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HEPATICS AND LICHENS

VOLUME XIX

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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ERRATA

Page 4, line 23, for *cylidricum* read cylindricum; line 34, for *Lyeli* read Lyellii.
Page 11, line 12, for *Rinodinia* read *Rinodina*.
Page 11, line 15, for *petrolepidum* read *petrolepidium*.
Page 22, line 16, add *Polytrichum*.
Page 23, line 3, add or closely pinnate.
Page 27, line 30, for *saxicola* read *saxicolus*.
Page 30, line 13, for *saxicola* read *saxicolus*.
Page 39, line 18 for *Sphnagnum* read *Sphagnum*.
Page 96, line 23, for *Opeographa* read *Opegrapha*.

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THE BRYOLOGIST

VOL. XIX JANUARY, 1916 NO. 1

MOSSES OF COLORADO FROM TOLLAND AND VICINITY

A. J. GROUT

For years I have had a desire to collect and study the mosses of the Rocky Mountains. The summer of 1914 gave me my opportunity at the laboratory of the Summer School of Biology of the University of Colorado at Tolland. Tolland is nearly fifty miles from Denver by the Moffat road and only about twelve or fifteen from the continental divide as the crow flies. The village of Tolland is largely a summer resort and there are numerous cottages to rent to summer dwellers. Just north of the village runs South Boulder Creek. The valley of the creek here expands into a meadow a mile or more in length and a little less than half a mile in width. This is known as "The Park." In the Park are at least two small lakes and several beaver dams. The creek is kept at high water, comparatively speaking, by the melting snows of the neighboring mountains, the snow clad summits of which are in full view from the town.

The village is at an altitude of about 9000 feet and the surrounding mountains were originally covered with a forest of lodge-pole pine, Englemann spruce and other conifers, but miners and fires have destroyed most of the trees. Moist ravines and cool, moist, north-facing slopes occur, but are not dominant. The only locality visited that would compare to the cool, moist, heavily-wooded localities of the mountains of New England and New York, localities which are most favorable for moss growth, was a deep wooded swamp in the region above Eldora Lakes.

The region about Tolland has a good deal of rainy and foggy weather in summer. We stayed through the month of July and for the last two weeks there was scarcely a day without rain. The region is one gorgeous alpine flower garden. But even here conservation needs to have a say, for great bunches of the beautiful blue and white columbine, the state flower, are brought to the trains for sale and the plants are rapidly being depleted if not altogether destroyed.

I have received much assistance from Miss H. A. Leonard, a student at the summer school, who has collected in localities I could not reach and at other seasons of the year. Dr. Ramaley, the Director of the school, placed the laboratory and its equipment at my service. Dr. Andrews, Mr. R. S. Williams, Prof. Holzinger, and Dr. Best kindly assisted me in making determinations. To each of these persons I acknowledge my indebtedness and hereby express my appreciation.

The November number of THE BRYOLOGIST was published November 20, 1915.

Practically no mosses here listed are from the western slope of the Rockies. A few from Corona and possibly some from Arapahoe and James peaks were a few rods over the crest.

I found the mosses more Eastern than Pacific, as the list shows. There were practically no mosses on the trunks of the trees. *Polytricha* were not numerous either in species or individuals, with the exception of *Polytrichum piliferum*, which was abundant up to 13,000 ft. To understand this and some other facts it will help to remember that this region is at about the latitude of Baltimore.

There were no mosses on the stones in the beds of the mountain creeks, with few exceptions. At first I thought this was due to the temperature, but at Corona Lake at an altitude of at least 11,000 ft. and with melting snow discharging directly into the lake, I found the stones as well covered as in New England. In one place at Tolland I found a sluggish cross creek well stocked with mosses, including *Fontinalis antipyretica*, the only species of the genus and the only locality discovered. I believe that the swiftness of the streams, filled all summer, with no low water in warm weather, accounts for the lack of mosses in the beds of the streams. Not a single species of *Fissidens* was found. *Hypnum revolutum* is the dominant species in the forests, replacing our eastern forms, such as *crista-castrensis*, *imponens*, etc. This moss is polymorphous and apparently abundant all through the high mountains of Colorado, as it has been sent me in a great variety of forms from other localities, particularly Pike's Peak. *Drepanocladus* species are very abundant in the swamps.

I was particularly pleased to find *Brachythecium Nelsoni* Grout abundant and well marked and almost supplanting *B. rivulare*. *Sphagnum* is found in the region but it is very scarce. I collected none because I saw none.

Polytrichaceae

Catharinea Selwyni (Aust.) E. G. B. Moist north-facing slope one mile below Tolland. Alt. about 8,800 ft. Sterile.

Pogonatum alpinum brevifolium Brid. Summit of James Peak, 13,000 ft. Collected by Miss Leonard. The short oblique unsymmetric capsule does not at all suggest this species, neither does the habit or appearance of the plant. But for Prof. Frye's excellent monograph on our Western *Polytrichaceae* I should never have been able to place these specimens.

Polytrichum gracile Dicks. Not infrequent and fruiting freely.

P. juniperinum Willd. Soil near Tolland. *Miss Leonard.* A stunted form from the side of Arapahoe Peak may be var. *alpinum*.

P. piliferum Schreb. Common and extending up to 13,000 ft. on James Peak.

Dicranaceae

Ceratodon purpureus (L.) Brid. Common on bare and barren soil and around rocks.

Dicranodontium longirostre (W. & M.) B. & S. Near trestle above Tolland.

Dicranoweisia cirrhata (L.) Lindb. Common on and around ledges.

Dicranum Bonjeani DeNot. Frequent in moist situations and often approaching *D. scoparium.*

D. rhabdocarpum Sulliv. (Det. R. S. Williams). Moist north-facing slope one mile below Tolland. There were brood bodies along the upper surface of the costa.

D. brevifolium Lindb. ("Probably"—R. S. Williams.) Corona, Alt. 11,500 ft. Sterile.

Dicranum scoparium (L.) Hedw. Soil at water's edge, foot of Arapahoe Peak. *Miss Leonard.* This may be a form of *D. Bonjeani* as its habit and habitat suggest, but the leaf apices were slender and very rough.

Oncophorus polycarpos (Hedw.) Brid. Crevices in rocks and ledges in rather dry places about Tolland.

O. virens (Sw.) Brid. On logs. *Miss Leonard, No. 77.* Very small, scarcely one-half inch in height.

O. virens serratum (B. & S.) Limpr. Gravelly bank of brook near Tolland.

Swartzia montana (Lamk.) Lindb. On soil. *Miss Leonard. No. 72.*

Grimmiaceae

Grimmia apocarpa (L.) Hedw. On soil by road to Teller Lake.

Grimmia apocarpa var. *rivularis* (Brid.) W. & M. On ledge near trestle, and by road to saw mill, Tolland. Frequent.

G. Californica Sulliv. Two collections near Tolland. Det. Holzinger.

G. calyptrata Hook. On rocks near Tolland.

G. commutata Hueben. Rocks, Corona. 11–12,000 ft. *Miss Leonard.* Det. Holzinger.

G. Doniana Smith. On rock and ledge along Jenny Creek and by road to Rollinsville, near Tolland.

G. montana B. & S. On ledges and stones. Two localities near Tolland, and at Corona.

G. ovata W. & M. On ledges. Two localities near Tolland. Det. Holzinger.

G. trichophylla Grev. On soil, Corona, Alt. 11,500 ft.

Hedwigia albicans (Web.) Lindb. Ledge by roadside near Rollinsville.

Tortulaceae

Barbula fallax Hedw. Corona, Alt. 11,500 ft. Det. Holzinger.

Desmatodon latifolius (Hedw.) B. & S. Edge of water at foot of Arapahoe Peak. *Miss Leonard.*

D. latifolius muticus Brid. Outlet of Corona Lake, Alt. 11,000 ft. Gemmae present. This is the var. *glacialis* of the L. & J. Manual. Det. Holzinger. "The leaves in this plant are not spatulate nor ligulate as described for *Tortula latifolia* . . . they are rather narrowed from a little below the apex, becoming finally abruptly apiculate. It is clearly monoicous while *T. latifolia* is dioicous.

and its male flowers have not been found. The peristome is that of *Desmatodon* and not at all as in *Tortula;* its basilar tube short, of only three horizontally lengthened cells."

Didymodon rigidulus Hedw. On ledges near trestle above Tolland. Det. Holzinger.

D. rubellus (Hoffm.) B. & S. Near Corona Lake, Alt. 11,500 ft. Det. Holzinger. Also by Miss Leonard but no data given.

Tortella tortuosa (L.) Limpr. James Peak. *Miss Leonard.*

Tortula canescens (Br.) Mont. Shores of Corona Lake. Alt. 11,000 ft. Det. Holzinger.

According to Dixon this species is much like *T. muralis* in all its vegetative parts, but much smaller. The only certain distinction is the long tubular basal membrane forming a tesselated tube almost half the length of the peristome. New to N. America.

Tortula latifolia Bruch. Outlet of Corona Lake, Alt. 11,000 ft. Capsules very short for the genus, either immature or old and without peristome. Gemmae present.

T. mucronifolia Schwaegr. On soil near Tolland. *Overholt.*

T. ruralis (L.) Ehrh. Common in rather dry places. Occurring at Corona also.

T. subulata (L.) Hedw. Upper end of Boulder Park, *Mr. C. J. Young.*

T. subulata var. *subinermis* Schimp. Dry rocks near Tolland.

Trichostomum cylidricum (Bruch.) C. M. In crevices of rock near Tolland, with *Encalypta.* Determination doubtful.

Encalyptaceae

Encalypta vulgaris var. *obtusifolia* Funck. Crevices of rock. Frequent, but sparse. Leaves like those of *E. streptocarpa*, but smaller, as is the whole plant.

Orthotrichaceae

Amphidium lapponicum (Hedw.) Schimp. Near trestle above Tolland. *Miss Leonard.* On rocks near Tolland.

Orthotrichum alpestre Hornsch. On rocks near Rollinsville. Det. Holzinger.

O. Hallii S. & L. Ledges by road to Rollinsville.

O. Lyelii Hook. & Taylor. On rocks near trestle above Tolland. Det. Holzinger.

O. Schimperi Hamm. Ledges by road to Rollinsville.

O. Schlotthaueri Vent. South peak of Arapahoe. *Miss Leonard.* Det. R. S. Williams.

O. Shawii Wats. Ledges by road to Rollinsville and near trestle above Tolland.

O. speciosum Nees. Two localities near Tolland. Prof. Holzinger has a suspicion that this may be *O. Kingianum* but says the material is not in shape to decide.

O. speciosum polycarpum Lesq. & James. On north-facing rocks and ledges near Tolland. Two localities. Capsule long-exserted, 8-plicate when old. papillae of leaves 2–3 forked.

O. Watsoni James. Ledges by roadside between Rollinsville and Tolland. Det. Holzinger.

Funariaceae

Funaria hygrometrica (L.) Sibth. Frequent.

Timmiaceae

Timmia austriaca Hedw. Moist north-facing cliffs a mile below Tolland.

Aulacomniaceae

Aulacomnium palustre Schwaegr. Frequent and abundant but grading into and mixed with

A. palustre imbricatum B. & S. which has some of the upper leaves almost identical at apex with *A. turgidum.* The variety is common in swamps near Tolland and was collected at Eldora Lakes and elsewhere.

Bartramiaceae

Bartramia ithyphylla (Haller) Brid. Moist crevices in cliffs around Tolland. Also at Corona. Infrequent and occurring in small quantities.

Philonotis Muhlenbergii (Schwaegr.) Brid. Springy rivulet near Tolland, also by roadside on the way to Apex, 10,000 ft. Teller Lake, *Miss Leonard.*

P. seriata Mitt. Outlet Corona Lake. Alt. 11,000 ft. Determination doubtful.

Bryaceae

(*Bryum* was mostly determined by Dr. A. LeRoy Andrews.)

Bryum argenteum L. Teller Lake. Det. Holzinger.

B. caespiticium L. Frequent.

B. capillare L. Near Corona Lake, 11,000 ft.

B. affine (Bruch) Lindb. Banks of Jenny Lind Creek.

B. Duvalii Voit. Swamp by creek just beyond Baltimore; also around Corona Lake.

B. pendulum (Hornsch.) Schimp. Frequent. Above Corona Lake, at an altitude of over 11,000 ft.

B. pseudotriquetrum (Hedw.) Schwaegr. Common in the Tolland region. Miss Leonard and I made 16 collections.

B. subpurpurascens Kindb. Moist shady crevices Tolland; Corona Lake. Det. Holzinger.

Leptobryum pyriforme (L.) Wils. Frequent.

Mniobrum albicans (Wahlenb.) Limpr. Swamp by Jenny Lind Creek.

Mnium affine rugicum B. & S. Swamp above Eldora Lakes. Determination doubtful.

M. hornum L. Cleft in ledge near trestle above Tolland. Det. Holzinger.

M. marginatum (Dicks.) P. B. Moist slope in coniferous forest near Tolland.

M. orthorrhynchum B. & S. Ledges near Jenny Lind Creek. Two localities near Tolland.

M. punctatum L. Swamp by Jenny Lind Creek.

M. punctatum elatum Schimp. Moist slope by Jenny Lind Creek.

M. rostratum Schrad. Moist N. facing slope below Tolland; outlet Corona Lake. Det. Holzinger.

M. spinulosum B. & S. Soil and logs near saw mill above Tolland, 9,500 ft. *Miss Leonard.*

Pohlia commutata Schimp. Near Tolland, 10,000 ft. Also Arapahoe Peak. *Miss Leonard.* Det. R. S. Williams.

P. cruda (L.) Lindb. Frequent.

P. nutans (Schreb.) Lindb. Frequent.

P. proligera (Lindb.) Correns. Rotten wood, bank of Jenny Lind Creek.

Leskeaceae

Leskea nervosa (Schwaegr.) Myrin. Moist north-facing slope below Tolland.

L. Williamsii filamentosa Best. Dry cliffs near Tolland. Det. Best.

Thuidium Blandowii (W. & M.) B. & S. Swamp above Eldora Lakes. Also in "The Park" near Tolland. Only a few plants were found in either locality.

T. paludosum (Sulliv.) Rau and Hervey. North-facing cliffs by Jenny Creek one-half mile north of Tolland.

Hypnaceae

(Brachythecieae)

Brachythecium acutum (Mitt.) Sulliv., var. Swamp near Teller Lake about two miles west of Tolland. Alt. 9,500 ft. Capsules very small for the species. (*N. Am. Musci Pl. 447*)

B. collinum (Schleich) B. & S. Frequent on wooded slopes around Tolland. (*N. Am. Musci Pl. 448*)

B. digastrum C. M. & Kindb. Outlet of Corona Lake, alt. 11,000 ft. A peculiar subaquatic form but with the characteristic leaf structure of this species; also at Lily Pond, 10,000 ft.

B. glareosum B. & S. On soil in a coniferous forest near Tolland. Differs from *B. salebrosum* in being dioicous and in the large leaves with a longer, more slender and twisted acumination. The leaves are also more plicate and rather less serrate. In gross appearance this somewhat resembles *Camptothecium lutescens* from which it differs in the more numerous and larger quadrate alar cells of the more slenderly acuminate leaves. The Colorado specimens are darker than is typical. They are the first American specimens that I have seen that I could refer to this species. Those collected by Macoun and Brinkman are *B. salebrosum*, to my mind.

B. Leibergii Grout. Banks of streams and in swampy places around Tolland. Frequent.

B. Nelsoni Grout. Common on humus, dead wood, and earth in wet places around Tolland, largely taking the place of *B. rivulare*. (*N. Am. Musci Pl. 450.*)

B. oxycladon (Brid.) J. & S. Outlet of Corona Lake, 11,000 ft.

B. oxycladon dentatum (L. & J.) Grout. Around Corona Lake.

B. plumosum (Sw.) B. & S., forma. On soil in moist cool woods near Tolland and in swamp above Eldora Lakes. (*N. Am. Musci Pl. 449*)

B. rivulare B. & S. Occasional in wet places about Tolland. A peculiar variety growing in pool by a creek has been issued as *N. Am. Musci Pl. 441.*

Bryhnia novae-angliae (S. & L.) Grout. Swamp above Eldora Lakes, 9,500 ft. A lax form.

Camptothecium nitens (Schreb.) Schimp. Park Lake swamp.

Eurhynchium diversifolium (Schleich) B. & S. Base of "Tenderfoot." Also about a mile west of Tolland at 10,000 ft. and at Lily Lake.

E. fallax (R. & C.) Grout. Swamp above Eldora Lakes and moist slope a mile below Tolland.

(Climaceae)

Climacium americanum Brid. Park Lake swamp. Approaches *C. Kindbergii.*

C. dendroides (L.) W. & M. Swamps about Tolland.

(Amblystegieae)

Amblystegium Juratzkanum Schimp. Under alders, Mammoth Gulch. *Miss Leonard.* (*No. 25*). Approaches *A. Kochii.*

A. Kochii B. & S. Mammoth Gulch. *Miss Leonard.* (*No. 28.*)

A. serpens (L.) B. & S. Common in moist places.

Drepanocladus aduncus (Hedw.) Warnst. Park Lake swamp; swamp above Eldora Lakes.

D. aduncus pseudofluitans (Sanio). n. comb. Sluggish creek below Tolland. *N. Am. Musci Pl. 459.*

D. capillifolius Warnst. Park Lake swamp. (*N. Am. Musci Pl. 445.*)

D. exannulatus (Guemb.) Warnst. Park Lake Swamp. (*N. Am. Musci Pl. 444.*)

D. fluitans (L.) Warnst. (Gr. typicus.) Around Corona Lake, 11,000 ft.

D. Kneiffii (B. & S.) Warnst. Sluggish creek near Tolland.

D. Kneiffii intermedius (B. & S.) n. comb. Swamp near Tolland. (*N. Am. Musci Pl. 461.*)

D. revolvens (Sw.) Warnst. Around Corona Lake, 11,000 ft.

D. Sendtneri (Sch.) Warnst., var. Park Lake swamp. (*N. Am. Musci. Pl. 439.*) A puzzling form that might possibly be referred to a form of *D. Wilsoni.*

D. uncinatus (Hedw.) Warnst. Common and variable. Forms very near var. *plumosus* (Sch.) were found.

(Hypneae)

Amblystegiella adnata (Hedw.) Nichols. By roadside between Tolland and Rollinsville.

Hygrohypnum dilatatum (Wils.) Loeske. On submerged stones, outlet Corona Lake, 11,000 ft. (*N. Am. Musci Pl. 446.*)

H. molle (Dicks.) Broth. On stones in brook, outlet Corona Lake. From the same locality as the preceding, of which it may be a large form. (*N. Am. Musci Pl. 442.*)

H. ochraceum (Turn.) Loeske. Frequent in creeks. Outlet Corona Lake, 11,000 ft.

H. palustre (Huds.) Loeske. On stones in creek near trestle just above Tolland.

Hypnum hamulosum B. & S. Around Corona Lake, 11,000 ft. The specimens were sterile and difficult of determination. Dr. Best finds the plants without paraphyllia and thinks they probably belong to this species. To this species also was referred a more slender moss collected near the trestle above Tolland.

H. pallescens (Hedw.) B. & S. On soil. Lily Lake; by road to Teller Lake.

H. patientiae Lindb., forma. Park Lake Swamp. With the appearance of *H. pratense.* (*N. Am. Musci Pl. 443.*)

H. revolutum (Mitt.) Lindb. Common on earth and stones from 8,000–11,000 ft. and exceedingly variable. A very small form scarcely secund is referred by Dr. Best to var. *pygmaeum* Mol. This species is the *H. plicatile* of the L. & J. Manual.

Plagiothecium denticulatum (L.) B. & S. Moist soil. Lily Pond. Swamp above Eldora Lakes, near Tolland. The capsules of the Tolland specimens were were strongly striate.

(Entodonteae)

Entodon orthocarpus (LaPyl.) Lindb. Summit of James Peak, 1,300 ft. *Miss Leonard.*

NECKERACEAE

Neckera pennata (L.) Hedw. Moist ledges near trestle above Tolland.

FONTINALACEAE

Fontinalis antipyretica L. Sluggish creek just below Tolland.

Practically all of the *Tortulaceae*, *Grimmiaceae*, and *Orthotrichaceae* have been examined by Prof. J. M. Holzinger, but too late to give credit for individual species.

A few hepatics were collected. These have been reported on by Dr. Evans in the BRYOLOGIST for May, 1915. Since that report I have discovered *Chiloscyphus pallescens* (Ehrh.) Dum. among my mosses. All my hepatics are with Dr. Evans.

