rugegense* var. *gracilescens* Warnst., *Andreaea kilimandscharica* Par., *Distichium kilimandjaricum* C. M., *Blindia acuta* forma *prolixa* [evidently proposed as a new form], *Campylopus stramineus* (Mitt.) Jaeg., *C. procerus* (C. M.) Par., *C. Joannis-Meyeri* (C. M.) Par., *Leptodontium pumilum* (C. M.) Broth., *L. Joannis-Meyeri* C. M., *Tortula erubescens* (C. M.) Broth., *T. Cavalli* Negri, *Grimmia ovata* Web. & Mohr, *Rhacomitrium alare* (Broth.) Par., *R. durum* (C. M.) Par., *Amphidium cyathicarpum* (Mont.) Broth., *Tetraplodon bryoides* (Zoeg.) Lind., *Pohlia afrocruda* (C. M.) Broth., *Pohlia* sp., *Rhodobryum spathulosifolium* (C. M.) Broth., *Bartramia ruvenzorensis* Broth., *Breutelia subgnaphalea* var. *densiramea* Negri, *B. auronitens* Negri, *Rhacocarpus Humboldtii* (Hook.) Lindb., *Antitrichia kilimandscharica* Broth., *Pterogonium ornithopodioides* (Huds.) Lindb., *Pilotrichella profusicaulis* (C. M.) Par., *Papillaria africana* (C. M.) Jaeg., *Pinnatella Engleri* Broth., *Thamnium Hildebrandtii* (C. M.) Besch., *Calliergon sarmentosum* var. *subflavum* Ferg., *Stereodon cupressiformis* (L.) Brid., *Pleuropsis sericeus* (Hornsch.) Broth., and *Brachythecium implicatum* (Hornsch.) Jaeg.

Dixon notes that "it may be possible to gain some idea of the prevailing species on Mt. Kenia from the number of gatherings made of some of them. Judged in this way, the most frequent mosses would be: *Campylopus stramineus* (Mitt.) Jaeg., 13 gatherings; *Tortula Cavalli* Negri, 9 gatherings; *Bartramia ruvenzorensis* Broth., 5 gatherings; *Grimmia ovata* Web. & Mohr, 5 gatherings. None of the others are represented by more than three gatherings each."

O. E. J.

Theriot on Some Chilean Mosses—Monsieur I. Thériot has recently sent us a separate of an article[4] dealing with the confusion that has arisen in the case of two Chilean mosses. According to the studies of M. Thériot, based partly upon a comparison of type material, practically all authors subsequent to Schimper have described under *Barbula flagellaris* a moss which is identical with what Sullivant, in the Mosses of the Wilkes Expedition, had called *B. depressa*. Schimper's original description, however, calls for a *Tortula*, and an examination of the original specimen collected by Bertero shows that Schimp-

[4] Thériot: Note sur une mousse du Chili. Extrait du recueil des publications de la Société Havraise d' études diverses. 1er trimestre, 1917. Pp. 1–7 (repaged?).

er's name applies to the plant later described as *Tortula perflaccida* Broth. The two species are, indeed, so similar in gross appearance that on the original sheet of Bertero's material, ticketed in Schimper's hand, there is a tuft of each species preserved, side by side.

The clearing up of the identity of these two species involves a few nomenclatorial changes, and as the original publication may not be readily accessible, we summarize these conclusions below:

(1) BARBULA DEPRESSA Sull. Musci Wilkes Exped. p. 5, pl. 11 B (1859).
B. flagellaris Schimp. pp. in sched. in Hb. Mus. Paris; Mitten, (sub *Tortula*), Musci austro-am. p. 150; Brotherus, in Engler & Prantl. Nat. Pflanzenf. Musci. p. 410; Dusén, in Arkiv för Bot. bd. 6, Nr. 8, p. 14; Cardot. Fl. bry. terr. magell. p. 94.

Under the species are three varieties, viz.: var. *denticulata* (Dus.) Thér.; var. *gracilis* (Dus.) Thér.; and var. *oliviensis* (Card.) Thér. The latter is the *Barbula oliviensis* Card., while the two others had been described by Dusén under *B. flagellaris* auct.

(2) TORTULA FLAGELLARIS (Schimp.) Thér.
Barbula flagellaris Schimp. Ann. sc. nat. 11th Ser. T. vi. p. 146 (1836); C. Müll. Syn. Musc. I, p. 642.
Tortula perflaccida Broth. in Dusén l. c.

Under this species M. Thériot describes as a new variety, var. *densiretis* Thér.

E. B. C.

Vegetation on Conglomerate Rocks in Cincinnati Region.—Miss Braun has described in an interesting paper[5] the succession of vegetation on the conglomerate rocks near Cincinnati, Ohio. In places the glacial-outwash boulders, gravels, and sands have been cemented by limestone into a massive irregular conglomerate, which, being more resistant to erosion than the surrounding materials, usually stands out as irregular outcrops on hillsides. The rock is rather porous and in the pockets of the irregular masses a black, sandy, calcareous, spongy, humus soil accumulates. Another interesting point lies in the isolation of the outcrops as plant habitats, several miles often intervening between similar outcrops. The succession is grouped under four headings: 1. Lichen stages. (a) Crustose lichens are the first, occurring as patches on the smoother and more exposed rock faces. *Lecidea* sp., *Pertusaria communis*, *Staurothele umbrina*, *Verrucaria muralis*, and *Placodium citrinum*. The xerophytic moss, *Grimmia apocarpa*, is of minor importance. (b) *Dermatocarpon miniatum* practically covers the surface in the second stage, the gelatinous lichen, *Omphalaria* sp., being the most prominent of the secondary species. Mosses are here more important than in the first stage: *Grimmia apocarpa*, *Anomodon attenuatus*, and *Leskea* sp. On under sides of ledges and in shaded spots the

[5] Braun, E. Lucy. The Vegetation of Conglomerate Rocks of the Cincinnati Region. Plant World **20**: 380–392. December, 1917.

pale powdery *Amphiloma lanuginosum* and a moss, *Plagiothecium* sp., are prominent. 2. Moss stages. (a) The first is characterized by *Anomodon attenuatus* with the secondary species, *Leskea* sp., *Anomodon minor*, *Grimmia apocarpa*, and the liverwort, *Porella platyphylla*. (b) Next comes a moss stage characterized by a dense mat of *Mnium cuspidatum* with the secondary species, *Rhodobryum roseum*, *Catharinea crispa*, *Entodon seductrix*, *Brachythecium salebrosum*, *Fissidens incurvus*, and the mosses of stage "a." The hepatic, *Conocephalum conicum*, and the lichen, *Peltigera apthosa*, are sometimes important here. This moss mat forms under it a thick layer of humus, thus leading to occupation by the herbs *Aquilegia*, *Sedum*, *Cystopteris fragilis*, *Woodsia obtusa*, *Poa compressa*, *Silene virginica*, *Camptosorus*, etc., this later stage eventually passing into a shrub stage of *Ribes gracile*, *Staphylea*, *Rhus canadensis*, and *Toxicodendron*, *Hydrangea*, and *Physocarpus*.

O. E. J.

Predigested Cladonias.—The story of natives of Madagascar feeding dispeptics on rice which has been cooked in the hollow portions of pitcher-plants and thus partially digested by the ferments of the "pitchers," is recalled by the following item, quoted from an interesting article[6] on the foods eaten by the natives of far northern regions in Canada:

"The Arctic 'salad,' which seems to be favored more in winter, when no vegetable food has been seen for months, is the first stomach or rumen of the caribou when it happens to be filled with freshly-chewed reindeer-moss or *Cladonia* lichens. This is frozen whole and sliced off very thin, the gastric juice supplying the acid, and a liberal mixture of seal-oil the salad dressing. The caribou stomach is seldom eaten except when filled with the succulent reindeer-moss, and when it contains woody grass-fibre is usually discarded. This food may properly be classed as 'pre-digested,' and under certain extenuating circumstances, such as a trail appetite, a long siege of one-course rations of meat, anything 'different' may have some attractions, but few white men venture to experiment with it."

O. E. J.

"Botanical Abstracts," a New Journal.—During the meetings of the American Association for the Advancement of Science and various affiliated societies in Pittsburgh last winter, a number of botanists, mostly editors of botanical magazines, got together and discussed plans for the publication in English of a magazine devoted to brief summaries or abstracts and citations of publications in botany. Organization was effected at the second meeting and a board of control elected, which, after the beginning of 1919, shall be composed of representatives elected from the various American botanical societies and organizations having to do with botany in its broadest sense. Dr. B. E. Livingston, Johns Hopkins University, finally consented at considerable sacrifice of time and effort to serve as editor-in-chief, assisted by nearly a score of editors

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[6] Anderson, Rudolph M. Eskimo Food—How It Tastes to a White Man. Ottawa Naturalist **32**: 59–65. Oct., 1918.

for the various subdivisions of botanical science. The first number has appeared, dated September, 1918, and it is planned to issue two volumes of three hundred pages each per year, at six dollars per year, the publisher being the Williams & Wilkins Company, Baltimore, Md. Heretofore our main reliance for botanical abstracts, which, of course, must be international, has been the *Botanisches Centralblatt*, and it is a distinct pleasure to call to the attention of our readers such a publication in English. This is a young journal and there will be up-hill work for its sponsors for a time. We would earnestly urge our readers to support the enterprise in every way possible. The first number in its 36 pages contains 206 abstracts ranging from mere citations up to some of more than four hundred words.

A New Genus and Species of the Collemaceae.—Bruce Fink[7] finds that much of the lichen formerly identified as *Collema pulposum* (Bernh.) Ach., from stations ranging from the Atlantic to beyond the Mississippi, represents a new genus and species, *Collemodes Bachmanianum* Fink. In the *Collemae* the trichogyne extends beyond the surface of the thallus, and the small spermatia escape from the superficial spermogonia and are carried to this exposed portion of the female reproductive tract. In *Collemodes*, however, the spermatic are internal, much larger, 6–14 by 2–3 microns, not contained in spermagonia, and the trichogynes grow to the spermatia within the thallus. Identified from N. Y., Ohio, Mo., Iowa, Minn., and Wis. O. E. J.

Uganda Mosses Collected by R. Duemmer and Others.—H. N. Dixon has identified and figured some Uganda mosses, principally specimens in the U. S. National Museum collected by Duemmer[8] The altitudes given are mostly 4000 ft., a few being at 3500 ft. The species are: *Trematodon intermedius* Welw. & Dub.; *Octoblepharum albidum* (L.) Hedw.; *Fissidens subglaucissimus* Broth.; *F. erosulus* (C. M.) Par.; *F. sciophyllus* Mitt.; *Tortula erubescens* (C. M.) Broth.; *Schlotheimia Grevilleana* Mitt.; *Rhodobryum roseum* (Weis.) Limpr.; *Neckeropsis truncata* (P. Beauv.) Fleisch.; *N. Lepineana* (Mont.) Fleisch.; *Porotrichum Laurentii* R. & C.; *Pinnatella Engleri* Broth.; *Thamnium pennaeforme* (Hornsch.) Kindb.; *Erythrodontium subjulaceum* (C. M.) Par.; *Fabronia angolensis* Welw. & Dub.; *Hookeriopsis Pappeana* (Hampe) Jaeg.; *Rhacopilum speluncae* C. M.; *Thuidium laevipes* Mitt. and *Vesicularia sphaerocarpa* (C. M.) Broth. *Rhacopilum ugandae* Broth. & Dix. is described as new, as are also the following by Dixon: *Brachymenium variabile*, *Pilotrichella pilifolia*, *Cyathophorum africanum*, *Rhacopilum marginatum*, *Lindbergia patentifolia*, *Thuidium pallidisetum*, and *Ectropothecium Dummeri*. O. E. J.

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[7] Fink, Bruce. A New Genus and Species of the *Collemaceae*. (Contrib. XIV, Bot. Lab., Miami Univ.) Mycologia **10**: 235–238. Pl. 13. Sept., 1918.

[8] Dixon, H. N. Uganda Mosses Collected by R. Duemmer and Others. Smithson. Misc. Coll. (Publ. 2522), **69**: No. 8, 1–10. Pl. 1. 1918.

The William Mitten Lichen Herbarium.—We quote the following from the *Journal of the New York Botanical Garden*, March, 1918: "The lichen herbarium of the late William Mitten, presented to the Garden several years ago by his daughter, Miss Flora Mitten, is being incorporated in the general herbarium of the Garden. This collection contains many fine specimens, most of which are determined."

Claassen on Lichens of Northern Ohio.—Edo Claassen published a list of the lichens of northern Ohio in the *Ohio Naturalist*, June, 1912, and has recently published an additional list[9] of 23 species found in one or more of seven counties centering around Cleveland. Species noted as apparently quite rare are: *Arthopyrenia macrospora*, *A. quinqueseptata*, *Bilimbia trachona*, *Lecanora tartarea*, *Lecidea myriocarpoides*, and *L. pycnocarpa*.

O. E. J.

The Stirling Herbarium.—It is stated in *Nature* that the herbarium of the late Lord Justice Stirling has been presented by Lady Stirling to the Tunbridge Wells Natural History Society, England. The collection is said to contain "about 6,000 varieties of mosses and liverworts."

More Lichens for Nantucket.—In two former lists[10] R. Heber Howe, Jr., enumerated the lichens found on the island of Nantucket, and in a third list[11] he enumerates seven more species, making altogether for the island 34 species.

EXCHANGE DEPARTMENT

Offerings—*To members only.* Return postage should accompany the request; a *stamp* is better than a stamped envelope, as specimen packets do not always fit the latter.

Mr. C. C. Plitt, 3933 Lowndes Ave., Baltimore, Md.—*Cladina implexa* Harm., collected in England by Rev. P. G. M. Rhodes, and *Solorina crocea* (L.) Ach., from Colorado.

Mr. S. Rapp, Sanford, Florida.—*Sphagnum recurvum* Beauv. and *S. strictum* Sulliv., collected in Florida by Mr. Rapp.

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[9] Claassen, Edo. Second Alphabetical List of the Lichens Collected in Several Counties of Northern Ohio. Ohio Journ. Sci. **18**: 62–63. December, 1917.

[10] Howe, R. Heber, Jr. Rhodora **14**: 88–90. 1912, and **15**: 93–94. 1913.

[11] Howe, R. Heber, Jr. Rhodora **20**: 40. Feb., 1918.

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HEPATICS AND LICHENS

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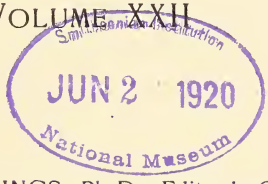

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INDEX TO PLANT-NAMES

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ERRATA

Page 22, line 21, for *Weissia* read *Weisia*.
Page 23, line 11, for Kindb. read (Beauv.) Kindb.
line 12, for B. & S. read (L.) B. & S.
line 28, for S. read L.
bottom line, for Willd. read (Willd.) Grout.
Page 23, line 5 from bottom, for Schreb. read Sibth.
Page 25, line 8, for Br. & Sch. read (L.) Br. & Sch.
line 13, for Hedw. read Leyss.
line 26, for *caespiticium* read *caespitosa*.

line 28, for *Muhlenbeckii* read *Muhlenbergii*.
line 3 from bottom, for Sulliv. read (Sulliv.) Grout.
bottom line, for Lindb. read (Lindb.) Correns.
Page 26, line 9, for B. & S. read R. & C.
line 18, for Pers. read Crome.
line 24, for B. & S. read Lindb.
line 26, for *americana* read *americanum*.
Page 52, fifth line from bottom, for *thelistegium* read *thelistegum*.
Page 74, line 14, for *osmundaceae* read *osmundacea*.
Page 81, line 10, for Fungf. read Fungi.
Page 86, line 17, for *Heterocladum* read *Heterocladium*.
Page 86, line 7 from bottom, for *vancourveriense* read *vancouveriense*.

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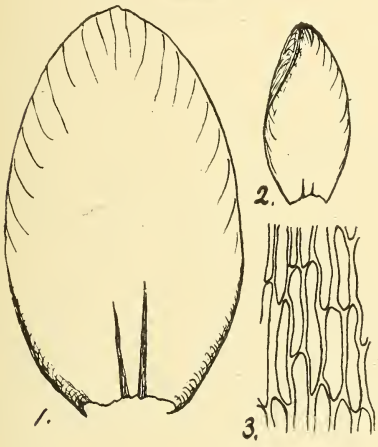
THE BRYOLOGIST

VOL. XXII JANUARY, 1919 No. 1

HYLOCOMIUM ALASKANUM (L. & J.) KINDB.*

Among a few specimens of mosses lately received from Mr. Maxon, of the Smithsonian Institute, was one small lot consisting of mostly three closely entangled species. Two of these are well known, namely *Rhytidiadelphus triquetrus* (L.) Warns., and *Drepanocladus aduncus* (L.) Warns. (*Hypnum uncinatum*). The other, of which there is scarcely more than a few fragments, is *Hypnum alaskanum* L. & J., as given in the *Manual*. This species seems to have been scarcely collected or understood since first obtained by Dall in Alaska. Dr. Brotherus, in Engler & Prantl, cites it (p. 1060) as a variety of *Hylocomium pyrenaicum* (Spruce) Lindb., a species found in Alaska, but a very distinct plant in its larger size, different branching and pointed, plicate leaves.



HYLOCOMIUM ALASKANUM

Fig. 1. Stem leaf, ×36 diam.
" 2. Middle branch-leaf, ×36 diam.
" 3. Median leaf-cells, ×320 diam.

H. alaskanum looks at first glance more like a small form of *Hypnum Schreberi* Willd. than anything else, but examination shows it belongs rather to *Hylocomium*, as the stems bear numerous, branching paraphyllia and the leaves are minutely serrulate all round (the teeth almost too small to be seen under a low power) with the margins flat above and strongly reflexed near the base. The leaves are not plicate but very concave. The leaf-cells are mostly long and narrow, slightly curved, the walls rather unequally thickened but not or very slightly pitted. The basal cells are mostly golden brown in the stem-leaves, the alar scarcely forming a distinct group.

It would seem that Dr. Kindberg had specimens of true *H. alaskanum* from somewhere in British America, but at present there are apparently none known among the collections at Ottawa.

R. S. WILLIAMS

NEW YORK BOTANICAL GARDEN

*Cat. Can. Plants. **6**: 248. 1892.

The November number of the BRYOLOGIST was published January 15, 1919.

WEST INDIAN MOSSES IN FLORIDA

ELIZABETH G. BRITTON

Mittenothamnium diminutivum (*H. thelistegum*)[1] and *Thuidium involvens* have recently been recognized and collected by Mr. Severin Rapp at Sanford, Florida. Dr. Small has collected abundant specimens of both these species in the vicinity of Miami, duplicates of which have been sent to Mr. Rapp. Diligent search and a keen eye have resulted in finding them both together "on logs in hammock," and Mr. Rapp is to be congratulated on discovering them several hundred miles farther north than they were previously known.

NEW YORK BOTANICAL GARDEN

ARCHIDIUM CUBENSE SP. NOV.

Autoicous; usually a single male flower, nearly or quite sessile, among several fertile flowers near the apex of the stem; the inner perigonial leaves broad, more or less pointed, mostly entire, ecostate or partly costate, often not much longer than the antheridia; the outer leaves similar to those of the stem but rather larger; antheridia 5–6, about 0.4 mm. long, without paraphyses; plants in brownish green mats with erect stems 3–5 mm. long, mostly simple or sometimes divided about half-way up into 2 or 3 branches and bearing usually 3–5 flowers rather crowded on very short branches or almost sessile, at or near the apex of the stem; upper stem-leaves ovate-lanceolate, about 1 mm. long, mostly slightly serrulate in the upper part, the margins more or less recurved; costa shortly excurrent, sometimes rather stouter in the upper part than near the base; leaf-cells with somewhat thickened, colored walls throughout; the median usually 6–7μ wide and 40–60μ long, the basal mostly shortly rectangular, 8–12μ wide by 12–20μ long; inner perichaetial leaves the largest, paler and broader than those of the stem, sometimes rather irregular above with a few coarse teeth a little below the apex, the costa pale in the upper part and sometimes not quite percurrent; capsule globose, 0.35–0.40 mm. in diameter, immersed, on a short, top-shaped vaginule; spores more or less roundish, up to 175μ in diameter, minutely punctate; calyptra not seen.

Type locality: Savana, west of Manacas, Santa Clara Co., Cuba. (Leon & Cayanas, Dec., 1915, *6002*, type; also obtained by the same collectors in wet, sandy savana near Mardago, Dec., 1915, *6001*.)

This species has the inflorescence of *A. ohioense;* it differs in the shorter-pointed leaves, the leaf-cells colored to the base, with thicker walls, the cells also longer and narrower in the upper part of the leaf, becoming short-rectangular toward the base.

R. S. WILLIAMS

NEW YORK BOTANICAL GARDEN

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[1] *See* BRYOLOGIST **17**: 9. 1914.

THE SOUTHERN LIMIT OF ENCALYPTA LACINIATA

RALPH S. NANZ

In the revision of the North American species of Encalypta by Dorothy Coker in the November (1918) number of the Torrey Botanical Club Bulletin the southern limit for *Encalypta laciniata* (Hedw.) Lindb. [*E. ciliata* (Hedw.) Hoffm.] in the eastern United States is given as northern New York, presumably the Adirondack Mountains. While the range given in the revision is the normal one, it seems worth while to record the appearance of this species elsewhere.

Evans and Nichols, in the Bryophytes of Connecticut (1908), report it from Branford, Connecticut, collected by J. A. Allen in 1881. This Encalypta was found in 1884 by the late Prof. G. F. Atkinson in Enfield Ravine, Ithaca, and since then has been collected several times in the same ravine by others. The moss was collected from vertical limestone cliffs.

Although there are a number of ravines of a similar nature near Ithaca, *E. laciniata* has been found only in the one ravine mentioned. For this reason no very logical explanation can be given for its occasional appearance so far from its natural habitat.

CORNELL UNIVERSITY, ITHACA, N. Y.

REVIEWS

Encalypta. A Revision of the North American Species by Dorothy Coker[1]

In connection with our studies for *N. A. Flora*, a critical revision of this genus became necessary, as the modern conception of its rank and relations to the *Tortulaceæ* differs materially from that of the older authors. It is now recognized as distinct not only from the "*Pottiaceæ*," where it has generally been placed, but is known to be intermediate between the *Haplolepideæ* and *Diplolepideæ*, having the peristome characters of both groups represented in various species; hence it has been placed by Fleischer in a new group known as the *Heterolepideæ*.

A critical comparison of typical and authentic material from North American and European herbaria has enabled us to reduce the 18 species recognized by Paris's *Index*, Brotherus and Kindberg to 8, *extinctoria*, *rhabdocarpa*, *alpina*, *laciniata*, *apophysata*, *brevicolla*, *procera*, and *contorta*. Only one species still remains doubtful, *E. lacera* Ren. & Cardot., specimens of which were not available for critical comparison. All of Kindberg's species, based on Macoun's collections, prove to be either wrongly described or based on false premises, as indicated by me in some notes on this genus.[2] One new varietal combination *E. laciniata microstoma* (Schimp.) Coker occurs in this revision. Miss Coker

[1] Coker, Dorothy. Revision of the North American Species of Encalypta. Submitted in partial fulfillment of the requirements for the degree of Master of Arts in the Faculty of Pure Science, Columbia University. Contrib. from the N. Y. Bot. Gard. No. 206. 1918. Reprinted without change of paging from Bull. Torr. Bot. Club **45**: 433–449. Pls. 13, 14. Nov. 15, 1918.

[2] Bull. Torrey Club **22**: 452–458. 1895.

is to be congratulated on the accuracy of her drawings and the rapidity with which she does them. We hope that this maiden task in hyper-critical study will not discourage her from undertaking further work in Bryology. She has been devoting her major energies to Bacteriology for the Red Cross, and it is understood is contemplating devoting herself to this work as a profession.

New York Botanical Garden. Elizabeth G. Britton.

A. Hesselbo—The Bryophyta of Iceland[1]

This is decidedly one of the most important bryological works of recent years, as Iceland was, in respect to its bryophyte flora, the most neglected of fairly accessible northern lands. Lists prior to those of Grönlund the present author finds to be essentially worthless, while those of Grönlund himself were, besides being incomplete, rather faulty. The present author's collections and observations were made upon three summer trips, in 1909, 1912 and 1914, and the greatest weakness of the work lies in the fact that the whole island could not possibly be covered by such limited field work, as the author realizes. Still one is impressed by the remarkably good use made of the time at his disposal. There are listed 93 hepatics, 20 *Sphagna*, and 324 (or including 2 subspecies, 326) true mosses. The attention paid to species found only in sterile condition shows the carefulness with which the author worked. Old records which were based upon wrong identifications or are otherwise suspicious are not included, though notes upon them are inserted. The flora of Iceland is, as has long been known, essentially northern European, among the mosses *Bryoxiphium norvegicum* being a unique case of a species found in Iceland and North America, but lacking in Europe. Two new species in *Bryum* and one in *Brachythecium* are proposed. Under the separate species are remarkably detailed notes as to habitat, while the whole is summed up in an œcological supplement. Most interesting in this is the careful study of the flora of the various hot springs. Species of *Riccia*, *Anthoceros*, *Archidium*, *Entosthodon*, etc., were found confined to warm ground of this description, while other bryophytes found their best development and most frequent occurrence under such conditions. One thing missed in this part of the work is an adequate discussion of geological substrata, particularly as to their chemical constituents. It is for example certainly to be expected that the flora of the areas of acidic lava would differ from that of basic lavas, and there is even a limited area of sedimentary rock (apparently visited by the author near Húsavik). A good geological map, by Thoroddsen, makes it possible to lay out one's route somewhat with reference to these differences and to at least gain some fundamental ideas of the effect of the different rocks upon the moss-flora, which a work on the comprehensive plan of this one demands. Of the additions which I have published,[2] all with two exceptions, *Pleuridium alternifolium* and *Dicranella Grevilleana*, are included on the basis

[1] Rosenvinge & Warming. The Botany of Iceland, Vol. I, Part 4. Pp. 395–677. 1918.

[2] Bryologist **18**: 51f. 1915; Torreya **16**: 47ff. 1916; **17**; 60ff. 1917.

of independent collection. Many of the statements of distribution, principally the negative ones, are too sweeping, as based upon a too limited field experience, and are contradicted by my own observations. To note only a few cases that have struck my attention:

Desmatodon latifolius is said (page 455) to appear to be quite absent from southwest and south Iceland. Yet I found it nicely fruiting on the lava-field at Hafnarfjördhur.

Tortula mucronifolia (page 456) is recorded only from Vestmannaey[3], but I have two specimens collected at Hafnarfjördhur and Isafjördhur. There is no reason why this species should not be expected at least as far north as *T. subulata*, though I also found it less common.

Dissodon splachnoides (page 467) is said to be absent or very rare in the southwestern and southern part. But I found it growing nicely in a boggy place at the base of Ingólfsfjall, near the bridge over the Olfusá in the southern lowland.

Meesea triquetra (page 492) is recorded as found only sterile. I found the plant with capsules, not far from Reykjavik.

Glacier-rivers (page 548) are said to be entirely devoid of bryophyte vegetation, which may be largely true. Yet I noticed in the Olfusá a short distance below the bridge, that a fish-net had brought up a good deal of *Fontinalis*, the presence of which one would not otherwise have suspected.

Pohlia polymorpha (pages 640, 643) is, on the basis of a single collection, recorded only from the "Mountain Region" (alt. 300–600 m.); but my own two localities, Hafnarfjördhur and Lâgafell, are lowland. Probably all or nearly all of the Iceland mosses of higher altitudes may be found descending to near the sea-level, though the lowland ones may not be expected to ascend in anything like the same proportion.

The illustrations are good and suggest the possibility of a considerably extended use of the camera in moss-study.

A. LeRoy Andrews

Ithaca, N. Y.

ANNUAL REPORTS—SULLIVANT MOSS SOCIETY—1918

Report of the President

The Armistice has lifted a load of care and trouble from a long-suffering world, and we are beginning to get reprints and publications from Central Europe which tell us what our old "*friendly enemies*" have been doing. They, too, have had difficulty in learning about our activities, for the *Botanisches Centralblatt* is giving abstracts of publications dating back to 1914–1916. The gift of

[3] There is no singular Vestmannaey, but only the plural Vestmannaeyjar (a small group of islands just south of the Iceland coast). Hesselbo's collections were evidently made upon the larger inhabited island, whose name is Helmaey. Generally speaking the Icelandic names in this work are identifiable, but in a Danish work of the sort one expects them to be correct.

the Bossier Herbarium and Library to the University of Geneva was announced in March, 1918, and the Conservateur, M. Gustave Beauverd, becomes a member of the faculty of the Botanical Laboratory. The last word received about the library and herbarium of M. J. Cardot, formerly at Charleville, France, was a postal card from Leopold Loeske, from Berlin, dated February 28, 1916, in which he stated that the War Ministry had assured him that "Cardot's house was uninjured and his collections undisturbed." C. Warnstorf,[1] in Hedwigia, has described some new (?) species of mosses from Japan, South America, and Europe, among them *Funaria flaviseta*, *Climacium acuminatum*, and *Bryhnia angustifolia* from New York! L. Loeske[2] also reviews a paper by Warnstorf on *Sphagnum*, *Fontinalis*, *Pohlia* and *Grimmia*. K. Müller continues his contributions on the Hepatics to Rabenhorst's Kryptogamen-Flora.

From H. N. Dixon[3] we recently have received two contributions on the mosses collected by the Smithsonian African Expedition of 1909–10, and from Prof. Borgensen[4] a list of the mosses and lichens collected in the former Danish West Indies (1892–93 and 1895–96, 1905–1906) including two new species, *Trichostomum perviride* Broth. and *Bryum Raunkiaerii* Broth., both sterile specimens.