CURTIS HIGH SCHOOL, N. Y. CITY.

A REVIEW OF DR. HAGEN'S NORWEGIAN DICRANACEAE, "DISTRIBUTED OCTOBER 13, 1915"

JOHN M. HOLZINGER

This is part XX of the author's "Forarbejder til en Norsk Lövmosflora." It is published as No. 1 of Det Kgl. Norske Videnskabers Selskabs Skrifter, 1914. It is a volume of 192 pages, including index. The taxonomic discussions are in French; notes of ecology and geographic distribution in Norwegian; keys and descriptions in Latin. There are also quotations from German and English authors.

The interest to North American moss students lies in the fact that the author has raised to generic rank a number of species, and groups of species, that have been felt to be out of place in the positions assigned to them in the accepted system. Following are the principal departures made by Dr. Hagen:

1. *Cynodontium schisti* Lindb. variously referred by authors to *Weisia*, *Rhabdoweisia*, *Oncophorus*, and *Cynodontiella*, is by the author made the monotypic genus *Cnestrum*. Name from the Greek word knestron (κνήστρον), a rasp or file.

2. *Metzleria alpina* Schimp., made *Metzlerella alpina* Limpr., violates the Rules of Nomenclature, and Dr. Hagen in consequence proposes *Metzlerella alpina* (Schimp.).

3. *Cynodontium strumiferum* DeNot., for structural reasons, becomes *Gongronia strumifera* (Ehrh., Hedw.), from the Greek word γογγρώνη, for goitre.

4. *Dicranum falcatum* Hedw., *starkei* (W. & M.), *glaciale* Berggr. (= *arcticum* Sch., with several other synonyms), become *Kiaeria falcata* (Hedw.), *starkei* (W. &M.), *glacialis* (Berggr.). The genus is dedicated to Franz Christopher Kiaer, a deserving Scandinavian bryologist. It is also to be noted that *Kiaeria starkei* is credited with eight varieties, viz., 1. var. *obtusula* n. var.; 2. var. *blyttii* (Br. Eur.); 3. var. *laxiretis* n. var.; 4. var. *riparia* (Lindb. fil.); 5. var. *alpestris* n. var.; 6. var. *fallax* n. var.; 7. forma *submamillosa* n. f.; 8. var. *glacialis* (Zett.).

5. *Dicranum montanum* Hedw., with its varr. *pulvinatum* Pfeff., and *flaccidum* (Ryan & Hag.), and *Dicranum flagellare* Hedw., are raised to the new genus *Scytalina*, from the Greek word σκυτάλη for cylinder.

These dispositions of mostly well known American species of *Dicranaceae* under the new genera of *Cnestrum*, *Gongronia*, *Kiaeria*, and *Scytalina*, each with its own well-coined character, commend themselves to systematic students; for, to the writer at least, their dispositions under the former genera has usually been accompanied by a certain mental violence and strain. And Dr. Hagen's course has made it possible for him to improve the keys under the genera. The key to the largest genus, *Dicranum*, is especially well crystallized and clear.

WINONA, MINN., NOV. 14, 1915.

UNE RECTIFICATION

I. Thériot

Appelé à déterminer quelques mousses du Chili recoltées par le rév. P. Nathaniel Costes, de Santiago, j'ai demandé au Muséum de Paris communication du type de *Hypnum liliputianum* Montagne, espèce chilienne d'après les auteurs contemporaines.

Grande a été ma surprise, en constatant que l'échantillon de l'herbier Montagne porte comme pays d'origine le nom de Cuba et comme collecteur celui de Ramon de la Sagra. Le nom de Cuba se retrouve également de la main même de l'auteur, sur les dessins originaux qui ont servi de modèle pour la planche où est figurée l'espèce.

La contradiction était flagrante avec les indications qui sont données dans les principaux recueils bryologiques. On lit en effet:

1° in Engler et Prantl, die Natürlichen Pflanzenfam. (Musci) p. 1110:—"Rhaphidostegium liliputanum (Mont.) Jaeg., in Chile."

2° in Paris, Index bryolog., éd. II.:—"Rh. lilliputianum (Mont.) Jaeg.; Hypnum lilliputianum Mont. in Cl. Gay, Hist. Chile, Crypt. t. 20, f. 3. (1850)."

3° in Jaeger, Adumbratio, p. 402:—"Rh. liliputianum (Mont. in Gay, Hist. Chile, Crypt. t. XX. f. 3. Hypnum.)."

4° in Mitten, Musci Austr.-Americ. p. 488:—(Même texte que dans l'Adumbratio).

J'ai appelé l'attention de mon savant ami J. Cardot—que la guerre a chassé de chez lui et que le Muséum a recueilli—sur cette contradiction. Des recherches qu'il a faites, il résulte que le *Rhapidostegium* en question a bien pour patrie l'île de Cuba et non le Chili.

L'espèce a été décrite pour la première fois in *Ramon de la Sagra, Hist. Cuba, Criptog.* t. XX. f. 3. p. 314 de l'édition originale, et p. 528 de l'édition française (1838–42). La description est reproduite dans le *Sylloge*, p. 10, avec des reseignements bibliographiques exacts.

La confusion paraît avoir pour origine l'erreur commise par Mitten, dans ses Musci Austro-Americani; ce lapsus a été reproduit depuis très fidélement par les auteurs. Et c'est ainsi que se transmettent et se perpétuent les erreurs, jusqu'à ce que le hasard permette de les découvrir et de les redresser.

L'occasion est bonne de préciser l'orthographe du nom de cette espèce; je ne puis pas dire, à ce propos, que les auteurs se copient, car chacun adopte une orthographe différente. On voit ce nom écrit, tantôt *liliputanum*, tantôt *lilliputianum* ou bien *liliputianum*. Cette dernièr forme est seule correcte: Montagne a en effet nommé ainsi son espèce Hypnum (Stereodon) liliputianum.

Havre, 12 novembre, 1915.

ANNUAL REPORTS—SULLIVANT MOSS SOCIETY—1915

Report of the President

During the past year the work of the Sullivant Moss Society has been ably continued by its members and has been productive of valuable results. The current volume of the BRYOLOGIST, in which some of these results are recorded, contains 96 pages, exclusive of the index, and is illustrated by two plates and twelve text figures. It includes twenty-three original articles, a report of the Philadelphia meeting, an obituary notice, and a series of short notes. Six of the articles deal with the mosses, eleven (wholly or in great part) with the hepatics, and six with the lichens. The articles on the mosses were written by six different contributors, those on the hepatics by six, and those on the lichens by four. The following species are described as new: *Rinodinia dirinoides* A. Zahlbr., *R. euryspora* A. Zahlbr., *Cetraria pallidula* Tuckerman, *Jamesoniella heterostipa* Evans, and *Cololejeunea tuberculata* Evans. The following new combinations also are proposed: *Endocarpon petrolepidum* (Nyl.) Hasse, *Dermatocarpon lecideoides* (Mass.) Hasse, and *Buellia parmeliarum* (Sommerf.) Hasse. One matter which deserves a word of criticism is the inclusion of manuscript species in printed papers. Three such species appear in the present volume: namely, *Cephalozia floridae* (p. 23), *Cephaloziella Rappiana* (p. 23), and *Cephaloziella Brinkmani* (p. 37). The printing of these names is in no sense publication of the species, it is hardly fair to the authors of the names (who are very likely to change their minds with respect to the plants in question), and it may be the cause of considerable confusion. It is suggested that contributors avoid the use of such names in the future. The President takes pleasure in renewing his congratulations to the Society.

ALEXANDER W. EVANS, *President.*

NEW HAVEN, CONNECTICUT.

Report of the Secretary-Treasurer

During the past year four new members, Miss Roberta Deam, Mr. N. Iwasaki, Mr. Alfred C. Kinsey, and Mrs. Leo D. Miner, have been added to our lists, and two others have changed from subscribers to members. In this issue a complete list of members is published in the hope of facilitating correspondence and exchange. Prompt notice should be sent to the Secretary of any errors or omissions. A few of the European members have not been heard from since the opening of the war, and it has seemed wisest to omit their names from the active list, without ceasing to use all efforts to get in touch with them. Through death, withdrawal, and the cause mentioned above, there has been a loss of ten members, the total now standing at 131.

Thirteen species of lichens, five of hepatics, and eleven of mosses have been offered through the columns of THE BRYOLOGIST for free distribution. It is a matter of great regret to the Secretary that more members do not take advan-

tage of the opportunity afforded by this service. The same statement may be made also regarding the contribution of material for short notes to the magazine. Members should remember that the columns are always open and that short notes add greatly to the interest. More interesting material means more members and more money for publication.

During the holiday season of 1916–17 there will be a meeting of the Society in connection with the convocation week of the American Association for the Advancement of Science at New York City. Members should bear this in mind, and endeavor to contribute material for exhibition, short papers, and when possible the inspiration of their presence. Further notices will be issued from time to time.

The Secretary also wishes to call attention to the fact that less than a dozen complete files of THE BRYOLOGIST remain unsold. The magazine already commands a premium at second-hand dealers, and it is important for those who wish to secure complete files to apply soon. Preference will be given to members if they apply promptly.

The financial statement below shows a decrease in the available balance. Part of this is due to the fact that payments for seven issues of the BRYOLOGIST are included, but part is also due to the failure of some members to send in their dues promptly. Attention in this connection is called to the ruling of the Post-office Department which compels publishers to discontinue sending copies of the magazine unless a remittance or acknowledgment is received soon after the notices are sent out. The easiest way to avoid this and the attendant loss of issues is obvious.

SUMMARY OF ACCOUNTS

RECEIPTS

Balance on hand Dec. 1, 1914	$40.92
Dues for current year	181.98
Subscriptions for current year	65.71
Arrears collected, dues and subscriptions	16.15
Sales of back numbers, files, advertising, etc.	35.77
	$340.53

EXPENDITURES

Bank fees	$2.02
Printing and stationery	11.20
Postage	1.71
Herbarium expenses	8.87
Express on shipments of the BRYOLOGIST	.49
Pittsburgh Photo-Engraving Co., plates	4.75
Intelligencer Printing Co., 7 issues of the BRYOLOGIST and Index	310.36
	$339.40
Cash on hand at close, Nov. 30, 1915	1.13
	$340.53

Respectfully submitted,

EDWARD B. CHAMBERLAIN, *Secretary-Treasurer.*

Report of Election of Officers for the Year 1916

What number of votes cast, 26.

For President, Mrs. Elizabeth G. Britton, 26 votes.

For Vice-President, Mrs. Annie Morrill Smith, 24 votes.

For Secretary-Treasurer, Mr. E. B. Chamberlain, 24 votes.

No votes were cast other than as reported above, the candidates thus being elected to the offices designated.

O. E. Jennings, *Judge of Elections, S. M. S.*

Report of the Curator of the Moss Herbarium for 1915

During the past year 52 specimens have been mounted in the Moss Herbarium of the Sullivant Moss Society, adding 13 species and varieties new to the herbarium, which now contains 3855 specimens, representing 1173 species and varieties belonging to 253 genera. The contributors have been: Mary F. Miller, S. H. Burnham, F. L. Pickett, S. Rapp, T. C. Frye, E. C. Wurzlow, Mrs. E. G. Britton, D. L. Dutton, W. Gray, E. B. Chamberlain, and Roberta Deam.

The meagerness of this showing is due to the utter cessation of all foreign correspondence since the duration of the European war and to the inactivity on the part of our home members. The Curator thanks all members who have contributed specimens, but again—as last year—earnestly solicits renewed activity among moss students. It is only by zealous collecting, correspondence, and exchange among bryologists from widely different localities that the herbarium can be made to satisfactorily grow, and the Curator remains ever ready to help along the good work by determinations, letters, and generous exchanges.

George B. Kaiser, *Curator.*

Germantown, Pa., Dec. 1, 1915.

Report of the Curator of the Hepatic Department for 1915

Three hundred and thirty-five specimens have been placed this year in the Hepatic Herbarium.

Of this number, 114 were from the A. H. Brinkman collections in British Columbia and Alberta. A report of this interesting and valuable collection and a list of species will be submitted during the year.

Fifty-four specimens, only a part of a valuable collection by Prof. E. Ishiba from Japan, and determined by Dr. A. W. Evans, have been included this year.

In addition to the specimens contributed by Mr. Severin Rapp, Dr. Farlow, and Dr. Evans in response to my appeal last year (*see* Bryologist Vol. 18, nos. 1–2), Miss Annie Lorenz has given the following:

Riccia dictyospora, Gymnomitrium corallioides, Anthoceros crispulus, Chiloscyphus fragilis, and *Anthoceros Macounii.*

Dr. A. W. Evans gave *Plagiochila Smallii* and *Cheilolejeunea decidua*. In A. H. Brinkman's collection we found *Marsupella sparsifolia* and the writer contributed *Fossombronia cristula*. The list therefore of N. A. species which were wanted, has been reduced from 110 to 77. May we not hope for a still larger response from the members who are interested in Hepatic during the coming year?

Other contributors to the herbarium were Roy Latham, H. Dupret, Mrs M. W. Satchwell, A. J. Dradisman, Mr. Palmer, John L. Sheldon, C. A. Mosier, E. C. Wurzlow, and R. S. Williams.

Stewart Burnham gave 21 specimens from N. Y.; A. Lorenz, 21 from New England; A. S. Foster, 19 from Washington State; O. E. Jennings, 24 from Ontario; and the writer, additions from the Duluth-Superior District.

This shows to some extent the range of distribution of the specimens submitted. The total number of specimens in the herbarium now numbers 4,334.

GEO. H. CONKLIN, *Curator*.

SUPERIOR, WIS., DEC., 1915.

Report of the Lichen Department for 1915

Thanks to the faithfulness with which Dr. Hasse kept his records, your present Curator had very little trouble making out his report.

During the past year 256 specimens have been added to the Lichen Herbarium of the Sullivant Moss Society. The number of specimens now mounted is 3073, representing 855 species and varieties belonging to 119 genera.

Our list of contributors is headed by Mr. S. Rapp, that indefatigable worker and collector, who sent more than 100 specimens. Other contributors were: Prof. O. E. Jennings, who sent a fine collection from Ontario, collected by himself and Grace K. Jennings; Mr. J. M. Grant, who sent specimens collected in the Olympic Mts., Washington; Mr. N. L. T. Nelson, who sent specimens from Florida; Dr. H. E. Hasse; Dr. R. H. Howe, Jr.; and Mr. Roy Latham. The European war is possibly responsible for our not having any contributors from that part of the world, this year.

Dr. Hasse, in one of his reports of this department, remarks "that in collecting (material for the lichen department) only complete, well developed, representative, and when possible, fruiting specimens, should be selected," and he might have added, that wherever material is to be sent for determination, by all means send *ample* material.

It is to be hoped that the interest and the enthusiasm shown in the study of Lichens in previous years will continue unabated.

CHARLES C. PLITT, *Curator*.

BALTIMORE, MD., Dec. 7, 1915.

MEMBERSHIP LIST, SULLIVANT MOSS SOCIETY

Please send the Secretary prompt notice of error or of change of address, that this list may be kept up to date. An asterisk (*) indicates Charter Members.

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Mr. E. C. Wurzlow.....Box 656, Houma, Terrebonne Parish, La.

SHORTER NOTES

In Lesquereux and James's Manual of North American Mosses a description is given of *Phascum carniolicum*. Dr. A. LeRoy Andrews[1] has recently studied the original collection and concludes that it represents a new species at least, and possibly a new genus. The plants are minute, and differ from the European species by their size, the shape and structure of the leaves, and the conspicuous protonema. The species has been collected but once ("silicious soil, prairies of western Kansas") and its rediscovery offers a problem of much interest. Dr. Andrews also gives a resumé of the other known species of the genus with notes upon their history.

EXCHANGE DEPARTMENT

Offerings—To Members only, for return postage.

Mr. Severin Rapp, 207 First St., Sanford, Fla.—*Lapodium phyllocharis* (Mont.) Feé.—As offered in these columns July, 1915, but note correction in name.

Mr. Severin Rapp, Sanford, Florida—*Ramalina usneoides* (Ach.) Fr. and *R. rigida* (Pers.) Ach.

Mr. Charles C. Plitt, 3933 Lowndes Ave., Baltimore, Md.—*Lecidea albocoerulescens* (Wulf.) Schaer.

Mr. Geo. H. Conklin, 1204 Tower Ave., Superior, Wis.—*Scapania paludicola* (Loeske) K. Müll., from Superior, Wisconsin.

[1] A. LeRoy Andrews. Bryological Notes I. Aschisma kansanum, a New Species with Remarks upon the Genus. Torreya. **15**: 63–67. (1915).

NOTE.—The late appearance of this issue is mainly due to losses in the mails of letters and printer's proofs.—EDITOR.

VOLUME XIX NUMBER 2

MARCH 1916

THE BRYOLOGIST

JOURNAL OF THE

SULLIVANT MOSS SOCIETY

Conducted and Published for the Society by

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

CONTENTS

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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

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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.

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

THE BRYOLOGIST

VOL. XIX MARCH, 1916 No. 2

HOW TO KNOW THE MOSSES WITHOUT THE AID OF A LENS[1]

ELIZABETH MARIE DUNHAM

A. KEY TO SEPARATE THE MOSSES FROM HEPATICS AND LICHENS without the aid of a lens.

Since hepatics and lichens are sometimes collected for mosses, the following key will be helpful when there is doubt as to what are mosses.

Plants growing flat, without stem or leaves.

Usually dark green..... **Thallose Hepatics**—*Marchantiales.*

The plant-body of some *Marchantiales* is like a broad flat leaf, sometimes elongated, often with a midrib, and branched by forking. A very young plant may resemble two or three leaves, but no distinct stem will be found and the apparent leaves will not be arranged in two opposite rows, or around a stem, as in the leafy hepatics, or the mosses.

Usually some shade of gray, or if green when moist, becoming gray when dry; sometimes brown or orange..... **Lichens**—(see below)

Plants, erect, ascending, prostrate, or hanging from trees; with a true stem, or, in lichens, apparently having a stem.

Stems without leaves; usually some shade of gray, or, if green when moist, becoming gray when dry.....**Lichens.**

The short branches of certain lichens may be mistaken for leaves. The leaves of hepatics and mosses are flat and thin, while the branches of lichens are round. When in doubt as to what are leaves, the color of the plants is usually a safe guide: lichens when dry are more gray than green, and are very stiff and brittle; hepatics and mosses are more a foliage green, and do not dry gray, or become so stiff and brittle.

[1] NOTE.—This article is extracted with slight changes from a book by Mrs. Dunham with the above title, soon to be issued by the Houghton Mifflin Company. It will be an illustrated guide to the mosses of the northeastern United States, with keys to genera and species, but placing special emphasis upon those characters that are apparent without the use of a hand lens. Our sincere thanks are extended to Mrs. Dunham and to the Houghton Mifflin Company, for the courteous permission to publish this extract.—THE EDITORS.

The January number of THE BRYOLOGIST was published March 13, 1916.

Stems with leaves; always some shade of green, never gray.

Leaves usually arranged in two opposite rows; rounded, lobed or cleft, often curved under at the tips, usually dark green, midrib absent; under or back side of the stem, towards which the leaves curl, sometimes bearing what appear to be rootlets....
Leafy Hepatics — *Jungermanniales* (Scale Mosses).

Leaves usually arranged equally around the stem (in *Fissidens* in only two rows); sometimes flattened on two opposite sides of the stem, never lobed or cleft, and when rounded not curved under at the tips, varying from light to dark green, midrib present or absent.....**True Mosses.**

Plants usually growing in bogs or very wet places; stems erect, much branched, branches at tip of stems forming a thick head; leaves usually light green, or tinged with red....
Sphagnum, or Peat Moss.

Plants growing on rocks in mountainous regions; stems erect, short and inconspicuous; leaves very dark, almost black.
Andreaea.

Plants growing in all sorts of places; on wet or dry ground, rocks, trees, decaying wood, and in streams or ponds.

Stems usually erect and not branched; if slightly branched by forking, usually with not more than two or three branches; fruit at the end of the stem or a well developed branch, sometimes *appearing* lateral by new growth of the plant.....**Acrocarpous Mosses.**

Stems prostrate or ascending, rarely erect, usually much branched (i. e., with more than two or three branches); fruit on the side of the stem or on a very short lateral branch.....**Pleurocarpous Mosses.**

B. Helps to Identify the Genera

of the more common and conspicuous mosses, without a lens.