Since my last report, various members have been active in Red Cross work, notably Dr. Nichols[5] at Yale, who has been demonstrating the value of *Sphagnum* in surgical dressings; Dr. Evans volunteered for Red Cross work in France, but the armistice came in time to stop his going. He completed the *MSS* of the *Marchantiales* for N. A. Flora, to which Dr. Howe has contributed the *Ricciaceæ*. It is not necessary to enumerate the work of the Bryologist. During the year, some of the Arctic collections made by the Macmillan Expedition in Northern Greenland and those collected by the Canadian Arctic Expedition have been received. Mr. Williams[6] has listed some of the mosses and lichens collected in Grant Land by the Peary Arctic Expedition. Miss Coker,[7] under my direction, has revised the North American species of *Encalypta*, and we have reduced the number of species from 18 to 8. A notable departure has been made in the Flora of Bermuda,[8] by including the mosses, hepatics, and lichens with reading chapters on the Algae and fungi, the mosses contributed by E. G. Britton; the hepatics by Dr. A. W. Evans; the lichens by Dr. L. W. Riddle; the Algae by Dr. M. A. Howe, and a brief account of the fungi, thus far imperfectly known, by Dr. F. J. Seaver. The Flora of the Bahamas, now going through the press, will also include these groups of flowerless plants.

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[1] Bryophyta nova Europæa et Exotica **57**: 62–131. 62 figures. 1915.

[2] *op. cit.* **6**: (28) 849–947. 1916.

[3] Smithsonian Misc. Coll. Volume **69**: Nos. 2 and 8. 1918. [See also Bryologist **21**: 93 and 95. Nov., 1918.]

[4] Dansk. Bot. Ark. **2**: No. 9. 1918.

[5] Journal N. Y. Bot. Garden **19**: 203–220. 1918.

[6] Torreya **18**: 210–211. 1918.

[7] Bull. Torrey Club Bot. **45**: 433–449. Pls. 13, 14. Nov. 15, 1918.

[8] Flora of Bermuda, by Nathaniel Lord Britton. 585 pp. XI. Illustrated by 519 cuts, in text, with colored frontispiece. Charles Scribner's Sons, 1918.

During the year a new American Botanical Abstracts magazine has begun publication, of which one number has been issued; Dr. J. R. Schramm, of Cornell University, is in charge of the taxonomic work for the flowerless plants, and Dr. A. LeRoy Andrews has consented to take charge of the bryological abstracts. It behooves us all to assist him in any way that we can and to send him copies of all our publications.

Elizabeth G. Britton, *President.*

New York Botanical Garden.

Report of the Secretary-Treasurer

In submitting the annual report for the past year, the Secretary-Treasurer almost fears that the members of the Sullivant Moss Society may feel that more of explanation is due them than any record of accomplishment. There have been so many demands upon the time of every member and so many interruptions, that all must have felt that the work of the Society has become largely secondary. In particular, the loss of proofs in the mails, the confused state of the printing trade, and the demands upon the Editor's time made by necessary war work, have so greatly delayed the issues of the Bryologist that, up to the present writing, only four numbers have been published for the current year. Particular thanks is due the members of the Society for the patience they have shown in putting up with this delay. We all hope most sincerely that it may soon be possible to bring the appearance of the magazine up to date, and avoid delays.

The response to the circular letter regarding elections, which was sent out the middle of November, has been most gratifying. The circular was sent to all members resident in the United States and Canada, postal conditions rendering it useless to send to others. Fifty-seven replies were received previous to December 7, and all of these were unanimous in voting that the present board of officers be continued for another year. Accordingly, the officers for 1919 are: *President*, Mrs. Elizabeth G. Britton; *Vice-president*, Mrs. Annie Morrill Smith; *Secretary-Treasurer*, Mr. Edward B. Chamberlain. The large response to the circular leads the Secretary to suggest that in the future all matters pertaining to the election of officers be handled in this manner, as the expense is trifling compared with the gain in promptness and in the expression of personal opinion.

No meeting of the Sullivant Moss Society was held in December, 1917, but plans were early laid for one in December, 1918, at Boston, in connection with the convocation week exercises of the American Association for the Advancement of Science. Early in March, however, word was received from the Secretary of the Association that the Executive Committee had decided to change the place of meeting to Baltimore, and to make the meetings limited in the matter of programme to matters connected closely with the great war. Under these circumstances, and in view of the increase in railroad rates, the lack of housing accommodations in Baltimore, and the probable small attendance, the

Advisory Board of the Society decided it would be best to abandon the proposed meeting. An effort was made, however, to have the Society represented by an exhibit of the usefulness of sphagnum in surgical dressings, of which Mr. Plitt very kindly took charge.

The membership of the Society now totals 142, a total increase of eight over last year. Two members have died, Mr. S. L. Schumo, of Philadelphia, and Dr. G. G. Kennedy, of Readville, Mass., and two others have not been heard from during the past year. As, under the regulations of the Post Office Department, the BRYOLOGIST cannot be sent to members *more than two issues in arrears* unless a definite promise of payment is received, the Secretary has been reluctantly compelled to suspend the magazine to those members who have not paid. To balance these losses, twelve new members have joined the Society. A complete list of new members and of changes in address since August, 1918, is given in this issue of the BRYOLOGIST.

The offerings of specimens, through the columns of the magazine, show an increase over the total of last year, and in comparing the results it is to be remembered that only four issues for 1918 have appeared. Twenty-four different species have been offered, all but one of which have been mosses. The force of last year's comment, that in war times hobbies suffer, has been shown true, but the Secretary sincerely hopes that during the coming year a great increase in the amount of material offered may show that the neglected hobbies are again being exercised. The most depressing feature, however, is not the small number of species offered, but the few requests for them that are received. During the past year the Secretary has offered eight species, all somewhat uncommon, and some rare: not more than a dozen different members have availed themselves of the opportunity of securing specimens. From reports received from others who have offered material, the Secretary concludes that his experience is not unique. It seems too bad that there is so little interest in this matter.

The financial statement appended below shows that the Society is still solvent. By cutting down the size of editions, costs have been kept well within previous figures, and it has been possible to repay advances made by Dr. Frye for plates, and by Mrs. Hasse on the charges for the shipments of Dr. Hasse's duplicates. From the balance on hand as shown by the report about seventy dollars should be deducted to cover the probable costs of the September and November issues of the BRYOLOGIST, thus leaving a balance of about sixty dollars to be carried on for next year.

In the matter of cutting down the size of the editions, however, the Secretary confesses that he rather overdid things, and that as a result the Society is short of copies of the numbers from September, 1917, to July, 1918, especially of the March, 1918, issue. Will members who may have any spare copies of these issues please communicate with the Secretary, in order that it may be possible to supply sets to those who in the future wish to purchase, and to make good the demand for lost copies that will in all probability come from foreign members.

In conclusion, the Secretary wishes to extend to all the members, and especially to those just joining the Society, his best wishes and heartiest greetings for the coming years.

SUMMARY OF ACCOUNTS

RECEIPTS

Balance on hand, December 1, 1917	$ 63.21
Dues for current year	170.90
Subscriptions for current year	59.08
Arrears collected, dues and subscriptions	14.85
Dues and subscriptions for coming year, already paid	18.09
Sales of back numbers	33.09
Incidental receipts, advertising, etc.	14.88
Sales of Hasse Lichens	33.00
Advance from Dr. Frye, on plates	22.00
	$429.10

EXPENDITURES

Printing and stationery	$ 6.25
Postage, bank fees, and incidentals	7.11
Herbarium expense	10.04
Express charges	13.31
Labels for Hasse Lichens	3.11
Plates for BRYOLOGIST	32.75
Printing BRYOLOGIST (Nov., 1917–July, 1918)	166.91
Repayment to Dr. Frye	22.00
Repayment to Mrs. Hasse	40.00
	$301.48
Cash on hand, November 30, 1918	127.62
	$429.10

Respectfully submitted,

EDWARD B. CHAMBERLAIN,

Secretary-Treasurer.

Report of the Curator of the Moss Herbarium for 1918

Among faithful workers who have contributed to the Moss Herbarium during the past year have been: Mrs. E. G. Britton, R. S. Nanz, J. M. Grant, C. H. Demetrio, S. Rapp, Miss Daisy Levy, Mrs. R. Lowe, Mrs. E. M. Dunham, H. Dupret, and others.

The year has brought such unusual conditions of other activit es for almost all of our members that bryological interests have not been quite so energetically pursued as usual, but we hope that the brighter outlook for 1919 may bring renewed correspondence and collections, so that another year we may have large figures to report of additions to the Herbarium which this year are purposely omitted. The Curator is ready to give a helping hand, insofar as he is

able, to those who may send material to him for determination. Let us establish a new and excellent record for the ensuing year.

George B. Kaiser, *Curator.*

232 Mt. Pleasant Ave., Mt. Airy, Philadelphia, Pa.

December, 1918.

Report of the Curator pro-tem of the Hepatic Department

Only 120 specimens have been added to the Hepatic Herbarium, making the number 5909. The collectors represented are the following: Geo. M. Pendleton, who found two additional stations for the rare *Cephalozia affinis* in California; S. H. Burnham; J. M. Grant; J. Evans, *Clevea hyalina* from Washington; Geo. B. Kaiser gave two Southern species collected by Mrs. J. M. Fox; Rev. Demetrio gave two northern species collected by Prof. Macoun and Rev. Mueller; C. C. Haynes a small set of Pearson's British Exsiccatæ, etc.

Capt. Conklin did not forget us, having sent an interesting looking set of French hepatics collected near Vichy; he being in charge of a ward in Base Hospital No. 1, located there. Mr. G. K. Merrill, who is sending us Maine hepatics, is heartily welcomed to our list of contributors. These specimens, together with various "left-overs," are being slowly worked up and will be reported on next year.

Prof. A. W. Evans has given eleven reprints from the *Journal of Botany* of W. S. Pearson's descriptions and figures of British hepatics and his papers on the botanical works of Gottsche and Benjamin Carrington. The library connected with this Department is steadily increasing in size and importance. Gifts of reprints are requested from members.

Caroline C. Haynes, *Curator pro-tem.*

Highlands, New Jersey.

Report of the Lichen Department for 1918

During the past year four more fascicles of the *Lichenes Exsiccati*, duplicates from Dr. Hasse's large collections, have been distributed. This makes in all ten fascicles of 25 specimens each, each species being described in Dr. Hasse's "Lichen Flora of Southern California." There remains on hand still enough material to make, perhaps, two more fascicles, thus completing three centuries. However, as but a slight amount of this material is described in the "Lichen Flora of Southern California," and in the later articles in the Bryologist, it is considered wiser to delay the issue of further fascicles after number ten, until a more detailed report upon the material can be given. This last may take considerable time, but when completed all subscribers to the earlier sets will be notified.

As stated in the Report for 1917, all the complete sets of the Exsiccati have been subscribed for. There is, however, much material, duplicating specimens issued in the sets, which can be sold in lots of 25, 50, or 100 specimens, upon

selection by the purchaser. Upon this material slightly lower rates will obtain than those charged for the full sets. A package of 25 specimens will be sold for $1.25; of 50, for $2.25; and of 100, for $4.00. Members desiring Californian lichens should take advantage of this opportunity.

The herbarium has been increased by a representation of all the species distributed in the Hasse lichen exsiccati during the year, and also by the following donations: Mr. J. M. Grant, from Washington; Mrs. M. A. Noble, from Florida; Mr. Frank Dobbin, from New York; Mr. J. Evans, from Washington; and Rev. P. G. M. Rhodes, from England. To all these members the Curator wishes to express his sincere thanks and appreciation. The additions total 125 specimens, which brings the total number of specimens in the Society Herbarium to 3385.

Respectfully submitted,

CHARLES C. PLITT, *Curator*.

BALTIMORE, MD., DECEMBER 18, 1918.

CORRECTIONS AND ADDITIONS—ADDRESS LIST, SULLIVANT MOSS SOCIETY

The present list gives all changes of address and all additions to the membership of the Society which have come to the knowledge of the Secretary from August 1, 1918, to November 30, 1918. It is supplementary to lists published in the BRYOLOGIST for January, March, and September, 1918.

NEW MEMBERS

Miss M. H. Best.....616 Madison Ave., New York City.
Mr. James L. Blackmer.....107 Penhurst Park, Buffalo, N. Y.
Mrs. Abigail Butler.....6730 Normal Ave., Chicago, Ill.
Mr. R. Thomas Hutchinson.....633 Christian St., South Bethlehem, Pa.
Mrs. Alice I. Irvine.....Palos Park, Ill.
Dr. Robert T. Morris.....616 Madison Ave., New York City.

CHANGES OF ADDRESS

Miss Lydia Prichett Borden.....306 North High St., Bethlehem, Pa.
Mrs Joseph M. Fox.....125 West Springfield Ave., Chestnut Hill, Pa.
Prof. N. L. T. Nelson.....Goodhue, Minn.
Mrs. Thomas Spencer.....1241 Belle Ave., Lakewood, Ohio.

Cardot's collections ravaged.—M. Jules Cardot, whom our readers know as one of the foremost living bryologists, has returned to his home at Charleville, up near the middle of the Belgian border, only to find the furniture smashed or stolen, family portraits torn to pieces, books torn and scattered about from cellar to attic, botanical collections thrown pell-mell on the floor of the attic and scientific books torn and mixed up and thrown down on top of them, and, besides all that, valuable parts of the collections are missing: all the unstudied material, a Japanese collection of over 5,000 specimens and including a large number of new species, and other collections from Saghalin, Juan Fernandez, and the

Sandwich Islands, all probably destroyed or lost beyond recovery. As the extracts below will indicate, there was reason to believe a couple of years ago that the collections might escape ruin.—Editor.

Following are extracts from two letters to Mrs. Britton.

25. 1. '16.

"Sehr geehrte Frau Britton:-

"Meines Wissens hat bei Charleville kein Kampf stattgefunden, und ich zweifel daher nicht, dass die Sammlungen des Herrn Cardot intakt sein werden. Wir sind eben trotz alledem keine Barbaren, und unsere Soldaten vergreifen sich nicht an wissenschaftlichen Sammlungen. Das tut ja nicht einmal ein nordamerikanischer Grizzly Bär."

28. 2. '16.

"Ich schrieb Ihnen vor einigen Wochen. Hoffentlich haben die Engländer meiner Brief nicht gekapert. Jetzt habe ich aus dem Kriegsministerium die Mitteilung erhalten, dass Herr Prof. Cadot bei Ausbruch des Krieges nach Paris, wo er einen Sohn hat, geflüchtet ist, Sein Haus ist völling unversehrt und daher wird auch seinen wissenschaftlichen Sammlungen nichts geschehen sein."

Leopold Loeske.

The following is an extract from a letter of M. Jules Cardot, the noted French bryologist of Charleville, France, written in Decenber 1918, and recently transmitted to me through M. I. Thériot, of Havre. I am sure that friends of M. Cardot will be glad to learn tidings of him.—E. B. Chamberlain.

"Depuis notre arrivée ici je vis des jours qui compterons, certes, parmi les plus pénibles de ma vie, et si nous n'avions pas la victoire, qui nous console de tout, je me demande si je n'aurais pas été tenté d'en finir avec l'existance. Vous ne pouvez vous imaginer le spectacle que présente notre pauvre maison, l'état de saleté repoussante et de dévastation dans lequel elle se trouve, Partout des meubles brisés, les portraits de famille lacérés, des livres en lambeaux épars de la cave au grenier, les armoires, les secrétaires fracturés, quoique tous les clefs étaient sur les portes; tous les beaux meubles anciens disparus et remplacés par l'autres meubles qui ne nous appartiennent pas. Les livres qui n'ont pas été déchirés formaient dans le grenier une indescriptible salads; on se demande comment on peut arriver à mélanger ainsi une bibliothèque; ce doit être un travail très fatigant! A côté de cela des choses déconcertantes. Mes collections qu' on avait dites evacuées sont là, en partie lu mains. Je les ai retrouvees, entassées dans le fond du grenier et recouvertes par ma bibliothèque scientifique, qu' on a jetés pêle-mêle par dessus. Malheureusement mes pauvres collections sont loin d'être au complet. Il manque outre tous les matériaux non étudiés, une énorme collection du Japon, de plus de 5,000 N°, contentant des centaines d'espèces nouvelles, une collection de Juan Ferrandez, une autre des iles Sandevich et une autre encore de Saghaline, tout cela probablement détruit et perdu sans retour."

EXCHANGE DEPARTMENT

Offerings—To Society members *only*. Return postage, rather than a stamped envelope, should be sent.

Rev. H. Dupret, Seminary of Philosophy, Montreal, Canada.—*Sphagnum fuscum* Klinggr., from Alberta, and *Hypnum polygamum* Wils., from near Montreal. *U. S. postage accepted.*

Mr. Severin Rapp, Sanford, Florida.—*Collema aggregatum* Nyl., collected in Florida by Severin Rapp.

VOLUME XXII NUMBER 2

MARCH, 1919

THE BRYOLOGIST

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THE BRYOLOGIST

VOL. XXII MARCH, 1919 NO. 2

ENCALYPTA LACINIATA IN CENTRAL NEW YORK

ELIAS J. DURAND

In the BRYOLOGIST for January, Mr. Ralph S. Nanz writes of the occurrence of *Encalypta laciniata* (*E. ciliata*) in Enfield Ravine, Ithaca, N. Y., stating that it had been found only in that one ravine, and that no very logical explanation for its appearance so far from its natural habitat in the north could be given.

The writer's acquaintance with this moss dates from a bright day in April, 1890, when, as a freshman, he went to collect mosses in Fall Creek Ravine, bordering the Cornell Campus, with the late Professor W. R. Dudley, that prince of men and of teachers. Two species gathered that day had such striking peculiarities that they made a strong impression on his mind and still remain vivid in his memory. One was *Buxbaumia aphylla*, in the woods north of Triphammer Falls, the other was *Encalypta ciliata*, on the rocks at the north end of the swinging bridge. Specimens of both collected in 1890 were preserved, and plants have since been noted repeatedly in the same spots. The *Encalypta* certainly was no stranger to Professor Dudley at that time. The writer was constantly on the lookout for it in suitable spots during many subsequent years. While exact data are not at hand, the impression is strong that *Encalypta* has been seen in most of the larger ravines about Ithaca. At any rate, specimens were collected in Six-mile Creek near the narrows, in Fall Creek, and in Enfield. Doubtless, specimens in the Dudley Herbarium, at Stanford University, will prove its wider range. Certainly it is not confined to Enfield, nor is its occurrence there exceptional.

It is well known that several northern species of flowering plants, notably *Saxifraga aizoides*, *Pinguicula vulgaris* and *Primula Mistassinica*, inhabit the deep, cold ravines about the head of Cayuga Lake. The explanation for their occurrence by Professor Dudley doubtless applies also to mosses, that they "may have been driven down by the ice-sheet and have retained their foothold after its recession, finally retreating to the wet, shaded walls of the ravines which were then forming, where they now remain, isolated from the home of the species."

UNIVERSITY OF MINNESOTA, MINNEAPOLIS.

The January number of the BRYOLOGIST was published February 20, 1919.

COLLECTING IN ARKANSAS

Rachel L. Lowe

If any of my readers go to Hot Springs, Ark., a bryological treat awaits them there. Mosses grow everywhere: on wet and dry ground, on dry rocks high on the hillsides, on tree trunks, and even in the cracks of the walls along the city streets. My knowledge of mosses at the time I was there was exceedingly limited (still is, for that matter!) and I never strayed far from the beaten paths near the city, but the following list gives an idea of the possibilities of the region if one could wander farther afield with a fuller knowledge of what to seek.

Ptychomitrium incurvum and *Grimmia leucophea* were common on the rocks. *Leucodon julaceus* grew in profusion on many of the hardwood trees and was conspicuous from the train. When wet it seems to me one of our most beautiful mosses. *Ditrichum pallidum* grew taller than it does here and attracted attention along the roadsides. A big ledge was covered with a thrifty growth of *Dicranum pallidum*. Any interested person going up West Mountain *via* the road would not fail to see it. On that same mountain I found the face of a rock overrun by the tree-loving *Drummondia clavellata*, from which it was easily separated in one big lacy mat. And along the path at the foot of the mountain was a suspicious-looking *Catharinea*. I gathered quantities of it in good fruit, hoping that it would prove to be something rare, but Mr. Kaiser blasted my hopes and it was all left behind as plain *angustata*. *Bartramia radicalis* was collected from the sidewalks growing on a wet bank along the road to the ostrich farm.

Campylopus fragilis was my best find, as Mrs. Britton says it is only the third report for that species in the United States. Not only was it a rare specimen, but it was growing in a very unusual habitat—on a rock in a brook, with the water running over it when I found it. To me at that time it was merely a queer *Dicranum* growing in a queer place, or I might have looked around for more of it to share with other collectors.

If I am ever fortunate enough to be in Hot Springs again, I shall be undecided which locality to make for first: the brook where the *Campylopus* grew, or the ledge where the *Clasmatodon* flourished.

Whoever reads this is probably more or less of a botanist and geologist, and every other kind of a naturalist, so perhaps it would not be amiss if I just mention the rock of which most of the ledges consist. It is novaculite, a quartzitic rock of the most beautiful texture and colors; and in many places where road-building was in progress, were fresh fractures which drew attention and admiration from every passerby There were interesting breccias and conglomerates, too. So take your hammer to Hot Springs as well as your vasculum. Yes, and your bird-glasses and any other paraphernalia, for it is a most interesting locality from whatever viewpoint a naturalist looks at it.

Following is the list:

Grimmia leucophea Grev.
Ptychomitrium incurvum (Schwaeg.) Sulliv.
Weisia viridula (L.) Hedw.
Polytrichum commune L.
Anomodon rostratus (Hedw.) Schimp.
Leucodon julaceus (Hedw.) Sulliv.
Plagiothecium micans (Sw.) Paris.
Dicranum pallidum B. & S.
Cirriphyllum Boscii (Schwaeg.) Grout.
Drummondia clavellata Hook.
Catharinea angustata Brid.
Mnium cuspidatum (L.) Leyss.
Pylaisia Schimperi R. & C.
Hedwigia albicans (Web.) Lindb.
Bartramia radicalis Beauv.
Bartramia pomiformis (L.) Hedw.
Entodon seductrix (Hedw.) C. M.
Thelia hirtella (Hedw.) Sulliv.
Thelia asprella (Schimp.) Sulliv.
Clasmatodon parvulus var. *rupestris* Sulliv. & Lesq.
Dicranella heteromalla (L.) Schimp.
Desmatodon plinthobius Sulliv. & Lesq.
Funaria flavicans Mx.
Physcomitrium turbinatum (Mx.) Brid.
Desmatodon arenaceus S. & L.
Bryum caespiticium L.
Amblystegium varium (Hedw.) Lindb.
Philonotis fontana (L.) Brid.
Thuidium delicatulum (L.) Mitt.
Ditrichum pallidum (Schreb.) Hampe.
Campylopus fragilis (Dicks) Bryol. Eur.

24 Brattle St., Worcester, Mass.

LICHENS OF THE MT. MONADNOCK REGION, N. H.—NO. 11*

Thomas Durfee

These lichens were determined by the late Dr. H. E. Hasse. All the specimens are fertile.

Genus: Rhizocarpon Ram.

194. *Rhizocarpon geographicum* (L.) DC. Four specimens.
195. *Rh. petraeum* (Wulf.) Mass. Two specimens.

Genus: Ephebe Fr.

196. *Ephebe pubescens* Fr. Three specimens.

Genus: Blastenia Mass.

197. *Blastenia ferruginea* (Huds.) Koerb. Two specimens.

Genus: Caloplaca Th. Fr.

198. *Caloplaca aurantiaca* (Lightf.) Th. Fr. Five specimens.
199. *C. variabilis* (Pers.) Th. Fr. One specimen.
200. *C. vitellina* (Ehrh.) Th. Fr. Two specimens.

Genus: Buellia DeNot.

201. *Buellia dialyta* (Nyl.) Tuck. One specimen.
202. *B. myriocarpa* (DC.) Mudd. Two specimens.
203. *B. parasema* (Ach.) Koerb. Ten specimens.
204. *B. parmeliarum* (Sommerf.) Th. Fr. One specimen.

Genus: Rinodina Mass.

205. *Rinodina exigua* (Ach.) Mass. One specimen.
206. *R. oreina* (Ach.) Mass. Five specimens.

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* No. 10 of this series was published in the Bryologist **21**: 18. Jan., 1918.

Genus: Baeomyces Pers.

207. *Baeomyces byssoides* (L.) Ach. Five specimens.

(This species should have been included with the other species of *Baeomyces* in Part 5, Sept., 1910.)

Genus: Physcia Schreb.

208. *Physcia adglutinata* (Flke.) Nyl. One specimen.

(This species should have been included with the other species of *Physcia* in Part 4, July, 1909.)

Middlesex School, Concord, Mass.

ANACAMPTODON SPLACHNOIDES VAR. TAYLORIAE IN MISSOURI

Edward B. Chamberlain

In 1906 Dr. Grout[1] published a new variety, *Anacamptodon splachnoides* (Fröl.) Brid., var. *Tayloriae* Grout, based upon material collected by Mrs. A. P. Taylor near Thomasville, Georgia. Through an unfortunate slip of the types, the varietal name was spelled "Tyloriae" in the original publication. This variety was characterized, in contrast to the species, by "a thinner, almost percurrent costa, longer seta, larger capsule, with the operculum barely conic." Judging from the two collections which I have seen, the variety differs also in the larger size, and in the longer, broader leaves.

My attention has been drawn to the variety again, since Rev. C. H. Demetrio has recently forwarded to me a specimen collected in Davis Creek Township, Lafayette County, Missouri, that matches perfectly the Georgia specimens. Dr. Grout has also verified the determination. While this last collection is only the second one to be recorded as far as I know, the very great extension of range which it represents warrants calling especial attention to it, in order that collectors may be more closely on the watch. The species itself is by no means common, but is usually so readily recognized in the field that the variety may pass unnoticed in collections. Dr. Grout, in his original article, calls attention to the similarity of the variety to the plant previously described as *Anacamptodon cubensis* Sull., and it is to be hoped that those who have access to collections from the Southern United States, and particularly from the West Indies, will examine them with reference to the variety in question, that the matter of its distribution may be settled, and the possible identity of it with the Cuban species cleared up.

MISCELLANEOUS NOTES

Mr. Chamberlain contributes the following note from Mr. H. N. Dixon, regarding Dr. Brotherus, Helsingfors, Finland: "I hear today from Thériot that he has just heard from Brotherus, from whom we have heard nothing for

[1] Bryologist **9**: 44. (1906).

years. He says that he is in good health, but has suffered much from the revolutionary movement, both physically and morally, and that they feel themselves isolated from the world. He hopes he may, however, soon begin his scientific work again, if peace is made."

NOTES ON RECENT BRYOLOGICAL LITERATURE

Bryophytes with reference to Plant Genetics.—A small but valuable text[1] on Plant Genetics by the Coulters, at the University of Chicago, has recently appeared, and pages 187 to 189 take up a brief treatment of the work which has been done in the mosses and liverworts bearing on questions of heredity.

In dioecious liverworts, such as *Marchantia*, the antheridia and archegonia appear in about equal numbers, and it was supposed, then, that the four spores (tetrads) produced by the spore mother-cell of the sporangium would be equally divided as to sex, two of them producing antheridial plants and the other two archegonial plants. Noll[2] found that gemmae from antheridial gametophytes produced only antheridial gametophytes, and those from archegonial gametophytes only archegonial ones. Strasburger[3] then worked on *Sphaerocarpus*, in which the four spores of the tetred hang together, and found that the four gametophytes produced from the four spores of the tetrad were always two antheridial and two archegonial, so that the sexes must be differentiated in the formation of the four spores of the tetrad during the so-called "reduction-division" of the nucleus of the spore mother cell of the sporangium.[4]

During these reduction divisions certain organs of the nuclei known as "chromosomes" split and separate to enter into the formation of the newly-formed nuclei, and Allen[5] not long ago claimed that the nuclei of the archegonial gametophyte of *Sphaerocarpus* have one larger chromosome, and the nuclei of the male gametophyte one very small one. A monoecious liverwort, however, must have both antheridial and archegonial characters in each spore, and what happens in some species of *Riccia* where antheridia and archegonia are produced by the same gametophyte but at different times?

The authors refer to the Marchal's work on *Funaria*[6], a species which, like *Marchantia*, is dioecious. Clipping fragments from young sporophytes the Marchals were able to grow these directly into gametophytes, thus leaving out of the life-cycle the reduction division. According to theory the resulting gametophytes should, of course, all be dioecious, producing both antheridia and archegonia, and this was exactly the result obtained.

O. E. J

[1] Coulter, John M., and Coulter, Merle C. Plant Genetics. University of Chicago Press. 1918.

[2] Noll. Sitzungsb. Nied. Gesell. Bonn. Naturw. Abt. 1907. S. 68.

[3] Strasburger. Biol. Centralblatt **20**: 657, 1900. and Jahrb. Wiss. Bot. **48**: 427–500. 1910.

[4] See Bryologist **20**: 64–66. 1917.

[5] Allen. Science **46**: 466–467. 1917.

[6] Marchal, El & Em. Bull. Acad. Roy. Begique, Cl. Sci. **1907**: 765–789; **1909**: 1249–1288; and **1911**: 750–778.

Effect of the Katmai eruption[1] on Mosses.—Since the great eruption in 1912 of the volcano Katmai, Alaska, R. F. Griggs has directed expeditions to that region, and among several articles relating to these expeditions one is of more strictly botanical interest,[1] and it is interesting to note what progress the mosses may have made towards recovering their former important place in the vegetation of the region.

The thick mantle of volcanic ash transformed much of the region into a bleak desert, but in the last few years considerable vegetation has appeared, coming not from seedlings but mostly from plants of the previous vegetation which have been able to survive more or less complete burial. Sphagnum bogs have been almost completely destroyed, even when covered by but two or three inches of ash, and here, as elsewhere, the common horsetail (*Equisetum arvense*) has assumed considerable importance as a ground-cover. In speaking of the forest, Griggs says:

"In the deeper parts of the forest the branches bore great masses of moss, which, of course, caught and held quantities of ash. During the interval that has followed the moss has grown out over the ash, making larger masses than ever and giving the trees a very bizarre appearance.

"The most striking feature of the revegetation of the forest, however, is to be found on the ground. When the ash dried out after the first heavy rains following the eruption, deep cracks appeared like the mud cracks in a dried-up puddle. These cracks are, of course, long since filled up by drifting ash, but a heavy growth of moss (*Amblystegium* sp.) has come up in every crack, giving the ground a most curious reticulated appearance.

"This curious distribution of moss is apparently due to the fact that the spores found lodgment in the cracks. The same moss often starts around fallen sticks or other objects on which wind-borne spores would settle. One of the most striking instances of this was a sea-urchin shell, dropped by a raven and which was embedded in a mass of moss that had grown up around it."

O. E. J.

Riddle on Pyrenothrix nigra[1]—I find no reference in our file of THE BRYOLOGIST to the new genus and species, *Pyrenothrix nigra*, described by Dr. Lincoln W. Riddle in 1917, from material collected in Florida in 1897 on bark of scrub oaks and on living oleander by Prof. Roland Thaxter. Riddle says:" On account of the distinctive combination of a byssine thallus and a pyrenomycetous fruit this new genus may appropriately be named as follows: *Pyrenothrix*, gen. nov." The new lichen has gonidia of the *Scytonema* type and fruit of the perithecial form, evidently belonging to the family *Pyrenidiaceae*, but differs from all other genera in that family by the byssine character of the thallus and the muriform spores. "The structure of the thallus and the relation of hyphae and gonidia are seen to be exactly that of *Coenogonium*." The thallus is "brownish-black, spreading over the substratum without definite limits and closely adnate, byssine, when wet soft and gelatinous, when dry harsh and not at all spongy."

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[1] Griggs, Robert F. Scientific Results of the Katmai Expeditions of the National Geographic Society. I. The Recovery of Vegetation at Kodiac. Ohio Journ. Sci. **19**: 1–57. Nov., 1918.

[1] Riddle, Lincoln W. *Pyrenothrix nigra*, Gen et Sp. Nov. figs.4 Bot.Gaz. 64: 513-515. 1917

Hotson on surgical sphagnum.[1]—Two articles by Hotson appeared recently on the use of sphagnum for surgical dressings. One article is published by the American Red Cross[2] and contains a good popular treatment of the distribution and structure of sphagnum, sphagnum bogs, uses of sphagnum, utilization of the plant by Great Britain, a history of the development of the use of the plant in the United States, then follow descriptions of the work of collecting and sorting, making bandages, a discussion of the absorbency of sphagnum, the species best suited to the work, and finally sterilization. This paper is accompanied by a number of photographs, drawings, and tables. The second article,[3] published by the Puget Sound Biological Station, takes up the subject in much the same manner but with much more detailed directions as to the various operations from the time the sphagnum is gathered up to its final use as a surgical dressing. This article also is fully illustrated and it is accommpanied by a bibliography of twelve titles accredited to eight authors. These two articles constitute the most complete treatment of the subject thus far published. O. E. J.

Notes on lichens.—Fink[4] has recently reviewed two articles by Danilov[5] which disprove Elfving's contention (1905) that the fungal hyphae in lichens cut off colorless spherical cells which later become green and divide rapidly, thus constituting the "gonidia" or so-called algae of lichens. Danilov found that unstained preparations might lead to such conclusions but that stained material showed the entrance of the fungal hyphae into the algal cells and that the pale alga-like cells were in reality algal cells killed by the parasitic fungal hyphae plainly visible within them. As to the relation of fungus to alga in the lichen, Danilov, in the words of Fink, "admits that there may be osmotic filtration of certain materials from the alga to the lichen [fungus], and the like passage of others from the lichen [fungus] to the alga. However that may be, Danilov finds the final result to be the absorption of the algae by the lichen [fungus] hyphae, which enter the algal cells and form dense networks of slender, thin-walled or naked absorbing threads. Although the lichen thallus with its prepared peptones and certain other organic materials is probably a favorable substratum for the algae, yet the lichen [fungus] is parasitic on the algae, which are killed in large numbers as a

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[1] In this connection see also notes on another article by Hotson, THE BRYOLOGIST **21**: 90–91. Nov. 1918; and articles by Nichols, THE BRYOLOGIST **21**: 53–56. July, 1918, and **21**: 81–83. Sept. 1918.

[2] Hotson, J. W. Sphagnum as a Surgical Dressing. Published by the Northwest Division of the American Red Cross. pp. 1–31. figs. 18. tables 2. No date, probably 1919.

[3] Hotson, J. W. Sphagnum from Bog to Bandage. Publ. Puget Sound. Biol. Sta., Univ. Wash. **2**: 211–247. March 7, 1919. pls. 31–48.

[4] Fink, Bruce. Gonidia of lichens. [Contribution under head of "Notes for Students."] Bot. Gaz. **67**: 97. Jan. 1919.

[5] Danilov, A. N. Ueber das gegenseitige Verhaeltnis zwischen den Gonidien und dem Pilzkomponten der Flechtensymbiose. Bull. Jard. Imp. Bot. St. Petersb. **10**: 33–70. 1910.

Danilov, A. N. The relation between the gonidia and the hyphae in lichens. Jour. Bot. **56**: 169–181. 1918.

result of the parasitism. On the whole the algae thrive better outside the association with the lichen [fungus], while the lichen [fungus] does poorly or dies outright outside the association."

In an interesting recent paper by W. B. McDougall[1] there is a general discussion of symbiotic phenomena and there is put forward a tabular classification of these various relationships. In this classification lichens, together with endotrophic mycorhizas, root tubercles, and leaf tubercles of *Rubiaceae*, are included as examples of reciprocal nutritive conjunctive symbiosis, i. e., reciprocal parasitism. McDougall says: "The word lichen, however, has been used for a long time to mean the composite structure that results from the symbiosis of lichen-fungi with algae, and no very good reason has yet been given for changing its meaning. A lichen-fungus is a fungus, it is not a lichen. There is no more reason for calling a lichen a fungus than there is for calling a mycorhiza a fungus; and it is just as absurd to call a lichen-fungus a lichen as it would be to call a mushroom a mycorhiza." O. E. J.

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Mr. Severin Rapp, Sanford, Florida.—*Bulimbia castanella* Merrill, sp. nov., collected by Mr. Rapp in Florida.

NOTE

Owing to scarcity of copy, the January and March, 1919, numbers of THE BRYOLOGIST have been smaller than usual, but it is expected that the normal number of pages will have been published by the end of the year. We would ask that you let us have your notes and articles, even if they are brief. Write up notes about what you have seen and found—others among us are sure to be interested in these things, too. Also, will you not get together material to offer in the Exchange Department and build up collections of your own? If you have not started your own collection of mosses or hepatics or lichens, you will probably not have realized what pleasure it might give you and what an added zest it might give you in your walks and visits to the fields and woods. Those of our readers who are interested in accumulating specimens from other countries will be interested in the sets of hepatics now being issued by Pearson from England, and advertised in this number of THE BRYOLOGIST.

[1] McDougall, W. B. The Classification of Symbiotic Phenomena. Plant World **21**: 250–256. Oct. 1918.

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All material for identification should be sent to the respective curators. All matter relative to offerings should be sent to the Editor, or to the Secretary


Sincerely Your Friend
Geo. H. Conklin

THE BRYOLOGIST

VOL. XXII MAY, 1919 NO. 3

COLLECTING IN OKLAHOMA

RACHEL L. LOWE

Unlike Arkansas, Oklahoma seemed bare of mosses. I had been in Ada a week before I saw any and then it was not in Ada, but in the neighboring town of Frances that I found a rocky knoll in the woods rich in different species of moss. After that I found many such places and came to the conclusion that Oklahoma furnished fully as good hunting as Arkansas.

Grimmia leucophea and *Ptychomitrium incurvum* were often growing on the same rocks. The *Grimmia* with its hoary tips was a perfect match for the gray rocks and at a little distance was almost indistinguishable. I shall never forget riding through the granite country between Tishomingo and Ravia where the rocks were almost entirely covered with it. The slanting rays of the late afternoon sun turned it to silver and we rode past miles of shining silver rocks and ledges.

The *Polytrichum juniperinum* I would never have recognized at first sight, it was such a short, thick growth. *Tortella tortuosa* was flourishing on a dry, barren hillside in big patches, but separated into individual plants as soon as gathered. *Thelia Lescurii* was everywhere underfoot on a sandy hill-top.

The most interesting moss I found was *Amblystegium irriguum* var. *spinifolium*. This was, and without doubt still is, growing in the Ada water-supply near Byrd's Mill. The pool is fed by bubbling springs and is enclosed by a stone wall. Evidently there is keen competition for the possession of said pool between Ada and the *Amblystegium*, for there are piles of dry moss all around the outside and the implement is there handy for raking it out; but, in spite of the quantities taken out, there is still a luxuriant growth all over the rocky bottom, and I must say that it is a great addition to the looks of the pool. On examining the moss that had been thrown out, I found that where it was not so old and dry as to be faded, the lower portion of the plants was of a decided orange color in marked contrast to the dark green of the upper. It grew six to eight inches tall and was exceedingly brittle when dry. Outside the walls, where a growth of it occurred on rocks and logs not submerged, it seemed to be the type form rather than the variety and fruited freely.

The March number of THE BRYOLOGIST was published April 30, 1919.

In my lists for Oklahoma and Arkansas, not a *Stereodon* appears and only one *Polytrichum*. That is probably my fault and not the fault of the localities visited, but certainly neither genus is as common as in the northeastern states, and we, who do most of our collecting in New England, miss them both as only old and constant friends can be missed.

A little transgression before my list: the red-bud or Judas tree made the thickets along the river beds a blaze of color, and the flowering dogwoods were scattered through the woods in all their beauty. Of the birds, three were of special interest: the tufted titmouse, the road-runner or chaparral-bird, and the scissor-tailed fly catcher, the latter being exquisitely colored and the most graceful bird imaginable. The geology of the region is at once the despair and the delight of its students. There is a great deal of limestone which ought to mean more limestone mosses than I collected.

Following is the list:

Dicranella varia Schimp.
Dicranella heteromalla (L.) Schimp.
Dicranum scoparium (L.) Hedw.
Dicranum pallidum B. & S.
Leucobryum glaucum (L.) Schimp.
Fissidens subbasilaris Hedw.
Weissia viridula (L.) Hedw.
Tortella tortuosa (L.) Limpr.
Didymodon tophaceus (Brid.) Jur.
Barbula unguiculata (Huds.) Hedw.
Desmatodon arenaceus S. & L.
Ptychomitrium incurvum (Schwaegr.) Sulliv.
Grimmia apocarpa (L.) Hedw.
Grimmia leucophea Grev.
Philonotis marchica (Willd.) Brid.
Catharinaea angustata Brid.
Catharinaea xanthopelma Muell.
Polytrichum juniperinum Willd.
Hedwigia albicans (Web.) Lindb.
Leucodon julaceus (Hedw.) Sulliv.
Pylaisia Schimperi R. & C.
Thelia Lescurii Sulliv.
Anomodon minor (P. Beauv.) Fuern.
Amblystegium irriguum var. *spinifolium* Schimp.
Amblystegium irriguum (Wils.) B. & S.
Amblystegium riparium B. & S.
Campylium chrysophyllum (Brid.) Bryhn.

Worcester, Mass.

PRELIMINARY LIST OF MOSSES COLLECTED IN THE NEIGHBORHOOD OF HULETT'S LANDING, LAKE GEORGE, N. Y.

DAISY J. LEVY

Amblystegiella adnata (Hedw.) Nichols.
" *confervoides* (Brid.) Loeske.
Amblystegium fluviatile (Sw.) B. & S.
" *hygrophilum* Schp.
" *irriguum* (Wils.) B. & S.
" *Juratzkanum* Schimp.
" *Kochii* B. & S.
" *orthocladon* Kindb.
" *riparium* B. & S.
" *serpens* (L.) B. & S.
" *varium* (Hedw.) Lindb.
" *varium* approaching var. *oligorhizon* Lindb.
Anacamptodon splachnoides (Froelich) Brid.
Andreaea petrophila Ehrh.
" *Rothii* W. & M.
Anomodon attenuatus (Schreb.) Hueb.
" *minor* (P. Beauv.) Fuern.
" *rostratus* (Hedw.) Schimp.
Aulacomnium heterostichum (Hedw.) B. & S.
" *palustre* Schwaegr.
Barbula unguiculata (Huds.) Hedw.
Bartramia Oederi (Gunn.) Swtz.
" *pomiformis* (L.) Hedw.
Brachythecium oxycladon (Brid.) J. & S.
" " var. *dentatum* (S. & J.) Grout.
" *plumosum* (Sw.) B. & S.
" *populeum* (Hedw.) B. & S.
" *reflexum* (Starke.) B. & S.
" *rivulare* B. & S.
" *rutabulum* (L.) B. & S.
" *salebrosum* (Hoff.) B. & S.
Bryhnia novae-angliae (Sulliv. & Lesq.) Grout.
Bryum affine (Brid.) Lindb.
" *bimum* Schreb.
" *capillare* L.
" *caespiticium* L.
" *Duvallii* Voit.
" *pseudotriquetrum* (Hedw.) Schwaeg.
Calliergon cordifolium (Hedw.) Kindb.
" *Schreberi* Willd.

Campylium chrysophyllum (Brid.) Bryhn.
" " var.
" *hispidulum* (Brid.) Mitt.
" *stellatum* (Schreb.) Lange & C. Jens.
Catherinaea angustata Brid.
" *undulata* (L.) W. & M.
Ceratodon purpureus (L.) Brid.
Climacium americanum Brid.
" *dendroides* (L.) Web. & Mohr.
Dicranella heteromalla (L.) Schimp.
" *heteromalla Fitzgeraldi* (R. & C.) Grout.
" *rufescens* (Dicks.) Schimp.
Dicranum Bonjeani De Not.
" *Drummondii* Muell.
" *flagellare* Hedw.
" *fulvum* Hook.
" *longifolium* Ehrh.
" *montanum* Hedw.
" *scoparium* (L.) Hedw.
" *schisti* (Gunn.) Lindb.
" *undulatum* Ehrh.
" *viride* (S. & L.) Lindb.
Ditrichum pallidum (Schreb.) Hampe.
" *tortile* (Schrad.) Brockm.
" *vaginans* (Sulliv.) Hampe.
Drepanocladus aduncus var. *intermedius* (Schimp.) Roth.
" *tenuis* forma *subpiligera* Renauld.
" *uncinatus* (Hedw.) Warnst.
Drummondia clavellata Hook.
Elodium paludosum (Sulliv.) Loeske.
Eurhynchium hians (Hedw.) J. & S.
" *strigosum* (Hoff.) B. & S.
Fissidens cristatus Wils.
" *osmundioides* (Sw.) Hedw.
" *taxifolius* (L.) Hedw.
Fontinalis Lescurii Sulliv.
" *novae-angliae* Sull.
" *Sullivantii* Lindb.
Forsstroemia trichomitria (Hedw.) Lindb.
Funaria hygrometrica (L.) Schreb.
Georgia pellucida (L.) Rabenh.
Grimmia apocarpa (L.) Hedw.
" " var. *rivularis* (Brid.) W. & M.
" *pennsylvanica* Schwaegr.

Gymnostomum rupestre Schleich.
Hedwigia albicans (Web.) Lindb.
" " var. *secunda* Schimp.
Hygrohypnum dilatatum (Wils.) Loeske.
" *eugyrium* (Br. & Sch.) Loeske.
" *ochraceum* (Turn.) Loeske.
Hylocomium proliferum (L.) Lindb.
" *triquetrum* Br. & Sch.
Leptobryum pyriforme (L.) Wils.
Leucodon julaceus (L.) Sull.
" *sciuroides* (L.) Schwaegr.
Mnium affine ciliare (Grev.) C. Muell.
" *cuspidatum* (L.) Hedw.
" *Drummondii* B. & S.
" *medium* B. & S.
" *punctatum elatum* Schimp.
" *rostratum* Schrad.
" *serratum* Schrad.
" *spinulosum* B. & S.
" *stellare* Reich.
Myurella Careyana Sulliv.
Neckera pennata (L.) Hedw.
Orthotrichum obtusifolium Schrad.
" *strangulatum* Sulliv.
Oxyrhynchium riparioides (Hedw.) Jennings.
Philonotis caespiticium approaching *laxa* Warnst.
" *fontana* (L.) Brid.
" *Muhlenbeckii* Schwaegr.
Plagiothecium denticulatum (L.) B. & S.
" *elegans* (Hook.) Sulliv.
" *laetum* B. & S.
" *Muellerianum* Schimp.
" *pulchellum* (Dicks.) B. & S.
" *turfaceum* Lindb.
" *striatellum* (Brid.) Lindb.
" *sylvaticum* (Huds.) B. & S.
Platygyrium repens (Brid.) B. & S.
Pleuridium subulatum (L.) Rabenh.
Pogonatum alpinum (L.) Roehl.
" *brevicaule* (Brid.) Beauv.
Pohlia cruda (L.) Lindb.
" *Lescuriana* Sulliv.
" *nutans* (Schreb.) Lindb.
" *proligera* Lindb.

Polytrichum commune L.
" *juniperinum* Willd.
" *Ohioense* R. & C.
" *piliferum* Schreb.
" *Smithiae* Grout.
" *strictum* Banks.
Pterygynandrum filiforme var. *minus* L. & J.
Ptilium cristra-castrensis (L.) DeNot.
Pylaisia intricata (Hedw.) B. & S.
" *polyantha* (Schreb.) B. & S.
" *Schimperi* R. & C.
Raphidostegium adnatum (Rich.) B. & S.
" *carolinianum* (C. M.) J. & S.
Rauia scita (Beauv.) Austin.
Rhacomitrium aciculare (L.) Brid.
" *microcarpum* (Schrad.) Brid.
Sphagnum Girgensohnii Russ.
" *squarrosum* Pers.
Stereodon cupressiformis (L.) Brid.
" *curvifolius* (Hedw.) Mitt.
" *fertilis* (Sendt.) Lindb.
" *Haldanianus* (Grev.) Kindb.
" *imponens* (Hedw.) Lindb.
" *pallescens* (Hedw.) B. & S.
" *Patientiae* (Lindb.) Warnst.
" " var. *americana* (R. & C.)
" *pratensis* (Koch.) Warnst.
" *recurvans* (Rich.) Broth.
" *reptilis* (Rich.) Mitt.
Thuidium abietinum (L.) B. & S.
" *delicatulum* (L.) Mitt.
" *recognitum* (Hedw.) Lindb.
" *virginianum* (Brid.) Lindb.
Tortella caespitosa (Schwaegr.) Limpr.
Ulota americana (Beauv.) Lindb.
" *crispa* (L.) Brid.
" *crispula* Bruch.
Weisia viridula (L.) Hedw.

403 West 115th St.,
New York City.

LIST OF FRENCH HEPATICAE COLLECTED BY MAJOR GEORGE H. CONKLIN, M. R. C.

Caroline C. Haynes

The following species of Hepaticae were collected in quantity at Malavieux, near Vichy, on September 15 and December 1, by Major Conklin while on leave; and I have had the pleasure of naming and placing a set of them in the Sullivant Moss Society Herbarium:

Metzgeria furcata (L.) Dumort.
Marsupella emarginata (Ehrh.) Dumort.
Lophozia barbata (Schreb.) Dumort.
" *quinquedentata* (Huds.) Cogn.
Plagiochila asplenioides (L.) Dumort.
Lophocolea cuspidata (Nees) Limpr.
Diplophyllum albicans (L.) Dumort.
Scapania compacta (Roth) Dumort.
" *nemorosa* (L.) Dumort., a single plant.
Porella platyphylloidea (Schwein.) Lindb.
Lejeunea cavifolia (Ehrh.) Lindb.
Frullania Tamarisci (L.) Dumort.

Highlands, N. J.

REVIEW

Mosses of Madagascar

A. & G. Grandidier, Histoire physique, naturelle et politique de Madagascar. Volume XXXIX. Histoire naturelle des plantes; Mousses, par MM. F. Renauld et J. Cardot.

This monumental work has already been referred to in The Bryologist (XIX, 75, 1916) by its junior and surviving author. It comprises three large volumes or "parts," two of plates bearing dates of 1898 and 1901, and one of text dated 1915. To the species of Renauld's "Prodrome" of 1897 and its "Supplément" of 1909 a few have been added. Under the separate species are comparative notes, often of considerable length. A short introduction deals with the essential phytogeographical facts. It has long been known that both the fauna and flora of Madagascar show a high degree of independence even from those of the not distant African continent, but that the moss-vegetation should show an endemism of 347 out of 540 species or over 63 per cent. (p. 8) impresses one as incredible; doubtless further collection and study will reduce rather than increase this proportion. The closest relationship, apart from that with other islands east of Africa, is with the mountainous regions of tropical Africa. Bryological investigation of the island has, however, not reached the point where the present list can hope to approach completeness.

The genera are those of the tropics with little or nothing startling in the way of odd or ancient types. *Leucoloma* is credited with 38 species, *Campylopus* with 28, *Fissidens* with 25, *Bryum* with 24, *Calymperes* with 22, etc. *Sphagnum* with 17 (p. 7) is noteworthy, even though the list is reduced by 3 and otherwise somewhat altered in a supplementary note (p. 54) resting upon a change of mind of Warnstorf. The genus *Cardotia* Besch. and the new one, *Porotrichella* Card. (type-species *Porotrichum scaberulum* R. & C.), are endemic, but their status as genera remains to be established.

The text contains various nomenclatorial observations of interest and some new applications of priority. Occasionally (pp. 154, 204) one is struck by an unaccountable refusal to make use of the priority duly pointed out. As to genera and the whole systematic arrangement the junior author is for better or worse pretty much wedded to Brotherus' system in "Die natürlichen Pflanzenfamilien." He substitutes, however (pp. 225 f.), on grounds of priority the generic name *Diplostichum* Mont. for *Eustichia*, asserting that the latter should then replace *Bryoxiphium*. For similar reasons (pp. 230 f.) *Leiomitrium* Mitt. replaces *Coleochaetium*. The opinion (p. 130) that the Pilopogons of tropical America are generically distinct from *Thysanomitrium* is also worthy of note.

The plates are good, but suffer somewhat in their interpretation and use from the fact that they were prepared so long before the text; the text-volume must be constantly used with them. Many species are not figured at all, while on the other hand some figures are of species not found in Madagascar. The latter are sometimes included for comparison, sometimes because they might be looked for on the island. In a few cases American forms are thus included, two West Indian Leucolomas, for example, by mistake (p. 102).

The extremely high price and the limited edition represent a direction hardly calculated to make science safe for democracy.

A. LeRoy Andrews.

Ithaca, N. Y.

NOTES ON RECENT BRYOLOGICAL LITERATURE

We have already noted in the last volume of The Bryologist the beginning of Father Luisier's articles upon the Mosses of Madeira. In continuation of the series, recent issues of *Broteria*[1] contain the detailed catalogue of the species from *Sphagnum* to *Barbula*, inclusive. Besides the critical notes on the species and the citation of previous publications, careful descriptions are given of all those species which are not described in current European manuals, and, in the accompanying plate, the details of certain species of *Fissidens* and *Leucobryum*. There is one new combination, *Campylopus Tulgreni* R. & C., being reduced to a variety of *C. polytrichoides* de Not.

[1] A. Luisier. Les Mousses de Madère. Broteria, **16**: 29–48. *pl. I.* (Ap. 1918); 49–70. (Aug. 1918).

In many respects the moss flora of the Iberian peninsula is one of the most interesting in continental Europe. It is, therefore, pleasing to note two articles in *Broteria* dealing with this region. The first[2] contains notes upon 22 species of mosses and 4 of hepatics from Portugal, the majority of them occurring in America. Senhor Machado describes three new varieties (in *Fissidens*, *Rhacomitrium*, and *Rhynchostegium*) and gives notes upon the occurrence or characters of the other forms included in the article. The text is in Portuguese. The second article,[3] by Father Luisier, is an enumeration of all the mosses which have thus far been collected or reported from the ancient kingdom of Galicia in northwestern Spain. The region is now divided into the four provinces of Corunna, Lugo, Orense and Pontevedra. The first portion of Father Luisier's list includes the 145 species previously known from Galicia, with citation of localities and a few notes; the remaining portions are composed of more extensively annotated lists of the 52 species which are new to the Galician flora, and of the 23 species which are new to the province of Pontevedra, without having been found in the other divisions. There are descriptions of the two new varieties (in *Fissidens* and *Pohlia*), and long, interesting notes upon *Pottia littoralis* Mitt., and *Sphagnum turgidum* Warnst. E. B. C.

MISCELLANEOUS NOTES

Mr. Moxley finds new lichens for southern California.—Mr. George L. Moxley notes in a letter some time ago that he had submitted to Mr. G. K. Merrill some lichens which he had collected in southern California. *Physcia obscura* var. *virella* (Ach.) Leight. and *Physcia caesia* (Hoffm.) Nyl. appear to be new to the flora of southern California, while a third species, *Parmelia dubia* (Wulf.) Schaer., is evidently new to California. Quoting from Mr. Merrill, he says: "Perforce the plant is new to California. Hasse may have enumerated it under the name of *P. olivetorum*, but I have never seen the thing he called *olivetorum*. It is not *P. olivetorum*, that is certain."

M. Jules Cardot to give up his bryological studies!—In a recent issue of The Bryologist there were published a few sentences giving news about Monsieur Jules Cardot, one of the foremost French bryologists. In the extracts below, which were taken from a more recent letter, M. Cardot announces that he is compelled to give up Bryology forever. The loss of collections was far more serious than either this or the former letter would indicate, as I am informed through other sources that the thefts have every appearance of having been highly selective and of having been performed by an expert. Material that had been studied and annotated, manuscripts, and diagnoses were taken,

[2] Antonio Machado. Apontamentos Briologicos; Plantas raras criticas ou novas para Portugal. Broteria. **16**: 97–103. (Dec., 1918).

[3] A. Luisier. Fragments de Bryologie iberique, —14. Mousses de Galice. Broteria. **16**: 123–142. (Dec. 1918).

but in all cases care was shown to select that material which did not bear Cardot's autograph, so that there could be no possibility of identification in the future. I hope that it may be possible to so warn scientists of this despicable attempt to blast another's reputation that future bryologists will be on their guard against the appearance of this material of Cardot's under any other author's name.

Monsieur Cardot writes that he was spared the grief of personal loss among the members of his family. He is now living at 1, rue Lacuee, Paris, XII, and is employed as technical adviser in the Economic Bureau of the Indo-Chinese Government.

It is hardly necessary to say that Monsieur Cardot may be sure that he has the deepest sympathy of all members of the Sullivant Moss Society in his losses, and that all will learn with the keenest regret that it is necessary for him to say farewell to bryology.

E. B. Chamberlain.

Extract from letter from M. Cardot under date of March 30, 1919:

"Pour en revenir à ce qui me concerne personellement, je dois malheureusement vous dire, que je me vois, à mon grand chagrin, dans la nécessité de renoncer complétement et définitivement à la bryologie. * * * En admettant même que, dans quelque années, lorsque les conditions économiques seront redevenues normales, il me soit possible de songer à reprendre mes travaux bryologiques, je serai trop vieux alors, je le crains, pour revenir à ces études après une aussi longue interruption, et je craindrais que mes publications ne s' en ressentissent fâcheusement. J' estime qu' il me vaut mieux, dès maintenant, considerer ma carrière scientifique comme terminée. La perte d' une partie de mes collections et de ma bibliothèque et de toutes mes notes manuscrites serait aussi un obstacle sèrieux a la continuation de mes travaux bryologique. Ce n' est pas, vous le pensez bien, sans un cruel déchirement que j'ai pris cette decision de renoncer aux chères études qui ont étè le grande charme de ma vie."

SULLIVANT MOSS SOCIETY NOTES

Attention has already been called to the death on March 31, 1918, of Dr. George Golding Kennedy, who had been a member of the Sullivant Moss Society since 1901. In the issue of *Rhodora* for February, 1919, Mr. E. F. Williams has published an appreciative biographical sketch of Dr. Kennedy, accompanied by a portrait. Though prevented from active work upon mosses through failing health for some years before his death, Dr. Kennedy always maintained a warm interest in the Society and its work. His most extensive bryological work concerned the floras of the Willoughby region in Vermont and the region around Mt. Katahdin in Maine. All his botanical collections have been given to the Cryptogamic Herbarium at Harvard and to the New England Botanical Club.

The following new members have joined the Sullivant Moss Society since the publication of the January list:

[1] Bryologist **22**: 11–12. January, 1919.

Mr. W. T. Arnold.....21 Park Road, Wyomissing, Pa.
Mr. H. C. Beardslee..... Perry, Lake Co., Ohio
Mrs. J. Sherman Dudley.....5447 Indiana Ave., Chicago, Ill.
Mr. Wm. Hy. Pearson....18 Palatine Road, Withington, Manchester, England.
Mr. W. F. Provo.....Wickliffe, Ohio.
Mrs. L. R. Reynolds.....11 Ellsworth Ave., Brockton, Mass.

CHANGES OF ADDRESS

Mr J. Evans.....Box 97, Kirkland, Wash.
Rev. S. M. Newman.....R. F. D. 5, Danbury, Conn.
Miss Barbara Smith.... Mrs. Anna Dress, 24 East 16th St., Paterson, N. J.
Miss Aravilla Taylor..... 5744 Kenwood Ave., Chicago, Ill.

Dr. L. W. Riddle becomes a member of the Harvard Faculty.—We are sure that our readers will join with us in heartily congratulating our Associate Editor, Dr. Lincoln Ware Riddle, in his recent appointment as Assistant Professor of Cryptogamic Botany at Harvard University. We quote from a recent announcement in Science (N. S. **49**: 444. 1919), enumerating various appointments in the scientific departments at Harvard University:

"Lincoln Ware Riddle, assistant professor of cryptogamic botany. A.B. (Harvard Univ.) 1902; A.M. (*ibid*) 1905; Ph.D. (*ibid*) 1906. Austin teaching fellow in botany, 1905–06, Harvard University; instructor in botany, 1906–09, associate professor of botany, 1909–18, professor of botany, 1918–19, Wellesley College."

Dr. George H. Conklin now a Major in the Medical Corps.—Miss C. C. Haynes, who is acting as Curator of the S. M. S. collections of hepatics during Dr. Conklin's absence in France, sends the following extract from a Superior, Wisconsin, newspaper:

"Dr. George H. Conklin, the only Superior physician to reach France, has been appointed major in the medical corps of the United States army by reason of his 'exceptional and efficient services in the hospitals of France.'

"Major Conklin enlisted in the fall of 1917 in the medical reserve corps. He was ordered to Fort Riley, receiving a captaincy at that time. He remained at Fort Riley from February 12, 1918, until May, when he was sent with the May replacement regiment to France. The command of this regiment of physicians was placed in Captain Conklin.