I. Acrocarpous Mosses

Manner of growth.—*Individual plants* of the acrocarpous mosses can nearly always be *easily separated,* as the stems are *erect and do not interweave.* In some cases the stems are matted together below with a felt-like mass of radicles called tomentum. The *stems* of most acrocarpous mosses are *usually unbranched,* but sometimes they fork with only two or three branches.

Stems ascending to erect, usually much branched by forking; plants growing on rock, leaves olive to dark green, except at the growing tip of the stem, which is lighter.....*Grimmia, Rhacomitrium.*

Stems erect, not branched or with *branches whorled at tip of stem;* plants growing on wet ground or on rocks, especially where water is dripping; leaves usually light or yellowish green..... *Philonotis.*

Looked at from above, *has the outline of a star with many rays*, or looked at from the side, *resembles tiny spruce or pine trees.* Stems erect, usually not branched; leaves bright green, glaucous green or dark green; plants growing on the soil, on earth-covered rocks, old stumps and upturned roots..... *Catharinaea, Polytrichum.*

Plants growing from protonema, a green or brownish coating on the surface of the soil..... *Buxbaumia, Pogonatum*

Color of stem.—Stems of most mosses are concealed by leaves, or are brown and inconspicuous.

Stems *showing red* through the leaves especially in the new growth when moist plants are held to the light..... *Pohlia, Bryum.*

Stems at least in the lower part *covered with tomentum*, a felt-like mass of brown or whitish radicles..... *Dicranum, Mnium, Aulacomnium, Bartramia, Philonotis, Polytrichum.*

Shape of leaves—

Leaves *too small or too closely folded to be seen easily.*

Capsule almost concealed by leaves..... *Grimmia.*

Capsule erect..... *Ditrichum, Orthotrichum, Georgia, Pogonatum.*

Capsule not erect..... *Funaria, Bryum, Philonotis.*

Leaves *conspicuously long and narrow.*

Capsule erect.. *Ditrichum, Dicranella, Dicranum, Ulota, Catharinaea, Pogonatum, Polytrichum.*

Capsule not erect.. *Dicranella, Dicranum, Leucobryum, Aulacomnium, Bartramia, Catharinaea, Polytrichum.*

Leaves *conspicuously short and broad.*

Capsule erect..... *Fissidens, Rhacomitrium, Physcomitrium,*

Capsule not erect..... *Fissidens, Rhodobryum, Mnium.*

Position of leaves.—Leaves of most mosses *are arranged equally around the stem* and branches and are *erect or spreading.*

Leaves more or less *turned to one side* (secund).... *Dicranella, Dicranum.*

Leaves *in two rows* on opposite sides of stem, giving the plants a flattened appearance..... *Fissidens.*

Leaves *forming a rosette* at tip of stem... *Leptobryum, Rhodobryum, Mnium. Catharinaea, Polytrichum, (Sphagnum).*

Leaves *undulate or wavy*..... *Dicranum, Catharinaea.*

Leaves *conspicuously crisped when dry.*

Capsule erect..... *Dicranum, Fissidens, Tortella, Barbula, Ulota, Catharinaea.*

Capsule not erect..... *Dicranum, Fissidens, Rhodobryum, Mnium, Bartramia, Catharinaea.*

Leaves conspicuously *folded straight when dry.*

Capsule partly concealed by surrounding leaves..... *Grimmia, Orthotrichum.*

Capsule erect..... *Ditrichum, Rhacomitrium, Orthotrichum, Ulota, Georgia.*

Capsule not erect..... *Ceratodon, Pohlia, Bryum, Pogonatum, Polytrichum.*

Midrib *seen* when moist plants are held to the light.....
Rhodobryum, Mnium, Catharinaea.

Color of leaves.—The color of the leaves of most mosses varies from light or yellowish green to dark green.

Leaves usually conspicuously *light or yellowish green*.....
Physcomitrium, Funaria, Aulacomnium, Philonotis, (Sphagnum).

Leaves *glaucous or whitish green*, especially when dry.....
Leucobryum, (Sphagnum).

Leaves *bluish green* ..... *Saelania, Polytrichum.*

Leaves usually conspicuously *dark or olive green*....*Grimmia, Rhacomitrium, Drummondia, Orthotrichum, Bryum, Webera, Georgia.*

Leaves sometimes with a *reddish tinge*.....*Catharinaea, (Sphagnum).*

Seta.—The seta of most mosses is single, reddish brown, and conspicuous.

Seta *yellowish*.....*Trematodon, Ditrichum, Dicranella. Physcomitrium, Dicranum, Funaria.*

Seta *dark red*.....*Ceratodon, Pohlia.*

Setae *clustered*.....*Dicranum, Rhodobryum, Mnium, Catharinaea.*

Seta very *short, apparently absent*, so that the capsule is partially concealed by the surrounding leaves.....*Grimmia, Orthotrichum, Webera.*

Position of Capsule—

Capsule *erect*....*Ditrichum, Dicranella, Dicranum, Fissidens, Rhacomitrium, Orthotrichum, Ulota, Physcomitrium, Georgia, Catharinaea, Pogonatum, Polytrichum*

Capsule *inclined*....*Trematodon, Ditrichum, Ceratodon, Dicranella, Dicranum, Leucobryum, Aulacomnium, Bartramia, Philonotis, Catharinaea, Polytrichum.*

Capsule *horizontal*....*Pohlia, Bryum, Rhodobryum, Mnium, Polytrichum.*

Capsule *hanging down*.....*Funaria, Leptobryum, Pohlia, Bryum, Rhodobryum, Mnium, Polytrichum.*

Capsule *partly concealed* by surrounding leaves...*Grimmia, Orthotrichum.*

Shape of operculum.—The operculum of most mosses is convex, cone-shaped, or short beaked, and not especially conspicuous.

Operculum conspicuously *long beaked*....*Trematodon, Ditrichum, Dicranella, Dicranum, Leucobryum, Catharinaea, Polytrichum.*

Calyptra.—The calyptra of most mosses is smooth and inconspicuous, often falling off long before the capsule is mature.

Calyptra *hairy and conspicuous*.....*Orthotrichum, Ulota, Pogonatum, Polytrichum.*

II. Pleurocarpous Mosses.

Manner of growth. Pleurocarpous mosses usually *grow in rather flat mats* with the stems and branches prostrate or creeping, and often *closely interwoven* so that no great length of stem can easily be separated.

Plants with stems usually *ascending or erect* and *easily separated*.....
Climacium, Helodium, Drepanocladus, Calliergon, Rhytidiadelphus, Hylocomium, Hypnum, Ptilium, Stereodon.

Plants *tree-like*, with erect stems, and erect or spreading branches only towards the tip of the stem..... *Climacium.*

Plants *fern-like* (branches bi- or tripinnate)..... *Ptilium, Thuidium, Hylocomium.*

Plants *plume-like*..... *Ptilium.*

Color of stem.—The stems of most pleurocarpous mosses are either covered with leaves and appear green, or are brown and inconspicuous.

Stems and branches *showing red* through leaves, when moist plants are held to the light..... *Climacium, Hypnum, Hylocomium.*

Position and shape of leaves.—The leaves of most pleurocarpous mosses are erect or spreading, and are usually arranged equally around the stem and branches, sometimes apparently in two rows. They are generally more or less oval at the base, and end in a straight or curved tip, but are often too closely folded or too small to show the entire outline.

Leaves *straight and flattened on opposite sides of the stem*, apparently in two rows, giving the plants a pressed appearance.... *Neckera, Homalia, Isopterygium, Plagiothecium, Brachythecium, Rhynchostegium.*

Leaves *curved and turned in two opposite directions*, giving a braided appearance to the stems and branches..... *Stereodon.*

Leaves *strongly curved*, and more or less *turned in one direction*..... *Drepanocladus, Ctenidium, Ptilium, Stereodon.*

Color of leaves.—The leaves of most mosses vary in color from a light or yellowish green to dark green.

Leaves usually *light, yellowish or golden green.*

Capsule erect..... *Dichelyma, Neckera, Entodon, Pylaisia.*

Capsule not erect..... *Helodium, Calliergon, Rhytidiadelphus, Hypnum, Ptilium, Cirriphyllum.*

Leaves usually very *dark or olive green.*

Capsule almost concealed by the surrounding leaves..... *Hedwigia.*

Capsule erect..... *Fontinalis, Anomodon, Leskea.*

Capsule not erect..... *Oxyrhynchium.*

Leaves glaucous or *bluish green* ..... *Thelia.*

Position of capsule.—The capsules of genera not mentioned are more or less inclined.

Capsule erect.... *Fontinalis, Dichelyma, Climacium, Leucodon, Neckera, Homalia, Entodon, Platygyrium, Pylaisia, Thelia, Myurella.*

Capsule partially concealed by the leaves. *Hedwigia, Fontinalis, Leucodon, Neckera.*

Shape of operculum.—The operculum of most mosses is convex, cone-shaped, or short-beaked, and not especially conspicuous.

Operculum conspicuously *long-beaked*..... *Plagiothecium, Cirriphyllum, Oxyrhynchium, Eurhynchium, Rhynchostegium.*

WABAN, MASS.

NOTES ON NARDIA CRENULIFORMIS (AUST.) LINDB.

Annie Lorenz

The writer had recently the good fortune of discovering a second Connecticut station for *Nardia crenuliformis* (Aust.) Lindb., in Glastonbury, the first one (for New England as well) being at Beacon Falls, where it was collected by Dr. Evans in 1907.

At this new station, which is in the ravine of Roaring Brook, South Glastonbury, the plants grew abundantly on schistose granulitic gneiss, on the southern bank of the brook, which is in shadow most of the time. The mats extended up the rocks not over a yard above the water-line, and the nearer the brook, the more luxuriant the plants, as the brook is extremely dirty.

The plants were associated with *Conocephalum*, *Blasia*, *Pellia*, *Geocalyx*, *Scapania nemorosa*, *Catharinaea angustata*, *Mnium* sp., etc., and the more robust plants were reddish. Perianths with green capsules were plenty, also antheridial spikes, but the antheridia were gone.

The general effect in the field is of a *Nardia*, but of a large *crenulata* rather than of *hyalina*, which is generally less prostrate. The very concave, bordered leaves and purple rhizoids (purple madder with a touch of rose madder) identify it in the field.

Austin, who stated that it was abundant about Closter, N. J., insisted that it was a good distinct species, wherein he was quite correct. Lindberg's hesitation, on the other hand, was from lack of familiarity with it in the field.

The ♂ plant is apparently undescribed, beyond the statement that the species is dioicous. It resembles that of *N. crenulata;* there are 5–7 pairs of ♂ bracts, which are imbricate, unequilateral and saccate, all intercalary on plants observed.

Dr. Evans gives such complete notes on the subject in *Rhodora* X, Oct. 1908, p. 186, that additional comment is unnecessary. As this species has not been previously illustrated, figures are subjoined.

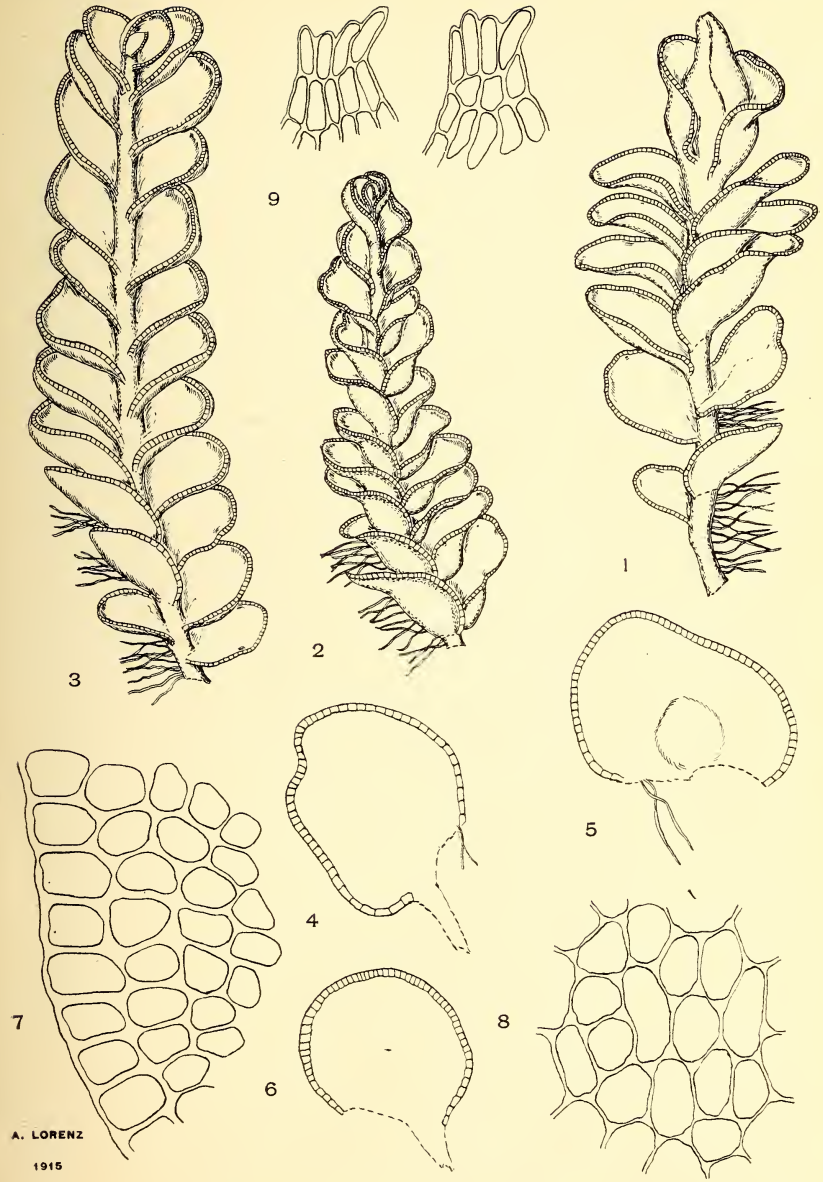
Hartford, Connecticut, November 1915.

Explanation of Plate II

Nardia crenuliformis (Aust.) Lindb.

All figures drawn from living material from South Glastonbury, Conn.

1. Plant with perianth, x 45.
2. Antheridial plant, x 45.
3. Sterile plant, x 45.
4. Perichaetial bract, x 80.
5. Perigonial bract, x 80.
6. Leaf, x 80.
7. Cells at margin of leaf, x 570.
8. Cells at center of leaf, x 570.
9. Lobes of perianth mouth, x 570.



NARDIA CRENULIFORMIS (Austin) Lindberg

SOME BRYOLOGICAL PHOTOGRAPHS FROM NORTH WALES[1]

P. G. M. Rhodes

The bryologist will hardly find richer ground in Europe than the shady ravines which penetrate the Welsh hills. The writer recently spent a holiday in the company of Mr. D. A. Jones, the well known hepaticologist of Harlech, Merioneth, and was able to photograph some of the more interesting spots in that district. The photographs will give some idea of the rich "Atlantic" flora.

Photograph No. I. Shady siliceous rocks (western aspect) in a mountain wood in the Artro Valley, Merioneth. As a rule the dominant moss in the wood is *Isothecium myosuroides*, occurring on every rock in thick cushions. On damp rocks, such as that one shown, fine patches of *Hymenophyllum Wilsoni* are noticeable: and occasionally a magnificent mass of the still rarer *H. tunbridgense* may be seen. The most noticeable hepatics are the Plagiochilas; in the picture *P. asplenioides* and *P. spinulosa* are both seen; *Saccogyna viticulosa* is also there in dense cushions on the face of the rock, though it does not fruit in this locality. A close inspection of the tufts of moss on the rock produced the rather rare *Scapania nemorosa* var. *uliginosa* (this, of course, cannot be seen in the photograph), while the *Scapania gracilis* rivals the Plagiochilas in robustness and abundance. On the wet rocks near the mouth of the cave two Lejeuneas occur; the common *L. cavifolia* and the rarer *L. patens.*

Photograph II. Dinas River, Uchartro, Harlech. Gives a good idea of the rich moss vegetation which clothes the boulders by these mountain streams. The bulk of the moss shown is *Rhynchostegium rusciforme*, *Brachythecium plumosum*, and *Isothecium myosuroides;* on one of the boulders a patch of *Hygrohypnum eugyrium* occurs; in the crevices of the rocks and among the tufts of moss *Metzgeria conjugata* and *Lejeunea cavifolia* are found. Within a few yards of the spot shown, the rocks among which the stream flows, are covered with luxuriant masses of *Madotheca Porella.*

Photograph III. A picturesque spot at the head of Ceunant Llenyrch, a ravine running into the siliceous hills behind Harlech. The seated figures are Mr. D. A. Jones and his young son Idris. The big boulder is covered with the robust mountain variety *rivulare* of *Isothecium myosuroides.* The sandy detritus among the stones in the foreground is an excellent locality for *Scapania subalpina* and *Eucalyx obovata.* On other rocks *Rhacomitrium protensum* was noticed; and *Grimmia retracta*, so typical of the siliceous Welsh hills, occurs in black tufts everywhere on the stones.

Photograph IV. The same place, showing rocks close to waterfall. The rocks in the middle are covered with a sheet of *Hyocomium flagellare*, which fruits freely. On the left *Isothecium myosuroides rivulare* takes its place, with patches of *Brachythecium plumosum. Metzgeria conjugata* flourishes, and *Lepidozia Pearsoni* knits together the stems of more robust species with its delicate threads. Not shown in the picture, but within a few yards occur *Stere-*

[1] *See* Plate I.

SOME BRYOLOGICAL PHOTOGRAPHS FROM NORTH WALES

odon callichrous, *Plagiochila punctata*, *Adelanthus decipiens*, *Bazzania trilobata*, and *B. tricrenata*, deep masses of *Plagiochila spinulosa*, and isolated stems of *Hylocomium umbratum*. It is on such shady rocks as this that *Saccogyna viticulosa* fruits. The plant occurs in a fine patch on the rocks shown, but is sterile. It fruits, however, in the district. Lower down the valley great cushions of *Sphagnum* strike the attention, chiefly *S. rubellum* and *S. molluscum*. *Leucobryum glaucum*, everywhere common in North Wales, is here found fruiting; and on the trunks of the conifers yellowish patches may be seen, which are formed by *Microlejeunea ulicina*. *Breutelia* is abundant, and Mr. Jones pointed out fruiting specimens, on a wall near the ravine.

Should any bryologist wish to study the Atlantic bryophytic flora at first hand, he could hardly do better than make a stay at Harlech, where he will receive a welcome and every assistance from Mr. Jones.

Edgbaston, Birmingham, England, 11 Oct., 1915.

ADDITIONS TO THE HEPATIC FLORA OF QUEBEC[1]

Alexander W. Evans

In the seventh part of Professor John Macoun's Catalogue of Canadian Plants, published at Ottawa, in 1902, sixty-three species of Hepaticae are recorded from the province of Quebec. They are the following: *Riccia arvensis*, *Ricciella fluitans* (listed as *Riccia fluitans*), *Ricciocarpus natans* (listed under the variety *terrestris*), *Neesiella rupestris* (listed as *Grimaldia rupestris*), *Conocephalum conicum*, *Preissia quadrata* (listed as *Cyathophora quadrata*), *Marchantia polymorpha*, *Riccardia latifrons* (listed as *Aneura latifrons*), *R. pinguis* (listed as *A. pinguis*), *Metzgeria myriopoda*, *Pellia epiphylla*, *Blasia pusilla*, *Fossombronia foveolata*, *Jungermannia cordifolia*, *J. pumila*, *Jamesoniella autumnalis* (listed as *Jungermannia autumnalis*), *Lophozia alpestris*, *L. attenuata*, *L. barbata*, *L. incisa*, *L. inflata*, *L. longiflora* (listed as *L. ventricosa*, var. *longiflora*), *L. Muelleri*, *L. porphyroleuca* (listed as *L. ventricosa*, var. *porphyroleuca*), *L. quinquedentata*, *L. ventricosa*, *Sphenolobus exsectus* (listed as *L. exsecta*), *S. Michauxii* (listed as *L. Michauxii*), *S. politus* (listed as *L. polita*), *S. saxicola* (listed as *L. saxicola*), *S. scitulus* (listed as *L. exsecta*, var. "*scituta*"), *Plagiochila asplenioides*, *Mylia anomala*, *M. Taylori*, *Lophocolea heterophylla* (listed also as *L. Macounii*), *Chiloscyphus rivularis* (listed as *Ch. polyanthos*, var. *rivularis*), *Geocalyx graveolens*, *Cephalozia bicuspidata*, *C. catenulata*, *C. curvifolia*, *C. fluitans*, *C. media*, *Calypogeia Trichomanis* (listed as *Kantia Trichomanis*), *Bazzania trilobata*, *Lepidozia reptans*, *Blepharostoma trichophyllum*, *Temnoma setiforme* (listed as *Blepharostoma setiforme*), *Ptilidium ciliare*, *Pt. pulcherrimum*, *Trichocolea tomentella*, *Diplophyllum taxifolium* (listed as *Diplophylleia taxifolia*), *Scapania curta*, *S. glaucocephala*, *S. irrigua*, *S. nemorosa*, *S. undulata*, *Radula complanata*, *Porella platyphylla*, *Lejeunea cavifolia*, *Frullania Asagrayana*, *F. eboracensis*, *F. Selwyniana*, and *Anthoceros Macounii*. There are perhaps eight species in this list of which the writer has seen no material from Quebec.

[1] Contribution from the Osborn Botanical Laboratory.

Only four of these, however, can be considered at all doubtful. One is *Metzgeria myriopoda*, a species with a decidedly southern range; the others are *Lophozia longiflora*, *L. Muelleri*, and *Sphenolobus scitulus*. A re-examination of Macoun's specimens of these four species is much to be desired. Since the publication of Macoun's Catalogue important collections of Quebec hepatics have been made, not only by Professor Macoun himself, but by Professor J. F. Collins, Rev. H. Dupret, Brother Victorin, and the writer. Another collection was made by Mr. J. A. Allen as long ago as 1881 but was not studied by Professor Macoun. These collections add forty-one species to those listed by Macoun. Five of the most interesting of these additions, *Clevea hyalina*, *Neesiella pilosa*, *Lophozia badensis*, *L. Hatcheri* (= *L. Baueriana*), and *Frullania Bolanderi*,[1] have already been recorded, and it is the purpose of the present paper to call attention to the others. The species are arranged according to Schiffner's system in Engler & Prantl's "Die natürlichen Pflanzenfamilien," and the only dates given are those of the earliest collections. The additions increase the total number of species known from Quebec to 104, or if the four doubtful species listed by Macoun are omitted, to 100.

1. METZGERIA FURCATA (L.) Dumort. On rocks. St. Hilaire Mountains, *Brother Victorin 30*, August, 1910; Bic, *A. W. E. 116*, *125*, *139*, *140*.

2. PELLIA NEESIANA (Gottsche) Limpr. In bogs and on moist rocks. St. Hubert, *Brother Victorin 23*, May, 1913; Bic, *A. W. E. 146*.

3. GYMNOMITRIUM CONCINNATUM (Lightf.) Nees. On rocks. Bic, *J. F. Collins 3262*, July, 1904; *A. W. E. 173;* Table-top Mountain, *J. F. Collins 4311b*.

4. GYMNOMITRIUM CORALLIOIDES Nees. On rocks. Bic, *A. W. E. 124*, *127*, *174*, August, 1915.

5. MARSUPELLA SULLIVANTII (DeNot.) Evans. On moist rocks. Table-top Mountain, *J. F. Collins 4389*, *4489*, August, 1906.

6. NARDIA CRENULATA (Sm.) Lindb. On sandy banks. Longueuil, *Brother Victorin 23*, July, 1910.

7. JUNGERMANNIA LANCEOLATA L. On shaded banks and rotten logs. Tadousac, *A. W. E. 16*, *59*, July, 1915; Bic, *A. W. E. 137*.

8. LOPHOZIA BICRENATA (Schmid.) Dumort. On shaded earth. Salmon River, *J. Macoun 8*, July, 1905; Tadousac, *A. W. E. 13*, *15*.

9. LOPHOZIA CONFERTIFOLIA Schiffn. On earth among rocks. Bic, *A. W. E. 165*, August, 1915.

10. LOPHOZIA EXCISA (Dicks.) Dumort. On shaded earth. Tadousac, *A. W. E. 14*, July, 1915.

11. LOPHOZIA FLOERKII (Web. f. & Mohr) Schiffn. On rocks. Table-top Mountain, *J. F. Collins 4387a*, *4390*, *4396a*, *4490a*, August, 1916.

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[1] See Evans, Rhodora **16:** 63. 1914 (for *Clevea hyalina*, the record being based on specimens collected by O. D. Allen on Mt. Albert, in July, 1881); Bryologist **14:** 84. 1911 (for *Neesiella pilosa*); ibid. **13:** 34. 1910 (for *Lophozia badensis);* ibid. **18:** 72. 1915 (for *Frullania Bolanderi);* also Conklin, Bryologist **15:** 12. 1912 (for *Lophozia Hatcheri*).

12. Lophozia heterocolpa (Thed.) M. A. Howe. On shaded banks and rotten logs in calcareous regions. Bic, *A. W. E. 99, 108, 109, 149, 150*, August, 1915.

13. Lophozia Kaurini (Limpr.) Steph. On moist calcareous rocks. Between Baldé and Baie des Chaleurs, Bonaventure River, *J. F. Collins 3540, 3584*, August, 1904.

14. Lophozia Kunzeana (Hüben.) Evans. On rocks. Mt. Albert, *J. F. Collins 4055c, 4083b*, July, 1906; Rigaud, *H. Dupret 7*.

15. Lophozia longidens (Lindb.) Macoun. On rocks. Tadousac, *A. W. E. 8, 80*, July, 1915; Bic, *A. W. E. 147*.

16. Lophozia lycopodioides (Wallr.) Cogn. On shaded rocks and earth. Mt. Albert, *J. F. Collins 4143*, July 1906; Table-top Mountain, *J. F. Collins 4387c, 4547, 4552, 4576a;* Bic, *A. W. E. 158, 159*.

17. Sphenolobus exsectaeformis (Breidl.) Steph. On shaded rocks, earth, and rotten logs. Sandy Bay, *J. F. Collins 4703*, August, 1906; Tadousac, *A. W. E. 5, 42;* Bic, *A. W. E. 92, 132, 151, 154*.

18. Sphenolobus Hellerianus (Nees) Steph. On rotten logs. Trail to Table-top Mountain, *J. F Collins 4259a*, July, 1906; Bic, *A. W. E. 161*.

19. Sphenolobus minutus (Crantz) Steph. On rocks. Ste. Anne des Monts River, *J. A. Allen 3*, July, 1881; *J. F. Collins 4616;* Table-top Mountain, *J. F. Collins 4784a;* St. Columbin, *Brother Victorin 17;* Tadousac, *A. W. E. 10, 68;* Bic, *A. W. E. 128, 142*.

20. Lophocolea minor Nees. On shaded rocks and banks. Montreal, *H. Dupret 13, 41*, November, 1906; Isle d'Orleans, *A. W. E. 1;* Tadousac, *A. W. E. 41;* Bic, *A. W. E. 97, 105*.

21. Chiloscyphus fragilis (Roth) Schiffn. In pools. Oka, *H. Dupret, 19*, July, 1904; Grand River, *J. F. Collins 3665*.

22. Chiloscyphus pallescens (Ehrh.) Dumort. On rotten logs. Tadousac, *A. W. E. 18*, July, 1915.

23. Harpanthus scutatus (Web. f. & Mohr) Spruce. On rotten logs. Tadousac, *A. W. E. 26*, July, 1915.

24. Cephaloziella byssacea (Roth) Warnst. On rocks and earth. Tadousac, *A. W. E. 49, 52 56*, July, 1915; Bic, *A. W. E. 168*.

25. Cephaloziella Hampeana (Nees) Schiffn. On rocks and earth. Bic, *J. F. Collins 4857*, July, 1907; Tadousac, *A. W. E. 45*.

26. Cephaloziella myriantha (Lindb.) Schiffn. On earth. Tadousac, *A. W. E. 61*, July, 1915; Bic, *A. W. E. 110*.

27. Odontoschisma denudatum (Mart.) Dumort. On rotten logs. Montmorency River, *J. Macoun 10*, July, 1905.

28. Calypogeia Neesiana (Massal. & Carest.) K. Müll. On shaded earth. Bic, *J. F. Collins 5057*, July, 1907; Oka, *H. Dupret 42, 48*.

29. Calypogeia suecica (Arn. & Perss.) K. Müll On rotten logs. Ste. Anne des Monts River, *J. F. Collins 4622*, August, 1906.

30. Bazzania tricrenata (Wahl.) Trevis. On rocks. Mt. Albert, *J. A. Allen 27*, July, 1881; *J. F. Collins 4202;* Percé, *J. F. Collins 3728a*.

31. Scapania paludicola Kaalaas & K. Müll. In peat bogs. St. Hubert, *Brother Victorin 1, 22*, August, 1909.

32. Scapania subalpina (Nees) Dumort. On rocks. Table-top Mountain, *J. F. Collins 4487*, August, 1906.

33. Scapania umbrosa (Schrad.) Dumort. On rotten logs. Tadousac, *A. W. E. 24, July, 1915*.

34. Porella pinnata L. In running water. Montmorency River, *J. Macoun 7*, June, 1905.

35. Frullania Oakesiana Aust. On trees and rocks. Seal Cove River, Douglastown, *J. F. Collins 3797*, August, 1904; Tadousac, *A. W. E. 74, 75*.

If the four doubtful species in Macoun's Catalogue are excluded it will be seen that all the Quebec species occur also in New England, with the exception of the following three: *Sphenolobus politus*, *S. saxicola*, and *Frullania Bolanderi*. It is probable, in fact, that most of the other species now known from Maine, New Hampshire, and Vermont await discovery in Quebec. Whether the more northern types, known from Arctic America, Yukon, and Alaska, are likewise to be expected is, of course, uncertain. The occurrence of such species as *Gymnomitrium concinnatum* and *G. corallioides* at Bic, almost at the sea level, is perhaps an indication that other alpine and artic forms may reach the shores of the St. Lawrence nearer its mouth, but there is no definite evidence as yet to support this idea. According to our present information no exclusively arctic types are known from Quebec, and its hepatic flora might be described as north temperate in character.

When compared with the flora of Europe the only distinctive elements are the five species of *Frullania*, *F. Asagrayana*, *F. Bolanderi*, *F. eboracensis*, *F. Oakesiana*, and *F. Selwyniana;* and the known range of *F. Bolanderi*, as has recently been noted, stretches across North America to the Pacific Coast with an extension to the island of Saghalin in eastern Asia. Possibly the high ratio of endemic species in *Frullania* is associated with the fact that the genus is apparently tropical in origin and comparatively modern.

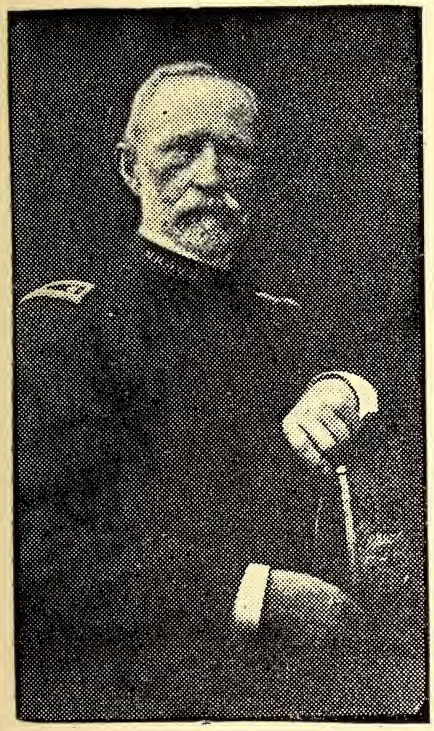
Sheffield Scientific School, Yale University

DR. HERMANN EDWARD HASSE

Charles C. Plitt

In the death of Dr. Hasse, October 29, 1915, lichenology has lost one of its ablest, most enthusiastic, scholarly, and conscientious workers. He was born January 12, 1836, in Freiburg, Saxony. At the age of 9 years he emigrated with his parents to Milwaukee, Wisconsin, where they established their home. Political discontent was the cause of the emigration. The father, Judge Carl E. Hasse, brought with him a fine library, and the boy grew up in an atmosphere of intelligence. He received his education in the public school. Later, having

decided to become a surgeon, he attended a medical school in St. Louis. Graduating at the medical school at the age of 21, he continued his studies in Europe. He studied at the University of Leipzig, Germany, from 1857 to 1860, then at Prague, Bohemia, and at the University of Wurzburg, Germany, where the degree of Doctor of Medicine was conferred upon him in 1861.



Hermann Edward Hasse
(Cut loaned by F. T. Andrae)

He then returned to Milwaukee, enlisted, and was commissioned as second assistant surgeon in the Ninth Wisconsin Volunteer Infantry. In 1862 he was promoted, becoming surgeon of the Twenty-fourth Wisconsin Volunteer Infantry. The next four years he spent in active service with his regiment, taking part in many notable battles and campaigns.

After the war, he entered private practice in Milwaukee. Later, in search for a milder climate, he practised his profession also in Arkansas and Missouri. In 1885 he went with his family to Los Angeles, where he practised until 1888, when he accepted appointment as chief surgeon at the newly-founded Soldiers' Home near Santa Monica. He retained this position seventeen years.

In 1905 he resigned from his position at the Home, and from all active practice, devoting his time almost wholly to botany, especially to the study of Lichens.

Dr. Hasse was of a very retiring disposition; he was always a lover of the great out-door world. His Civil War diary shows him already interested in botany, but it was not until 1880 that he began collecting an herbarium. This herbarium he sold later to Columbia University, just prior to his specializing in Lichens. His lichenological studies were made during the last twenty years of his life. His vacations (while surgeon at Soldiers' Home) were invariably spent "browsing" in the hills and canyons, or exploring some of the islands near his home, in search of specimens. His repeated visits to out-of-the-way haunts resulted in establishing a friendship with many a recluse, an isolated fisherman, or a lonely shepherd. On the other hand, it was with the greatest difficulty

that he could be dragged to even the most informal social affairs by his family. He derived the keenest pleasure from his botanical correspondence and seemed to feel his lichen friendships were a haven and refuge from all the sordid and petty insincerities of common day dealings. He detested "bluff" and insincerity and was very quick to detect the hypocrisies of ordinary social intercourse. The old soldiers cherished a warm affection for him—"the old Dutch Doc"—feeling sure of his absolute sincerity in caring for their interests. How keenly the city of Santa Monica felt the loss of their old doctor was beautifully shown on the day of his funeral by the lowering of the city flag to half mast in his memory. This tribute is the more interesting when it is borne in mind that Dr. Hasse had practically no conception of "politics," and had never been "prominent" in the usually accepted meaning of this word. It was an unlooked for tribute to his quarter century of being a good neighbor in the fullest sense.

Possibly the only papers ever written by Dr. Hasse besides his "The Lichen Flora of Southern California" are his articles in the BRYOLOGIST, nearly all also on Southern California lichens. It is gratifying to learn that these, along with other notes on the lichens of this part of California, are likely to be published—possibly in the form of a supplementary bulletin.

He became a member of the Sullivant Moss Society in 1905; in 1913 he became curator of the Society's Lichen Herbarium. During the three years while he was its curator 1120 additional specimens were added to the herbarium; of this number 397 are from Southern California, collected by Doctor Hasse himself. During his twenty years of lichen study Doctor Hasse discovered many a new and undescribed specimen; many of them were described by himself, but quite a number were named for him, and the specific name "*hassei*" can be observed in a number of California specimens. Dr. Zahlbruckner further honored him by naming a new genus of lichens—*Hassea*.

Besides being a member of the Sullivant Moss Society he was also a member of the Sierra Club and of the Southern California Academy of Sciences.

Dr. Hasse left behind him a fine library consisting of medical and botanical works, and quite a large herbarium.[1] It would indeed be fortunate for Southern California if this fine collection could be kept intact and retained in that part of the state. The botanical works are in the main lichenological.

Following is a list of Dr. Hasse's writings, as far as known:

List of the Lichens of Los Angeles County, California. Erythea, March, 1895.

Supplementary List of the Lichens of Los Angeles County, California.

The Lichen Flora of Southern California—Contributions, U. S. National Herbarium. Vol. XVII, Part 1, 1913.

Additions to the Lichen Flora of Southern California.—BRYOLOGIST XI, 1908, pp. 6–7.

Same title, No. 2. BRYOLOGIST XII, 1909, pp. 101–104.

Same title, No. 3. BRYOLOGIST XIII, 1910, pp. 60–62.

[1] Dr. Hasse's herbarium has been recently purchased by Harvard University.

Same title, No. 4. Bryologist XIII, 1910, pp. 111–112.
Same title, No. 5 Bryologist XIV, 1911, pp. 2–4.
Same title, No. 6. Bryologist XIV, 1911, pp. 100–102.
Same title, No. 7. Bryologist XV, 1912, pp. 45–48.
Same title, No. 8. Bryologist XVI, 1913, pp. 1–2.

A New *Reinkella* from Mexico—*R. Parishii* Hasse. Bryologist XVII, 1914, pp. 45–46.

Addition to the Lichen Flora of Southern California. No. 9. Bryologist XVII, 1914, pp. 61–63.

A New Species of Blastenia. Bryologist XVII, 1914, p. 92.

Additions to the Lichen Flora of Southern California. No. 10. Bryologist, XVIII, 1915, pp. 22–23.

Same title, No. 11. Bryologist XVIII, 1915, pp. 76–78. 92–94.

Dr. Hasse lived with his wife at his home in Santa Monica, where death came after a short illness. Besides his widow five children survive.

Baltimore, Md., Dec. 11, 1915

SHORTER NOTES

The mosses that the late John B. Leiberg collected in the Philippines and in Hawaii are enumerated in the Torrey Bulletin for October[1] last. The list includes 57 species from the Philippines with three new species and one new combination, while of the three Hawaiian species listed two are new.

In the same issue of the Bulletin, R. Heber Howe, Jr.[2] gives a descriptive list with keys, historical notes, and ranges of the three species of *Teloschistes* recognized. The same author has also recently published a study of the genus Cetraria[3] containing descriptions of six species, key, synonomy, and maps illustrative of the distribution.

We have already had occasion to mention the series of studies upon the Norse mosses that are being issued by Dr. Hagen of the Natural History Museum at Trondhjem. The latest one to arrive contains an account of the Polytrichaceae[4] which is of especial interest to North American students on account of the many species common to the two regions. All critical notes, of which there are many, are in French which greatly facilitates reference. There is an account of the morphological peculiarities of the family, with especial reference to the epiphragm and peristome, followed by keys and descriptive matter for

[1] R. S. Williams. Mosses of the Philippine and Hawaiian Islands collected by the late John B. Leiberg. Bull. Torrey Bot. Club. **42**: 571–577. (1915).

[2] R. Heber Howe, Jr. The Genus Teloschistes in North America. Bull. Torrey Club. **42**: 579–583. *figs. 1, 2.* (1915).

[3] R. Heber Howe, Jr. The Genus Cetraria as represented in the United States and Canada. Torreya. **15**: 213–230. *figs. 1–10.* (1915).

[4] Forarbejer til en Norsk Lövmosflora. xix. Polytrichaceae. Kgl. Norsk Vidensk. sels. Skrifter. 1913. No. 1. pages 1–77. *figs. 1, 2.* (Oct. 10, 1914).

all genera and species. In *Psilopilum* there is a discussion of the two species *P. tschuctschicum* and *P. laevigatum* with their varieties, *Oligotrichum incurvum* var. *latifolium* Frye is reduced to a synonym of the former species; vars. *hymenocarpum* and *aloma* of *P. tschuctschicum* are described as new, both occurring in Greenland and the latter also on St. Paul's Island. *Oligotrichum incurvum* Fryė (non Lindb.) is described as var. *brevifolium* Hagen under *O. incurvum* Lindb. *Pogonatum alpinum* is placed under *Polytrichum;* the remaining species are *P. polytrichoides* (L.) Brockm., (*P. nanum* Beauv.); *P. mnioides* (Neck.) Hagen (*P. aloides* Beauv.); *P. dentatum* var. *minus* (Wahl.) Hagen; and *P. urnigerum* Beauv. A very complete account is given of *P. dentatum* var. *minus*, which is considered as synonymous with *P. longidens* Aongs. and *Polytrichum Wahlenbergii* Kindb. Attention should also be called to a new variety of *Polyticum alpinum*, var. *propinquum* Hagen, from Melville Island, and to the extended account of *Polytrichum Jensenii* Hagen. *P. inconstans* is considered a synonym of *P. Swarzii* var. *nigrescens* (Warnst.) Hagen.