"Arriving in France, Major Conklin was assigned to U. S. Base Hospital No. 1 at Vichy, where he was in charge of one of the many hospital buildings until February 1, 1919. Following his work at Vichy he was ordered to Paris for reassignment. He was next stationed at Camp Hospital No. 1 at Gondrecourt, where he was recently commissioned major."

EXCHANGE DEPARTMENT

Offerings—To Society members *only*. Return postage, rather than a stamped envelope, should be sent.

Rev. H. Dupret, Seminary of Philosophy, Montreal, Canada.—*Drepanocladus aquaticus* (Sanio) Warnst., and *D. capillifolius* (Warnst.) Warnst., from the neighborhood of Montreal. *U. S. postage accepted.*

Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.—*Ectropothecium Penzigianum* Fleisch. *st.* from Java.

Miss Caroline C. Haynes, Highlands, New Jersey.—*Anthoceros Macounii* M. A. Howe, collected by Miss A. Lorenz, and *Herberta adunca* (Dicks.) S. F. Gray, collected in Wales by Messrs. James, Wilson, and Rhodes.

O. E. Jennings, Carnegie Museum, Pittsburgh, Pa.—*Hedwigia albicans* (Web.) Lind., north end Long Lake, n. w. Ontario, July 14, 1917, and *Caloplaca cerina* (Ehrh.) Zahlbr., on aspen, Jellicoe, n. w. Ontario, Aug. 2, 1917. Collected by O. E. and G. K. Jennings.

Miss Daisy Levy, 403 West 115th Street, New York City.—*Sphagnum Girgensohnii* Russow, collected by Miss Daisy Levy, in Maine.

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GEORGE N. BEST, M.D. JOHN M. HOLZINGER, M.S.

ALEXANDER W. EVANS, Ph.D. LINCOLN W. RIDDLE, Ph.D.

and the

Advisory Board Officers of the Society

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All material for identification should be sent to the respective curators. All matter relative to offerings should be sent to the Editor, or to the Secretary

THE BRYOLOGIST

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HEPATICAE OF THE LAKE GEORGE FLORA

Stewart H. Burnham

The Lake George Flora covers the region included in the counties of Washington, Warren and Saratoga, New York. Although I collected my first hepatic mosses about 1892, no special effort was made to collect them until 1906. It was Miss Sarah A. Brown of Unadilla Forks, N. Y., who first interested me in the Hepaticae.

Specimens collected by Dr. Chas. H. Peck and Dr. E. C. Howe are preserved in the N. Y. State Herbarium: those by Dr. Smith Ely Jelliffe about Huletts Landing, Lake George, in 1892, are preserved in his herbarium in New York City. Many specimens have been determined by Dr. A. W. Evans; by Miss Annie Lorenz; and by Dr. M. A. Howe. Many of the records, herein listed, were made during the years 1914–1917. These specimens have been determined by Dr. G. H. Conklin and Miss C. C. Haynes, and are preserved in the Hepatic Herbarium of the Sullivant Moss Society. Rather ample collections were made in West Fort Ann during 1918, but no attempt has been made to work these plants over.

List of Species

Ricciella fluitans (L.) A. Br. Fort Ann (C. H. Peck); Cambridge waterworks swamp woods (Frank Dobbin); Five Combine woods, east of Hudson Falls, floating on pools.

Ricciella Sullivantii (Aust.) Evans. Moist clay upland soil, east of Vaughns. Determined by Dr. A. W. Evans.

Ricciocarpus natans (L.) Corda. Shushan (Dobbin); South Beaver creek, east of Vaughns, on quiet pools.

Reboulia hemisphaerica (L.) Raddi. Thin rocky soil. Vaughns; south of Tripoli; northwest Hartford. Determined by Dr. M. A. Howe; also by Dr. G. H. Conklin.

Grimaldia fragrans (Balb.) Corda. Dresden in muck soil (Peck).

Asterella tenella (L.) Beauv. Thin rocky soil, northern Washington county; Bacon Pond, southern W. Fort Ann, in low grassy ground. Determined by Dr. Evans; also by Miss C. C. Haynes.

Conocephalum conicum (L.) Dum. Damp ground in shaded places, specially near streams; abundant. Plants when bruised give off a pleasant aromatic fragrance.

Preissia quadrata (Scop.) Nees. Thin soil about limestone rocks at Vaughns; wet clay banks east of Tripoli. Determined by Dr. Evans; also by Dr. Conklin.

Marchantia polymorpha L. Mossy bogs, moist sandy banks and sometimes abundant on recently burned-over upland areas.

Riccardia latifrons Lindb. Shushan on rotten wood (Dobbin), two collections. Determined by Dr. Howe; also by Miss Annie Lorenz.

Riccardia multifida (L.) S. F. Gray. Wet place, New Michigan road, southern W. Fort Ann. Determined by Dr. Conklin.

Riccardia pinguis (L.) S. F. Gray. Wet places in Five Combine woods. Determined by Dr. Conklin.

Metzgeria conjugata Lindb. Shushan (Dobbin); rocky soil, Sugar Loaf Mt., southwestern W. Fort Ann.

Pellia epiphylla (L.) Corda. Marshes and wet soil; common. The plants of this genus should be collected during April or early May, before the capsules discharge their spores.

Pellia Fabroniana Raddi. Wet shaded places east of Tripoli; and the eastern base of Sugar Loaf Mt. Determined by Miss Haynes.

Blasia pusilla L. Roadside banks, Mt. Hope road north, northern W. Fort Ann; roadside on moranial hill south of East Lake George marsh. Determined by Dr. Conklin.

Jungermannia lanceolata L. Fort Edward (E. C. Howe); Devine's woods on rocks, at Vaughns. Determined by Dr. Conklin.

Jamesoniella autumnalis (DC.) Steph. Anaquassacook hills and on rotten logs in Rich's swamp, southwest of Shushan; Curtis hill east of Fort Ann; southern W. Fort Ann; northwest of Kingsbury Street. Determined by Dr. Conklin; also by Miss Haynes.

Lophozia barbata (Schreb.) Dumort. Mossy rocks specially in mountain woods. Huletts Landing (S. E. Jelliffe); Black Mt.; South Bay; Saddle Mt.; Peaked Mt.; Sugar Loaf Mt.; Shushan; Wilburs Basin. Specimens have been determined by Miss Lorenz; also by Dr. Conklin.

Lophozia incisa (Schrad.) Dumort. Old log in swamp woods east of Thompson's gravelbed, southern W. Fort Ann. Determined by Miss Haynes.

Lophozia inflata (Huds.) M. A. Howe. Fort Edward (Howe).

Plagiochila asplenioides (L.) Dumort. Banks along streams and often on rocks in shallow water, bogs, and it sometimes occurs on old wood; common. Specimens have been determined by Miss S. A. Brown, Miss Lorenz and Dr. Conklin.

Pedinophyllum interruptum (Nees) Pears. Old log and rocks, Devine's woods, Vaughns, April 13, 1915. Determined by Dr. Conklin.

Mylia anomala (Hook.) S. F. Gray. New Michigan Pond, "Talman marsh," southern W. Fort Ann, Nov 23, 1900 Determined by Dr. Evans. Recorded in N. Y. State Mus. Bull. **54**: 946, 1902, as new to the state. Sphagnum marsh near the road, north of Glen Lake, Oct. 6, 1908. Determined by Miss Lorenz. "Fine plants" were collected on the marsh north of Glen Lake, Aug. 24 and Sept. 20, 1916. Determined by Dr. Conklin.

Lophocolea heterophylla (Schrad.) Dumort. Rotten wood and on earth in shaded places; common. Specimens have been determined by Miss Lorenz, Miss Haynes and Dr. Conklin.

Lophocolea minor Nees. On rocky ledges, ½ mile east of Tripoli, southern W. Fort Ann. Determined by Dr. Conklin.

Chiloscyphus ascendens Hook. & Wils. Grinnell's (Washburn's) woods by Glenwood brook, Vaughns, on stones, April 29, 1915. Determined by Miss Haynes. "Marginal cells measure 25×30μ; medium cells 30×37μ." Recorded in Bryol. **20:** 13. Jan. 1917.

Chiloscyphus fragilis (Roth) Schiffn. Dried up streambed, ravine south base of Sugar Loaf Mt., Nov. 13, 1915. Fine mats! "Marginal cells measure 23×50–60μ; medium cells 31×60μ." Wet place in woods, east base of Sugar Loaf Mt., Oct. 11, 1917. Both collections determined by Miss Haynes.

Chiloscyphus polyanthos (L.) Corda. Cold spring, South Bay; east of Tripoli; woods west of Kingsbury St. Determined in part by Dr. Conklin. The largest cells of this species according to Miss Haynes measure 28–33μ; of *C. pallescens* (Ehrh.) Dumort. 40–50μ; of *C rivularis* 21–28μ.

Chiloscyphus rivularis (Schrad.) Loeske. Swampy woods, Moreau, north of Fort Edward reservoir, Aug. 30, 1902. Determined by Dr. Howe.

Harpanthus scutatus (Web. & Mohr) Spruce. Shushan on rotten logs; old ash log, Devine's woods, Vaughns; east base of Sugar Loaf Mt. Determined by Dr. Howe; also by Miss Haynes.

Geocalyx graveolens (Schrad.) Nees. Old logs, decaying humus, shaded banks and trunks of *Thuja occidentalis*. Shushan (Dobbin); southern W. Fort Ann. Several collections determined by Dr. Howe, Dr. Conklin and Miss Haynes. "The cells are very opaque and usually the stem humps up with the end curling up. The terminal inflorescence, always present in *Lophocolea*, is absent. Sporangium matures—in substratum—an oblong hairy fleshy pendulous perigynium; no perianth."

Cephalozia bicuspidata (L.) Dumort. Old logs, Shushan (Dobbin); and bog north of Clarks Pond, west of Shushan Determined by Miss Lorenz.

Cephalozia catenulata (Hüben.) Spruce. Swampy woods east of Thompson's gravel-bed, southern W. Fort Ann, April 29, 1917. Determined by Miss Haynes.

Cephalozia connivens (Dicks.) Lindb. Marshes and wet woods. Sphagnum marshes south of Glen Lake; and south end of East Lake George marsh; southern W. Fort Ann. Specimens determined by Dr. Evans, Miss Haynes and Dr. Conklin.

Cephalozia curvifolia (Dicks.) Dumort. Rotten logs, specially coniferous; apparently not an uncommon species. Horicon (Peck); Shushan (Dobbin); southern W. Fort Ann. Specimens have been determined by Dr. Conklin.

Cephalozia lunulaefolia Dumort. Old logs in Rich's swamp near Shushan, June 16, 1907. Determined by Miss Lorenz.

Cephalozia media Lindb. Southern W. Fort Ann in swampy woods. Determined by Dr. Conklin. also by Miss Haynes.

Cephalozia pleniceps (Aust.) Lindb. East Lake George marsh at Brayton on old wood, Oct. 18, 1915. Determined by Dr. Conklin. Sphagnum marsh about Mud Pond, south of Glen Lake, Sept. 11, 1917; and swampy woods east base of Sugar Loaf Mt., Oct. 11, 1917. Determined by Dr. Evans and Miss Haynes.

Cephaloziella byssacea (Roth) Warnst. Rocks by road south of South Bay village, Sept. 26, 1916. Determined by Dr. Conklin.

Cephaloziella elachista (Jack.) Schiffn. Sphagnum bog south of Glen Lake, Sept. 11, 1917. Determined by Miss Haynes.

Odontoschisma denudatum (Mart.) Dumort. Old log in swamp woods east of Thompson's gravel-bed, April 29, 1917. Determined by Miss Haynes.

Calypogeia Neesiana (Massal. & Carest.) K. Müll. On trunks of *Thuja occidentalis*, old wood, and old *Osmunda* and fern root-stocks, swamp woods east of Thompson's gravel-bed. Specimens have been determined by Dr. Conklin and by Miss Haynes.

Calypogeia sphagnicola (Arn. & Perss.) K. Müll. Sphagnum marsh near the road north of Glen Lake, Aug. 24 and Sept. 20, 1915. Determined by Dr. Conklin.

Calypogeia Trichomanis (L.) Corda. French Mt., on earth. Determined by Dr. Evans. Shushan, on rotten logs (Dobbin); Sugar Loaf Mt., wet cliffs.

Bazzania trilobata (L.) S. F. Gray. Moist woods and mossy swamps, particularly in upland regions; common.

Lepidozia reptans (L.) Dumort. Coniferous log, and old *Osmunda* and fern rootstocks, swamp woods east of Thompson's gravel-bed. Determined by Dr. Conklin; also by Miss Haynes.

Blepharostoma trichophyllum (L.) Dumort. Falls, West brook, W. Fort Ann; on earth in clearing south of Sugar Loaf Mt. Determined by Dr. Howe; also by Dr. Conklin.

Ptilidium ciliare (L.) Nees. Mountain and upland coniferous woods. Cold spring, South Bay, on rocks; Crosset Pond; Three Ponds; Sugar Loaf Mt.; Peaked Mt.; Curtis hill east of Fort Ann.

Ptilidium pulcherrimum (Web.) Hampe. Rocky places among mosses; but more often found on living or dead coniferous wood; abundant.

Trichocolea tomentella (Ehrh.) Dumort. Among mosses in wet woods and swamps. Huletts Landing (Jelliffe); W. Fort Ann; Five Combine woods, east of Hudson Falls; Rosecran's swamp, north of Glens Falls; Fort Edward reservoir; Cambridge waterworks swamp woods.

Scapania nemorosa (L.) Dumort. Moist rocks, in upland regions, often on limestone. Dresden (Peck); Black Mt.; South Bay; east of Fort Ann; Peaked Mt.; Sugar Loaf Mt.; Peaked Rock near Shushan. Specimens have been determined by Miss Brown; also by Dr. Conklin.

Scapania paludicola Loeske & K. Müll. Sphagnum marsh north of Podunk Pond, Oct. 17, 1899. Determined by Dr. Evans as *Scapania irrigua* (Nees) Dumort. Recorded in N. Y. State Mus. Bull. **54**: 946, 1902, as new to the state. Dr. Evans in Rhodora **18**: 78. April, 1916, reports this "Podunk Marsh" plant as *Scapania paludicola*. It has also been collected on the

East Lake George marsh at Brayton, Oct. 18, 1915. Determined by Dr. Conklin. A similar or closely related plant, growing with *Leucobryum*, has been collected in Rich's swamp, near Shushan, May 20, 1906.

Scapania undulata (L.) Dumort. Black Mt.; ravine south base of Sugar Loaf Mt. Determined by Dr. Howe; also by Mr. G. B. Kaiser.

Radula complanata (L.) Dumort. Rocks and on trunks of trees; abundant.

Porella platyphylla (L.) Lindb. "Dresden Station, Adirondack Mountains, N. Y. (*C. H. Peck 60*)." A. W. Evans in Rhodora **18**: 83. April, 1916.

Porella platyphylloidea (Schwein.) Lindb. Trunks of trees and rocks; common.

Leucolejeunea clypeata (Schwein.) Evans. Dresden on rocks, No. 61 (*Peck*). Presumably determined by Dr. Evans, who in Rhodora **10**: 190. Oct., 1908, says, "Eastern shore of Lake George."

Frullania Asagrayana Mont. Huletts Landing (Jelliffe).

Frullania Brittoniae Evans. Trunks of *Ulmus americana*, North Beaver creek at lower falls, Vaughns, April 7, 1914. Determined by Dr. Conklin.

Frullania eboracensis Gottsche. On rocks and trees; abundant.

Frullania riparia Hampe. Limestone rocks, Bacon hill, 3 miles west of Fort Ann, April 22, 1917. Determined by Miss Haynes.

Anthoceros crispulus (Mont.) Douin. Sandy fields, ½ mile west of Tripoli, Aug. 26, 1917. Determined by Miss Haynes.

Anthoceros laevis L. Shushan (Dobbin). Farley's (Vaughan's) woods, north of Vaughns, on a wet clay bank. Determined by Dr. Conklin.

Hudson Falls, N. Y.

MOSS NOTES.—II. TWO POGONATUMS

A. J. Grout

In preparing the manuscript for a new handbook on mosses I had occasion to study carefully our two Pogonatums with persistent protonema. The distinguishing characters are far more clearly cut than any published description would indicate.

P. brevicaule (Brid.) Beauv. is the common species in the North with which all bryologists are familiar. P. brachyphyllum (Mx.) Beauv., though common in the South and extending as far north as Long Island, New York, is much less well known and doubtless often overlooked.

In *P. brevicaule* the leaves are narrow, serrate, and pointed. The capsules are cylindric and erect, or drooping by the bending of the seta, two to six times as long as broad, usually straight. The calyptra is light gray, sometimes with a tinge of brown. In *P. brachyphyllum* the leaves are tongue-shaped and entire. The capsules are shorter and broader, not more than twice as long as broad, and plainly curved. The calyptra is a tawny red-brown.

Occasionally there are plants of *P. brevicaule* with capsules as short and broad as the larger forms of *brachyphyllum* but the other characters are practically always distinct.

In the accompanying illustration the distinguishing characters are all clearly marked, with the exception of the calyptra. The photographs were

taken from dried herbarium material. *a. P. brevicaule; b. P. brachyphyllum.* Both four times natural size.

New Dorp, N. Y., June, 1919

MOSSES AS FORMERS OF TUFA AND OF FLOATING ISLANDS

Aravilla Taylor

In an article by W. H. Emig in The Bryologist of March, 1918, the author described certain species of moss, *Didymodon tophaceus* (Brid.) Jur. and *Philonotis calcarea* Sch., as rock builders in the waterfalls in the Arbuckle Mountains of Oklahoma.

A somewhat similar, although probably a less extensive, formation has been observed in the outlets of various mineral springs in Indiana and Illinois where mosses aid in forming a rock-like tufa.

At Otis, Indiana, and New Lenox, Illinois, there are numerous springs, the water of which is highly impregnated with iron compounds. In the outlet of such a spring is frequently found large quantities of *Brachythecium rivulare* B. & S.

As the iron compounds penetrate the moss tissue, a hard porous tufa is formed which becomes a part of the accumulation of bog iron ore about these springs. Together with other species of plants this moss may aid in building up a mound so high as to make it necessary for the water of the spring to find a new and lower place of escape.

Very much the same situation occurs at Turkey Run, Indiana, where *Cratoneuron filicinum* (L.)Roth. is found as a tufa former in calcareous springs.

Near the head of Lake Michigan in northern Indiana are many ponds, forming a series extending southward from the present beach. These are long, narrow lagoons cut off originally from the lake proper by barrier beaches which were built up near the lake margin by water currents, and which lie nearly parallel to the shore line. The lagoons vary in depth and size as well as in ecological age, while the ridges or old sand bars are now, in many cases, forested with oak.

In some of the deeper lagoons are floating islands which seem to have had their origin in a surface mat formed over the water as in the case of quaking bogs. Portions of the mat have here broken loose from the shore, and now form small islands floating without attachment to bottom or margin.

One of the chief agents in the formation of the mat, and still found in great abundance on the islands, is *Campylium stellatum* (Schreb.) Bryhn. The same species of moss has been found along the margin of the smaller lagoons, in the shallow pine "pannes" among the sand dunes near Miller, Indiana, and on the surface mat of the quaking bog at Mineral Springs, Indiana. This species does not form a tufa, as in the former case, but takes a large part in filling up bodies of water by growth upon the ground either submerged or emerging, and by aiding in the formation of a surface mat.

The pannes are low depressions among the dunes frequently with the surface little, if at all, above the lake level. Water sweeps through the sand from the lake or from streams during times of high water-level. It may rise only to the surface or may, in some instances, reach a depth of a foot or more. Around the margin of the deeper ponds may be found cottonwoods or willows, or if the panne is of an older ecological succession, the edge may be bordered with pines. Here *Campylium stellatum* is often abundant either submerged or above the surface at the margin and many may be found growing even among the pines.

Milwaukee-Downer College,
Milwaukee, Wisc.

A HERBARIUM NOTE

Edward B. Chamberlain

For several years it has been impossible for me to keep the larger portion of my herbarium in New York, owing to lack of room. In order to have for comparison a series of authentic specimens, I have mounted in the manner described below a number of sets of exsiccati, and it may be that the method

will be of service to those who have only small collections, or wish to keep a representative series of specimens apart from a general collection. The method is the result of some years of experimenting, and has the advantage of working to perfection.

The specimen-envelopes are mounted in loose-leaf binders, using the Biflex Binder No. 21, manufactured for Messrs. Ginn & Co. This particular binder accommodates sheets 8 by 10½ inches in size and has the following advantages over most of the binders on the market: the sides and back are made of heavy board, the back reinforced by a metal strip so that crushing is impossible with ordinary use; the fastening for the individual sheets consists of two heavy spring wire loops which snap into two slots at the side and do not become loose or open when in use; the leaves lie perfectly flat when the binder is open and turn readily, without the hump along the back that is found in so many such devices; the pages can be inserted or removed at any place without disturbance of the remaining portion.

For pages I use sheets of standard weight herbarium paper cut to size and punched with two holes, each page then accommodating three envelopes three inches wide and six or seven inches long. This size is ample for most specimens. The envelopes are made of stout bond paper (I use Old Hampshire Bond, No. 120) and are pinned directly to the sheets with ordinary, medium-sized pins. Care should be taken to secure a linen bond that is not brittle, otherwise the paper becomes fragile with age. Envelopes can in this arrangement be removed at any time for the insertion of new species, without upsetting the arrangement of the remainder of the collection, the old specimen being merely transferred to an extra leaf. The binders file in a bookcase like ordinary volumes, and the specimens are free from dust or possibility of loss. Actual experience shows that the envelopes do not tear loose, and that the portions of the pins projecting into the envelopes do not injure the specimens. Ordinarily, about fifty specimens can be put in each binder.

HEPATIC EXCHANGE

Will all who are interested in the exchange of Hepatics please consider the idea of an annual exchange in quantity, and, if interested, write to the undersigned. The last Hepatic Exchange List, published by Miss Haynes and Dr. Evans, will be used as a basis, and *desiderata* and *oblata* marked on it with the probable number of specimens of each species of the latter marked against the names.

The undersigned will act as a distributor, and the lists, marked as indicated above, are to be sent to him about the end of October. The distributor will then inform each one of the number of *oblata* necessary, and these parcels are to be forwarded the distributor in December. Specimens will be distributed during January, as far as possible in proportion to the value of the *oblata* sent.

If a sufficent number of replies are received to justify starting the Hepatic Exchange, further details will be published in the BRYOLOGIST. It is urgently requested that the reply to this notice be sent as early as possible.

Address: Mr. A. H. Brinkman, Dowling Lake, Alberta, Canada.

REVIEW

Flore des mousses de la Suisse[1]

We learn from the general preface that the present work was begun in 1884, completed ten years later and that for a long time no publisher could be found. Even when M. Barbey secured publication through the Boissier Herbarium, the printing was greatly hindered and finally interrupted through causes beyond control, so that it was not possible really to undertake active work until 1911, by which time the progress of science had made great revision necessary. We feel that these circumstances should be kept in mind in judging the book: they explain the cases of disagreement between the two parts, the omissions from the keys and indexes, the presence of two sets of keys for *Sphagnum*, and the unusually large amount of material that has been put in the Supplement and Addendum—(some thirty-five pages, in part separately paged, both before and after the plates). No one is, probably, more conscious of such defects than the authors, and such things, while rendering the use of the book less convenient, do not diminish the very great value of the painstaking records of facts regarding the species mentioned. We most sincerely congratulate the authors upon the book, finished in spite of discouragement. We wish most sincerely that a similar volume were available for our own flora.

At the outset it should be stated that the flora is much more than a set of keys and a list of the Swiss mosses. Nearly all European species are mentioned, or noted, even those like *Schistidium maritimum*, or *Myurium hebridarum* which are not in the least likely to be found in Switzerland.

An introductory essay of some twenty pages deals with the methods of microscopic study and the structure of the mosses. Though much is well-trodden ground, there are several very interesting suggestions; such as the use of polarized light for studying peristome structure, the use of the number of cells per square millimeter (see discussion at end of Part II) as a unit of comparison for the size of areolation, and the careful directions for the preparation and preservation of microscopic dissections. As a medium for temporary mounts a mixture of equal weights of pure carbolic acid, lactic acid, and water with twice the weight of glycerine is recommended, on account of its high refractive index (it is almost that of optical crown glass), its slow evaporation, and the absence of the distortion of tissues which is produced by pure glycerine. A similar preparation containing gelatine is recommended in place of the customary glycerine jelly. The advice "Pour les commencants" is especially good. We quote, in abstract: "Examine collections when fresh. Note on the spot such

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[1] Flore des mousses de la Suisse.

Premi.re partie: Tableaux synoptiques pour la détermination des mousses, par Jules Amann et Charles Meylan. Pp. 1-215. Lausanne, 1912.

Deuxi.me partie: Bryogéographie de la Suisse; Catalogue des mousses suisses, avec douze planches, par Jules Amann en collaboration avec Paul Culmann et Charles Meylan. Pp. 1–414+1–4 with 86 figures in 12 plates. Lausanne, 1912.

[Though the inner title pages are dated as above and the prefaces are dated February and March 1912, respectively, the cover page bears the imprint, "Publication de l'herbier Boissier. Geneve, 1918." The two portions are separately paged and indexed.]

characters as the curving of the seta, the calyptra, the inflorescence. The detailed study of a small district will furnish better results than long trips into a far country. Don't neglect common species and their forms; the object of study is not to discover rarities but to observe the association of species and their relations to climatic, topographic and geologic conditions. There is far more interest when the aim of moss-study is placed above mere chasing after rarities."

M. Amann informs us that the keys are based largely on those characters which years of field study have shown to be most reliable, without neglecting those fundamental differences emphasized in the classic European works. By an ingenious system of abbreviations and formulae, most of them readily suggesting the proper term, it is possible to give a condensed description of the salient features of each species at the appropriate place in the key. In nearly all cases all species of one genus or group are on one page. This constant necessity of verifying a group of characters instead of a single item, should materially prevent the beginner (or older student) from thinking that moss species are distinct entities that can be separated by the presence or absence of single characters. The format of the key is the "box," as printers say, each group of characters being in a separate enclosure; the more general placed vertically at the right, the specific ones horizontally at the left, with the species-names near the margin.

The Catalogue is no mere list. Descriptive or critical notes occur for the majority of species, and in many cases there are supplementary keys. In *Bryum*, *Brachythecium*, *Dicranum*, and some other genera there is practically a synopsis of the European species. For each Swiss species there is a reference to exsiccati, the vertical and horizontal distribution, the facts of relation to light, moisture, substratum, climate, geological formation, and frequently notes upon the association with other species. The book is a mine of information. For all less common species there is detailed citation of actual specimens seen. The species are classified as primary, secondary, and tertiary in rank, with the addition of varieties, races, and forms in addition. Especially worthy of mention are the notes on *Campylopus Schimperi*, *Orthotrichum callistomum* (of which M. Culmann has found a second specimen as well as having had the opportunity of examining the original collection), and the keys to *Schistidium*, the bulbiferous *Pohliae*, and the *Barbulae rurales*.

The plates deal mainly with new species or varieties described in the volume, and give in general only diagnostic details. They are clear and sharp, each figure being accompanied by a line showing actual scale measurement. This is certainly a great advantage over the usual method of giving mere magnification.

In the matter of the authorities for binomials, we wish that the authors had more closely followed the prevailing modes of citation. This point seems to us a serious defect in the whole work, and one that is bound to make much additional labor for others. Only the so-called parenthetical authority for the specific name is cited, all authority for the binomial combination being omitted, if it is other than that for the specific name. The new species and other forms proposed are clearly indicated as new, but in the case of the new genera or revival of old genera, there is no indication of the proper authority

for the combination. Such an omission means long searching of literature in order to find out whether the combination be "new" or not. The general absence of synonyms is of little importance in the main, especially for those having access to standard works, but we feel sure that in all cases the binomial authority would have greatly facilitated reference to these other books.

EDWARD B. CHAMBERLAIN

NOTES ON CURRENT BRYOLOGICAL LITERATURE

A. LEROY ANDREWS, Bryological Notes. V.—Scapania nimbosa from Norway. Torreya **19**: 49–51. (1919).—*Scapania nimbosa* Tayl. has previously been known only from the western coasts of the British Isles. It is one of the so called "Atlantic species" which seem to be relicts from an older flora. In 1907 Dr Andrews and Herr B. Kaalaas discovered the species in the Tverfjeldene in Romsdalamt, Norway, although at the time the material was determined and reported as *Scapania planifolia* (Hook.) Dum.

EDO CLAASSEN, Mosses of several Ohio counties. Ohio Journ. Sci. **19**: 362–366. (1919).—Mr. Claassen lists 5 Sphagna besides 72 acrocarpous and 79 pleurocarpous mosses from certain counties, mostly in northern Ohio. The only notes given refer to the substratum and, by abbreviation, to the counties in which collection was made without more definite locality. Several of the species reported seem additions to the list given by Kellerman and Werner in the Catalogue of Ohio Plants issued in 1895. It seems a pity that more careful proof reading could not have obviated the errors in the spelling of specific names.

ALEXANDER W. EVANS, A taxonomic study of Dumortiera. Bull. Torrey Club **46**: 167–182. (1919).—Dr. Evans gives an outline of the history of the genus and of the species belonging to it, with a citation of 26 titles in a bibliography. A much more extended discussion is given of the morphology and of the characters of systematic value in limiting the species. Two species are recognized: *D. hirsuta* (Sw.) Nees (including *D. irrigua* Nees) which ranges, in the United States, from Pennsylvania and Missouri southward; and *D. nepalenis* (Tayl.) Nees (including *D. velutina* Schiffn. and *D. calcicola* Campb.) which has been reported in the United States only from Georgia and Florida, though widely distributed in the West Indies, northern South America and the far East.

A. LUISIER. Les Mousses de Madère. Broteria **17**: 28–48. (Ap. 1919). A continuation of the articles upon the mosses of Madera which have been previously noticed in THE BRYOLOGIST. The present instalment covers the species from *Cinclidotus* to *Amphidium*. Extensive notes are given for *Cinclidotus chloronotus* (Bruch.) Limpr., *Tortula Solmsii* (Schimp.) Limpr., *T. perlimbata* Geh., *T. marginata* (Bry. Eur.) Spruce, *Anoectangium angustifolium* Mitt., and *A. curvipes* (C. M.) Jaeg. Apparently, two new combinations are made in *Grimmia*.