E. B. C.

Members of the Sullivant Moss Society will learn with sorrow of the death on September 18th last of Miss Jane Wheeler, of Albany, N. Y., for more than twelve years a member of the Society and keenly interested in its work. She was a lover of outdoor life and of all that is included in that term. Her summers were usually spent in the open country or at the seashore, and she had an intimate and exact knowledge of birds, trees, flowers, ferns, seaweeds, and mosses, which gave her great delight and satisfaction, making her an authority among those less well informed and observant. Under the shade of the graceful elms at Malden's Bridge, where she had spent many summers, she passed away as gently as she had always lived. She was a woman of rare fineness of spirit and mind. An invalid for many years, her ill health stood in the way of much that she would otherwise have done gladly and efficiently.

H. W.

EXCHANGE DEPARTMENT

Offerings—To Members only, for return postage (2 cents)

Mr. Roy Latham, Orient, Long Island, N. Y.—*Cladonia alpestris* (L.) Rabenh.

Mr. Charles C. Plitt, 3933 Lowndes Ave., Baltimore, Md.—*Ochrolechia pallescens* (L.) Mass.

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

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NOTES ON FUNARIA

E. J. HILL

In Grout's "Mosses with Hand-lens and Microscope" it is stated that *Funaria americana* Lindb. had been collected in but five or six localities as far as recorded at the time of publication of that work. The states in which it occurred are given as Pennsylvania, Ohio, Georgia, and Minnesota. To thees Illinois can now be added. In April, 1903, I found it growing in the thin soil that caps a low cliff of limestone opposite the village of Lemont. The next month it was found again on the soil which lodges in crevices and on narrow shelves of the face of the cliff. In the summer of 1904 I came across it once more under similar conditions of growth on a cliff about a mile northwest of the village of Lockport. These stations are all on the west side of the Des Plaines River, the one at Lockport six miles below those at Lemont. The cliffs are remnants of the old banks of the river when the water of the upper lakes flowed southward to the Mississippi through the Chicago Outlet, and lie at some distance from its present channel. No similar outcrops of cliff-like structure are found between the two localities.

The moss is a small one, hardly looking like a Funaria. The stems are 2–5 mm. high, but the greatest unlikeness in size, as compared with the common Cord-moss, is in the length of the seta, which in fruiting examples in my collections is from 2 to 12 mm. high. Is is gregarious; or the stems may be more crowded, forming more or less caespitose tufts, sometimes mixed with other mosses. The habitat is well exposed to the sun's rays, becoming very dry in summer, making the moss a pronounced xerophyte. The hepatic, *Reboulia hemispherica*, is associated with it or grows under the same conditions, taking on a very xerophytic form, its parts much curled or becoming almost tubulose from the upward curling of their margins. Like *Grimaldia fragrans* (Balb.) Corda, which grows on the cliff at Lemont, *Funaria americana* is not attached to the underlying rocks, but roots in the thin soil that finds a resting place upon them.

This species is one of the earliest fruiting mosses of spring, the sporophyte starting in March, probably as soon as the days become warm enough, and ripening its spores the last of April or in May in this latitude. Specimens taken at the Lockport station April 6, 1908, mostly retained the calyptras, but some capsules were quite well advanced. The year after finding it there it was examined for fruit April 29. The opercula were mostly in place, but some had fallen off and the moss had begun to shed its spores. In those first found at Lemont, April 16, 1903, the hoods were generally gone, but the capsules mostly

The March number of the BRYOLOGIST was published April 25, 1916.

nearly grown. On May 6 they had lost the opercula in many cases and were freely shedding their spores. This early fruiting during the moisture of spring is an advantage to a moss growing under conditions so xerophytic. Yet the empty capsules persist far into the summer, as is shown in examples of those first found at Lockport, August 2, 1904. The urn was quite well preserved but the long rugulose neck and smooth or smoothish upper part, as well as the leaves, served to identify it. On some capsules even a few teeth remained.

Funaria flavicans Michx.

Several years ago I had a station for this species at Pine, Lake County, Indiana, close to the south end of Lake Michigan. This has now been destroyed by the encroachments of railway tracks and industrial works, which have so greatly multiplied in this region. The moss was first detected June 3, 1898. It grew in moist sands bordering a shallow slough. Such sloughs are common in this part of the dune area. Some capsules were ripe and were shedding their spores, others still retained the opercula, one occasionally even the calyptra, but the mass of them was full grown. The time of ripening can, therefore, be placed in the latter part of May and the first half of June, or one or two weeks earlier than that of *F. hygrometrica* in this latitude. The stems, 2–6 mm. high, formed little tufts or were loosely caespitose. The seta was shorter than the average in the common Cord-moss, being 2–3 cm. high, and it was not mixed with that species. The nearly horizontal or slightly nodding capsule, the urn less furrowed and with a less oblique mouth, the low, barely apiculate lid, the larger smooth spores, 22–28μ in diameter, served to distinguish it from *F. hygrometrica*, with which it is most likely to be confounded. The spores of the latter I find 14–18μ, finely granulose or warty. Those of *F. americana* are about the size of those of *F. flavicans*, but are finely papillose. Though the operculum of *F. flavicans* is smaller than that of *F. hygrometrica*, its narrower capsule when old and de-operculate often presents a relatively wider and more open mouth than that of the latter.

There is also a character of the peristome which, if as common as in these I studied, must serve as a good distinction. The inner peristome in all that were examined was found but partly developed, ¼–⅓ as high as the teeth, each part forming a blunt process opposite a tooth. In the description in Sullivant's "Icones Muscorum," page 87, nothing is said of the extent of their development, "processibus dentibus oppositis luteis," being the characterization, color and position only being mentioned. In the illustrative plate, Table 53, Fig. 14, they appear to be shown about as I find them, being seen in the figure by the margins of the teeth at their base. This is quite in contrast with the corresponding parts of *F. hygrometrica*, in which they are well developed, long and pointed or lanceolate-subulate, and about ⅔ the height of the teeth.

Funaria flavicans is a species mainly of southern range, and the station at the head of Lake Michigan must be well towards its northern extension. This is somewhat further north than Bedford Park, New York City, mentioned by R. S. Williams in The Bryologist (4:9. 1901.) or Closter, N. J., where it is said

to have been collected by Austin. The most northerly station for which I find a report is Buffalo, N. Y., where it was obtained by Judge George W. Clinton, and is given as "rare" in David F. Day's "Catalogue of the Plants of Buffalo and Vicinity," published at Buffalo in 1883. As I have not come upon it again anywhere in the Chicago region, it must be considered rare also for this locality.

Chicago, Illinois.

TWO EXTENSIONS OF RANGE

A. LeRoy Andrews

Since the appearance of the first two parts of Volume 15 of *North American Flora* (1913) the two following cases of extension of range have come to my notice:

1. *Sphagnum Dusenii* Jensen. A specimen was recently received from A. Brinkman collected in a "boggy meadow" at Tetachuk Lake in British Columbia, September 1, 1911. It represents a very considerable extension of range to the westward, though one that might have been expected. The species is a fairly well marked one, but of uncommon occurrence. Its tendencies are northern and it is one of the lesser number that appear to thrive rather better inland than along the coast. The finding of it by Nichols at Salisbury, Connecticut, in 1907[1] sets a remarkable southern record. In New York State the southern outpost seems to be Sand Lake not far from Albany, where it was collected at an early date by Peck.[2] This was in fact its first discovery in America, but its identity remained a puzzle to our older bryologists.[3] As its southern limits figure next northern Michigan, also Wisconsin as reported by Cheney,[4] while further stations to the westward may be looked for.

2. *Rhabdoweisia crispata* (Dickson) Kindberg. Mr. Williams gives as the southern limit of this species in the Alleghanies, Virginia. Professor Atkinson's collections of 1901 from North Carolina show it however from two localities in that state: Blowing Rock (No. 10983) and Grandfather Mountain (No. 11606). Such extension was of course probable and it will very likely be found still further south in the mountains. It is in fact apparently not the first time that the plant has been collected in North Carolina, as I note Evans and Nichols in their Bryophytes of Connecticut[5] give its range southward to North Carolina. Dr. Nichols informs me that this record was based upon the label of No. 56 of the second edition of Sullivant and Lesquereux' Musci bor. Amer., which reads: Hab. in Novae Angliae Montibus Albis (Oakes); etiam in summo cacumine Black montis Carolinae Sept.,[6] meaning then either that this number was made up partly of

[1] Evans and Nichols, Bryophytes of Connecticut, 83. 1908.

[2] A duplicate from the State Museum at Albany bears the date, July, 1867.

[3] It was not clearly recognized as a separate species in Europe until 1890.

[4] Transactions of the Wisconsin Acad. of Sc., Arts and Lett., X, 68. 1895.

[5] P. 99. 1908.

[6] No. 43 of the first edition bore the same label.

specimens from the North Carolina locality or that the editors knew it from that locality as well as from the other from which they distributed it. Professor Farlow informs me that the Sullivant Herbarium does in fact contain a specimen labelled "*Weissia fugax*, in montibus Carolinae Septentrionalis, leg. A. Gray & J. Carey, July 1841." This specimen I have not seen, but I would agree entirely with Mr. Williams that all specimens from our eastern states which I have seen belong with *R. crispata* rather than *R. fugax*.

Ithaca, N. Y.

THE BRYOPHYTES OF NOVA SCOTIA, WITH SPECIAL REFERENCE TO CAPE BRETON[1]

George E. Nichols

Cape Breton, projecting so far out into the Atlantic that the distance to the west coast of Ireland is less by a thousand miles than from New York, has sometimes been referred to as "the long wharf of Canada." Politically it is a part of the province of Nova Scotia, but geographically it is separated from the mainland by the Gut of Canso, a narrow strait about a mile in breadth. Although it has been visited by several botanists in recent years, very few additions appear to have been made to the list of bryophytes recorded from this region in Macoun's catalogue.[2] During a short trip to Cape Breton in 1909 the writer collected a number of liverworts and mosses not before recorded from there, and this number has been considerably augmented on two subsequent trips, in 1914 and 1915, when about four months were spent in botanical investigations. The primary object of the present paper is to present a list of the various species collected in Cape Breton by the writer. Incidentally it has seemed worth while to summarize briefly all previous records, so far as known to the writer, concerning Cape Breton bryophytes, and to include some account of the brypohytes of other parts of Nova Scotia. For the sake of convenience the term Nova Scotia will be used to embrace only parts of the province outside of Cape Breton. In order to economize space the following system of symbols has been adopted. An asterisk (*) placed after a species indicates, "collected in Cape Breton by the writer also"; a dagger (†), "recorded from Nova Scotia in Macoun's catalogue"; a double dagger (‡), "represented from Nova Scotia by a specimen either in the herbarium of Yale University or in the herbarium of New York Botanical Garden, but not recorded by Macoun"; a question mark [?], "some doubt as to identity of specimens on which record was based."

For assistance in the determination of various species, indebtedness is acknowledged to the following bryologists: Mrs. Elizabeth G. Britton, Professor Alexander W. Evans, Mr. Robert S. Williams, Professor A. LeRoy Andrews, Dr. Abel J. Grout, Dr. George N. Best, Dr. Carl Warnstorf, Dr. Ingebrigt S. Hagen and Dr. Leopold Loeske.

[1] Contribution from the Osborn Botanical Laboratory.

[2] Catalogue of Canadian Plants: Part 6, Montreal, 1892; Part 7, Ottawa, 1902.

1. Species Recorded from Cape Breton by Macoun

Below is a list of the bryophytes recorded from Cape Breton in Macoun's catalogue. Liverworts: *Conocephalum conicum**‡, *Preissia quadrata**† (as *Cyathophora*), *Marchantia polymorpha**†, *Riccardia latifrons**‡, (as *Aneura*), *Pellia epiphylla**†, *Blasia pusilla**‡, *Marsupella emarginata**†, *M. Sullivantii**† (as *M. sphacelata*), *Nardia crenulata**†, *Jungermannia cordifolia**, *J. lanceolata*, *Jamesoniella autumnalis**†, (as *Jungermannia*), *Lophozia attenuata**†, *L. barbata**‡, *L. incisa**†, *L. inflata**†, *L. longidens**, *L. quinquedentata**, *L. ventricosa**, *Sphenolobus minutus** (as *Lophozia*), *Plagiochila asplenioides**†, *Mylia Taylori**†, *Lophocolea heterophylla**‡, *Chiloscyphus rivularis**‡ (as *C. polyanthos*), *Harpanthus scutatus**†, *Geocalyx graveolens**†, *Cephalozia bicuspidata**†, *C. catenulata**†, *C. curvifolia**†, *C. media**†, *Odontoschisma denudatum*†, *O. Sphagni*, *Calypogeia Trichomanis**‡ (as *Kantia*), *Bazzania tricrenata**† (as *B. triangularis*), *B. trilobata**†, *Lepidozia reptans**†, *Blepharostoma trichophyllum**†, *Ptilidium ciliare**‡, *Diplophyllum albicans**† (as *Diplophylleia*), *D. taxifolium**† (as *Diplophylleia*), *Scapania nemorosa**† (also as *S. gracilis*), *S. undulata**†, *Radula complanata**‡, *Porella platyphylla**†, *Lejeunea patens**, *Frullania Asagrayana**†, *F. eboracensis**†, *F. Oakesiana**, *F. Tamarisci**‡. Mosses: *Sphnagnum imbricatum**, *S. Pylaesii**, *Andreaea petrophila**†, *Trematodon ambiguus**†, *Swartzia montana** (as *Distichium capillaceum*), *Trichodon tenuifolius* [?] (as *T. cylindricus*), *Ceratodon purpureus**†, *Ditrichum flexicaule*, *D. heteromallum* (as *D. homomallum*), *D. lineare** (as *D. vaginans*), *Blindia acuta**, *Dicranella heteromalla**†, *D. pusilla** (as *D. cerviculata*), *D. squarrosa**, *Oncophorus Wahlenbergii**†, *Dicranum Bergeri**†, *D. flagellare**, *D. fulvum*† (also listed as *D. viride**), *D. fuscescens**† (listed also as *D. congestum*, *D. crispulum*, and *D. sulcatum*), *D. longifolium**, *D. majus**, *D. rugosum**‡ (as *D. undulatum*), *D. scoparium**† (also listed as *D. canadense*), *D. spurium**† († also as *D. brachycaulon*), *Dicranodontium denudatum* [?] (as *D. longirostre*), *Dichodontium pellucidum**, *Leucobryum glaucum**† (as *L. vulgare*), *Fissidens adiantoides**†, *F. cristatus* (as *F. decipiens*), *F. osmundioides**†, *Gymnostomum calcareum*†, *Gyroweisia pusilla* [?] (as *Gymnostomum*), *Leptodontium excelsus* (as *Amphoridium Sullivantii*), *Tortella tortuosa** (as *Barbula*), *Didymodon rubellus**†, *Barbula unguiculata*†, *Encalypta contorta* (as *E. streptocarpa*), *Grimmia apocarpa**†, *G. gracilis*, *Racomitrium aciculare**†, *R. canescens**, *R. fasciculare**, *R. hypnoides**† (also as *R. lanuginosum*), *R. microcarpum*†, *Anoectangium lapponicum**† (as *Amphoridium*), *A. Mougeotii* (as *Amphoridium*), *Orthotrichum affine**, *O. fastigiatum*, *O. obtusifolium*†, *O. rupestre*, *Ulota Drummondii*, *U. intermedia*, *U. Ludwigii**†, *U. maritima*, *U. phyllantha*†, *U. ulophylla**† (as *U. crispa*), *Tayloria tenuis*†, *Tetraplodon australis*, *Splachnum ampullaceum*†, *Funaria hygrometrica**†, *Leptobryum pyriforme**†, *Pohlia cruda**† (as *Webera*), *Bryum acutiusculum*, *B. pallens*, *B. pallescens**, *B. ventricosum** (as *B. pseudotriquetrum*), *Mnium affine*†, *M. ciliare**, *M. Drummondii*†, *M. hornum**†, *M. hymenophylloides*†, *M. punctatum**†, *M. stellare*, *Aulacomnium palustre**†, *Plagiopus Oederi**† (as *Bartramia*), *Bartramia crispa*, *Philonotis fontana**†, *Hedwigia albicans**† (as *H. ciliata*), *Fontinalis dalecarlica**†, *F. gigantea**†, *F. Delamarei**, *F. seriata*,

Neckera complanata†, *N. pennata**†, *Homalia Jamesii*†, *Pylaisia polyantha*, *P. polyantha pseudo-plätygyrium* (as *P. pseudo-platygyrium*), *P. Schimperi*† (as *P. intricata*), *Pterygynandrum decipiens*, *Myurella gracilis**† (as *M. Careyana*), *Anomodon attenuatus**†, *A. viticulosus*, *Thuidium Philiberti*, *Amblystegium fluviatile*, *A. varium*† (as *A. porphyrhizon*), *Drepanocladus Sendtneri* (as *Hypnum*), *Hypnum* (*Drepanocladus*) *pseudolycopodioides*, *Hypnum* (*Drepanocladus*) *Moseri*, *Calliergon cordifolium**† (as *Hypnum*), *C. stramineum** (as *Hypnum*), *Acrocladium cuspidatum** (as *Hypnum*), *Hygrohypnum eugyrium**† (as *Hypnum*), *H. ochraceum**† (as *Hypnum*), *Hypnum* (*Chrysohypnum*) *sinuolatum*, *Hylocomium brevirostre**†, *H. umbratum**†, *Rhytidiadelphus loreus**† (as *Hylocomium*), *R. squarrosus**† (as *Hylocomium*), *Stereodon canariensis* (as *Hypnum Waghornei*), *S. fertilis** (as *Hypnum*), *S. imponens**† (as *Hypnum*), *Hypnum* (*Stereodon*) *molluscoides*, *Plagiothecium aciculari-pungens*†, *P. denticulatum**†, *P. striatellum**† (as *P. Muhlenbeckii*), *Sematophyllum delicatulum* (as *Raphidostegium laxepatulum* (also as *R. Roellii* and *R. Whitei*), *Brachythecium digastrum*, *B. glaciale* (as *Eurynchium*), *B. plumosum**†, *B. populeum**†, *B. reflexum**, *B. rivulare**, *B. salebrosum**†, *Oxyrrhynchium rusciforme**† (as *Eurynchium*), *Webera sessilis**† (as *Diphyscium foliosum*), *Georgia geniculata**, *G. pellucida**†, *Catharinaea Haussknechtii* [?] (as *Atrichum*), *C. Selwyni* [?] (as *Atrichum*), *Polytrichum alpinum**‡ (as *Pogonatum*), *Polytrichum ohioense**, *Pogonatum tenue**† (as *P. brevicaule*), *P. urnigerum**†.

2. Species Since Recorded from Cape Breton

The following bryophytes have been recorded from Cape Breton since the publication of Macoun's catalogue: *Metzgeria furcata***,[1] *Nardia scalaris**,[2] *Cephalozia Francisci***,[3] *C. leucantha***,[3] *Hygrobiella laxifolia***,[3] *Sphagnum palustre**,[4] *Gymnostomum rupestre**,[4] *Philonotis americana***‡,[5] *Anacamptodon splachnoides***,[6] *Stereodon curvifolius**[4] (as *Hypnum*) and *Polytrichum commune**.[4] Cape Breton records for double starred (**) species are based on the writer's specimens.

3. Species New to Cape Breton

The writer's explorations have been confined to the northernmost portion of Cape Breton. With the exception of Cape Dauphin (in Cape Breton County), all stations cited for specimens collected by the writer are situated in that part of Victoria County lying north of North River. This area is one of varied topography and geological diversity. The interior is mountainous and in places the mountains form massive promontories along the coast. Elsewhere the shore is bordered by a narrow strip of flatter land averaging less than a mile

[1] A. W. Evans, Rhodora **11**: 186. 1909.
[2] A. W. Evans, Rhodora **14**: 12. 1912.
[3] A. W. Evans, Bryologist **18**: 83. 1915.
[4] C. B. Robinson, Bull. Pictou Acad. Sci. Asso. **1**: 32. 1907.
[5] G. Dismier, Bull. Soc. Bot. France **57**: 22. 1910.
[6] G. E. Nichols. Rhodora **13**: 46. 1911.

in width but locally extending inland for several miles. Along the coast are occasional outcrops of dolomite, and extensive beds of gypsum occur in many localities. With these exceptions the rocks are predominantly potassic. For the most part the calcareous rocks are dry or otherwise unfavorable for the growth of bryophytes, so that comparatively few strictly calciphilous species have been found. The general vegetational features of this region are to be discussed in a forthcoming paper. Suffice it to state here that, except on the mountains where there are extensive heath-like "barrens," the country is forested with a mixture of coniferous and deciduous types. Some of the localities mentioned in the subtended list require brief definition. "Barrasois" includes the area within a radius of five miles of the mouth of Indian Brook. A large proportion of the specimens so designated came from the valley of the Barrasois River. Similarly, "Ingonish" includes the area within a radius of five miles north and west of South Bay, Ingonish; and "Aspy Bay" embraces the area within a radius of five miles of Dingwall, on Aspy Bay. "Barrasois barrens" refers to a large barren about eight miles northwest of the mouth of Indian Brook—locally known as Scotchman's Barren. "Ingonish barrens" include a series of barrens from eight to twelve miles west (approximately) of South Bay, Ingonish. "Ingonish mountains" include the mountains between these barrens and the settlement at South Bay. "Aspy Bay barrens" refer to barrens about seven miles west-southwest of Dingwall. "Aspy Bay mountains" are in the vicinity of these barrens. The numbers cited under the various species refer to specimens preserved in the herbarium of Yale University. Specimens numbered *091–09180* were collected in 1909, *1–1050* in 1914, and *1101–1750* in 1915. Liverworts collected in 1909 (and so cited) were not numbered. The list of species new to Cape Breton is as follows:

LIVERWORTS

1. RICCARDIA MULTIFIDA (L.) S. F. Gray.‡ Barrasois *1334b*, *1446*, *1449b*.

2. RICCARDIA PINGUIS (L.) S. F. Gray. Barrasois *1203*, *1204*.

3. RICCARDIA SINUATA (Dicks.) Trevis. Barrasois *199;* Ingonish barrens *789*, *840*, *1665*.

4. PALLAVICINIA LYELLII (Hook.) S. F. Gray. Barrasois *1169;* Ingonish mountains *796*, *1657;* Ingonish barrens *1637*, *1660;* Aspy Bay *968*.

5. PELLIA FABRONIANA Raddi. Ingonish *722*.

6. PELLIA NEESIANA (Gottsche) Limpr.‡ Barrasois *1205*, *1245;* Ingonish *704*.

7. FOSSOMBRONIA FOVEOLATA Lindb. Aspy Bay *975*.

8. MARSUPELLA AQUATICA (Lindenb.) Schiffn. Barrasois *1500*.

9. MARSUPELLA USTULATA (Hüben.) Spruce. Barrasois barrens *509*.

10. NARDIA OBOVATA (Nees) Carringt. Barrasois *1269*, *1445*, *1478;* Ingonish mountains *1725*.

11. LOPHOZIA ALPESTRIS (Schleich.) Evans. Barrasois 1909, *1371*.

12. LOPHOZIA BADENSIS (Gottsche) Schiffn. Ingonish *715*.

13. LOPHOZIA BINSTEADII (Kaalaas) Evans. Barrasois *1431b*.

14. Lophozia Kaurini (Limpr.) Steph. Ingonish mountains *1722;* Aspy Bay *961*, *965*.

15. Lophozia porphyroleuca (Nees) Schiffn.‡ Barrasois 1909, *300*, *322*, *1292*, *1358*.

16. Sphenolobus exsectus (Schmid.) Steph. Barrasois 1909; collected also at Half Way Brook by *Macoun* (1898, in herb. A. W. Evans).

17. Sphenolobus Hellerianus (Nees) Steph.‡ Barrasois 1909.

18. Sphenolobus Michauxii (Web.) Steph.† (listed by Macoun under *Lophozia*). Barrasois 1909, *263*, *299*, *1549*.

19. Mylia anomala (Hook.) S. F. Gray.‡ Barrasois *1170*, *1198;* Barrasois barrens *461*, *463*, *467*, *469*, *470;* Ingonish barrens *1638*.

20. Chiloscyphus fragilis (Roth) Schiffn. Barrasois *1487;* Ingonish *1726*.

21. Chiloscyphus pallescens (Ehrh.) Dumort.‡ Barrasois 1909, *507*, *1395;* Ingonish *721;* Ingonish mountains *791;* Aspy Bay mountains *1010*.

22. Cephalozia fluitans (Nees) Spruce. Barrasois *1195*, *201;* Barrasois barrens 460; Ingonish barrens *1684;* Aspy Bay barrens *999*.

23. Cephalozia Loitlesbergeri Schiffn. Barrasois *1243b*. New to North America.

24. Cephalozia pleniceps (Aust.) Lindb.‡ Ingonish barrens *1653b*.

25. Cephaloziella byssacea (Roth) Warnst. Barrasois 1909, *1378*.

26. Odontoschisma Macounii (Aust.) Underw. Barrasois *1431a*.

27. Calypogeia fissa (L.) Raddi. Barrasois *1482*.

28. Calypogeia Neesiana (Massal. & Carest.) K. Müll. Barrasois *89*, *1449a*.

29. Calypogeia suecica (Arn. & Perss.) K. Müll. Ingonish *711*.

30. Lepidozia setacea (Web.) Mitt. Barrasois *1211;* Barrasois barrens *472*.

31. Ptilidium pulcherrimum (Web.) Hampe.‡ Barrasois 1909; also Big Intervale (*Macoun*, as *P. ciliare*), North Sydney (*Howe & Lang*).

32. Trichocolea tomentella (Ehrh.) Dumort.‡ Barrasois 1909, *639;* Aspy Bay mountains *1015*.

33. Scapania dentata Dumort. Barrasois *1397*, *1409*, *1444*.

34. Scapania Oakesii Aust. Barrasois *294*.

35. Scapania paludicola Loeske & K. Müll. Barrasois *213*.

36. Scapania subalpina (Nees) Dumort. Barrasois 1909, *1370*, *1405*.

37. Scapania umbrosa (Schrad.) Dumort. Barrasois 1909, *634;* Ingonish barrens *833 b*.

38. Lejeunea cavifolia (Ehrh.) Lindb.‡ Barrasois 1909, *273*, *640*, *1136*, *1273*, *1319*, *1346*, *1349*, *1354*, *1472*. Mount Smoky *739*.

39. Anthoceros punctatus L.† Barrasois 1909.

Mosses

40. Sphagnum capillaceum (Weiss) Schrank.† *S. acutifolium* Ehrh. Barrasois *200*, *1234;* Ingonish barrens *834*. The Cape Breton specimens belong to

var. *tenellum* (Schimp.) A. L. Andrews, which is also recorded by Macoun from Nova Scotia (as *S. tenellum rubellum*).

41. Sphagnum cuspidatum Ehrh. Barrasois barrens *511*; Ingonish barrens *1676;* Aspy Bay barrens *1000*.

Var. Torreyi (Sull.) Braithw. Barrasois *1227*, *1164b;* Ingonish barrens *835*, *836*.

42. Sphagnum fuscum (Schimp.) H. Klinggr. Barrasois *1194*, *1235;* Barrasois barrens *465*, *478*, *481;* Ingonish barrens *808*, *838*, *1677;* Mount Franey *1703*.

43. Sphagnum Girgensohnii Russ. Barrasois *0925*, *1210;* Ingonish barrens *1674;* Mount Franey *1701*.

44. Sphagnum magellanicum Brid. Barrasois *1165*, *1196;* Barrasois barrens *476;* Aspy Bay barrens *999*.

45. Sphagnum papillosum Lindb.† Barrasois *206*, *1166*, *1197;* Barrasois barrens *477;* Ingonish barrens *807*, *1668*, *1669*, *1672*, *1675*.

46. Sphagnum plumulosum Röll var. flavicomans (Card.) A. L. Andrews. Barrasois barrens *480*.

47. Sphagnum pulchrum (Lindb.) Warnst. Barrasois *203;* Ingonish barrens *837*, *1671*, *1673*.

48. Sphagnum quinquefarium (Lindb.) Warnst. Barrasois *0918*, *1498*, *1499*.

49. Sphagnum recurvum Beauv.† (the Nova Scotia plants are referred to var. *amblyphyllum*). Barrasois *0920*, *1233*.

50. Sphagnum robustum (Russ.) Röll. Barrasois *0919*.

51. Sphagnum squarrosum Crome. Barrasois *0923*, *0926*.

52. Sphagnum subsecundum Nees.† *S. rufescens* Limpr. Barrasois *207*, *1433;* Mount Franey *1702*.

53. Sphagnum tenellum Pers. Ingonish barrens *1670*, *1678*.

54. Sphagnum tenerum Sull. & Lesq. Barrasois *1167;* Barrasois barrens *482;* Ingonish barrens *1667*.

55. Sphagnum teres (Schimp.) Aongstr. Barrasois *1164*.

56. Ditrichum pusillum (Hedw.) Timm.† *D. tortile* (Schrad.) Lindb. Barrasois *09157*, *627*.

57. Dicranella varia (Hedw.) Schimp.† Barrasois *09154*.

58. Oncophorus polycarpus (Hedw.) Brid. Barrasois *1461*, *1462*.

59. Dicranum Bonjeanii DeNot.† *D. subpalustre* C. Müll. & Kindb. Barrasois *190*, *191;* Indian Brook barrens *459;* Ingonish barrens *1650*.

60. Dicranum condensatum Hedw.† Ingonish barrens *818*.

61. Dicranum Drummondii C. Müll. Barrasois *196*, *1344*.

62. Dicranum montanum Hedw.† Barrasois *09156*, *197*.

63. Dicranum Muhlenbeckii Br. & Sch. Ingonish barrens *811*.

64. Weisia viridula (L.) Hedw. Barrasois *09159*.

65. Hymenostylium curvirostre (Ehrh.) Lindb. Cape Dauphin 595.

66. Encalypta ciliata (Hedw.) Hoffm. Barrasois *1470*.

67. Grimmia conferta Funck.† Barrasois *0979*.

68. Racomitrium sudeticum (Funck) Br. & Sch.† Ingonish barrens *1663b.*

69. Ulota americana (Beauv.) Limpr.† Barrasois *1345, 1574, 1577.*

70. Tetraplodon angustatus (Sw.) Br. & Sch. Ingonish barrens *827, 1632, 1640, 1680.*

71. Tetraplodon bryoides (Zoeg.) Lindb. Barrasois barrens *493;* Ingonish barrens *824, 1679, 1681.*

72. Pohlia nutans (Schreb.) Lindb.† Barrasois *09131, 09139, 1347;* Mount Franey *1705.*

73. Bryum bimum Schreb.† Aspy Bay *1044.*

74. Bryum capillare L.† Barrasois *09136* (var. *flaccidum* Br. & Sch.); Aspy Bay *1026.*

75. Bryum cyclophyllum Br. & Sch. Barrasois *1304.*

76. Bryum Duvalii Voit.† Barrasois *389.*

77. Mnium cinclidioides Hüben. Barrasois *1172*; Ingonish *717.*

78. Mnium cuspidatum (L.) Leyss.† Barrasois *0954, 1389;* Ingonish *708.*

79. Mnium marginatum (Dicks.) Beauv. Barrasois *638.*

80. Mnium medium Br. & Sch. Barrasois *0956;* Ingonish *705.*

81. Mnium orthorrhynchum Br. & Sch.† Ingonish *710.*

82. Mnium spinulosum Br. & Sch.† Barrasois *0958; 1294, 1337.*

83. Aulacomnium androgynum (L.) Schwaegr.† Barrasois *0937, 1237 1350.*

84. Bartramia pomiformis (L.) Hedw.† Barrasois *0992, 1348;* Mount Franey *1706.*

85. Philonotis marchica (Willd.) Brid. Aspy Bay mountains *1004.*

86. Fontinalis antipyretica L.† Barrasois *1207;* Ingonish *682, 723.*

87. Fontinalis biformis Sull. Barrasois *214.*

88. Fontinalis Cardoti Ren. Barrasois *1481.*

89. Fontinalis flaccida Ren. & Card. Mount Smoky *728b.*

90. Fontinalis Lescurii Sull. Ingonish *700.*

91. Fontinalis novae-angliae Sull.† Barrasois *416.*

92. Fontinalis Sullivantii Lindb. Aspy Bay mountains *1012.*

93. Dichelyma capillaceum (L.) Schimp. Barrasois *1171.*

94. Leucodon sciuroides (L.) Schwaegr. Barrasois *0994, 1332;* Ingonish *917.*

95. Pylaisia intricata (Hedw.) Ren. & Card. (*P. velutina* Schimp.). Barrasois *1484, 1537.*

96. Ptergynandrum filiforme (Timm) Hedw. Barrasois *394, 631, 1291, 1375, 1402, 1403.*

97. Heterocladium squarrosulum (Voit) Lindb. Barrasois *0950, 0964, 0965, 1105, 1400, 1460, 1540;* Mount Smoky *735*; Ingonish *707;* Aspy Bay *1048.*

98. Myurella julacea (Vill.) Br. & Sch. Cape Dauphin *599.*

99. Anomodon rostratus (Hedw.) Schimp.† Ingonish *706.*

100. Leskeella nervosa (Schwaegr.) Loeske. Barrasois *0966, 385.*

101. Thuidium abietinum (L.) Br. & Sch.† Barrasois *0963.*

102. THUIDIUM DELICATULUM (L.) Br. & Sch.† Barrasois *0962, 93, 315, 1396.*

103. THUIDIUM RECOGNITUM (Hedw.) Lindb.† Barrasois *0961.*

104. ELODIUM BLANDOWII (Web. f. & Mohr) Broth.† *Thuidium Blandowii* Br. & Sch. Aspy Bay *972.*

105. AMBLYSTEGIUM RIPARIUM (L.) Br. & Sch. Ingonish *683, 884.*

106. AMBLYSTEGIUM VACILLANS Sull. Ingonish *888.*

107. AMBLYSTEGIELLA CONFERVOIDES (Brid.) Loeske. Cape Dauphin *594.*

108. AMBLYSTEGIELLA SPRUCEI (Bruch) Loeske. Ingonish *1714.*

109. AMBLYSTEGIELLA SUBTILIS (Hedw.) Loeske. Barrasois *091.*

110. HYGROAMBLYSTEGIUM FILICINUM (L.) Loeske.† *Hypnum filicinum* L. Aspy Bay *969.*

111. DREPANOCLADUS ADUNCUS (L.) Warnst.† *Hypnum uncinatum* Hedw. Barrasois *099, 0928, 1134, 1146; 09122* (var. *plumosus* [Schimp.] Warnst.); *09126* (var. *gracilescens* [Br. & Sch.] Warnst.); *09127* (var. *gracillimus* [Berg.] Warnst.); *1200* (var. *alpinus* [Ren.] Warnst.); Ingonish *712.*

112. DREPANOCLADUS EXANNULATUS (Gümb.) Warnst.† *Hypnum exannulatum* Gümb. Barrasois *88, 201, 215;* Ingonish mountains *795, 798a, 996.*

113. DREPANOCLADUS FLUITANS (L.) Warnst.† *Hypnum fluitans* L. Barrasois *0913, 503, 570, 1231, 1232.* Ingonish *883.*

114. DREPANOCLADUS PURPURASCENS (Schimp.) Loeske. Ingonish mountains *1659.*

115. DREPANOCLADUS REVOLVENS (Sw.) Warnst. Ingonish mountains *794, 798b.*

116. DREPANOCLADUS SCORPIOIDES (L.) Warnst. Ingonish mountains *792, 803;* Aspy Bay *963;* Aspy Bay barrens *1013.*

117. DREPANOCLADUS SERRATUS (Milde) Warnst. Barrasois *0911, 0912.*

118. DREPANOCLADUS SUBMERSUS (Schimp.) Warnst. Ingonish barrens *822.*

119. HYGROHYPNUM ALPESTRE (Sw.) Broth. Barrasois *1496.*

120. HYGROHYPNUM DILATATUM (Wils.) Loeske. Barrasois *09162, 09163;* Cape Dauphin *601.*

121. HYGROHYPNUM PALUSTRE (Huds.) Loeske. Barrasois *1133.*

122. HYGROHYPNUM SMITHII (Sw.) Broth. (*Hypnum arcticum* Sommerf.). Barrasois *1448.*

123. CHRYSOHYPNUM CHRYSOPHYLLUM (Brid.) Loeske.† *Hypnum chrysophyllum* Brid. Barrasois *09175;* Aspy Bay *973.*

124. CHRYSOHYPNUM HISPIDULUM (Brid.) G. Roth.† *Hypnum hispidulum* Brid. Barrasois *09108.*

125. CHRYSOHYPNUM POLYGAMUM (Br. & Sch.) Loeske. Barrasois *540.*

126. CHRYSOHYPNUM STELLATUM (Schreb.) Loeske. Barrasois *672;* Ingonish mountains *797;* Aspy Bay *1045.*

127. RHYTIDIADELPHUS TRIQUETRUS (L.) Warnst.† *Hylocomium triquetrum* Br. & Sch. Barrasois *0951, 94, 1202, 1485.*

128. HYLOCOMIUM SPLENDENS (Hedw.) Br. & Sch.† Barrasois *0987a.*

129. Hypnum Schreberi Willd.† Barrasois *0989a, 0989b, 0989c.*

130. Ptilium Crista-Castrensis (L.) DeNot.† *Hypnum Crista-Castrensis* L. Barrasois *09118, 09177.*

131. Stereodon callichrous Brid.† *Hypnum callichroum* Brid. Ingonish mountains *1664.*

132. Stereodon cupressiformis (L.) Lindb.† *Hypnum cupressiformis* L. Barrasois *097, 09125, 1332, 1473.*

133. Stereodon Lindbergii (Mitt.) Warnst. Barrasois *0910, 0929, 199;* Ingonish mountains *870b,* Aspy Bay *962.*

134. Stereodon pallescens (Hedw.) Lindb. Barrasois *09113a, 09113b 09114.*

135. Stereodon pratensis (Koch) Warnst. Barrasois *0930;* Ingonish *1 3.*

136. Stereodon reptilis (Michx.) Mitt.† *Hypnum reptilis* Michx. Barrasois *09117, 09176, 09178, 09179, 312, 630.*

137. Heterophyllon Haldanianum (Grev.) Kindb.† *Hypnum Haldanianum* Grev. Barrasois *09107, 1391, 1429.*

138. Isopterygium elegans (Hook.) Lindb.† *Plagiothecium elegans* Schimp. Barrasois *1339.*

139. Isopterygium Muellerianum (Schimp.) Lindb. Barrasois *09172, 1308.*

140. Isopterygium pulchellum (Dicks.) Jaeg. Barrasois *1336.*

141. Isopterygium turfaceum (Lindb.) Lindb.† *Plagiothecium turfaceum* Lindb. Barrasois *09170, 1290, 1314;* Ingonish *1716.*

142. Plagiothecium sylvaticum (Huds.) Br. & Sch. Barrasois *09167.*

143. Sematophyllum recurvans (Michx.) E. G. Britton. Barrasois *09180, 09181, 265, 1311.*

144. Sematophyllum tenuirostris (Br. & Sch.) E. G. Britton. Barrasois *266.*

145. Camptothecium nitens (Schreb.) Schimp. Barrasois *1208.*

146. Brachythecium albicans (Neck.) Br. & Sch. Barrasois *1486.*

147. Brachythecium flexicaule Ren. & Card. Barrasois *1542.*

148. Brachythecium novae-angliae (Sull. & Lesq.) Jaeg. & Sauerb. Barrasois *09100.*

149. Brachythecium Rutabulum (L.) Br. & Sch.† Barrasois *09104.*

150. Brachythecium Starkei (Brid.) Br. & Sch. Barrasois *0999.*

151. Oxyrrhynchium praelongum (Hedw.) Warnst. Barrasois *09173.*

152. Oxyrrhynchium rusciforme (Neck.) Warnst. var. *complanatum* H. Schultze. Barrasois *1539, 1560.*

153. Eurynchium strigosum (Hoffm.) Br. & Sch.† Barrasois *09102.*

154. Climacium dendroides (L.) Web. f. & Mohr. Barrasois *0990, 1297, 1541.*

155. Buxbaumia indusiata Brid. Barrasois *1.*

156. Catharinaea angustata Brid. Barrasois *0948;* Aspy Bay *1022.*

157. Catharinaea undulata (L.) Web. f. & Mohr.† *Atrichum undulatum* Beauv. Barrasois *0947;* Aspy Bay *1023.*

158. Polytrichum commune L.† Barrasois *0938, 131, 502, 514, 568;* Aspy Bay mountains *1001.*

159. Polytrichum gracile Dicks. Aspy Bay barrens *1002* (var. *anomalum* Milde).

160. Polytrichum juniperinum Willd.† Barrasois *0939, 188.*

161. Polytrichum strictum Banks.† Barrasois *0944, 0945.*

4. Additional Species Recorded from Nova Scotia

The following list includes species which have been reported from Nova Scotia but have not been collected in Cape Breton. Except where otherwise indicated the records are to be found in Macoun's catalogue. Liverworts: *Riccardia palmata, Nardia Geoscyphus* (DeNot.) Lindb.‡, *Jamesoniella heterostipa* Evans‡, *Lophozia lycopodioides, Cephalozia connivens* (Dicks.) Lindb.‡, *Cephaloziella divaricata* [?] (as *Cephalozia*), *C. elachista* (Jack) Schiffn.‡, *Scapania apiculata* Spruce‡, *S. Bolanderi* [?], *S. irrigua* (Nees) Dumort.‡, *Microlejeunea ulicina* (Tayl.) Evans‡. Mosses: *Sphagnum imbricatum affine, S. tabulare* (as *S. molle*), *Andreaea alpestris, Dicranum consobrinum* [?], *Fissidens minutulus, Tortula mucronifolia* (as *Barbula*), *Racomitrium affine, R. Nevii, R. robustifolium, Orthotrichum speciosum, O. strangulatum, Ulota crispula, Pohlia annotina* (as *Webera*), *P. proligera*‡, *P. pseudo-carneum* (as *Webera*), *P. pulchella* (as *Webera Lescuriana*), *P. sphagnicola* (as *Webera*), *Mniobryum albicans* (as *Webera*), *M. carneum* (as *Webera*), *Bryum argenteum, B. caespiticium, B. erythrophyllum, B. inclinatum, B. intermedium, B. Knowltoni, B. Raui, B. torquescens, Mnium pseudolycopodioides, Cinclidium stygium, C. subrotundum, Meesia trichodes* (as *M. uliginosa*), *Leucodon brachypus, Homalia Macounii, Amblystegium orthocladon, Ctenidium molluscum* (as *Hypnum*), *Rhytidiadelphus calvescens* (as *Hylocomium*), *Stereodon canadensis* (as *Hypnum*), *S. fastigiatus* (as *Hypnum*), *S. Jamesii* (Sull.) Broth.‡, *Isopterygium deplanatum* (as *Rhynchostegium*), *Plagiothecium Roeseanum* (as *P. Sullivantiae*), *Polytrichum piliferum.*[1]

5. Summary

In the present paper, 349 bryophytes are recorded as having been collected in Cape Breton.[2] Of this number, 93 species are liverworts, 256 are mosses. Of the total number, 170 species (51 liverworts, 119 mosses) have been recorded from Nova Scotia also, while 179 species (41 liverworts, 138 mosses) are accredited only to Cape Breton. On the other hand, 50 of the species listed from Nova Scotia (9 liverworts, 41 mosses) have yet to be recorded from Cape Breton. Considering the province of Nova Scotia as a whole, its bryophyte flora, as summed up in the present paper, includes 399 species: 102 liverworts and 297 mosses.