E. B. C.

SULLIVANT MOSS SOCIETY NOTES

Since the going to press of the May issue of THE BRYOLOGIST, the following changes in the membership lists have occurred:

NEW MEMBER

Mrs. Franklin D. Williams.....24 Dean St., Taunton, Mass.

CHANGE OF ADDRESS

Mr. Walter E. Flowers. .....E. 808 Hoffman Ave., Spokane, Wash.

We regret to announce the death in March last of Mrs. Charles C. Smith, who had been a member of the SOCIETY since 1902.

A recent letter from Mr. E. Iishiba of Sendai, Japan, states that the school where he is teaching was burned down in March, and that he had lost all his collections. The Secretary will be greatly obliged to any member who may be able to contribute specimens which can be forwarded to Mr. Iishiba, who has in the past contributed much to the herbarium of SOCIETY and to the exchange column.

EXCHANGE DEPARTMENT

Offerings—To Society Members *only*. Return postage, rather than a stamped envelope, should be sent.

Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.—*Pseudoleskea catenulata* (Brid.) Kindb. Collected in Switzerland by Rev. P. G. M. Rhodes.

Miss Caroline C. Haynes, Highland, New Jersey.—*Lophozia attenuata* (Mart.) Dumort , collected in England by Rev. P. G. M. Rhodes, and *Sphenolobus Michauxii* (Web.) Steph., collected by Miss C. C. Haynes.

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SULLIVANT MOSS SOCIETY

Conducted and Published for the Society by

O. E. JENNINGS, Ph.D., Editor-in-Chief

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All material for identification should be sent to the respective curators. All matter relative to offerings should be sent to the Editor, or to the Secretary

THE BRYOLOGIST

VOL. XXII SEPTEMBER, 1919 No. 5

NOTES ON NORTH AMERICAN SPHAGNUM—VIII

A. LEROY ANDREWS

The Group Cuspidata Lindberg (Continued)

19. *Sphagnum tenellum* Persoon, 1798. This species is commonly referred to by Warnstorf and others as *Sphagnum molluscum* Bruch, 1825, though the name admittedly lacks priority. *S. tenellum* (as synonym) is by Warnstorf cited as of (Ehrhardt) Lindberg and dated 1862, but as a matter of fact Lindberg, in the place referred to by Warnstorf,[1] says nothing whatever about Ehrhardt, but accredits the species to Persoon on the basis of his manuscript name and Bridel's publication in his Mantissa (1819) and says Persoon was the first to discover it, in the Harz (Hercynia). Lindberg's ascription of the species to Ehrhardt is found in a later work, viz. Europas och Nordamerikas Hvitmossor, 22 ff. 1882, and is based upon a specimen of Ehrhardt's (†1795) in the herbarium of the Academy of Science at St. Petersburg labeled "*Sphagnum tenellum* mihi." This is however not a publication, and the reference to Persoon's specimen under the name *S. tenellum* in Hoffmann, Deutschlands Flora, II, 22. 1795, is also not such as to constitute publication. The earliest proper publication (with description) of the species is in Bridel's Muscologia Recentiorum, II, 1, p. 223. As Bridel here definitely credits the species to Persoon, there is hardly anything further to be said. Dusén[2] also has the facts clear, though he calls the species *S. tenellum* Bridel. Warnstorf had himself examined the Bridel herbarium in Berlin and seen that Bridel's specimen really represents this species.[3] His astounding reason[4] for preferring the later name, that Bridel might possibly not have distinguished from his (or Persoon's) species slender forms belonging to other species, is subscribed to by Cardot.[5] The fact that there is a later (invalid) *S. tenellum* (Schimper) Klinggräff, 1872 does not of course invalidate the older one.

[1] Öfv. kgl. Vet.-Akad. Förh., XIX, 142. 1862.

[2] Sphagnaceernas utbredning, 13 f. 1887.

[3] Bot. Centralblatt, IX, 99. 1882.

[4] Verh. bot. Ver. Prov. Brandenburg, XXXII, 227. 1891.

[5] Répertoire sphagnologique, 337 f. 1897.

The July number of THE BRYOLOGIST was published Sept. 8, 1919.

It is a species not easily confused, and one whose immediate relationships are not at once clear, though for some time it has been generally recognized that it belongs to the group *Cuspidata*, and it probably finds its nearest affinity in the several species last considered. Its branch-leaves are hardly undulate when dry, though a slight tendency in that direction is sometimes observable, and are considerably shorter and wider in proportion to their length, giving them an ovate rather than lanceolate shape; in section their chlorophyll cells are particularly broad in their exposure on the dorsal surface and even convexly bulging, but barely, if at all, reaching the ventral surface, where the empty cells are strongly bulging. The cortical cells of the stem are clearly differentiated as in all the following species of the group, normally in two layers of not very large cells with fairly thin walls. Stem-leaves, branch-leaves, perichaetial leaves belong otherwise to the general type of the *Cuspidata*. The species is often used for illustration of the retort-cells of the Sphagnum-branch, as these are remarkably well developed in it, standing out in marked contrast to the other small cells of the branch. The color is usually a delicate yellowish green, rarely more deeply pigmented yellow-brown. It is generally regarded as dioicous, though Warnstorf describes it as polyoicous. I have not succeeded in demonstrating monoicous plants, though in the coastal region of northern Europe I have found the species fruiting rather frequently.

Its distribution is remarkable and with us confined to immediate proximity of the coast. It may thus be found in various localities, often widely separated, from Labrador to New Jersey, and on the Pacific coast from Alaska to Vancouver Island. The circumstances of its occurrence, manner of growth, etc., in a favorable part of its American range are given in considerable detail by Nichols.[6] In Europe it extends northwest to the Faroes and southwest to Portugal, but is not confined to the coast, being reported from most of the mountain systems southward to the Alps. In Asia it is known only from Japan. The facts would seem to indicate Europe as the center of distribution of this species, and it is in general doubtless true that if any region can lay valid claim to being the original home of *Sphagnum*, it is northern Europe.

20. *Sphagnum cuspidatum* Ehrhardt, 1795.[7] About the application of this name there seems neither to have been nor to be any question. A question which has often been raised is whether or not it is specifically distinct from *S. recurvum*. With the segregations of recent decades this question has ceased to be urged, and in my own experience I have failed to find anything that convinces me that *S. cuspidatum* is a mere aquatic form of *S. recurvum*, though there can be no doubt whatever that the relationship is a close one. For practical distinction a number of characters have been and may be used, but in doubtful cases one or more of them may be found to fail. It has been noted for example that pendent branches of *S. recurvum* are generally long and closely appressed to the stem.

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[6] The Vegetation of Northern Cape Breton Island, Nova Scotia, 422 and elsewhere. 1918.

[7] On the date of Hoffmann's separate publication of the *Sphagna* for the second volume of his Deutschlands Flora cf. my note in Bryologist, XX, 84. 1917.

which is quite concealed by them. This arrangement may in some measure make up for the lack of specially differentiated cortical stem-cells in this species. In *S. cuspidatum* on the other hand, which is of more aquatic tendencies, such an arrangement is unnecessary and the stem is quite bare, the pendent branches being inconspicuous and little developed. The stem-leaves of *S. cuspidatum* are distinguished as somewhat fibrillose in the apical part, and as a rule this is true, but it is also a fact that the fibrils may be lacking in stem-leaves of *S. cuspidatum*, while on the other hand, in immature or otherwise abnormal specimens of *S. recurvum*, the stem-leaves may show somewhat of the fibrillose condition of the branch-leaves, a condition of isophylly or hemiisophylly that must always be borne in mind in considering the stem-leaves of any species of *Sphagnum*, for these are obviously a secondary development from the type of the branch-leaves and are accordingly in immature specimens not adequately differentiated, while in other abnormal ones they may approach the same type by reversion. In section the chlorophyll cells of the branch-leaves of *S. cuspidatum* are described as trapezoidal, having a narrower exposure on the ventral surface of the leaf, while those of *S. recurvum* are triangular, the apex of the triangle barely reaching the ventral surface. Normally this is true, but unquestionable specimens of *S. recurvum*, particularly the aquatic forms called *S. fallax* Klinggräff, may be found with the leaf-section of *S. cuspidatum*, just as we have seen before that aquatic specimens of *S. palustre* may show such abnormal chlorophyll cells. I have even seen such specimens of *S. recurvum* var. *tenue*. The character which remains, which to my mind is the least subject to confusion, is the stem-cortex. In *S. cuspidatum* the cortex consists of about two rows of good-sized, fairly thin-walled cells clearly set off from those within. It is possible that aquatic conditions of growth may have some effect upon the cells, but that they can immediately produce a difference such as that between the cortical stem-cells of *S. recurvum* and *S. cuspidatum* is incredible, and *S. fallax* is an aquatic form of *S. recurvum*, which does not show it.[8] Artificial species that have been inserted between them with such names as *S. fallax*, *S. pseudorecurvum*, *S. pseudocuspidatum*, etc., are apparently always satisfactorily referable to either the one or the other. Of other characters than those already mentioned it may be said that the branch-leaves of *S. cuspidatum* are more elongated to almost linear, often without undulations, and that their empty cells are accordingly narrowed and their pores reduced to the mere end-pores on either surface, or nearly so. Of further synonyms *S. virginianum* Warnstorf, 1900 is retained in 1911,[9] though distinguished there neither in key nor description, nor so far as one can see in the specimen, from small forms of *S. cuspidatum*. *S. ruppinense* Warnstorf, 1908, originally Prussian as the name suggests, was given an American locality in 1911,[10] but here also I am unable to find a valid specific distinction. The same is true of *S. Faxonii* Warnstorf, 1908, from New England. From researches of Bartlett[11]

[8] Cf. the note in Bryologist, XX, 87. 1917 and the literature there cited.

[9] Pflanzenreich, **51**: 269.

[10] Op. cit., 232.

[11] Rhodora, X, 113 f. 1908.

it appears that Warnstorf had garbled his statements as to the specimen making up his *S. Faxonii*. In spite of this he retains them in 1911[12] with the further addition of the locality suggested by Bartlett. There is nothing either in the description or in such specimens as are available to separate it specifically from *S. cuspidatum*.

The species is hardly as widely distributed as *S. recurvum*. On our eastern coast it extends from Labrador[13] southward to Georgia (Florida according to Warnstorf). It seems to be entirely lacking inland and on our Pacific coast. It is well represented in Europe, also in Japan, and forms of it or closely related species occur in various parts of the southern hemisphere.

Var. *Torreyi* (Sullivant) Braithwaite, 1875. Such is the form and date of the name as first applied varietally. The earlier species name was *S. Torreyanum* Sullivant, 1849. Whether it should be called a variety or species is a matter still open to discussion. There is such lack of good characters separating them and it is so possible to find material showing the transition from one form to the other that I am unable to see in them separate species, though I think the variety is abundantly deserving of taxonomic recognition as such. The most immediately apparent distinction lies in the decidedly greater size of the variety. With its robustness goes a greater breadth of branch-leaf, the latter tending then to be somewhat undulate and sometimes showing good-sized pores on the ventral surface of the empty cells. The chlorophyll cells are also not so much exposed on the ventral surface of the leaf, in its lower part being normally triangular in section with apex just reaching the surface of leaf. In all these respects the plant lies nearer to *S. recurvum*, and one could sooner conceive of the variety than of the type as an aquatic form of the latter species. Also the cortical cells of the stem are in the variety more irregular in size, with slightly thicker walls and forming a less definite cortical layer, but the condition is still too far removed from that of *S. recurvum*. Of synonyms Warnstorf has been guilty of one in *S. Kearneyi* Warnstorf, 1900, from the Dismal Swamp of Virginia, which marks at the same time the variety's southern limit of range.[14] From here northward the range is entirely coastal and extends to Newfoundland. In Europe it also shows coastal preferences, though Warnstorf (p. 233) gives a single locality from the Alps. It apparently does not occur elsewhere[15] and compares then as to its range in a general way with *S. pulchrum*.

Var. *serrulatum* Schliephacke, 1882 (first noted as *S. laxifolium* var. *serrulatum*, Schliephacke, 1865). To Schliephacke appears to belong the credit for having first taxonomically registered the fact that *S. cuspidatum* shows in its

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[12] Op. cit. 231.

[13] Warnstorf (p. 266) includes it from Greenland, but his station is that of the variety *Kruusei* (not *Krausei*) Jensen, a fragment of which from Jensen's herbarium is certainly referable to *S. Lindbergii*.

[14] It had been collected there before (1893) by Small and rightly named by Warnstorf. Cardot's *S. cuspidatum* var. *miquelonense*, 1887 has long since been reduced to synonymy.

[15] Warnstorf's locality in Tierra del Fuego requires confirmation.

aquatic specimens an occasional tendency to have its branch-leaves serrulate, the teeth being due solely to a slight extension of the distal ends of the narrow border cells. This might readily be regarded as a casual variation having no taxonomic value, but it is significant that it does not occur in other species,[16] that it is not characteristic of all aquatic specimens of *S. cuspidatum*, and that in some regions this form becomes more frequent or even supplants the normal form entirely. Warnstorf in 1911 leaves two North American species of this category, *S. serratum* Austin, 1877 (including the European form), and *S. trinitense* Carl Müller, 1848,[17] but without any very definite characters to distinguish them from each other.[18] With us the plant is confined to our east coast, the most northerly station being in Maine.[19] It is also known from Massachusetts and becomes common in the southern coastal states, reaching to Louisiana. It further occurs in Bermuda, where it is the only *Sphagnum* except *S. magellanicum*, and in Porto Rico (where it has acquired another synonym, *S. Helleri* Warnstorf, 1905), extending through Trinidad apparently to eastern South America. Warnstorf includes specimens from Japan and Australia, while several of his other species from the southern hemisphere are possibly identical. It is sometimes found richly fruiting, as is normal *S. cuspidatum* in spite of its dioicous inflorescence. The close relationship of *S. Fitzgeraldi* Renauld will be discussed under the latter species.

To revert to a species previously discussed, a new locality for *S. Ångströmii* has come to light in good specimens from Nome, Alaska, collected in 1918 by C. W. Thornton, which I have been able to examine through the kindness of Mr. Maxon. This is the second station for this subarctic species from the American mainland, the third from North America altogether. Further collecting may show it to be not uncommon in northern Alaska, the Yukon and possibly farther eastward. It is however strange that it has never been reported from Greenland, whose Sphagnum-flora is so well known that one hesitates to believe it can occur there without having been discovered. If it should not in future be found there nor in the adjacent eastern parts of arctic or subarctic America, the conclusion would seem inevitable that it had reached Alaska in its distribution from Asia and had not yet succeeded in spreading across arctic or subarctic America to Greenland.

Ithaca, N. Y.

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[16] Except S. Fitzgeraldi, exotic species having this character are synonyms or closely related.

[17] Separated by nearly 30 pages of print. The author in his Vorwort congratulates himself on the natural arrangement of species in his keys and descriptions.

[18] He puts one of Mrs. Britton's numbers from Pembroke Marsh in the Bermudas under one of the two species and her other number from the same marsh under the other.

[19] A specimen in the Austin herbarium labeled "from a pit in a peat swamp wholly submerged, Hebron, Maine, Aug., 1878" has a note by Austin calling attention to the serrulate leaves. Mr. G. K. Merrill has recently sent me an entirely similar specimen from a "pool in a bog, Union, Maine, Aug. 17, 1919.

A LIST OF MOSSES FROM SANFORD, FLORIDA

S. Rapp

The mosses enumerated in the following list were collected within a radius of ten miles of Sanford, Seminole County, Florida, formerly belonging to Orange County. The writer is under great obligations to Mrs. E. G. Britton for determining critical specimens and for preparing most of the list. For the determination of certain specimens thanks are also due to Dr. Best, Dr. Grout, Prof. Holzinger, and Miss Edith A. Warner; and to Dr. A. LeRoy Andrews for determining the specimens of *Sphagnum* and *Bryum*.

Sanford is situated on the southern shore of Lake Monroe, a tributary of the St. Johns River, and being the entrance of southern Florida is spoken of as "The Gate City of South Florida." The surrounding country is of low elevation and abounds in river-swamps and hammocks; the former with oaks, hickory, *Carpinus*, and other trees, the latter with cypress, ashes, maple, and elms. It is here in the chinks of the cypress where one finds *Fissidens Donnellii*, hidden like the modest violet in the hedges; *Fissidens falcatulus* along creeks on exposed roots and logs; *Callicostella scabrida* (*Hookeria Cruceana*) on logs; *Climacium americanum*, *Amblystegium floridanum*, *A. varium*, and *A. riparium*. On drier situations in the adjoining hammock another dwarf moss, *Fissidens Garberi*, occurs on live oak, together with the glossy *Entodon Drummondii*, *Brachythecium splendens*, and *Forsstroemia trichomitria*. The variety *immersa* of the latter species occurs together with *F. floridanum* mostly on elm.

Cyclodictyon varians is a mud-inhabiting species with *Eurhynchium hians*. On borders of swamps and dried-up ponds occurs *Ephemerum megalocarpum*, also *E. spinulosum* and *E. papillosum*. *Campylopus inflexus*, *C. gracilicaulis*, *C. Donnellii*, and *C. angustiretis* are found on sandy banks together with *Funaria hygrometrica*, the very common var. *patula*, also *F. flavicans*, *F. calvescens*, the rare *F. serratum* and single plants of *F. americanum*. Here also are found *Bruchia Donnellii* and *B. Ravenellii*.

For data concerning the habitats of certain other species at Sanford see Mrs. Britton's article in a former number of The Bryologist (**21**: 27–28. March, 1918). It may be added that *Dicranella curvata* (*D. secunda*) has been collected in Jacksonville, and *Ectropothecium caloosiense* and *Fontinalis biformis* in Tampa, Florida.

List of Species

Amblystegium floridanum R. & C. (*A. riparium* var. *floridanum*). *1*
" *hygrophilum* (Jur.) Schimp. *2*
" *irriguum* Bry. Eur. (*H. tenue* (Hedw.) Card.)? *102*
" *riparium* (L.) Br. & Sch. *3*
" *vacillans* Sull. *5*
" *varium* (Hedw.) Lindb. *4*
Anomodon attenuatus (Schreb.) Hueb. *6*

Nanomitrium synoicum (James) Lindb. *100*
" *Austini* (Sull.) Lindb. *120*
Octoblepharum albidum (L.) Hedw. *53*
Octodiceras fontanum (LaPyl.) Lindb. (*O. Julianum* Brid.) *94*
Papillaria nigrescens (Sw.) Jaegr. *54*
Philonotis longiseta (Michx.) E. G. B. (*P. radicalis* (P. Beauv.) Brid.) *11*
Pirella cymbifolia (Sull.) Card. (*Pilotrichum cymbifolium* Sull. *79*
Physcomitrium australe E. G. Britt., var. *115*
" *megalocarpum* Kindb. *114*
" *turbinatum* (Michx.) Brid. *56*
" " *Langloisii* (R. & C.) E. G. Britt. *103*
Plagiothecium denticulatum (L.) Br. & Sch. *32*
Pogonatum brachyphyllum (Michx.) P. Beauv. *55*
Polytrichum commune L. *57*
Rhizogonium spiniforme (L.) Bruch. *61*
Rhynchostegium serrulatum (Hedw.) Jaegr. *60*
Schlotheimia Sullivantii C. M. *62*
Sematophyllum adnatum (Michx.) E. G. Britt. (*Rhaphidostegium microcarpum* (Brid.) Jaegr.) *58*
Sematophyllum subpinnatum (Brid.) E. G. Britt. (*Rhaphidostegium Kegelianum* var. *floridanum* R. & C.) *59*
Sphagnum cuspidatum var. *serrulatum* Schimp. *21*
" *cyclophyllum* Sull. & Lesq. *27*
" *erythrocalyx* Hampe. *3*
" *Fitzgeraldi* Renauld. *22*. Collected in fruit!
" *magellanicum* Brid. *1*
" *macrophyllum* Bernh. (*S. floridanum* Card.) *28*. In fruit!
" *palustre* Ehrh. *4*
" *recurvum* Beauv. *17*
" *strictum* Sull. *9*
" *subsecundum* forma Nees. *25*
" *tabulare* Sull. (*S. molle* Sull.) *39*
" *tenerum* Sull. & Lesq.
Splachnum ampullaceum Su l. & Lesq. *72*
Syrrhopodon floridanus Sull. *63*
" *texanus* Sull. *64*
Taxithelium planum forma? (?) *42* Sterile!
Thelia asprella Sull. *66*
" *hirtella* (Hedw.) Sull. *65*
Tortella caespitosa (Schwaegr.) Limpr. *10*
Thuidium delicatulum (L.) Mitt. *68*
" *gracile* var. *Ravenellii* (S. & L.) Card. *70*
" *involvens* (Hedw.) Mitt. *80*
" *minutulum* (Hedw.) Br. & Sch. *69*.
Trematodon longicollis Michx. *73*

Weisia longiseta Lesq. & James. *77*
" *viridula* (L.) Hedw. *75*
" " var. *nitida* R. & C. *74*

SANFORD, FLORIDA.

NOTES ON NORTH AMERICAN HEPATICAE—VIII[1]

ALEXANDER W. EVANS

(WITH PLATE II)

In a recent paper on New England Hepaticae[2] the writer discussed three species of *Nardia* (*N. hyalina*, *N. obovata* and *N. obscura*) and called attention to the discovery of *N. subelliptica* in Nova Scotia, this species being an addition to the American flora. In the present paper *N. subelliptica* and two other species of *Nardia*, *N. fossombronioides* and *N. rubra*, are considered; *N. fossombronioides* is an eastern species, which is perhaps to be expected in New England, while *N. rubra* is confined to the Pacific Coast region. The paper reports further two additions to the flora of the United States, *Petalophyllum Ralfsii* (which is new also to America) and *Leptocolea cardiocarpa*. The five remaining species are introduced for various reasons but mainly to record extensions of range or to help clear up difficulties in nomenclature.

Since the appearance of the seventh number of this series[3] an important article has been published by Arnell on the mosses of the Vega Expedition.[4] Most of the species considered came from Nova Zembla or Siberia but a few had been collected at Port Clarence or on St. Lawrence Island, Alaska. These include the following additions to the hepatic flora of the territory: *Cephalozia pleniceps*, *Cephaloziella striatula*, *Lophozia barbata*, *L. Binsteadii*, *L. Kaurini*, *Pleuroclada albescens*, and *Scapania subalpina*. In the writer's report on the Hepaticae of Alaska,[5] published in 1915, 105 species are recorded. Adding to these *Harpanthus Flotowianus* (which was omitted by mistake), *Asterella Lindenbergiana* (which has recently been reported in another paper),[6] and the seven species listed by Arnell, the total number of species now known from Alaska is increased to 114.

1. CORSINIA CORIANDRINA (Spreng.) Lindb. Hepat. Utveckl. 30. 1877. *Riccia reticulata* Gmel.; Linnaeus, Syst. Nat. ed. 13, **3**: 1355. 1796 (not *R. reticulata* Sw., 1788). *R. coriandrina* Spreng. Anleit. **3**: 320. 1804. *Corsinia marchantioides* Raddi, Opusc. Sci. Bologna **2**: 354. 1818. *Tessellina coriandrina* Dumort. Comm. Bot. 78. 1822. *Corsinia reticulata* Dumort. Hep. Eur. 166. 1874.

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[1] Contribution from the Osborn Botanical Laboratory.
[2] Rhodora **21**. 1919. *In press.*
[3] Bryologist **20**: 17–28. *pl. 2.* 1917.
[4] Arkiv för Botanik **15**[5]: 1–111. 1917.
[5] Bull. Torrey Club **41**: 577–626. *pl. 21.* 1915.
[6] Contr. U. S. Nat. Herb. **20**: 284. 1919. *In press.*

Collected in February, 1915, near Austin, Texas, by F. McAllister. The specimens were determined by Dr. Marshall A. Howe, of the New York Botanical Garden, and reported by him (under the name *C. marchantioides*) at a meeting of the Torrey Botanical Club, held on March 31, 1915.[1] In 1887, Langlois[2] reported the species from Louisiana, but this earlier record is doubtful, and no other North American stations are at present known. In South America, however, it has been found in the vicinity of La Plata, Argentina, by C. Spegazzini.[3] Since the original discovery of the species by Micheli in the neighborhood of Florence, nearly two hundred years ago, its European range has gradually been extended, especially in the Mediterranean region, and it is now known from various other parts of Italy and also from Dalmatia, Switzerland (south of the Alps), France and Portugal. It has been reported also from Algeria, from the Atlantic Islands and from Japan. In certain parts of its range it is abundant.

The genus *Corsinia* is monotypic and was placed by the older writers, including Leitgeb, among the Ricciaceae. At the present time its relationships are supposed to be with the more complex genera of the Marchantiales. Cavers has united it with the South American genus *Boschia* to form the special family Corsiniaceae, which occupies a position in his system between the Ricciaceae and *Targionia*. The features of the genus have been well described by European writers,[4] so that only the more distinctive will be noted here.

The thallus is of a fair size, measuring 5–6 mm. in width, and its color varies from yellowish to bright green, without showing any traces of purplish pigmentation. It branches rather sparingly by forking and occasionally forms apical innovations. The photosynthetic tissue is made up of a single layer of air-chambers, separated by plates of cells and covered over by a thin-walled epidermis one cell thick. Each chamber communicates with the outside air by means of an epidermal pore, surrounded by one or two concentric rows of scarcely modified thin-walled cells. The floors of the chambers sometimes give rise to short and simple, upright green filaments, each composed of a single row of cells, but these filaments are often lacking altogether. The ventral scales are colorless and irregularly scattered; they are ovate to lunulate in outline, and each tapers gradually into a filamentous appendage.

The inflorescence is usually dioicous but may be autoicous. The most important characters of the genus are derived from the grouping of the sexual organs and from the protective structures associated with them. The antheridia are situated in an elongated and sometimes forked cluster, occupying a median position on an ordinary thallus and bounded on each side by a low ridge. The archegonia occupy a similar position, but the groups, which are in shallow depressions, are shorter, and several are sometimes formed in rather close succession, showing that the formation of the archegonia does not limit the growth of the

[1] See Torreya **15**: 159. 1915.

[2] Cat. Pl. Basse-Louisiane 26. 1887.

[3] See Massalongo, Bull. Soc. Bot. Ital. 1917: 45.

[4] See especially Müller, Rabenhorst's Kryptogamen-Fl. **6**: 226–229. *f. 142, 143.* 1907; and Cavers, New Phytol. Reprint 4: 18–22. *f. 8, 9.* 1911.

thallus. In the lack of a specialized female receptacle the genus differs from such typical marchantiaceous genera as *Marchantia*, *Reboulia* and *Plagiochasma* and agrees with the more simply organized genera, such as *Targionia* and *Riccia*. Involucral organs may be absent altogether. When they occur they attain full development only after fertilization and are in the form of one-sided or peltate, lobed structures with air chambers, taking their origin from the surface of the thallus and arching up over the young sporophytes. The calyptra is fleshy and covered over with coarse tubercles.

The sporophyte[1] shows the usual differentiation into capsule, stalk and foot, but the stalk remains very short. The wall of the capsule is composed of a single layer of thin-walled cells and dehisces at maturity, according to Meyer, by means of a long slit in the upper part. The spore sac contains both spores and sterile cells, the latter being short and blunt and destitute of spiral thickenings in their walls. The spores are blackish brown and almost opaque at maturity, usually measuring 100–130μ in diameter. They show the usual tetrahedral form, though somewhat obscurely. The plane faces are smooth but the spherical face is covered over with a coarse reticulum. The meshes measure 25–35μ in diameter and are bounded by grooves and not by ridges, a remarkable feature first pointed out by Leitgeb.[2] This type of spore-marking is not known in any other North American hepatic but recurs, with certain modifications, in the European *Grimaldia dichotoma* Raddi.[3]

2. SAUTERIA ALPINA Nees, Naturg. Europ. Leberm. **4**: 143. 1838. *Lunularia alpina* Nees; Nees & Bisch. Flora **13**: 399. 1830.

Collected on soil among rocks, in July, 1881, on Mt. Albert, Gaspé County, Quebec, by O. D. Allen (*No. 1*). These specimens have already been reported by the writer[4] under the incorrect name *Clevea hyalina* (Sommerf.) Lindb. Careful sectioning of the scanty material, however, has demonstrated the presence of a rhizoid-furrow in the stalk of the female receptacle, showing that the plant is *Sauteria alpina* and not the *Clevea*. Additional North American stations for the *Sauteria* are in Greenland, Alaska and Alberta; and it has a wide distribution in Europe and northern Asia.

A full description of this arctic and alpine plant may be found in Müller's "Lebermoose,"[5] while the characteristics of the group Astroporae, to which it belongs, have already been briefly discussed by the writer.[6] The most important distinction between *Clevea* and *Sauteria* is found in the stalks of the

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[1] The following two papers by Meyer give a full account of the development and structure of the sporophyte: Untersuchungen über den Sporophyt der Lebermoose—I. Entwickelungsgeschichte des Sporogons der *Corsinia marchantioides*. Bull. Soc. Imper. Nat. Moscou 1911: 263–286. *pl. 7+f. 1–22.* 1912; III. Das Sporogonium der *Corsinia marchantioides* Raddi. Ber. Deuts. Bot. Ges. **32**: 262–266. *f. 1–4.* 1914.

[2] Ueber Bau und Entwicklung der Sporenhäute 22–38. *pl. 1, f. 16–33.* 1884.

[3] See Leitgeb, *op. cit.* 50. *pl. 2, f. 28, 28a.*

[4] Bryologist **19**: 28 (footnote). 1916.

[5] Rabenhorst's Kryptogamen-Fl. **6**: 241. *f. 150, 151.* 1907.

[6] Rhodora **16**: 63. 1914.

female receptacle; in *Clevea* there is no rhizoid-furrow, in *Sauteria* a single one is present. In *Clevea* the receptacle is dorsal on a thallus branch and does not limit its growth; in *Sauteria* it is terminal and brings the growth of the branch to an end. An important distinction between *Clevea hyalina* and *Sauteria alpina* is found in the paleae associated with the female receptacles. In the *Clevea* there are few or no slime-papillae on the paleae; in the *Sauteria* the papillae are very numerous.[1]

3. Plagiochasma Muenchianum Steph. Sp. Hepat. **6**: 9. 1917.

This species was based on specimens collected by G. Münch at San Cristobal, Chiapas, Mexico. From a study of these specimens several years ago,[2] before the species had been published, the writer reached the conclusion that they represented a form of *P. crenulatum* Gottsche. It is therefore suggested that *P. Muenchianum* be placed among the synonyms of *P. crenulatum*.