Sheffield Scientific School of Yale University.

[1] Common in Cape Breton also, but no specimens preserved.

[2] The figures here given do not include species queried [?] in the preceding lists. For various reasons it seems not unlikely that a few others of the mosses listed by Macoun should also be excluded.

TWO REVIEWS OF JAPANESE MOSSES

JOHN M. HOLZINGER

1. *Ishibaea*, novum Brachytheciacearum genus ex *Japonia*, elab. V. F. Brotherus et Shutai Okamura. Reprinted from the "Botanical Magazine, Tokyo, Vol. xxix, No. 346."

This article, establishing a new genus of Brachytheciaceae, indigenous to Japan, deserves special review in the BRYOLOGIST. The description is, fortunately, in Latin. The affinity of the genus is with *Homalothecium* from which it differs in inflorescence, in the slenderness of all parts, in the leaves not folded, and in the structure of the peristome.

The excellent drawings for the plate illustrating the article were made by Prof. Shutai Okamura, of the Botanic Garden at Tokyo. The generic name is given in honor of Prof. Eikichi Iishiba, an able student of the moss-flora of Japan.

2. Prof. Okamura also transmits two other reprints, the deciphering of of which is not so happily accomplished, for the numerous perpendicular columns of beautiful, closely-crowded characters, looking like hieroglyphics, are only sparingly interlined with some German sentences, and names of mosses, and one new liverwort, *Aplozia towadaensis* Sh. Okamura, *n. sp.* Prof. Okamura's German is good, save in the title of the paper, which doubtless is intended to read: "Ueber *einige* Arten von Bryophyten aus gewissen *Seeboeden* in Japan." This, translated, means, "Concerning some species of Bryophytes from certain *lake bottoms* in Japan." In the course of the learned Japanese treatise the author evidently refers to an article "in dem Botanischen Zentralblatt" discussing the moss flora in the lake bottoms of Lake Geneva and Lake Constance. After enumerating some twenty species of mosses—which one hesitatingly guesses may be species common to the lakes of Switzerland and Japan (but another guess may be due!)—the author announces "*Bryhnia Nakanoi* Sh. Okamura, *n. sp.*," charmingly describing it in his strictly inimitable Japanese style. Some day the readers of the BRYOLOGIST will doubtless be favored by Prof. Okamura with a translation of this Rising Sun description in some Setting Sun speech.

In the second paper on this subject (Der zweite Bericht) the author seems to discuss principally the occurrence in certain Japanese lake bottoms of a hepatic, *Chiloscyphus rivularis* (Schrad.) Loeske.

DUPLICATES FROM THE HASSE LICHEN HERBARIUM

The Lichen Herbarium of the Sullivant Moss Society has been most beautifully remembered by Mrs. H. E. Hasse, the widow of our late Curator Upon the assumption by the Society of the transportation charges only, Mrs. Hasse has given to the Society all the duplicates of Dr. Hasse's great herbarium, numbering many thousands of specimens. All of the material is now in the hands of the present Curator, who takes this opportunity to express the hearty apprecia-

tion of the Society to Mrs. Hasse for her generous gift, and to send her herewith a vote of thanks.

It will take considerable time to mount and arrange the new material, which is itself very rich in duplicates, but as this progresses, it seems very probable that there will be an opportunity for offering some of the extra material for sale to members of the Society and others. While nothing definite can be announced at present, members may be sure that the price will be as reasonable as it can be made, while still covering the costs of handling and transportation. Further notices will appear regarding this from time to time, but it is suggested that any member interested in securing a chance at these valuable specimens should write either to the Curator or to the Treasurer, so that some idea may be obtained as to the possibilities.

CHARLES C. PLITT.

SHORTER NOTES

The fourteenth fascicle, numbers 326–350 inclusive, of Prof. J. M. Holzinger's *Musci Acrocarpi Boreali-Americani* was issued the middle of February last. The issue contains a number of the less well known species, among them *Ephemerum megalosporum* (Aust.) Salm., *Nanomitrium synoicum* (James) Lindb., *Pleuridium Bakeri* Card. & Thér., *Pl. Bolanderi* C. M., Jaeg., *Didymodon Hendersoni* R. & C., *Bartramia stricta* Brid., and a new variety of *Bryum pseudotriquetrum*, marked "var. *aristatum* Thér. ined.," from the type locality. Besides these there are three species from Swedish localities. We need say nothing in addition to what has already been given in these pages, concerning the care which the excellent specimens of this series shows. But we would urge members of the Society to coöperate whenever possible in collecting material for Prof. Holzinger. As time goes on, the task of securing species unrepresented becomes far more difficult, and it is only by extensive help from collectors that it becomes practicable to continue the fascicles.

E. B. C.

NICHOLS'S VEGETATION OF CONNECTICUT.—In a fine series of papers[1] on the vegetation of Connecticut Dr. George E. Nichols has done much to preserve for future botanists a record of the general composition and ecological relations of a vegetation which in a few more years will present practically no virgin forests or other undisturbed groups of plants. Nichols follows in the main the method of treatment originated by Cowles, paying particular attention to the relation of the plant societies to the physiography of the region studied.

To the readers of THE BRYOLOGIST there is much of interest in Nichols's papers. In his third paper, "Plant Societies on Uplands" (Torreya **14**: 167–

[1] The Vegetation of Connecticut. I.—Phytogeographic Aspects. Torreya **13**: 89–112, *f. 1-6.* May, 1913; II.—Virgin Forests. Torreya **13**: 199–215. *f. 1-5.* Sept., 1913; III.—Plant Societies on Uplands. Torreya **14**: 167–194. *f. 1-9.* Oct., 1914; IV.—Plant Societies in Lowlands. Bull. Torr. Bot. Club **42**: 169–217. *f. 1-15.* Apr., 1915.

194. Oct. 1914) the succession of vegetation begins with a bare rock surface, and, on an exposed trap rock for instance, the pioneers are *Buellia petraea* and *Lecanora cinerea* and, immediately following, *Physcia tribacea*. These lichens are followed by other species, the crustose lichens being succeeded by a group of foliose and fruticose species and eventually such mosses as *Grimmia Olneyi* and *Hedwigia ciliata*.

In crevices of the trap rocks the pioneers are fruticose lichens and mosses and these are soon succeeded by other plants of various kinds. Eventually the trap ridge becomes covered with an oak-hickory forest which may persist for a long time, but may finally be succeeded by the climax forest in which the most prominent tree is the chestnut.

Nichols takes up other plant successions in the same manner, tracing the development and analyzing the composition of the vegetation, and to readers of THE BRYOLOGIST it is distinctly a pleasure to note the frequent mention and prominent place given the bryophytes and lichens.

O. E. J.

THE MOSSES OF MADAGASCAR, CARDOT AND RENAULD, NOW BEING PUBLISHED. —Under date of March 9, 1916, Dr. Holzinger writes: "A letter just from Paris, by M. Jules Cardot, is like a voice from the dead. He had to leave behind nearly all of his botanical equipment—herbarium, books, pamphlets, manuscripts—when the French military authorities ordered the entire population of the Meuse valley to leave their homes, on ten hours' notice, and flee to the southwest of France. He worked for awhile after the beginning of hostilities at Dinard in the hospital service. At present his work is more congenial: he is connected with a museum in Paris (Address: No. 164 rue Jeanne d' Arc prolongée). He is at work on the Rosaceae of Asia. The point of great bryological interest, however, is the announcement that he did save a valuable manuscript, on which he had been at work for years, jointly with his beloved friend, Capt. Renauld, now deceased, viz., The Mosses of Madagascar, a magnificent volume of 560 pages, illustrated by 187 plates, figuring 360 of the 550 species described. This the author reports is now being published."

CORRECTIONS

In order to make her key to the mosses more complete Mrs. Dunham would ask that the following insertions be made in the article "How to Know the Mosses without the Aid of a Lens," BRYOLOGIST, March, 1916:

Page 22, line 16, add Polytrichum.

Page 23, line 3, add or closely pinnate.

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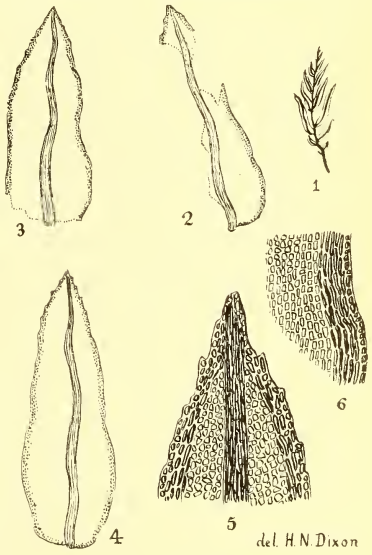
THE BRYOLOGIST

VOL. XIX JULY, 1916 No. 4

MNIUM ANTIQUORUM CARDOT AND DIXON, AN EXTINCT MOSS

H. N. DIXON

The number of species of mosses found in a more or less fossilized condition and now extinct is very small. E. G. Britton and A. Hollick have recently shown (Bull. Torr. Bot. Club **34**: 139. March, 1907) that of the comparatively few records some at least are erroneous, and do not belong to mosses at all. A recently described species having peculiarly interesting relationships has been published in "The Pliocene Floras of the Dutch-Prussian Border" by Clement Reid, F. R. S., and Eleanor M. Reid, B.Sc. (The Hague, 1915). As this publication is not likely to be well-known by bryologists, it is perhaps worth while to reproduce the description here.



Mnium. antiquorum Card. & Dixon

1. Stem, × 3.
2, 3. Leaves, × 25.
4. Leaf, restored, × 25.
5. Apex of leaf, × 100.
6. Basal areolation, × 100.

The plant-remains amongst which the few fragments of moss occurred came from the Pliocene deposits at Reuver, in the valley of the Maas, on the borderline between Limburg and Prussia. This flora exhibits a remarkable affinity with the present flora of Eastern Asia—China and Japan; the bulk of the species determined either being identical with, or having for their nearest allies, species occurring in those countries at the present day; they include a large number of extinct species, and but very few identical with those existing in Europe at the present time. This affinity among the flowering plants was entirely supported by the few remains of mosses detected. My note on these may be cited:

"The Reuverian collection consists of but half a dozen exceedingly small and very fragmentary remains. Of these, however, two were of distinct interest. One, a mere fragment from Swalem with but little left of any of the leaves but the nerves and parts of the basal areolation, retained however sufficient of the

The May number of the BRYOLOGIST was published May 26, 1916.

latter to show that it belonged to a small group of mosses, § *Urocladium* of the genus *Pinnatella* Fleisch., (*Porotrichum* spp. auctorum), consisting of some half dozen species confined to the southeastern region of Asia (India, Malay Archipelago, Tonkin, Formosa, Japan), and especially characterized by an *intramarginal* border or band of elongate cells, such as is found in a very few groups of mosses only (*Calymperes*, *Fissidens*, particularly). The Reuverian moss is scarcely distinguishable from *P. alopecurioides* (Hook.) Fleisch., except in the shorter nerve (35–40μ wide) and the leaf-cells slightly larger and with a pronounced tendency to be elliptical. These characters are probably quite sufficient to indicate a specific difference, but the relationship is close, and the fragment bears out in an interesting way the indications given by the rest of the plant remains.

"The second from Reuver is perhaps still more interesting. It is a species of *Mnium* of the § *Trachycystis*, represented at the present day by two species only, both confined to China (including Saghalin and the Amur region) and Japan. It differs however from both of these, and in conjunction with Mons. Cardot, who has kindly examined it, I propose the following name for it:

"*Mnium antiquorum* Card. & Dixon, sp. nov. A *M. microphyllo* Doz. & Molk. differt cellulis minoribus, parietibus magis incrassatis, atque foliis limbo incrassato bistratoso circumscriptis; a *M. flagellari* Sull. & Lesq. proximo foliis minoribus, irregulariter, obscure, simpliciter dentatis, nec spinulis bigeminatis armatis."

17 St. Matthew's Parade, Northampton, England.

THE MOSSES OF THE PECH CATALOGUE—MISSOURI

B. F. Bush

It is just a half a century since F. Pech, an obscure collector residing in Washington, D. C., prepared a list of plants collected by himself in various parts of Missouri, chiefly during a temporary residence at Louisiana, Missouri, and through several visits to Potosi, Washington County. Scarcely any one ever saw this catalogue and it has remained almost unknown up to the present. Tracy,[1] in his Catalogue of Missouri Plants in 1886, includes about 1725 species in his list, and in the preface he says "The following Catalogue is, I believe, the first publication of any list of the plants of the State, excepting a 'Partial Catalogue of the Plants of Illinois and Missouri,' published by Mr. Geyer about 1842 which has long been out of print." This statement is completely at variance with the Catalogue itself in which he cites many species of plants collected by Pech, a thing he could not have done, unless he had seen the Pech catalogue, either in the Englemann Library or in that of the Missouri Botanic Garden, and he makes no mention of it in the preface. As the Pech catalogue contains about 950 species of the higher plants of Missouri, Prof. Tracy added to the flora of the

[1] Tracy, S. M. Catalogue of the Phanerogams and Vascular Cryptogamous Plants of Missouir. 1886.

State only about 775 species from over eighty counties represented in his catalogue.

Some five or six years after Prof. Tracy published his catalogue Prof. Trelease called my attention to the Pech Catalogue, which I then saw for the first time. The next mention of the Pech Catalogue is by Sargent[1] in his second paper on *Crataegus* in Missouri, page 79, where he says "The only publication devoted to the flora of northeastern Missouri, appeared in a list of the plants growing at Louisiana, on the Mississippi River, not far below Hannibal, in a 'Catalogue of the United States Plants in the Department of Agriculture,' issued by Isaac Newton, the authorship of which has been ascribed to Mr. F. Pech." In this paper Prof. Sargent commemorates Pech's name in *Crataegus Pechiana*, a species of the *viridis* group.

Excepting these two references, all mention of Pech's list seems to be wanting. The title of the list is "Catalogue of the United States Plants in the Department of Agriculture" and the date written in by Pech himself is November 1, 1866.

The preface to the Catalogue states that the Department of Agriculture having received a donation of a large collection of plants gathered in different states which, while not stating positively that this was the first collection of plants in the museum of the Department, plainly shows every evidence that it was the initial collection, and itis signed by Isaac Newton, Commissioner.

No mention is made of the donor in the preface of this Catalogue, nor is F. Pech's name anywhere mention ed in it, and it is to F. Pech himself that we owe the knowledge that he is the author of it, for I have seen two copies of it from Pech himself and inscribed "Pech Catalogue" with his autograph and regards to those to whom it was presented. The Catalogue is an obscure little pamphlet with pale blue covers, containing 25 pages of names of plants, the pages averaging about 65 names, so that the total number of species for Missouri as listed is not far short of twelve hundred, including the Musci, Hepatics, Lichens, Fungi, and Algae,of which there is a large representation, and for that day and time it was a won derful achievement.

As already noted, this Catalogue remained unknown, or almost unknown, up to the present time, and the reason for this was that the Department of Agriculture buildings were shortly afterwards destroyed by fire, and all copies of the Catalogue, except those distributed by Pech, and the entire Pech collection of plants and other natural history objects were lost. No trace of the Catalogue of the Pech collection of plants now remains at Washington, D. C., and the identity of his species must forever remain a question of doubt.

It is the mosses of this Catalogue that I particularly wish to discuss, and these number seventy-eight, of which sixty-six are from Missouri, a long list for Missouri at that time—and, indeed, a long list for any state. As but few of my readers have ever seen this Catalogue I herewith reproduce the list of mosses exactly as given, except that for convenience I have prefixed numbers to the names.

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[1]Sargent, C. S. Crataegus in Missouri II. Ann. Rpt. Mo. Bot. Gard. **22**: 78. Feb. 14 1912.

1.	Sphagnum	Cymbifolium, (Dill.)	Louisiana, Mo.
2.	Gymnostomum	Curvirostrum, (Hedw.)	Louisiana, Mo.
3.	———	Coccineum, (Pech)	Louisiana, Mo.
4.	Rhabdoweisia	Fugax, (B. & S.)	Louisiana, Mo.
5.	Dicranum	Scoparium, (Lin.)	Louisiana, Mo.
6.	———	Orthocarpon	Louisiana, Mo.
7.	Ceratodon	Purpureum, (Brid.)	Louisiana, Mo.
8.	Leucobryum	Glaucum, (Hamp.)	Louisiana, Mo.
9.	Fissidens	Subbasilaris, (Hedw.)	Louisiana, Mo.
10.	———	Taxifolius (Hedw.)	Louisiana, Mo.
11.	Trichostomum	Pallidum, (Hedw.)	Louisiana, Mo.
12.	Barbula	Unguiculata, (Hedw.)	Louisiana, Mo.
13.	Didymodon	Rubellus, (B. & S.)	Louisiana, Mo.
14.	———	Rupestre, (Pech)	Louisiana, Mo.
15.	Pottia	Truncata, (B. & S.)	Louisiana, Mo.
16.	Tetraphis	Pellucida, (Hedw.)	Louisiana, Mo.
17.	Encalypta	Ciliata, (Hedw.)	Louisiana, Mo.
18.	Drumondia	Clavellata, (Hooker)	Louisiana, Mo.
19.	Orthotrichum	Hutchinsiae, (Smith)	Louisiana, Mo.
20.	Schistidium	Apocarpon, (B. & S.)	Louisiana, Mo.
21.	Atrichum	Undulatum, (Beauv.)	Louisiana, Mo.
22.	Pogonatum	Brevicaule, (Brid.)	Louisiana, Mo.
23.	Polytrichum	Commune, (Lin.)	Louisiana, Mo.
24.	———	Formosum, (Hedw.)	Louisiana, Mo.
25.	———	Juniperinum, (Hedw.)	Louisiana, Mo.
26.	———	Piliferum, (Schreb.)	Louisiana, Mo.
27.	Timmia	Megapolitana, (Hedw.)	Louisiana, Mo.
28.	Aulacomnion	Heterostichum, (B. & S.)	Louisiana, Mo.
29.	———	Palustre, (Sch.)	Louisiana, Mo.
30.	Bryum	Roseum, (Schreb.)	Louisiana, Mo.
31.	———	Argenteum, (Lin.)	Louisiana, Mo.
32.	———	Cernuum, (Hedw.)	Louisiana, Mo.
33.	Mnium	Punctatum, (Hedw.)	Louisiana, Mo.
34.	———	Drumondii, (B. & S.)	Louisiana, Mo.
35.	———	Cuspidatum, (Hedw.)	Louisiana, Mo.
36.	Bartramia	Oederi, (Swartz.)	Louisiana, Mo.
37.	———	Pomiformis, (Hedw.)	Louisiana, Mo.
38.	———	Fontana, (Brid.)	Louisiana, Mo.
39.	Funaria	Hygrometrica, (Hedw.)	Louisiana, Mo.
40.	———	Flavicans, (Michx.)	Louisiana, Mo.
41.	Leucodon	Julaceus, (Sulliv.)	Louisiana, Mo.
42.	Anomodon	Obtusifolius, (B. & S.)	Louisiana, Mo.
43.	———	Attenuatus, (Hub.)	Louisiana, Mo.
44.	Leskea	Rostrata, (Hedw.)	Louisiana, Mo.
45.	Thelia	Hirtella, (Hedw.)	Louisiana, Mo.
46.	———	Lescurii, (Sull.)	Louisiana, Mo.
47.	Pylaisia	Intricata, (Bryol.)	Louisiana, Mo.
48.	Cylindrothecium	Cladorhizans, (Bryol.)	Louisiana, Mo.
49.	———	Seductrix, (Bryol.)	Louisiana, Mo.
50.	Climatium	Americanum, (Brid.)	Louisiana, Mo.
51.	Hypnum	Protensum, (Michx.)	Louisiana, Mo.
52.	———	Minutulum, (Hedw.)	Louisiana, Mo.
53.	———	Strigosum, (Hoffm.)	Louisiana, Mo.
54.	———	Boscii, (Schw.)	Louisiana, Mo.
55.	———	Triquetrum, (Lin.)	Louisiana, Mo.
56.	———	Recurvans, (Schw.)	Louisiana, Mo.