4. Grimaldia pilosa (Hornem.) Lindb. Musc. Scand. 1. 1879. *Marchantia pilosa* Hornem. Fl. Dan. **8**: 7. *pl. 1426*. 1810. *Duvalia pilosa* Lindb. Not. F. et Fl. Fenn. **9**: 280. 1868. *Neesiella pilosa* Schiffn. Hedwigia **47**: 314. 1908.

Collected in June, 1893, on Cold Creek Hill, Yukon River, Alaska, by F. Funston (*No. 94*). This specimen was reported by the writer some time ago under the incorrect name *G. fragrans* (Balb.) Corda;[3] since, however, the thallus shows large air chambers the plant clearly belongs to *G. pilosa*, and *G. fragrans* should no longer be included among the species known from Alaska. *G. pilosa* is an arctic and alpine species which occurs at various scattered localities in northern Europe and Asia. In North America it is known from Greenland, Quebec and Vermont, as well as from Alaska.

In the second paper of this series[4] *G. pilosa* is included in the genus *Neesiella*, following the example of Schiffner, but it is shown that the reasons for separating *Neesiella* from *Grimaldia* are not very convincing, being based simply on differences in the structure of the thallus. Since the related genus *Asterella* shows equally great differences, it is now suggested that *Neesiella* be again combined with *Grimaldia*. As thus enlarged the genus is represented in North America by the following species: *G. californica* Gottsche, *G. fragrans*, *G. pilosa*, and *G. rupestris* (Nees) Lindenb., the last species being the type of the genus *Neesiella*.

5. Petalophyllum Ralfsii (Wils.) Nees & Gottsche; Lehmann, Pug. Plant. **8**: 30 (in obs). 1844. *Diplolaena Lyellii α lamellata* Nees, Naturg. Europ. Leberm. **3**: 345. 1838. *Jungermannia Ralfsii* Wils.; Sowerby, Engl. Bot. Suppl. **4**: *pl. 2874*. 1843. *Petalophyllum lamellatum* Lindb. Not. F. et Fl. Fenn. **13**: 390. 1874 *Fossombronia corbulaeformis* Trabut, Rev Bryol. **13**: *pl. 2, f. 9–14*. 1886 (no description); Battandier & Trabut, Atlas Fl. d' Alger 7. *pl. 2, f. 9–14*. 1886.

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[1] See Solms-Laubach, Bot. Zeit. **57**[1]: 19. 1899.

[2] Bull. Torrey Club **42**: 289, 292. 1915.

[3] Proc. Washington Acad. **2**: 290. 1900.

[4] Bryologist **14**: 84. 1911.

Collected in March, 1914, at Austin, Texas, by Miss M. S. Young (*No. 2;* specimen in the herbarium of the New York Botanical Garden); also at College Station, Texas, by C. H. Farr. New to America. This rare species was discovered by J. Ralfs, in 1830, at Aberffraw, on the island of Angelsey in Wales, and is now known in addition from the English counties of Cornwall, Lancaster and York and from the Irish counties of Dublin, Kerry and Londonderry. For a long time it was supposed to be confined to the British Isles, but about fifty years after its original discovery it was found by Trabut at various localities in the vicinity of Algiers. He described it as a new species, under the name *Fossombronia corbulaeformis*, but the identity of his plant with the *Petalophyllum* was soon recognized. Largely through the studies of Massalongo the species is now known also from the following islands in the Mediterranean: Pianosa (Tuscan Archipelago), Sardinia, Sicily, Lampedusa (southwest of Sicily), and Malta. Its discovery in America marks a very interesting extension of range.

The genus *Petalophyllum*, as originally proposed, contained only two species, *P. Ralfsii* and the Australian *P. Preissii* Gottsche. The latter is apparently as rare as *P. Ralfsii*, although its known range now includes New Zealand. When Stephani monographed the genus in 1900[1] he still recognized the two original species but no others. Since that time, however, he has proposed a third species, under the name *P. bolivianum*.[2] This species presumably came from Bolivia, although he describes the habitat as "sine loco natali." It is unfortunately known in sterile condition only, but the description indicates that it must be close to *P. Ralfsii*. For descriptions of *P. Ralfsii* reference may be made to the European manuals and to an important morphological study by Cavers.[3] This work has served as the basis for most of the remarks which follow.

The gametophyte consists of a green, flattened, thalloid stem about 1 cm. long, which is sometimes simple and sometimes once-dichotomous. This stem broadens out from a cylindrical stalk-like base and lies closely appressed to the surface of the soil. It consists of a thickened median portion, which forms a long convex ridge on the ventral surface, and two wings which thin out gradually, becoming only one cell thick in the outer part. On the upper surface of the wings a series of oblique lamellae, which are regarded as leaves, take their origin. These lamellae are only one cell thick and are usually somewhat imbricated. They are broadest in the middle, where they attain a width of about twenty cells, and narrow gradually toward each end. The lamellae on one wing tend to alternate with those of the other, but there are often deviations from this arrangement; two or more lamellae on the same wing, for example, may be "joined by a membranous outgrowth," or two lamellae of opposite wings may be continuous with each other across the middle. On the lower surface the stem "bears numerous small scales in two longitudinal rows." These are developed early

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[1] Mém. Herb. Boissier **16**: 16. 1900.

[2] Sp. Hepat. **6**: 70. 1917.

[3] Notes on Yorkshire Bryophytes. 1. *Petalophyllum Ralfsii*. Naturalist 1903: 327–334. *f. 1–4.*

and appear crowded in the apical region, becoming withered and indistinguishable in the older parts of the plant. The scales are triangular in form and are provided with slime-papillae. Toward the end of the growing period the flattened stem forms an apical tuber, which persists until the following season and then grows out into the cylindrical base of a new stem. The method of growth and the formation of the tuber are clearly shown in a figure by Goebel.[1]

The antheridia and archegonia of *P. Ralfsii* are borne on separate plants. The yellow antheridia are borne on the upper surface of the thickened median portion and show a tendency to be arranged in two longitudinal rows. Some but apparently not all of the antheridia are protected by scale-like or tubular outgrowths, and these sometimes grow together and form a system "of chambers, each containing a single antheridium." The archegonia and associated parts are clearly described by Cavers. According to his account a "female plant bears several groups of archegonia," protected by "narrow scales or leaf-like outgrowths." If fertilization takes place in a group, "the perianth begins to grow up as a tubular sheath which surrounds the whole group . . . . within the ring of scales." As it "grows upward some of the scales are carried up on its outer surface." The mature perianth is wide open at the mouth, which bears a series of irregular lobes or sharp teeth.

The spherical capsule is essentially like that of a *Fossombronia* and splits irregularly at maturity. Spores are abundant in the material collected by Miss Young and agree closely with the description and figure of Macvicar.[1] They are pale brown at maturity and measure 50–60μ in diameter. The whole surface is covered over by a coarse and regular reticulum formed by anastomosing lamellae 6–10μ wide. The meshes are mostly hexagonal and measure 10–16μ across, while the lamellae are darker on their edges and very minutely crenulate. The elaters have blunt ends and most of them are narrow, measuring 10–14μ in diameter; occasional elaters, however, are much broader. It will be seen that the spores are strikingly like those of *Fossombronia angulosa* Raddi.

6. Nardia fossombronioides (Aust.) Lindb. Acta Soc. Sci. Fenn. **10**: 530. 1875. *Jungermannia fossombronioides* Aust. Proc. Acad. Philadelphia for 1869: 220. [Text figs. 1–7.]

New Jersey: On rocks along a rivulet, near Closter, *C. F. Austin*, distributed in Hep. Bor.-Amer. *32*, as *Jungermannia fossombronioides;* Englewood, *M. A. Howe*. West Virginia: near Burnt House, *J. L. Sheldon 4226*, *4233* in part, mixed with *N. crenuliformis* (Aust.) Lindb. Illinois: Canton, *J. Wolf 30*. The range of this interesting species is still incompletely known, and these are the only stations which can be cited with certainty. The specimens from Macon, Georgia, distributed under this name in Underwood & Cook's Hep. Amer. *39*, are sterile and doubtful.

In Austin's original description of this rare species he emphasized its most distinctive feature, the "large, subcampanulate and multi-plicate perianth."

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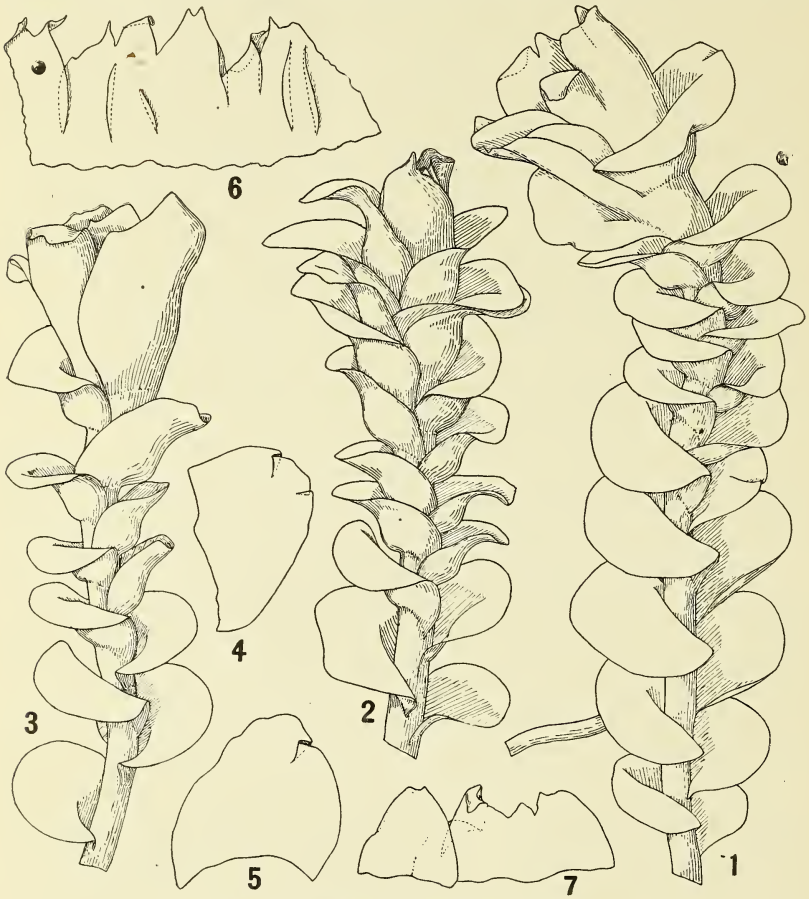
[1] Organogr. der Pfl. ed. 2, *f. 533*. 1915.

[2] Student's Handb. British Hep. 79. *f. 3*. 1912.

He called attention further to its deeply laciniate mouth and to the fact that it was "highly connate" with the bracts. In transferring the species to the genus *Nardia*, Lindberg was so impressed with the peculiarities of the perianth



NARDIA FOSSOMBRONIOIDES (Aust.) Lindb.

FIGS. 1–3. Plants with perianths and perigonial bracts, ×15.

FIGS. 4, 5. Innermost perichaetial bracts from a single inflorescence, ×15.

FIG. 6. Mouth of perianth from the same inflorescence, ×15.

FIG. 7. Mouth of perianth from another inflorescence, ×15.

The figures were all drawn from specimens collected near Closter, New Jersey, by C. F. Austin and distributed in Hep. Bor.-Amer. *32*, as *Jungermannia fossombronioides*. The rhizoids are not represented.

that he made them the basis for the new section *Chascostoma* and even suggested that this section might represent a valid genus. He noted the paroicous inflorescence of the species, the presence of long flagella or stolons and the absence

of underleaves. Schiffner also was impressed by the features of the perianth, although he still retained *Chascostoma* (with a question mark) among the subgenera of *Nardia*.[1]

In FIGS. 1–3 more or less characteristic perianths are shown and in FIGS. 6 and 7 the upper parts of two other perianths are represented, dissected off and spread out flat. The figures indicate that the perianth is a somewhat variable organ. In most cases the apical lobes or laciniae are irregular in number, size and shape. They tend to flare out a good deal and are frequently revolute, but sometimes they are suberect or even involute, thus partially closing the mouth. In many cases the perianths are incompletely or abnormally formed. A lobe, for example, instead of meeting the next lobe directly, may extend down the outer surface of the perianth for a considerable distance in the form of a free lamella. Austin described the margins of the laciniae as entire. As a matter of fact the marginal cells usually project as vague crenulations, and sometimes minute and irregular teeth are present. The cells of the perianth vary considerably, although elongated cells are usually present somewhere. Even at the mouth the cells are often isodiametric, an unusual condition in the genus *Nardia*, but this feature is inconstant and the marginal cells are sometimes elongated. In the writer's opinion the features of the perianth in *N. fossombronoides* have perhaps been over-estimated as a sectional or subgeneric character, but they certainly form an excellent basis for separating the species from its allies.

Passing now to the vegetative organs the resemblance between *N. fossombronioides* and the northern *N. obovata* (Nees) Lindb. is striking. The plants are of about the same size, they are both distinguished by the presence of purple rhizoids and long stolons, the branching in both is intercalary, and both (so far as observed) show a complete lack of subfloral innovations. The leaves, moreover, are of about the same shape and spread in about the same way, while the leaf-cells are characterized by small but distinct trigones. Even the measurements of the leaf-cells yield no differences. In *N. fossombronioides* the marginal cells average about 23μ and the median about 36$\times$31μ, these measurements coming well within the extremes found in the more variable *N. obovata*. There are, however, a few differences even in the vegetative organs. In *N. obovata* the rhizoids rarely extend to the vicinity of the apex, owing to the fact that only the older parts of the stem are prostrate; they show furthermore no tendency to form a ventral longitudinal strand; and the cuticle of the leaves is usually striolate-verruculose, at least in part. In *N. fossombronioides*, on the other hand, rhizoids extend close to the apical region; they often show a tendency to form a ventral longitudinal strand; and the cuticle of the leaves is smooth.

Although the inflorescence is normally paroicous in *N. fossombronioides* (as noted by Lindberg) a plant will sometimes give rise to a series of male bracts and then continue its growth vegetatively. In normal cases the number of male bracts formed is from three to six pairs, which is somewhat in excess of the number found in *N. obovata*. The bracts usually spread widely from a basal sac, and the apical portion is sometimes slightly reflexed. Even the bracts next

[1] Engler & Prantl, Nat. Pflanzenfam. 1[3]: 79. 1893.

to the perianth usually enclose antheridia, although the innermost bract on one side may be free from them. The perigynium, even when fertilization has taken place, is exceedingly shallow, thus differing from *N. obovata*, and it is rare for more than one bract to be borne on it.

The material at the disposal of the writer has been insufficient for the study of mature capsules, and these are not described in the published accounts beyond the fact that they are oval. A section cut through the stalk of a young sporophyte shows a somewhat more complex condition than in *N. obovata;* the outermost row is composed of twenty-four cells, the second of eighteen, and the innermost cells, which form an irregular group, number eleven. These numbers are high for the genus *Nardia* but in all probability a good deal of variation would be found if numerous sporophytes were compared.

Another paroicous *Nardia*, *N. Geoscyphus* (De Not.) Lindb., has been found in New Jersey, but there is little danger of confusing it with *N. fossombronioides*, on account of the fact that some of its leaves are retuse at the apex or even distinctly bilobed. It is further distinguished by an occasional terminal branching, giving rise to an apparent dichotomy; by small underleaves, distinct in the apical portion; and often, in the case of fertile plants, by a short bulbous perigynium.

7. **Nardia rubra** (Gottsche) comb. nov. *Jungermannia rubra* Gottsche; Bolander, California Med. Gaz. 1870: 184 (nomen nudum); Underwood, Bot. Gaz. **13**: 113. *pl. 4.* 1888. [PLATE II, FIGS. 1–7.]

BRITISH COLUMBIA: Ucluelet, *J. Macoun 33, 35, 72;* Hastings, *J. Macoun 208, 1245;* Stanley Park, Vancouver, *J. Macoun 118, 119;* Goldstream, Vancouver Island, *J. Macoun 21.*

WASHINGTON: Renton, *T. C. Frye 22;* Seattle, *T. C. Frye 1, C. V Piper 101* (also distributed, under a manuscript name, in Underwood & Cook's Hep. Amer. *169*); Ilwaco, *T. C. Frye 2066, 2068;* near Cathlamet, *A. S. Foster 512;* Houghton, *T. C. Frye 590;* Tacoma, *J. B. Flett;* Aberdeen, *A. S. Foster 950;* Pacific Beach and vicinity, *A. S. Foster 1447, 1496;* above Hoquiam, *A. S. Foster 759;* Bainbridge, *A. S. Foster 1959;* Montesano, *J. M. Grant 2035, 2040.*

CALIFORNIA: Without definite locality, *H. N. Bolander;* Santa Cruz, *W. G. Farlow;* Santa Cruz Mountains, *L. M. Underwood* (distributed, as *N. crenulata*, in Hep. Amer. *200*); near Lake San Andreas, San Mateo County, *M. A. Howe 44;* Cazadero, Sonoma County, *M. A. Howe 1226.*

Many of these specimens have been recorded elsewhere under the name *N. crenulata* (Sm.) Lindb. According to the information at hand, *N. crenulata* is restricted in North America to the eastern part. Stephani reports it from Greenland, but the writer has seen no specimens from farther north than Prince Edward Island and Cape Breton Island, Nova Scotia. Toward the south it increases in frequency, becoming one of the commonest species in southern New England and New York. The southernmost specimens examined came from Alabama and the westernmost from West Virginia, but records from Ohio are available. The species has a wide distribution in Europe, and Stephani lists it from Japan. *N. rubra*, on the other hand, seems to be confined to the Pacific

Coast region of North America. Both species grow on sandy or clayey banks, often along roadsides, and *N. rubra* is sometimes found on friable sandstone.

The species was named by Gottsche many years ago and was based on specimens collected by Bolander "on metamorphic sandstone" at Mendocino City, California. It was not published by its author but remained a manuscript species, except for its inclusion in Bolander's catalogue of San Francisco plants, until 1888, when Underwood had Gottsche's original figures reproduced, supplying them with a short diagnosis. He was able to add a second station, "cliffs by the sea, Santa Cruz, California, where the plant had been found by Farlow. In 1891 it was still listed as a valid California species by Underwood,[1] but in 1899 it was included by Howe[2] among the synonyms of *N. crenulata.* In adopting this course he states that "the Californian forms mostly agree with Gottsche's *Jungermannia rubra*, founded on a specimen collected . . . by Dr. Bolander, but *Jungermannia rubra* seems to us not to differ in any structural characters from the European conditions of *Nardia crenulata* which have at times been known as *Jungermannia gracillinia* and *J. Genthiana.*" Howe's views have been accepted by subsequent writers, and *N. crenulata* has been recorded not only from California but also from Washington and British Columbia.[3]

In studying a large series of specimens from the Pacific Coast region, which had been determined as *N. crenulata*, the writer was impressed by certain features which seemed to distinguish them from authentic material of that species coming from Europe and eastern North America. The differences noted are slight and the most important of them attracted the attention of Howe. He regarded them, however, as insufficient to serve as a basis for specific separation, especially when the great variability of *N. crenulata* was taken into account. The Pacific Coast plants are likewise very variable, and certain forms occur which are distinguished with difficulty from certain forms of *N. crenulata.* At the same time the agreement is between poorly developed forms, rather than between robust forms, and the range of variability shown by the Pacific Coast series is different from that of the authentic *N. crenulata.* In view of these facts the writer suggests that Gottsche's *Jungermannia rubra* be reinstated as a species, under the name *Nardia rubra*, even if many writers would regard it as nothing more than a "small" species.

The numerous European forms of *N. crenulata* have been carefully studied by European botanists and especially by Schiffner,[4] but the views regarding them and their nomenclatorial status are still very much at variance. Schiffner recognizes the following varieties, in addition to the typical form of the species: *gracillima* (Sm.) Lindb., *cristulata* (Dum.) Schiffn., *turfosa* (Warnst.) Schiffn., *subaquatica* Schiffn., *inundata* (Husnot) Schiffn., and *exundata* (Husnot) Schiffn. The last four of these varieties are aquatic or subaquatic in habit. He regards

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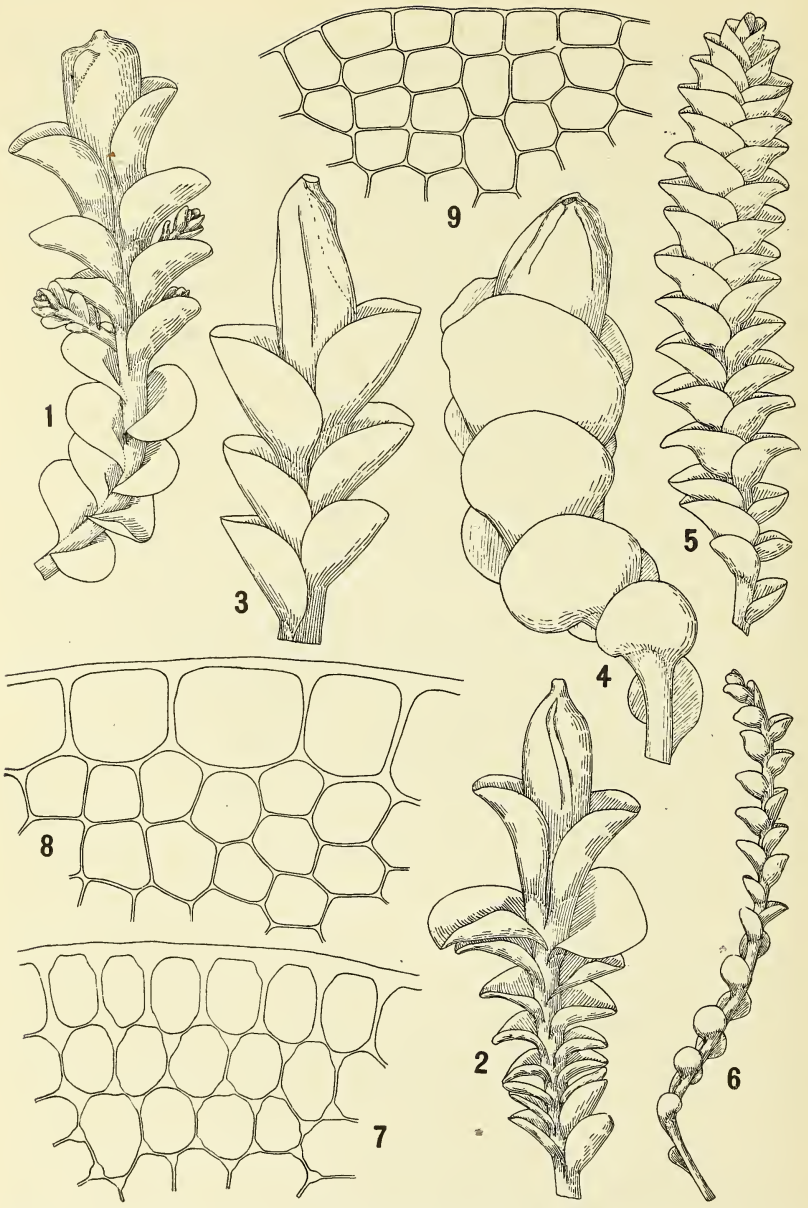
[1] Zoe **1**: 365. 1891.

[2] Mem. Torrey Club **7**: 94. 1899.

[3] See Miss Haynes, Bryologist **12**: 67. 1909; and Macoun, Cat. Canadian Pl. 7: 13. 1902.

[4] Verhandl. der K. K. zool.-bot. Gesellsch. in Wien **53**: 410–418. 1904; Lotos **58**: 271. 1910.



NARDIA RUBRA (Gottsche) Evans, 1–7; N. CRENULATA (Sm.) Lindb., 8; N. CRENULATA GRACILLIMA (Sm.) Lindb., 9

var. *cristulata* as a possible subspecies, on account of the fact that its distinctive features seem to be hereditary. Müller[1] accords varietal rank to the var. *cristulata* but reduces the var. *gracillima* to a form and groups the vars. *turfosa*, *subaquatica* and *inundata* under the forma *elatior* Gottsche, as mere synonyms. According to Loeske[2] the var. *gracillima*, although apparently only a biological "Kleinform" of *Eucalyx crenulata* (as he calls it), adapted to hard and bare footpaths, occurs nevertheless so independently in the Harz Mountains and other localities that he gives it specific rank under the name *E. gracillima*. He suggests, moreover, that his *E. gracillima* may represent the original species, from which *E. crenulata* has been derived. Warnstorf seems to be even surer that the var. *turfosa* is not an aquatic form of *N. crenulata*. According to his last-expressed opinion[3] it is a distinct species, which he designates *Haplozia turfosa* Warnst.

Of Schiffner's six varieties the only one which is certainly known from North America is the var. *gracillima*. This sometimes occurs in pure mats, just as it does in Europe, and sometimes in admixture with the typical form of the species. Under the latter circumstances it presents the appearance of being a juvenile state of the typical form, and this may well be its true explanation. Even if this is the case, however, there may be two closely related races or "small" species, one which advances beyond the juvenile state and one which does not. This would account for the fact that the var. *gracillima* evidently occurs by itself in certain regions, to the exclusion of typical *N. crenulata*. Unfortunately very little is known at the present time about the effects produced on the Hepaticae by modifications of the environment, so that the various problems raised by var. *gracillima* and by the other varieties of *N. crenulata* must still await solution.

As Howe has pointed out the Californian forms of *N. rubra* resemble the var. *gracillima* rather than typical *N. crenulata*. The leaves almost always lack enlarged marginal cells, and the leaf-cells throughout are essentially the same in structure. This condition tends to persist, even in the most robust forms, but the marginal cells then acquire characteristics unlike those found in robust forms of *N. crenulata*. In order to make these points clear the structure of the leaves in the two species will be considered at some length, even at the risk of repeating well-known facts.

In *N. crenulata* the leaf-cells and their walls have been variously described by writers. According to Schiffner the walls, both in the typical form and in the var. *cristulata*, are almost uniformly thickened throughout, and he uses this feature in separating critical forms of the species from *N. hyalina* (Lyell.) Carringt., where trigones are invariably present. According to Müller the walls are thin and trigones are either slightly developed or absent altogether. According to Hesselbo,[4] who discusses Icelandic forms, plants which are "low"

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[1] Rabenhorst's Kryptogamen-Flora **6**: 542. 1909.
[2] Hedwigia **49**: 9. 1910.
[3] Kryptogamenfl. der Mark Brandenburg **2**: 1113. 1906.
[4] Rosenvinge & Warming, Bot. Iceland **1**: 410. 1918.

and "reddish-brown" have cells which are "especially distinctly collenchymatous, while the more vigorous green forms . . . . have thin-walled cells which are indistinctly collenchymatous."

The writer has found the following conditions in typical forms of the species, such as the specimens from the vicinity of Berlin, collected by Osterwald and distributed by Schiffner (Hep. Europ. Exsic. *57*), or the specimens from Nova Scotia, collected by Nichols (*No. 1376*). The marginal row of cells is distinct all the way round (except at the very base) and in the apical portion (PLATE II, FIG. 8) stands in especially sharp contrast to the cells just within; toward the base the contrast becomes less striking. The cells average about 40μ in both radial and tangential dimensions, but the latter often vary between 30 and 50μ. The outer walls are sometimes 8μ thick; the radial walls appear almost as thick (as the figure shows), but careful focusing shows a large thin place in each; the inner walls are somewhat less thickened and present the appearance of having large pointed trigones with concave sides. The cells just within the marginal cells average only 20μ in diameter and are therefore only a quarter the size of the marginal cells in surface extent. Their walls (except those common to the marginal cells) are very slightly thickened, and it is often difficult to say whether trigones are present or not; even in extreme cases the trigones are minute with strongly concave sides. Toward the base of the leaf the cells gradually increase in size and especially in length, the median cells measuring about 40$\times$28μ; their walls are even thinner than those of the submarginal cells, and their trigones, although no larger, appear somewhat more distinct. The cuticle is everywhere verruculose or striolate-verruculose.

In the var. *gracillima*, as represented by specimens collected in the Vosges Mountains by Müller and distributed by Schiffner (Hep. Europ. Exsic. *361*), the conditions are very different (PLATE II, FIG. 9). There is no contrast, either in size or structure, between the marginal and submarginal cells, both averaging about 22μ in diameter; toward the base the cells become longer but scarcely wider, the median cells averaging about 29$\times$22μ. The walls are everywhere slightly thickened but minute trigones with concave sides can often be demonstrated; the cuticle is smooth or nearly so throughout.

Under certain circumstances the more "collenchymatous" appearance noted by Hesselbo presents itself. The specimens collected by Underwood at Auburn, Alabama, and distributed by Miss Haynes (Amer. Hepat. *61*) represent this condition. According to the label they were found "on rocks in a ravine," but the rocks were either covered with earth or much disintegrated, because the substratum of the plants is in the form of minute granules loosely held together. The plants are small and deeply pigmented and seem to have grown in an exposed locality. Their leaves are distinctly bordered, just as in the typical form, but the contrast in size between the marginal and submarginal cells is somewhat less, the marginal cells averaging only 32μ in diameter and the submarginal 18μ. The smaller size of the marginal cells may be associated with the fact that the leaves themselves are distinctly smaller than in the usual form of the species. With regard to the cell-walls the marginal cells present no aberrant features,

but the other cells have thicker walls than usual and the trigones are distinctly larger. Even here, however, the trigones run out to acute points and have concave sides, so that the boundaries between the trigones and the thinner parts of the wall are not distinct.

The conditions found in *N. rubra* may now be considered. In what may be regarded as the typical form of the species, such as the material collected at Renton, Washington, by Frye (*No. 22*), the leaves appear bordered (PLATE II, FIG. 7), but the marginal cells are distinguished less by their size than by the peculiarities of their walls. According to a series of measurements the marginal cells average 24μ in width and the submarginal 22μ; toward the base the usual increase in size is apparent but is more gradual and less marked than in typical *N. crenulata*, the median cells averaging about 30×25μ. The walls of the marginal cells are thickened, much as in *N. crenulata*, and thin places can be distinguished in the radial and inner walls, leaving large and sometimes confluent trigones; but the latter usually show straight or convex sides. The trigones are somewhat smaller along the inner walls of the submarginal cells, becoming still smaller farther inward, and yet they are distinct almost everywhere, and their sides often bulge strongly. They are thus distinctly bounded off from the thin places and differ in this respect from the trigones of the Alabama *N. crenulata*. The cuticle is striolate-verruculose and thus offers no points of distinction.

In a specimen collected by Macoun at Hastings, British Columbia (*No. 1245*) the measurements of the marginal and submarginal cells are about the same as in the Washington specimen, but the thickenings of the wall are less pronounced. Even here, however, the trigones are distinct and sometimes show convex sides. In Underwood's specimens from California (Hep. Amer. *200*) another type of variation is to be observed. Both the marginal and submarginal cells are a little larger, averaging respectively 30 and 27μ, while the median cells measure about 32×24μ. In some of the leaves the trigones are just as distinct as in the Washington specimen, but in many of the older leaves they have become obscured by the deposition of additional layers of thickening. This condition is by no means confined to Californian specimens. It occurs also in a plant collected by Macoun at Ucluelet, British Columbia (*No. 72*), where it seems to be associated with a pigmentation of the wall.

It will be seen from this account that the leaves of the more robust and typical forms of *N. rubra* are distinguished by very slightly enlarged marginal cells and by distinct trigones usually with bulging sides. In the typical form of *N. crenulata*, on the other hand, the leaves are distinguished by greatly enlarged marginal cells and by minute and often poorly defined trigones, usually with concave sides. If these distinct features are regarded as culminating conditions, they may well serve as the basis for a specific separation, even if poorly developed forms sometimes approach each other closely.

Aside from the differences in the leaf-cells there are certain differences in habit and in the disposition of the leaves on the stem, which deserve a few words of comment. In *N. crenulata* the stems usually cling very closely to the substratum, and rhizoids are found close to the growing tips; in *N. rubra* the older

parts of the stem often cling closely, but the younger parts tend to be ascending or suberect, so that no rhizoids are to be found in the vicinity of the tips. Sometimes, especially in the case of slender branches with distant leaves, this condition is intensified and the axis will be free from rhizoids as far back as the sixth pair of leaves or even farther. As Howe has pointed out, "the leaves are sometimes slightly more decurrent" in *N. rubra* than in European forms of *N. crenulata*. This appearance of greater decurrence is due in part to the fact that the lines of leaf-attachment are often less oblique in *N. rubra* and might even be described as subtransverse in certain cases (as in FIG. 4), if the decurrent portions were left out of account. From these lines of attachment the leaves usually spread widely, but owing to their strong concavity they often present the appearance of clasping the stem (see FIGS. 1–3). In *N. crenulata* these conditions are scarcely apparent. The leaves are not only more obliquely attached but they are less concave and spread less widely, so that the whole shoot often appears laterally compressed. In the male bracts of *N. rubra*, as would be expected, the appearance of clasping is especially pronounced (FIGS. 5 and 6), but the bracts still spread distinctly from the axis. In *N. crenulata*, as shown clearly by Müller, the degree of spreading is less and the appearance of lateral compression, already noted in the vegetative shoots, is still to be found. The bracts of *N. crenulata* are further distinguished by their revolute margins, a condition not found in *N. rubra*. Müller notes the fact that the male plants of *N. crenulata* appear more delicate than the female. In *N. rubra* the male plants are often fully as robust as the female, but exceedingly slender individuals sometimes occur, one of which is shown in FIG. 6. Aside from the small size of the leaves and bracts these slender plants show few distinctive features.

In both *N. crenulata* and *N. rubra* very shallow perigynia are developed and the perianths are essentially alike. The latter organs (FIGS. 1–4) are narrowly to broadly ovate or obovate in outline and are sometimes laterally compressed. In the upper part four distinct folds are commonly present. At the contracted mouth a short beak may or may not be developed. The cells of the perianth are elongated in the region of the mouth, those bounding the opening projecting as crenulations or very short cilia. On the inner surface some of the cells often project slightly in the same way.

The sporophytes apparently yield no differential characters. According to Douin[1] the structure of the stalk is very uniform in *N. crenulata*, showing (in cross section) three concentric rows of cells, the outermost composed of sixteen, the second of eight, and the innermost of four. Müller gives sixteen to eighteen cells for the outermost row and eight to twelve for the second, so that the numbers are evidently more variable than Douin implies. In a section cut from a stalk of *N. rubra* (Cathlamet, Washington, *Foster 512*), the outermost row showed nineteen cells, the second nine, and the innermost six, numbers which indicate a similar variability. The cells of the capsule valves have been measured in both species and are essentially alike, those of the outer layer averaging about

[1] Bull. Soc. Bot. France **50**: 369. *pl. 6, f. 8.* 1908.

27×21μ, while those of the inner layer measure 30–60μ in length and 9–13μ in width. The spores and elaters are likewise very similar in the two species.

8. NARDIA SUBELLIPTICA Lindb. Meddel. Soc. F. et Fl. Fenn. **9**: 182. 1883; Kaalaas, Nyt Mag. f. Naturv. **33**: 386. 1893. *Eucalyx subellipticus* Breidler, Mitt. Naturw. Ver. Steiermark **30**: 291 1893. [TEXT FIGS. 8–15.]

Collected in the summer of 1915 at the following two stations on Cape Breton Island, Nova Scotia, by G. E. Nichols: valley of the Barrasois (*Nos. 1269 & 1478*); mountains west of Ingonish (*No. 1725*). These specimens have already been reported by their collector under the name *N. obovata*.[1] The present species was based on material collected by its author at Blesebäck near Kongsvold, Dovre, Norway. Breidler extended its known range by recording it from several localities in Styria, and it is now known in addition from Germany (Harz Mountains and Bavaria), the Voralberg, Switzerland, Tirol, Lower Austria, France, Italy, Scotland, the Faroe Islands and Iceland. It grows on damp or wet rocks and prefers relatively high altitudes, except in the northern part of its range.

When Lindberg first proposed *N. subelliptica* he compared it with slender forms of *Jungermannia pumila* With., but pronounced it a true *Nardia*, most closely allied to *N. obovata*. Its relationship to *N. obovata* is indeed so close that certain European writers refuse to recognize its validity altogether, while others regard it as a "small" species. The latter view is held by Müller, according to whom it is distinguished from *N. obovata* by its small size and yellowish green color and also by differences in the shape of the leaves and in the cuticle of the cells. He describes the leaves of *N. subelliptica* as elliptical from an almost transverse base and the cuticle as smooth or minutely verruculose ("punktförmig papillös"), while he states that the leaves of *N. obovata* are broadly ovate to circular and that the cuticle is covered with distinct linear warts. One reason which he gives for recognizing the species is that *N. subelliptica* and *N. obovata* seem never to occur in the same locality. This mutual exclusion was first noted by Schiffner[2] but is not absolutely constant; both species are known to occur, fairly close together, in France, in the Faroe Islands and also in Nova Scotia.

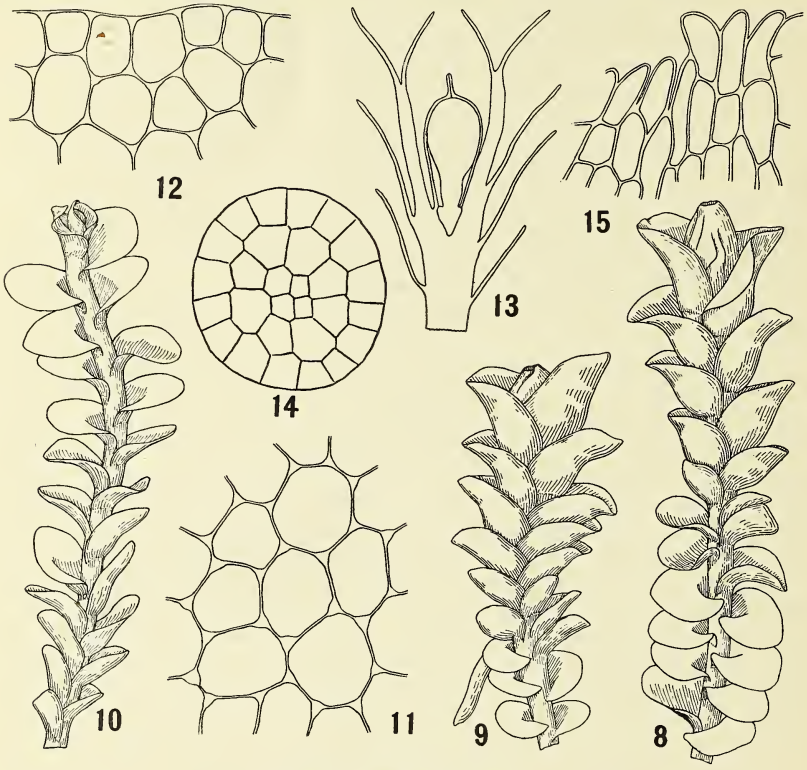
In both *N. obovata* and *N. subelliptica* the following characters are present: a cespitose habit; intercalary branches, some of them differentiated as stolons; numerous rhizoids, usually more or less pigmented with purple; entire leaves, rounded at the apex; leaf cells of about the same size with distinct trigones and a more or less striolate-verruculose cuticle; a paroicous inflorescence; a well-developed perigynium; and a short plicate perianth, contracted but not rostrate at the mouth.

Although *N. subelliptica* seems to be invariably small, the difference in size which Müller emphasizes is not always present, since forms of *N. obovata* sometimes occur as small as *N. subelliptica*. The differences in color are likewise to be used with caution. Although *N. subelliptica* is usually yellowish

[1] Bryologist **19**: 41. 1916.

[2] Oesterr. Bot. Zeitschr. **58**: 4. 1908.

green, a purplish pigmentation is sometimes present in the stems and leaves and may be fairly extensive. The differences in the cuticle are of even less importance. The differences in the form and disposition of the leaves, however, are



NARDIA SUBELLIPTICA Lindb.

FIGS. 8, 9. Plants with perianths and perigonial bracts, dorsal view, FIG. 9 showing also a stolon, 15.

FIG. 10. Sterile plant, dorsal view, ×15.

FIG. 11. Cells from the middle of a leaf, ×265.

FIG. 12. Marginal cells of the same leaf, ×265.

FIG. 13. Longitudinal section of a young sporophyte and surrounding parts, ×25.

FIG. 14. Transverse section of the stalk of a young sporophyte, ×200.

FIG. 15. Cells from the mouth of a perianth, ×200.

The figures were all drawn from specimens collected in the mountains west of Ingonish, Cape Breton, Nova Scotia, by G. E. Nichols, No. 1725. The rhizoids and the verruculae of the leaf cells are not represented.

often very striking. In *N. subelliptica* the leaves are especially characteristic on sterile stems, like the one shown in FIG. 10. It will be noted that the lines of attachment, as Müller states, are almost transverse, that the basal parts of

the leaves are strongly concave and spread obliquely, and that the apical parts tend to spread more widely. This lends the shoot a distinctly squarrose appearance.

In spite of the fact that *N. subelliptica* is normally paroicous, Schiffner noted the occasional presence of purely male branches in specimens which he collected near Hall in Tirol and distributed in his exsiccatae (Hep. Europ. Exsic. *376*), and similar branches occur in some of the Cape Breton material (*No. 1478*). In normal cases three or four pairs of perigonial bracts are usually developed, followed by one or two pairs of perichaetial bracts. In *N. obovata* the number of perigonial bracts is usually reduced to two or three pairs. The bracts of *N. subelliptica* are at first imbricated (Fig. 9) but tend to become separated later (Fig. 8). They are saccate at the base, and the keel is strongly arched in the lower part. The dorsal inflexed portion is usually nearly or quite as large as the rest of the leaf, so that the bracts present the appearance of being subequally complicate-bilobed. In the upper half the bracts often spread widely. The perichaetial bracts clasp the perianth (or perigynium) closely. They resemble the perigonial bracts in most respects but are less saccate at the base. Usually the innermost bracts are suberect, and this will often serve to distinguish them from the widely spreading bracts of *N. obovata;* but sometimes, unfortunately, the innermost bracts (as in the Tyrolese specimens distributed by Schiffner under No. 377) are just as squarrose as in *N. obovata*, so that this distinction is not always available.

Subfloral innovations have been observed with considerable frequency, not only in European material but also in the Nova Scotian. They are usually sterile for a while but sometimes give rise to inflorescences while still very short. It has already been noted (under *N. fossombronioides*) that subfloral innovations are either very rare in *N. obovata* or absent altogether. The perigynium in *N. subelliptica* is unusually deep and often exceeds the perianth in length (Fig. 13). The latter organ, which projects slightly beyond the bracts, is delicate and composed throughout of elongated cells. It is plicate in the upper part, and the cells bounding the opening project as crenulations or short cilia (Fig. 15). Sometimes small groups of marginal cells project as vague and irregular teeth, but this appearance is much less marked than in *N. obovata.*

According to Müller the stalk of the capsule shows three concentric rows of cells in cross-section, the outermost composed of sixteen cells, the second of eight, and the innermost of four. This statement is confirmed by a section cut from Nova Scotia material (Fig. 14), but more sections would be necessary to prove that these numbers are constant. The cells of the capsule-wall are essentially like those of *N. obovata.*

Another species which should be compared with *N. subelliptica* is the recently described *N. obscura* Evans, known at present only from New England and New York. This species is somewhat more robust and usually much more deeply pigmented than *N. subelliptica* and is distinguished at once by its dioicous inflorescence. The leaves, moreover, are relatively broader and the perianth is distinctly shorter than the bracts. In other respects the species are much alike.

9. **Porella Cordaeana** (Hüben.) comb. nov. *Jungermannia Cordaeana* Hüben. Hepat. Germ. 291. 1834. *Madotheca Cordaeana* Dumort, Recueil d' Obs. sur les Jung. 11. 1835. *M. rivularis* Nees, Naturg. Europ. Leberm. **3**: 196. 1838. *Porella dentata* Lindb. Acta Soc. Sci. Fenn. **9**: 342. 1869. *P. rivularis* Trevis. Mem. Ist. Lombardo III. **4**: 407. 1877. *Madotheca dentata* Massal. Bull. Soc. Bot. Ital. 1904: 38. *M. lamelliflora* Steph. Sp. Hepat. **4**: 250. 1910.

A few years ago Müller[1] demonstrated the fact that *Jungermannia Cordaeana* Hüben. was the oldest valid name for the present species. He consequently revived for it the name *Madotheca Cordaeana* (Hüben.) Dumort. For those who maintain the Linnaean genus *Porella*, in place of the much later *Madotheca*, the above new combination becomes necessary. The writer[2] has pointed out the distinctive features of *P. Cordaeana*, in connection with a discussion of *P. platyphylla* (L.) Lindb., and has shown that it is confined, in North America, to the western part of the continent. Specimens have been examined from Alaska, British Columbia, Washington, California, Idaho and Montana.

10. Leptocolea cardiocarpa (Mont.) Evans, Bull. Torrey Club **38**: 268. *pl. 12, f. 1–3.* 1911. *Lejeunea cardiocarpa* Mont.; Ramon de la Sagra, Hist. Cuba **9**: 476. *pl. 18, f. 4.* 1845.

Collected in 1918, in the vicinity of Sanford, Florida, by S. Rapp (*Nos. 92 & 93*). New to the United States but widely distributed in the American tropics. In the last paper of this series the number of Lejeuneae definitely known from Florida was estimated as thirty-eight. Last year the writer[3] was able to report the six following species, all collected by Rapp in the vicinity of Sanford: *Cololejeunea contractiloba*, *Lejeunea cladogyna*, *L. longifissa*, *Rectolejeunea Maxonii*, *Euosmolejeunea parvula*, and *Ptychocoleus heterophyllus*. These, together with the *Leptocolea* just reported, increase the total number of Florida Lejeuneae to forty-five.

The most important distinctions between *Leptocolea cardiocarpa* and the closely related *L. Jooriana* (Aust.) Evans are found in the male inflorescence. *L. cardiocarpa* is an autoicous species and the male bracts occupy a more or less elongated branch, each bract bearing as a rule two antheridia. *L. Jooriana*, on the other hand, is paroicous and the male bracts, which are usually monandrous, are situated close to the perianth. In other respects the species agree closely.

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Explanation of Plate II

Nardia rubra (Gottsche) Evans

Figs. 1–3. Plants with perianths, dorsal view, 15.
Fig. 4. Plant with perianth, lateral view, ×15.

[1] Rabenhorst's Kryptogamen-Flora **62**: 585. 1915.
[2] Rhodora **18**: 106–109. 1916.
[3] Am. Jour. Bot. **5**: 131–150. 1918.

FIGS. 5, 6. Male plants, mostly in dorsal view, ×15.

FIG. 7. Cells from the apex of a stem-leaf, ×265.

FIG. 1 was drawn from a specimen collected above Hoquiam, Washington, by A. S. Foster, No. 759; FIG. 2 from a specimen collected at Pacific Beach, Washington, by the same collector; and the remaining figures from specimens collected at Renton, Washington, by T. C. Frye, No. 22. The rhizoids are not represented.

NARDIA CRENULATA (Sm.) Lindb.

FIG. 8. Cells from the apex of a stem-leaf, ×265.

Drawn from a specimen collected in the valley of the Barrasois, Cape Breton, Nova Scotia, by G. E. Nichols, No. 1376.

NARDIA CRENULATA GRACILLIMA (Sm.) Lindb.

FIG. 9. Cells from the apex of a stem-leaf, ×265.

Drawn from a specimen collected near Herlisheim in the Vosges Mountains, by C. Müller, and distributed in Schiffner's Hep. Eur. Exsic. *361*.

MISCELLANEOUS NOTES

Eocronartium muscicola, a fungus parasitic on moss.—FITZPATRICK[1] has recently published a detailed account of the life history and parasitism of this fungus, giving also some natural sized photographs of *Climacium americanum* bearing the mature fungus. Probably some of our readers have noticed this fungus as it occurs on a considerable number of species of mosses: the author obtained most of his material from *Climacium americanum*, but he finds that it has been collected also on *Anomodon rostratus*, *Leskea obscura*, *L. polyantha*, *Thuidium delicatulum*, *T. minutulum*, *Amblystegium serpens*, *A. varium*, *A. riparium*, *Brachythecium oxycladon*, *Climacium dendroides*, *C. Kindbergii*, *Entodon seductrix*, *Hypnum chrysophyllum*, *Plagiothecium Muellerianum*, and *Pylaisia intricata*. It is interesting to note that the hosts, thus far reported, are all members of the two closely related families *Leskeaceae* and *Hypnaceae*.

The mycelium of the fungus persists perennially in the moss, growing up through the stems and leaves as the new shoots develop, matting together the leaves and enveloping the growing point, and eventually forming a slender club-shaped or cylindrical, usually unbranched structure often with a somewhat enlarged base, and in larger mosses, like *Climacium*, sometimes reaching a length of 6 cm., commonly about 2 cm. The author publishes the name *Eocronartium muscicola* (Fries) Fitzpatrick, synonyms being *E. typhuloides* and *E. muscigena;* the name *muscicola* having also been placed under the genera *Clavaria*, *Pistillaria*, and *Typhula* by various authors.

As to the origin of the rust fungi the suggestion is made by the author:

"Admitting that the rust fungi on ferns constitute a primitive type, it is carrying the argument only one step farther to suggest that the ancestors of these forms occurred on mosses. The Uredinales probably arose from forms similar to those now embraced in the *Auriculariaceae*, their high degree of speciali-

[1] Fitzpatrick, Harry N. The Life History and Parasitism of Eocronartium muscicola. Phytopathology 8: 197–218. May, 1918.

zation having resulted from their parasitic habit. The existence of a number of parasitic species of *Auriculariaceae* on mosses, and the presence in *Eocronartium muscicola* of a highly developed obligate parasitism suggest the origin of the *Uredinales* from this group."

We may thus have to watch some of the phytopathologists who are on the trail of the barberry bushes that they do not attempt to even up an old score on our mosses! O. E. J.

Boissier Herbarium goes to the University of Geneva.—We learn from the Kew Bulletin of Miscellaneous Information (1918: 126) that the herbarium of the late E. Boissier and the accompanying library have been presented to the Botanical Institute of the University of Geneva, and that the present curator, Mr. Beauverd, will continue in office, accompanying the herbarium to its new location.

Schistostega osmundaceae, the Luminous Moss.—From a review by Dr. J. M. Coulter (Bot. Gaz. **67**: 278–279. March, 1919) we learn of studies by Toda[1] on material of this interesting moss obtained from a cave in Japan. He found that the protonema can live for 7 months without producing a leafy shoot. The "chromatophores" scattered in a day in light and turned towards light in a changed direction in 7–10 days. White, blue, and violet light were the most favorable. The spores germinated in a month at about 60–77° Fahr., the leafy shoot died at about zero Fahrenheit, but the protonema could live at –5° and the optimum temperature for the leafy shoot was about 60–77° Fahr.

O. E. J.

Bryophytes and Lichens on Fell-Fields.—Dr. John W. Harshberger (Alpine Fell-Fields of Eastern North America. Geographical Review **7**: 233–255. April, 1919) defines a fell-field as

"a rocky flat or plateau, situated in arctic or subarctic regions or on the alpine summits of mountains in northern as well as southern latitudes. The soil of a fell-field is not continuous but is broken by stones, rocks, boulders, rocky slabs, or outcropping ledges into pockets, crannies, or small areas circumscribed by the scattered or projecting rocks. Hence the surface of a fell-field is never completely covered with plants. Between the scattered patches of vegetation we see bare, pebbly, stony, sandy, or clayey soil usually devoid of humus in the ordinary acceptance of that term as meaning the organic material of the soil."

Warming has stated the characteristic feature of fell-field vegetation to be the dwarfishness of the plants and the poverty of individuals covering the bare surface. Cryptogams, such as lichens and mosses, are abundant and there are usually a goodly number of species represented. The seed plants are mainly of the cushion or tufted type, with strong perennial tap-roots, and such shrubs as appear are usually evergreen. Harshberger describes from Kruuse's

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[1] Toda, Viscount Ya umochi. Physiological studies on Schistostega osmundacea (Dicks.) Mohr. Jour. Coll. Sci. Tokyo **40**: no. 5. pp. 30, pls. 2. 1918.

account[1] the fell-fields in eastern Greenland, mentions also those of Iceland,[2] of South America, and of the European Alps, and then gives in considerable detail the results of his own observations on the fell-fields of some of the higher peaks of the eastern part of the United States.

On Mt. Marcy, in the Adirondacks:

"The fell-field occupies the immediate summit and roughly covers several acres of rocky ground. . . . On this circumscribed alpine fell-field of Mt. Marcy grow several interesting lichens. The soil-inhabiting ones are *Thamnolia vermicularis* with its white, frequently curled, quill-like thalli. The rounded cushions of the reindeer lichen, *Cladonia rangiferina*, are found; as is also Iceland moss, *Cetraria islandica*. The alpine club moss, *Lycopodium Selago*, is a fell-field plant; as also are such flowering plants as *Arenaria groenlandica*, *Potentilla tridentata*, *Cornus canadensis*, *Vaccinium pennsylvanicum* var. *angustifolium*, *Nabalus Boottii*, and *Ledum groenlandicum*. In the lee of rock ledges *Diapensia lapponica* was found growing in its characteristic cushion-form. *Salix uva-ursi* is a dwarf prostrate willow. The alpine rattlebox, *Rhinanthus crista-galli*, was found in flower at the summit, along with other plants which live protected in the soil pockets on rock ledges or in the crannies and crevices of the rough angular boulders or slabs of crystalline rock which lie in confusion on the dome-shaped top. Photographs of Mt. Whiteface (4,872 feet), 16 miles north of Mt. Marcy, show similar conditions of fell-field, while Giant Mountain (4,622 feet) is not bare at the summit except where shelving rocks occur."

On Mt. Katahdin[3] Harshberger says, in part:

"The slopes south from the two chief peaks are covered with loose, angular fragments as far down as the (so-called) tree line. The wind-swept balsam grows in the clefts between the confused, loosely piled blocks. . . . The rocks of this fell-field formation are covered with the crustaceous lichen *Lecidea geographica*, whose thallus, alternately black and yellow, resembling a colored map, gives them a yellowish-green tone. Other crustaceous lichens begin as small patches and expand into mats and carpets which cover the boulders. *Tripe-de-roche, Umbilicaria* sp., as a rock lichen, accompanies the preceding form, as also several lithophytic mosses, such as *Andreaea petrophila*, *Rhacomitrium sudeticum*, and *R. aciculare*. The detritus produced by the wash, decay, and disintegration of the rocks, along with the organic remains of lichens and mosses, prepares a soil suitable for the reindeer lichen, *Cladonia rangiferina*, and Iceland moss, *Cetraria islandica*.

"Accompanying the growth of these lichens, more material is accumulated to form a soil sufficient for the plants which characterize the alpine tundra. Here are such grasses, according to Harvey, as *Hierochloe alpina*, *Agrostis rubra*, *Deschampsia flexuosa;* such sedges as *Carex vulgaris hyperborea* and rushes as *Juncus trifidus*, accompanied by mosses such as *Mielichhoferia nitida elongata*, *Polytrichum commune*, *P. juniperinum*, and *P. ohioense*. In the ecologic succession of plants on this alpine fell-field, *Lycopodium annotinum* var. *pungens*, *L. Selago*, *Arenaria groenlandica*, and *Potentilla tridentata* appear or live side by side with the lichens and mosses above mentioned. This is explained by different summit

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[1] Kruuse, Chr. Rejser og Botaniske Undersögelser i Ost-Grönland mellem 65° 30′ og 67° 20′ i Aarne 1898–1902, samt Angmagsalik-Egnens Vegetation. Meddelelser om Grönland **49**: 1–304. 1912.

[2] Thoroddsen, Th. An Account of the Physical Geography of Iceland, with Special Reference to the Plant Life (the Botany of Iceland. I: 2). 1914.

[3] For a detailed account of the hepatics of this mountain see LORENZ, ANNIE. Notes on the Hepaticae of Mt. Ktaadn. BRYOLOGIST **20**: 41–46. May, 1917. [Editor.]

areas being in a more advanced or more retrograde stage of physiographic and edaphic development. Later the low heaths appear, some growing only when sheltered by some projecting slab of granite. The pioneer heaths are *Vaccinium pennsylvanicum* var. *angustifolium*, *V. uliginosum*, *V. Vitis-Idaea*, and the cushioned *Diapensia lapponica*. Of less frequency are *Ledum latifolium*, *Arctostaphylos alpina*, *Rhododendron lapponicum*, *Cassiope hypnoides*, *Loiseleuria procumbens*, and *Phyllodoce caerulea* (*Bryanthus taxifolius*)."

The fell-fields of the Mt. Washington massif are described at length and illustrated by a number of good pictures, but the mosses and lichens are mentioned only in a rather general way, the seed plants receiving the more detailed treatment.

O. E. Jennings.

SULLIVANT MOSS SOCIETY NOTES

Members of the Sullivant Moss Society will be sorry to learn of the death on June 8th last, of Rev. C. H Waddell of Grey Abbey, Ireland, who had been a member of the Society since 1907. A short note from Mrs. Waddell states that her husband had just returned from church when he was stricken without previous illness. The letter states that Mr. Waddell's botanical collections are to be divided: the mosses going to the Royal College of Science at Dublin, and the flowering plants and lichens to Queen's University, Belfast.

Since the publication of the July Bryologist, Mr. H. Sasaoka, whose address is 30, Tsukioka, Kaminiikawa, Toyama-ken, Japan, has joined the Society.

EXCHANGE DEPARTMENT

Offerings—To Society members *only*. Return postage rather than a stamped envelope, should be sent.

Mr. S. Rapp, Sanford, Florida.—*Bryum coronatum* Schwaegr., collected by Mr. Rapp at Sanford, Florida, May, 1919.

Miss Daisy Levy, 403 West 115th St., New York City.—*Ptychomitrium incurvum* (Schwaegr.) Sull., collected by Miss Levy at Harpers Ferry, West Virginia, summer of 1919.

Mr. F. E. McDonald, 417 California Ave., Peoria, Ill.—*Gymnostomum curvirostre* Hedw., c. fr., collected in Illinois, where, Mr. McDonald writes, it is a rare moss.

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Conducted and Published for the Society by

O. E. JENNINGS, Ph.D., Editor-in-Chief

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THE BRYOLOGIST

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A SHORT HISTORY OF LICHENOLOGY[1]

CHARLES C. PLITT

Like the history of most things biological, the history of Lichenology, especially that most worth while, does not date very far back. Due to their little economic value, (especially true of the vast majority of Lichens, and particularly true for those found in the more habitable regions of the world) Lichens had hardly been thought worth while studying. Even Linnaeus dubbed them the "rustici pauperrimi" of vegetation, which has been quite properly translated, the "poor trash" of vegetation.[2] Linnaeus, however, was no particular friend of the Cryptogams, and the Lichens, in particular, received very little of his attention.

As to the derivation and meaning of the word "lichen," there are differences of opinion. According to Lindsay (History of British Lichens), it is derived from λειχήν—a wart, in allusion to the resemblance of the apothecia of many of the species to a wart. On the other hand Dillen is quoted as stating that the word is derived either from λείχω—Latin *lingo*, to lick up, because the plants can absorb water so readily, or from λειχήν, because of the efficacy of these plants in curing the disease known as λειχήν.

The word λειχήν appears in Dioscorides, later also in Pliny, but it is not definitely understood what plant is meant; some think that some Marchantia form of Liverwort is meant, and no Lichen; Krempelhuber (Geschichte der Lichenologie), however, says that there is no more reason for supposing this, than that a Lichen is what is meant.

Several Lichens were no doubt known to the ancients—*Usnea dasypoga*, for example, seems to have been known to Aristotle—likewise several furnishing valuable purple dyes are alluded to under various names in Dioscorides, Theo-

[1]This paper was read at a biological seminary meeting about three years ago. It is here presented, as it was also on the above occasion, for the benefit of such readers who, although interested, in a general way, in Lichens, may not be so much so as to find the time to read, or, perhaps, may not have access to the works treating this subject more elaborately; at the same time, it is hoped that some will have their interests aroused to the study of this most interesting class of plants.

[2]Schneider, "Guide to the Study of Lichens," p. 6, or Schneider, "A Text book of General Lichenology," p. 8. Both of these books are recommended for those interested in the history of Lichens.

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phrastus, and Pliny. However, as a class of plants they did not attract much scientific attention, nor did they become the subject of special classification until about the beginning of the 18th century.

The ideas of earlier authors concerning them, of course, were very primitive and erroneous. Some believed them excrementitious matter produced by the earth, the rocks or the trees. Some believed that depending upon external media Lichens, Algae, or Fungi might arise, and even animalcules. Another form of belief was that they were merely the result of the decomposition of higher vegetation. Sprengel speaks of the Lichens as formed of nothing but the vegetable juices, and except here and there, some slight rudiments of a cellulose organization.

Up to the time of Tournefort, 1694, only such forms as were remarkable for their size, their color, or their supposed medicinal virtues received any attention.

The abstraction of a purple dye from certain species of Lichens dates far back into history, and must have been quite a profitable industry—to-day, however, it is limited to the abstraction of litmus, cudbear, and orchil.

As to their medicinal virtues; it is not surprising that, at a time when people believed in the "doctrine of signatures"—that is, that a plant had stamped upon itself an indication of the purpose for which it is to be used—they believed that *Lobaria pulmonaria*, which so closely resembles lung tissue, was good for diseases of the lungs; and that *Peltigera aphthosa*, with the little eruptions all over the thallus, was good for the thrush; and that *Xanthoria parietina*, that beautiful yellow lichen, was good for jaundice. To-day, however, Iceland Moss—*Cetraria islandica*—is perhaps the only lichen that still is used. It at one time had a prominent place in our Materia Medicas, and was one of the articles in the U. S. Pharmacopoea even as late as 1900.

Due to the fact that nearly all lichens contain a bitter principle, most disagreeable to the taste, they are used as food only in countries where nothing else is likely to grow, and then only in case of famine. The "manna" which supplied the Children of Israel during their sojourn in the desert, is generally supposed to be a species of Lecanora—*L. esculenta*. This lichen, loosely attached, is carried by the wind quite readily, and in countries where it occurs plentifully, is sometimes brought in quantity from the mountain sides down into the valleys.

The only discovery of especial interest that was made in this long period (that is, from Aristotle to Tournefort), was that of Malpighi, who discovered the *soredia*[3]; he understood them to be propagative organs, and for that reason considered them true seed.

It was Tournefort (1694), who first considered the Lichens as a distinct class of plants; up to his time they were given no definite position in the vegetable kingdom, and were classified variously, as Algae, Fungi, Liverworts, and Mosses.

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[3]The little patches of powdery or mealy substance formed on the upper surface or margin of many lichens.

Between the time of Tournefort and Linnaeus, we still find that little progress has been made, notwithstanding that the Lichens were receiving a little more attention. Most investigators at this time were interested in the question if the Lichens had flowers, fruit and seed, as in the case of the Phanerogams, whether these parts could be seen or not; that is whether the parts observed on Lichens could be taken as such. Micheli, an Italian botanist, believed the soredia to be seeds, and the apothecium[4], the calyx cup and floral receptacle. He also saw the spores, but took them to be buds.

Dillen an English botanist, at first, was going to throw all this aside but, nevertheless, later expressed himself thus: that the soredia were pollen grains, and the apothecia, seed vessels or the seed itself. Linnaeus believed the apothecia to be male organs, and the soredia female organs. Heller, one of the foremost lichenists of his time, and a cotemporary of Linnaeus, believed as Micheli; that is, that the soredia were seeds, and the apothecium a calyx cup.

It goes without saying, that most of these ideas were not founded upon direct observations, but were merely opinions.

As already stated, Linnaeus paid little attention to the Lichens; in his "Species Plantarum," he mentions 86 species, although 170 were known at the time.

The next 100 years was the era of the systematists, 1051 species of Lichens having been described as occurring in Germany and Switzerland alone. Discoveries concerning the nature of Lichens were very few, the chief of these being the following: (1) The discovery of the spermagonia[5] by Hedwig (1784)—he believed them to be the male reproductive organs and the apothecia with their spores to be the female reproductive organs, and the soredia, a fertilizing element, or the true pollen. (2) The discovery of the gonidia[6] by Wallroth (1825), the most important discovery thus far made. He called them gonidia because of their resemblance to spores (γόνη generation, εἶδος resemblance). He made a careful study of the soredia, and found that they consisted of gonidia enclosed by a delicate network (hyphae), and held the opinion, that the gonidia, therefore also the soredia, could develop into new plants. He believed that the gonidia and spores were the only reproductive organs of Lichens. His ideas concerning the gonidia received general recognition. Thus we read in Lindsay (A Popular History of British Lichens, 1856): "They (the gonidia) may be regarded as intermediate in function between the vegetative and reproductive cell, assuming the offices and partaking the characters of both. Their great peculiarity, is the want of union between each other and between them and surrounding tissues. They frequently break through the cortical layer, appearing on its surface in the form of powdery masses, denominated soredia." Lindsay, too, in speaking of the position of Lichens, says: " . . . . by their reproductive system, Lichens are closely allied to the Fungi, by their vegetative system, to the Algae,

[4]The fructification or spore-bearinng structure of the lichen.

[5]Minute cup-shaped structures immersed in the upper surface of the thallus, appearing to the naked eye as minute black specks.

[6]The green cells, or Algae, found in the lichen-thallus.

from both they are distinguished by the presence of gonidia, as an essential element of their thallus."

The last statement gives us a pretty good idea of the notion as to what Lichens really were about the time when Schwendener presented his important discovery. At this time, all lichenists believed Lichens to be autonomous, co-equal in rank with Algae and Fungi. The gonidia, they believed, were peculiar cells formed right in the thallus of the Lichen. Schwendener, too, at first, firmly believed this; so we find him making the following statement in one of his "Untersuchungen über den Flechtenthallus;"[7] "The green cells or gonidia are, as all know, lateral formations of the hyphae, and as such are analagous to branches. Like the latter, ... they never develop from apical cells, and in their early development can not be distinguished from them. The difference between the two shoots, however, soon becomes noticeable. While the branch by repeated division of cells, grows indefinitely in length, we find that in the formation of a gonidium, that the rule is, that the first cell divides once only, so that the branch becomes only two-celled. The apical cell now swells out spherically and becomes a gonidium, whilst the basal cell, does not change and becomes a sometimes longer sometimes shorter stalk. (Plate, 1, Fig, 18.)" In a foot-note Schwendener adds: "That the gonidia develop from hyphae cells is a fact already discovered by Bäyrhoffer and verified by Speerschneider and others. There really is no difficulty in convincing one's self through one's own investigations that they (the gonidia) are connected by short stalks to the hyphae." After describing how to proceed to see this, he adds: "Most of the gonidia, of course will be torn loose, nevertheless, some will be found, here and there, that will still be found in their original relationship with the hyphae." On page 126, he says: "Of especial importance to the plant is the multiplication of the gonidia, which occurs through division. The first plane of division, through which the spherical cell is divided into two hemispheres, lies in a plane passing through the point of attachment and the center of the green cell, in such a way that the stalk cell remains in connection with the two daughter cells."

This goes to show that Schwendener, at this time, was a firm believer in the prevailing notions regarding Lichens, and far behind DeBary, whom he soon was destined to outstrip.

It was DeBary who first hinted at the true nature of Lichens. In his "Morphology and Physiology of the Fungi, Lichens and Myxomycetes," he expresses the belief that some of the gelatinous Lichens (*Collemaceae*), were "either mature states of those plants, whose immature states are recognized as forms of *Nostoc*, *Chroöcoccus*, etc., or that these organisms are true Algae, attacked by some *Ascomycetes*, whose hyphae penetrate the Algae, and form the lichen-thallus."

In 1867 (published 1868), Schwendener expresses himself as of the same opinion as DeBary regarding the gelatinous Lichens. In the same paper, he further asks the question—if the gonidia of all Lichens are not Algae, and the hyphae, Fungus-hyphae. Schwendener's further investigations soon convinced

[7]Nageli. Beitrage II, p. 125.

him of the truth of the surmise, and in the same year, September, 1867, he presented his now famous talk "On true nature of Lichens" before the Swiss Naturalists' Club at Rheinfelden. The same was communicated by letter to DeBary, and was published by Von Mohl in 1868 in the Botanische Zeitung. Here he expresses the opinion that the gonidia of various Lichens correspond to certain low forms of Algae. His conclusions at that time, may be summarized as follows:[8] (1). There is no direct proof of any genetic relationship between the gonidia and the hyphal elements. (2) The cell-walls of the gonidia have a different chemical behavior from the membranes of the hyphae; the former react similarly to those of Algae; the latter similarly to those of Fungf. (3) As to structure and development, the various forms of gonidia correspond to different forms of Algae. The resemblance is so close that in many cases a given isolated gonidium cannot be distinguished from the corresponding Alga.

The next year 1869, he published his "Die Algentypen der Flechtengonidien". Here is what he says in his preface: "According to my investigations, these growths are not simple plants, not individuals in the ordinary sense of the word, they are more likely colonies, composed of hundreds and thousands of individuals. Of them, however, one only is in control, whilst the others, forever imprisoned, provide for themselves and their master, nourishment.

"This master is a fungus, of the class Ascomycetes, a parasite, accustomed to live upon the work of others, its slaves are green Algae, which it has gathered around itself, at any rate, holds on to and forces into service. It invests them as a spider her prey, with a fine meshed web, which gradually is converted into an impregnable integument, but, whilst the spider sucks out her prey and throws it aside when dead, the Fungus stimulates the Algae, found in its net, to more lively activity, in fact, causes them to grow larger and causes thereby a luxuriant growth and the thrifty appearance of the whole colony."

About the same time that Schwendener was making his investigations, two other botanists, Famintzin and Baranetsky were also working upon the development of the gonidia. These two investigators had succeeded in developing the gonidia of three different Lichens apart from their thallus, (*Xanthoria parietina*, *Evernia furfuracea*, and a *Cladonia*). They made the interesting discovery that many of these gonidia produced zoospores, whilst others dividing themselves in various ways, formed masses of cells which separated and rounded themselves; in fact, they concluded that the gonidia, thus capable of living apart, were identical with the Alga *Cystococcus*. They concluded from this that the forming of zoospores was not only peculiar to Algae and Fungi, but also to Lichens; furthermore, that *Cystococcus* was now no longer to be looked upon as an independent Alga, but one of the forms in the evolution of a Lichen, and that many more such forms would likely be discovered later and withdrawn from the Algae. They believed, therefore, that many of the unicellular Algae were merely free Lichen gonidia.

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[8]Schneider. A Text book of General Lichenology, page 24.

Now, up to this time, as all students of Lichens believed in their autonomy, one may readily surmise that Schwendener's advanced theory regarding them was likely to cause bitter controversy, and such it did. The systematists, with one accord, stood as one man against it.

Nylander, the greatest systematist of his day, came out at once against it, and seemed to favor Famintzin and Baranetzky. Krempelhuber, "Geschichte der Flechten," writing of the situation at the close of 1870, does not feel sure which theory is correct. He felt much concern that Sachs had sided with Schwendener. He feared that he might be promulgating an error and he thought that of the two theories Famintzin's was more plausible, and adds: "Even if Schwendener is right, it is questionable if one should classify the Lichens with Fungi, to do in other words, what the healthy mind finds unnatural and forced."

In 1874 Bornet, "Recherches sur les gonidies des lichens," isolated and determined specifically the Algae which enter into the composition of a large number of Lichens. The situation, however was not materially changed.

It is interesting, that the systematists, those who really, at any rate from their point of view, know the Lichens best of all, have always stood for the autonomy of Lichens. Nylander never was of any other opinion, and we find him writing thus in the preface of his "Les Lichens des Environs de Paris," 1896: "It is a true saying to-day that the formula 'Lichens are Fungi living in symbiosis with Algae,' is an assertion either of pure fantasy or a slander. It is fully proven that the Lichens constitute a noble and venerable autonomous class of plants having nothing seriously in common either with the Fungi or with the Algae. To subordinate the Lichens to the Fungi is even more absurd than to reunite the Characeae with the Algae. From the biological point of view the Lichens are sufficiently differentiated by the indefinite longevity which characterizes them. The beautiful specimens of *Umbilicaria pustulata* in the forest of Fontainebleau are probably a little less aged than the rocks upon which they display themselves," and, in a foot-note, "A new argument against the famous formula above mentioned is given by the volcanic peaks which raise themselves from the midst of the ocean, and which one finds covered with Lichens, the only plants which form themselves there first, it is the primordial vegetation. It is impossible to admit the intervention of a symbiosis whatever, in the multiplication of the saxicoline Lichens, since Algae and Fungi are absolutely lacking under these circumstances."

And Korber says: "The hyphae produced by the germination of a Lichen spore, must meet with the gonidia specifically belonging to it, that is coming from the particular Lichen species, if it is to give rise to a normal thallus. But the hyphae and whatever else there is in the Lichen thallus except the gonidia do not belong to a Fungus but to the Lichen, and the gonidia which are specifically necessary, are no Algae, but free independent Lichen gonidia, which have become asynthetic."[9]

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[9]DeBary. Comparative Morphology and Biology of the Fungi, Mycetozoa and Bacteria, 1887, page 418.

The view that the lower Algae, which vegetate where Lichens are found, are Lichen gonidia escaped from the thallus, originated with Wallroth, and was often expressed after him. There thus came to be two classes of followers: those who believed as Schwendener, and those who believed as Famintzin.

Up to this time, the experimental formation of a Lichen from its two components had not been accomplished, and, until this had been done, the question, of course, could not be considered settled. This was left to Stahl. Stahl's experiments, however, were not the first ones having this object in view. Already, in 1871, M. Reese had made the attempt, and he actually succeeded in forming a thallus, but he was not able to bring it to the formation of fruit and spores. In the same year Bornet repeated Reese's attempt, but with no better success. Treub, 1873, next tried, and again the results were no better than those of his predecessors. "This is, of course, what is to be expected," said those opposed to Schwendener. Hear what Crombie, England's great systematist, had to say upon the above experiments: "All these experiments, however, met with but a very limited amount of success, just as in the case of spore-culture by itself without any added 'algals.' Even where the spores successfully germinated and produced hyphae, all that could be affirmed was that these formed with the Algae a structure resembling in some degree the more or less rudimentary thallus of a Lichen. But it is to be observed with respect to these synthetical cultures, and all other experiments of a similar kind, that even were the results more pronounced than they have been, they would prove absolutely nothing as to the truth of the hypothesis. The Lichen-spore must, from its very nature, produce Lichen-hyphae, whether with or without the addition of algals or pseudo-algals; though what the fate of true added Algae in the subsequent evolution of the thallus might be, the experiments in *Symbiosis* do not show."[10]

Crombie, like Nylander, never believed otherwise, than that Lichens formed a distinct class of plants. In the article, from which the above is quoted, page 281, he says: "From all these various considerations and illustrations, to which others, though of minor importance, might easily be added, it is clear that the Algo-lichen hypothesis rests upon no solid basis whatever, but simply and solely upon imagination, and that it is merely a plausible attempt to explain certain phenomena which its author and adherents supposed to be otherwise inexplicable. Notwithstanding the laboured arguments by which it has been sought to deprive them of their autonomy and intrude them amongst the Ascomycetes, Lichens still remain a distinct class of plants, intermediate between the Algae and the Fungi, ... Lichens therefore are Lichens and nothing else —neither Fungi nor Algae, nor any intermixture of these; but everywhere and constantly preserving their own distinct type, and distinguished by many important characters peculiar to themselves."

It was in 1877 that Stahl succeeded in effecting the synthesis of three different species of Lichens. He did this by allowing the spores of the Lichens to ger-

[10]Rev. J. M. Crombie. On the Algo-Lichen Hypothesis, Linn. Journ.-Botany, Vol. XXI, pag 266.

minate in contact with the hymenial algae that had been expelled with the spores and had stuck to them.[11] These and other experiments soon demonstrated beyond a doubt the dual nature of Lichens.

There arose, however, the question as to the nature of the relationship of the two components towards each other. Schwendener called it parasitism, and he and his followers uniformly agreed to classify Lichens as Fungi, to all of which, as already stated, the systematists objected very strongly. DeBary called the relationship symbiosis—a union for mutual good, enabling these plants to exist where neither of the components could exist alone—and this I believe is the prevailing view. Pfeffer, for example, in his "Physiology of Plants," Vol I, page 370, says: "Lichens are good examples of reciprocal symbiosis, for they are *specific* organisms formed by the union of a fungus and one or more algae, and can frequently withstand climatic conditions to which the isolated component parts succumb. The fungus, especially in those lichens which grow upon bare rocks, obtains organic food from the algae, while the fungal mycelium supplies the latter with water and salts, or even with proteids when the symbiotic algae are peptone-organisms." These views are, no doubt, all due to the influence of Reinke, the greatest of the upholders of the autonomous nature of Lichens. He calls the relationship of Fungus to Alga "consortism," and says: "We have, therefore, in the thallus of Lichens, a consortism, the components of which form a unit, a morphological individual, somewhat as the different tissues in a higher plant unite to form the individual. The fact that the alga can exist independently is dependent upon its ability to assimilate carbon. In the state of consortism, at least in the heteromerous thallus, the alga is nourished by the enclosing fungus, that is, it receives from the hyphae the necessary minerals, nitrogen, hydrogen and water. The alga in return supplies the fungus with the essential carbon compounds. From this it is evident that the components (Alga and Fungus) are biologically associated, mutually dependent upon each other for the formation of the organic substances required for the upbuilding of the common body."

However, the question does not seem to be any nearer solution to-day: each side has its followers. Several years ago, (1911) Professor Fink, of Miami, Ohio, wishing to get some sort of an idea how botanists, and especially lichenists, stood upon the question "Should the Lichens be maintained as a distinct class of plants or should they be distributed among the Fungi?[12] . . . . , wrote to 75 Americans and 75 Europeans. Of the 115 replies received, 19, or about 17%, favored distribution; 14, or about 12%, thought that Lichens might be distributed, but for one reason or other prefer that they should remain a distinct group. In other words, 83% of the 115, believe that Lichens should be maintained as a distinct group. A closer examination of the replies showed that the lichenists were nearly unanimously in favor of maintaining the group Lichens.

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[11]Stahl. Beitrage zur Entwickelungsgeschichte der Flechten, II, Leipzig. 1877.

[12]Mycologia, September, 1911, and May, 1913.

Before bringing this paper to a close, a few words must be said on Stahl's discovery of the sexuality of Lichens. See his Beitrage zur Entwickelungsgeschichte der Flechten, 1877. The spermagones had been discovered for quite a while, and several investigators had already made extensive studies regarding them and their enclosed spermatia. Tulasne, 1852, for example, had studied them and believed that they were peculiar reproductive organs closely related to the apothecia. Lindsay also studied them, and was inclined to believe them male reproductive organs. Stahl now concludes that in *Collema*, one of the gelatinous Lichens, the spermatia are the male reproductive organs. The female reproductive organ he calls a carpogone. It consists of a spirally rolled portion, the ascogone, and a slender hyphal portion the trichogyne; the ascogone is inside the thallus some distance below its surface; the tip of the trichogyne penetrates the surface. Fertilization takes place by the spermatia coming in contact with the tip of the trichogyne, later resulting in the formation of an apothecium with asci and spores. Stahl's results have been verified and similar reproductive organs have been found in other species of Lichens. However, not all Lichens behave in this way, as many of them form their fruits apogamously; in fact, there are a number of different ways, many of the supposed apogamous Lichens, for example, are now believed to have internal trichogynes and internal spermatia. Then again some investigators have demonstrated that the spermatia will develop a hyphal net-work, even developing new spermagonia, which would seem to show that the spermatia, in some cases, are true spores instead of sexual organs. As a matter of fact, our knowledge regarding the formation of reproductive organs, apothecia, and other structures is very meager, and many more investigations must be made before we can feel sure of the results.

3933 Lowndes Ave., Baltimore, Md.

MOSSES OF THE CASCADE MOUNTAINS, WASHINGTON COLLECTED BY J. A. ALLEN[1]

M. E. Seymour

The mosses collected in the vicinity of Mt. Rainier by J. A. Allen and his father were distributed in sets, several years ago. As there are still a number of these sets which have not been disposed of it may be well to put on record the names of the mosses as they are a very fine set of specimens, in good fruiting condition, and include some rare or unusual species.

Alsia abietina, *Amphidium lapponicum*, *Antitrichia californica*, *A. curtipendula*, var. *gigantea*.

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[1]The names used in this article are those under which the mosses were distributed, thus differing in some instances from present usage.

Barbula cylindrica, *B. vinealis*, *Bartramia pomiformis* var. *crispa*, *Blindia flexipes*, *Brachythecium asperrimum*, *B. Leibergii*, *B. rutabulum*, var. *flavescens*, *B. salebrosum*, *Braunia californica*, *Bryum Atwateriae*, *B. bimum*, *B. capillare*, *B. commutatum*, *B. crudum*, *B. nutans*, *B. occidentale*, *B. pseudo-triquetrum*.

Camptothecium aeneum, *C. lutescens*, *C. megaptilum*, *C. nevadense*, *C. pinnatifidum*, *Catharinea undulata*, *Ceratodon purpureus*, *Claopodium crispifolium*, *C. Whippleanum*.

Dichodontium pellucidum, *D. pellucidum* var. *serratum*, *Dicranella heteromalla*, *Dicranoweisia crispula*, *Dicranum falcatum*, *D. fuscescens*, *D. scoparium*, *D. strictum*.

Eleutera Douglasii, *E. Menziesii*, *Eurhynchium oreganum*, *E. praelongum*, var. *Stokesii*, *E. stoloniferum*, *E. strigosum*.

Fontinalis antipyretica, *F. Kindbergii*, *F. Neo-Mexicana*, *Funaria hygrometrica*.

Georgia pellucida *Grimmia acicularis*, *G. canescens* var. *ericoides*, *G. torquata*, *G. trichophylla*, *G. varia*.

Hedwigia albicans, *Heterocladum heteropterum*, *H. procurrens*, *Hylocomium loreum*, *H. squarrosum*, *H. triquetrum*, *Hypnum aduncum* var. *gracilescens*, *H. arcticum*, *H. chrysophyllum*, *H. circinale*, *H. cordifolium*, *H. cuspidatum*, *H. dilatatum*, *H. filicium*, *H. fluitans* forma *filiformis*, *H. fluitans* var. *brachydictyon*, *H. giganteum*, *H. ochraceum*, *H. palustre*, *H. proliferum*, *H. Schreberi*, *H. subimponens*, *H. uncinatum*, *H. uncinatum* forma *plumosa*, *H. vernicosum*.

Leersia extinctoria, *Leptobryum pyriforme*, *Leucolepis acanthoneura*.

Mnium glabrescens, *M. insigne*, *M. orthorrhynchum*, *M. punctatum* var. *elatum*, *M. rostratum*, *M. spinulosum*, *M. umbratile*, *M. venustum*.

Neckeropsis undulata.

Orthopyxis androgyna, *O. palustris*, *Orthotrichum laevigatum*, *O. papillosum*, *O. rupestre*, *O. rupestre* var. *ovatum*, *O. speciosum*, *O. ulotaeforme*.

Philonotis fontana, *Plagiothecium denticulatum*, *P. elegans*, *P. pulchellum*, *P. silesiacum*, *Pogonatum alpinum*, *P. albicans*, *P. porosa*, *P. proligera*, *Polytrichum juniperinum*, *P. sexangulare*, *Porotrichum Bigelovii*, *P. neckeroides*, *Pseudoleskea denudata* var. *Holzingeri*, *P. radicosa*, *P. rigescens*, *Pterygnandrum filiforme*, *Pterygophyllum lucens*, *Ptilium crista-castrensis*.

Rhaphidostegium Roellii, *Rhytidium robustum*.

Schistidium apocarpum, *S. gracile*, *Schistostega osmundacea*, *Scleropodium illecebrum*, *S. obtusifolium*, *Scouleria aquatica*, *Seligeria recurvata*, *Sphagnum acutifolium*, *S. fuscum* var. *vancourveriense*, *S. Mendocinum* var. *gracilescens*, *S. squarrosum*, *S. teres* var. *squarrosulum*, *S. turfaceum*.

Tayloria serrata, *Thuidium Blandovii*, *Timmia austriaca*, *Tortella fragilis*, *T. tortuosa*, *Tortula princeps*, *T. ruralis*.

Weisia megalospora, *W. phyllantha*.

Zygodon rupestris.

Simsbury, Conn.

MOSSES OF BERMUDA

E. G. Britton

Flora of Bermuda—pp. 430–448

In the Flora of Bermuda, published by Dr. N. L. Britton in 1918, the Bryophytes were included and figured. The following list of mosses may be of interest, as no complete enumeration of these plants from this Island has been printed in The Bryologist:

Sphagnum magellanicum Brid.
Sphagnum cuspidatum Ehrh.
Campylopus bermudianus R. S. Williams.
Leucobryum glaucum (L.) Schimp.
Fissidens taxifolius (L.) Hedw.
Fissidens minutulus Sull.
Fissidens Garberi Lesq. & James.
Syrrhopodon floridanus Sull.
Weisia viridula (L.) Hedw.
Trichostomum bermudanum Mitt.
Eucladium verticillatum Br. & Sch.
Gyroweisia Barbula (Schwaegr.) Paris.
Hymenostylium curvirostre (Ehrh.) Lindb.
Tortula agraria Sw.
Funaria hygrometrica (L.) Sibth.
Funaria flavicans Rich.
Bryum capillare L.
Bryum Crugeri Hpe.
Cyclodictyon varians (Sull.) Broth.
Rhacopilum tomentosum (Sw.) Brid.
Haplocladium microphyllum (Sw.) Broth.
Thuidium minutulum (Hedw.) Br. & Sch.

New York Botanical Garden

RESOLUTIONS UPON THE LOSS OF THE COLLECTIONS AND LIBRARY OF M. JULES CARDOT

Whereas, it has come to the knowledge of the members of the Sullivant Moss Society, by information received from France, that a large portion of the valuable botanical collections and scientific library of Monsieur Jules Cardot of Charleville, France, has been destroyed or removed during the recent war: and

Whereas, the city of Charleville being outside the zone of active warfare, this destruction cannot be laid to accident, but appears to have been a purely wanton act:

THEREFORE BE IT RESOLVED, that the members of the SULLIVANT MOSS SOCIETY deplore the loss of this valuable collection and library, and condemn in the strongest terms the acts which led to the destruction or removal: and be it further

RESOLVED, that the members of the SULLIVANT MOSS SOCIETY extend to Monsieur Cardot their heartfelt sympathy and assure him of their active cooperation in obtaining such reparation as may be possible: and be it further

RESOLVED, that all botanists in Germany be, and hereby are, called upon actively to aid in returning to Monsieur Cardot any portions of his collection or library that may be found and in obtaining reparation for him in respect to the portions destroyed or lost: and be it further

RESOLVED, that these resolutions be forwarded to Monsieur Cardot, and that a copy be published in THE BRYOLOGIST.

For the SULLIVANT MOSS SOCIETY:
(Signed.)

ELIZABETH G. BRITTON,
President.
ANNIE MORRILL SMITH,
Vice-President.
EDWARD B. CHAMBERLAIN,
Secretary-Treasurer.
G. N. BEST
GEORGE H. CONKLIN
ALEXANDER W. EVANS
A. J. GROUT
CAROLINE C. HAYNES
J. M. HOLZINGER
MARSHALL A. HOWE
GEORGE B. KAISER
O. E. JENNINGS
ANNIE LORENZ
GEORGE E. NICHOLS
CHARLES C. PLITT
L. W. RIDDLE
R. S. Williams
Advisory Committee.

SULLIVANT MOSS SOCIETY NOTES

Since the September BYROLOGIST went to press, Mr. A. McEwen, 118 Marbridge Bldg., New York City, has become a member of the Society.

The Secretary is glad to inform members that Rev. David Lillie has sent a number of rare, exotic mosses to the Secretary for use in exchange. Mr. Lillie

desires especially material of the less common American species, those peculiar to the country being most wanted. There is not sufficient quantity of any of Mr. Lillie's species for a general offering, but the Secretary will be glad to arrange for individual exchanges with any who will write him.

MISCELLANEOUS NOTES

Medical Notes for the tropical collector.—One who has had any experience collecting in warmer climates will appreciate the notes on medicines contributed by E. B. Williamson[1] in his account of "A Collecting Trip to Colombia, South America." For warding off fever he took four grains of quinine a day in four doses His one light attack was cured by increasing the dose for a few days to about fifteen grains per day. For amoebic dysentery paregoric in frequent doses and alcresta ipecac were used from the start. Paregoric was discontinued when no longer needed and ipecac, equivalent to four hundred grains, was taken at the rate of sixty grains per day. This effected a prompt cure. For red bugs (harvest mites) cresol compound, which can be gotten under various trade names and is used as a dip or wash for live stock, was mixed with about ten parts of water and sponged all over the body morning and evening, allowing it to dry on. Williamson says this is a splendid antiseptic and is also of value as a local anaesthetic allaying irritation caused by bites of various insects. Aqua ammonia was found useful for relieving pain caused by more severe bites. Scratches and wounds were cleansed and rubbed with a bit of gauze or cotton soaked in a solution of one hundred and twenty grains of resorcin and twenty grains of salicylic acid in eight ounces of fifty per cent. alcohol. Iodine was used on sore toe-nails due to too much wading. It was found helpful to dust into the dry socks each evening a mixture of talcum powder, powdered alum, and sulphur. "Dobie itch" was successfully cured with balsam of Peru after iodine and boracic acid had failed. Salol was used as an intestinal disinfectant in dysentery, and the present writer can vouch for its value from his own experiences in the Isle of Pines. O. E. J.

EXCHANGE DEPARTMENT

Offerings—To Members *only*. Return postage, rather than a stamped envelope should be sent.

Rev. H. Dupret, Seminary of Philosophy, Montreal, Canada.—*Dicranum Drummondii* C. M. and *D. longifolium* Ehrh. c. fr. (U. S. postage accepted.)

Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.—*Thamnium Hildebrandtii* (C. M.) Besch. British East Africa, coll. Mearns. (Courtesy of the Smithsonian Institution).

[1] Museum of Zoology, Univ. Mich., Miscel. Publ. No. 3. 1918.