57. ——— ..... Eugyrium, (Bryol.) ..... Louisiana, Mo.
58. ——— ..... Acuminatum, (Beauv.) ..... Louisiana, Mo.
59. ——— ..... Serpens, (Hedw.) ..... Louisiana, Mo.
60. ——— ..... Radicale, (Brid.) ..... Louisiana, Mo.
61. ——— ..... Noterophilum, (Sull.) ..... Louisiana, Mo.
62. ——— ..... Denticulatum, (Lin.) ..... Louisiana, Mo.
63. ——— ..... Sericeum, (Lin.) ..... Louisiana, Mo.
64. ——— ..... Commutatum, (Hedw.) ..... Louisiana, Mo.
65. ——— ..... Serrulatum, (Hedw.) ..... Louisiana, Mo.
66. ——— ..... Polyanthos, (Schreb.) ..... Louisiana, Mo.

No. 1. Evidently intended for *Sphagnum cymbifolium* Ehrh., a species of the Northern and Eastern States, not collected by any other person in Missouri, and is probably an error of determination or of locality.

No. 2. Very doubtful, as this is a species of the Northern and Eastern states, although it has been reported from Allenton, Cliff Cave, and Crescent, in the Engelmann Botanical Club List.

No. 3. Is not identifiable, as it probably was only a herbarium name of Pech's.

No. 4. Very doubtful, as this is a species of the Northern and Eastern states, and has not since been collected in Missouri. Apparently Pech did not collect *Weisia viridula* (L.) Hedw., a very common species on the ground in meadows and pastures, so I presume he must have mistaken this for *Rhabdoweisia*.

No. 5. Possibly correct, although the typical form is rare or absent in Missouri, the variety *pallidum* L. & J. being common on rocky ground in Eastern Missouri.

No. 6. I am unable to determine whether Pech meant this for *Dicranum orthocarpum* Austin or for *Dicranum orthocarpum* Hedw., two species of the Northern and Eastern states not known for Missouri. Apparently Pech did not collect any species of *Dicranella*, one of which, *D. varia* (Hedw.) Schimper, is very common on the ground in Missouri, and it may be that this was collected and mistaken for a *Dicranum*.

No. 7. Evidently *Ceratodon purpureus* Brid., a common species on clay banks in woods in the State.

No. 8. Evidently intended for *Leucobryum glaucum* (L.) Schimp., a common species on rocky ground in woods in Eastern Missorui.

No. 9. Very doubtful, as this is a species of the Northern and Eastern states, although reported from Allenton in the Engelmann Botanical Club List.

No. 10. Probably correct as this is a common species on dry banks in woods in Missouri. Two other species of *Fissidens*, *F. adiantoides* and *decipiens* are common on the ground in woods in the State, but apparently overlooked by Pech.

No. 11. Probably correct, the *Ditrichum pallidum* (Screb.) Hampe, a fine conspicuous species on rocky ground throughout the State.

No. 12. Probably correct although not often collected on account of its small size. It is a little curious that Pech collected none of the larger species of *Barbula*, particularly *B. caespitosa* Schwaegr., a conspicuous species so common on rocky ground in Eastern Missouri.

No. 13. Very doubtful, as this is a species of the Northern and Eastern states; no specimens having been collected in Missouri since then that are certainly referable to this species, although specimens collected at Pleasant Grove, in 1900, have been referred to it.

No. 14. Not identifiable, as it probably was only a herbarium name of Pech's. The mere citing of Pech as the author of this species and of No. 3, and of a number of species of fungi farther on in this Catalogue, shows clearly that Pech was the author of the catalogue.

No. 15. Very doubtful, as this is a species of the Northern and Eastern states, and has not been collected since in the State. Apparently Pech did not recognize nor collect any species of Astomum, two species of which, *A. Sullivantii* Schimp., and *A. crispum* (Hedw.) Hampe, are common on the ground in pastures and fields in Missouri, and I suspect that one or the other of these was mistaken by Pech for *Pottia*.

No. 16. Possibly correct, as it has been collected at several localities in Eastern Missouri, but is very rare. Apparently Pech did not collect any species of *Physcomitrium*, although *P. turbinatum* (Rich.) Brid. is abundant in meadows and old fields everywhere in the State, and *P. Drummondii* Britton is common in similar situations.

No. 17. Very doubtful, as this is a species of the Northern and Eastern states, and has not been collected in the State since.

No. 18. Probably correct, as this species is common on trees in Eastern Missouri.

No. 19. Intended no doubt for *Weissia americana* Lindb., and very doubtful, as this is a species of the Northern and Eastern states, and it has not been collected again in the State. Pech apparently did not collect any species of *Orthotrichum*, although *O. Braunii* and *O. ohioense* are common on trees in Eastern Missouri, and *O. Porteri* Austin is very common on rocks throughout the State. It is possible Pech mistook one of these for *Weissia*.

No. 20. Probably correct, and what we now call *Grimmia apocarpa* (L.) Hedw., a common species on flat rocks throughout the State. Pech apparently did not find *G. campestris* Burch., a handsome attractive species common on sandstone boulders in Eastern Missouri.

No. 21. Probably correct, and what is now named *Catharinea undulata* (L.) W. & M., a conspicuous species on moist banks in woods, and very likely including the tall-capsuled form, *Catharinaea undulata altecristata* (R. & C.), (*Atrichum undulatum altecristatum* R. & C., Bot. Gaz. **15**: 58. 1890), which is usually found with the specific form and which had not yet been described. A still more common species of *Catharinaea*, *C. angustata* Brid., of similar situations, apparently was overlooked by Pech.

No. 22. Probably correct, as it has been found on sandy walls of ravines in several localities in Missouri.

No. 23. Very likely correct, as it is a very common species on rocky hills in Eastern Missouri.

No. 24. Probably correct and what is now called *Polytrichum ohioense* R. & C., a common species on rocky ground in Eastern Missouri.

No. 25. Evidently intended for *Polytrichum juniperinum* Willd., but very doubtful, as this is a species of the Northern and Eastern states, although reported for several localities around St. Louis in the Engelmann Botanical Club List.

No. 26. Very doubtful, as this is a species of the Northern and Eastern states and has not again been collected in Missouri.

No. 27. Very likely correct, as this is a large fine species of wet banks along the wooded bluffs of the Missouri and Mississippi rivers, although not often collected.

No. 28. Probably correct, as this species is common on the ground in Eastern Missouri.

No. 29. Evidently intended for *Aulacomnium palustre* (L.) Schwaegr., but very doubtful, as this species is not certainly known north of the lowlands of southeastern Missouri.

No. 30. Very likely correct and what is now known as *Bryum ontariense* Kindb., a fine handsome species of rich shaded woods along bluffs throughout the State, but not often collected.

No. 31. Without doubt correct, as the species is very common on the ground everywhere in the State.

No. 32. Evidently intended for *Bryum pendulum* Schimp. (*Bryum cernuum* Br. & Sch.), as there is no *Bryum cernuum* Hedw., and very doubtful, this being a species of the Northern and Eastern states and no other specimens have been collected in Eastern Missouri since then. Apparently Pech did not collect more than three species of *Bryum*, which is rather strange, considering the number in the State, some of them very common, particularly *B. caespiticium* L.

No. 33. Very doubtful, as this is a species of the Northern and Eastern states and no other specimens have been collected in the State.

No. 34. Very doubtful, as this is also a species of the Northern and Eastern states and no other specimens have been collected in Missouri, and I suspect that this and the last preceding have been collected elsewhere.

No. 35. No doubt correct, as this is a fine species on shaded ground throughout the State.

No. 36. Evidently intended for *Bartramia Oederiana* Swartz, but very doubtful, as this is a species of the Northern and Eastern states, and no other specimens have been collected in the State.

No. 37. Very likely correct, as this species is common on wet banks in Eastern Missouri.

No. 38. Evidently intended for *Philonotis fontana* (L.) Brid., and very probably correct, as this species is common in springy places throughout the State.

No. 39. Probably correct, as this species is very common on the ground everywhere in the State.

No. 40. Probably correct, although not often collected in Missouri.

No. 41. Probably correct, as this species is common on trees in Eastern Missouri.

No. 42. Very likely correct, as this species is common on rocks along the bluffs of the Missouri and Mississippi rivers.

No. 43. Very likely correct and more common than the last preceding species in similar situations.

No. 44. Evidently intended for *Anomodon rostratus* Hedw., a species still more common than the last two preceding. Apparently no species of *Leskea* were collected by Pech, although two species, *L. gracilescens* Hedw. and *L. polycarpa* Ehrh. are common on bases of trees in woods throughout the State.

No. 45. Possibly correct and evidently intended for *Thelia hirtella* Sulliv., as there was no genus *Thelia* in Hedwig's time, and I assume that Pech intended to write Sullivant instead of Hedwig.

No. 46. Possibly correct, and evidently intended for *Thelia Lescurii* Sulliv., thus showing that he was aware of the genus *Thelia* Sulliv. Another species of *Thelia*, *T. asprella* Sulliv., does not appear to have been collected by Pech, although it is very common on trees throughout the State. Concerning the date of Pech's collection, no evidence appears in the Pech Catalogue, but ulterior evidence exists showing that he made the collection during the years 1842 and 1843. As to the time when the Catalogue was prepared, the mere listing of *Thelia* alone indicated that it was after Sullivant established that genus in 1858, and after Pech had left Louisiana, Missouri, and had taken up his residence in Washington, D. C.

No. 47. Probably correct, and evidently intended for *Pylaisia intricata* Br. & Sch., which is now known as *Pylaisiella Schimperi* Grout, the common species on old logs and trees throughout the State, but not the *Pterigynandrum intricatum* of Hedwig, an European speices.

No. 48. Evidently intended for *Cylindrothecium cladorrhizans* Schimper, and what is now called *Entodon cladorrhizans* (Hedw.) C. Muell., and very probably correct, as it is a common species on rocks and trees throughout the State.

No. 49. Evidently intended for *Cylindrothecium seductrix* Sulliv., and what is now known as *Entodon seductrix* (Hedw.) C. Muell., another very common species in dense woods along the bluffs of the Missouri and Mississippi rivers. Another species of *Entodon*, *E. compressus* C. Muell., appears not to have been collected by Pech, although not uncommon on old logs in woods along the Missouri River bluffs to St. Louis. Still another species, *Platygyrium repens* (Brid.) Br. & Sch., sometimes called *Entodon repens* (Brid.) Grout, common on old logs in deep woods along the Missouri River bluffs, seems to have been overlooked by Pech.

No. 50. Certainly correct, and the only correct determination of this species in Missouri, all others naming this *Climacium dendroides* (L.) W. & M., which is a species of the Northern and Eastern states.

No. 51. Evidently intended for *Thuidium recognitum* (Hedw.) Lindb., and probably correct.

No. 52. Evidently intended for *Thuidium minutulum* (Hedw.) Br. & Sch., but very doubtful, as this is a species of the Northern and Eastern states and has not been collected again in Missouri. Several other species of *Thuidium* appear

to have been overlooked by Pech, the common *T. microphyllum* (Sw.) Jacq. on old logs in deep woods and the beautiful conspicuous *T. delicatulum* (L.) Mitt., so common on the ground in Eastern Missouri.

No. 53. Evidently intended for *Hylocomium triquetrum* (L.) Br. & Sch., but not indicated for Missouri, or if so, very doubtful, although the species has been collected several times in Shannon County by the writer.

No. 54. Evidently intended for *Eurhynchium strigosum* Br. & Sch., and very likely correct, as this species is common on the ground in rich woods along the Missouri and Mississippi rivers.

No. 55. Evidently intended for *Eurhynchium Boscii* J. & S., now called *Cirriphyllum Boscii* (Schwaeg.) Grout, and very probably correct, as this fine large species is common on rocks in Eastern Missouri. No other species of *Eurhynchium* appears to have been collected by Pech, although *E. hians* and *E. praelongum* are common in the State on the ground in rich woods along the bluffs of the Missouri River.

No. 56. Evidently intended for *Raphidostegium recurvans* Br. & Sch., now called *Sematophyllum recurvans* (Rich.) Britton, and very doubtful, as this is a species of the Northern and Eastern states and has not since been collected in Missouri.

No. 57. Evidently intended for *Hypnum eugyrium* Schimp., and very doubtful, as this is a species of the Northern states and has not been collected since in this State.

No. 58. Evidently intended for *Brachythecium acuminatum* (Hedw.) Kindb., and very likely correct, as this is an extremely common species on wet banks in dense woods throughout the State. Apparently Pech did not collect any other species of *Brachythecium* although *B. oxycladon* (Brid.) J. & S. is very common on damp banks in rich woods, and *B. salebrosum* (Hoffm.) Br. & Sch. is fairly common in similar places.

No. 59. Evidently intended for *Amblystegium serpens* Br. & Sch. and probably correct, although I know of no other collection in Eastern Missouri.

No. 60. Evidently intended for *Amblystegium radicale* (L.) Br. & Sch., as I know of no *Hypnum radicale* Brid., and probably correct, although no other collection is known from Eastern Missouri.

No. 61. Evidently intended for *Amblystegium noterophilum* Holz., and very doubtful, as no other specimens are known from Eastern Missouri, although specimens collected at Webb City by the writer in 1909 are doubtfully referred here. Other species of *Amblystegium*, particularly *A. adnatum*, *fluviatile*, *orthocladon*, *riparium*, and *varium*, all very common species of wet woods or shallow water, appear to have been overlooked by Pech.

No. 62. Evidently intended for *Plagiothecium denticulatum* (L.) Br. & Sch., but very doubtful, as this is a species of the Northern and Eastern states, and I have seen no authentic specimens from this State.

No. 63. Evidently intended for *Homalothecium sericeum* (L.) Br. & Sch., but very doubtful, as it has not been collected again, and, if of this genus, is referable to *H. subcapillatum* (Hedw.) Sulliv.

No. 64. Evidently an error of determination or of locality, as no other collection of this species had been made in Missouri, and I suspect Pech had mistaken for this species either *H. chrysophyllum* Brid. or *H. hispidulum* Brid., neither of which, though very common, are listed by him. Another fine species of *Hypnum*, *H. curvifolium* Hedw., so common on rocky ground in Eastern Missouri, and *H. Patentiae* Lindb., of similar situations and range, appear to have been overlooked by Pech.

No. 65. Evidently intended for *Rhynchostegium serrulatum* L. & J., and very likely correct, as this species is common on the ground in woods throughout the State. Another species of *Rhynchostegium*, *R. deplanatum*, Schimp., common in similar situations, does not seem to have been collected by Pech.

No. 66. Evidently intended for *Pylaisia polyantha* (Schreb.) Br. & Sch., now known as *Pylaisiella polyantha* (Schreb.) Grout, but very doubtful, as this is a species of the Northern and Eastern states, and no other specimens are known from Missouri.

COURTNEY, MISSOURI.

MOSSES, HEPATICS, AND LICHENS OF THE QUARTZITE HILLS OF THE KAMOURASKA FORMATION, QUEBEC, CANADA

FR. M.-VICTORIN

In the counties of Montmagny, l'Islet, Kamouraska and Temiscouata, the St. Lawrence lowland is broken by a few sharp elevations that can hardly fail to attract the attention of the passing tourist on account of their very peculiar shape. The rocks of this formation have been of late studied by Mr. John A. Dresser of the Geological Survey[1] and provisionally separated from the Sillery in which they were included.

The Kamouraska formation as it is now commonly called, consists in a series of detached hills which are seldom more than 300 feet high and a couple of miles in length, and most of them are much smaller. In the ground plan they are much flattened ellipses, the longer axes running in a northeasterly direction. In structure they are sharply folded anticlines, slightly overturned towards the northwest, giving a general dip to the southeast of about 75°. They are also domed so as to give a pitch of 15° or 20° to the northeast and southwest near the ends of many of the hills. The course of the chief glaciation has been nearly at right angles to the trend of these ridges, and the central parts of some of the domes have been broken away by the ice, leaving the extreme ends of a hill pitching away from each other, sometimes separated by a drift covered interval. The Gros Pèlerin Island offers a good example of an ice-notched dome.

The Kamouraska quartzite is fine, even-grained, light-colored, and weathers to an almost pure white, very striking in the landscape. Quartz is usually the

[1] John A. Dresser. Reconnaissance along the National Transcontinental Railway in Southern Quebec. Geol. Surv. Canada, Memoir No. 35. 1912.

only mineral that can be distinguished in the hand specimen, but in places the quartzite contains nodules of dolomitic sandstone. These nodules disintegrate more rapidly than the quartzite under the action of the atmosphere, and give a pitted surface in exposed places. Interstratified with the quartzite above described are beds of conglomerate from a few inches to 25 feet in thickness. The matrix of the conglomerate is a dolomitic sandstone and the included pebbles are limestone, slaty sandstone, quartz, and occasionally granite, apparently Laurentian.

No botanical work has been done up to the present time on these peculiar hills, except the collecting of a few Phanerogams by Penhallow.[1] The writer has had the opportunity to collect both Phanerogams and Cryptogams during the season of 1913 and 1914 on the easternmost representatives of the group in Temiscouata: the Hospital Hill and Mt. Pilot at Rivière-du-Loup; several unnamed hills at St. Arsene and Cacouna; and two of the Pilgrim Islands: "Gros Pèlerin" and "Pelerin du Milieu."

The object of this paper will be to give a brief account of the mosses, hepatics, and lichens of this particular habitat.

The quartzite hills bearing but few and dwarfed trees and being but huge masses of snow-white rocks, maintain typical xerophytic associations of plants, and for this reason the Mosses and Hepatics are comparatively scarce. The Lichens are the plants best adapted to such dry situations and, as a matter of fact, they are numerous both in species and individuals. *Cladonia* is richly represented and almost all American species of *Gyrophora* can be found. The following is a list of the species of Cryptogams recorded and whose identity has been ascertained.

Mosses

Amblystegiella adnata (Hedw.) Nichols. Gros Pèlerin Island. This plant is very variable according to habitat but is readily distinguished from closely related species by its rhombic cells.

Anomodon attenuatus (Schreb.) Hueben. Gros Pèlerin Island: Mt. Pilot. Very common.

Anomodon rostratus (L.) Hedw. Mt. Pilot. This Anomodon is a remarkable feature at the base of the quartzite hills, and its ecology is worthy of some attention. It has been stated above that the quartzite beds have a general dip to the southeast of about 75°. It ensues that the northern face is not only steep and precipitous, but very often overhanging, thus inducing the formation of a damp and sheltered belt at the foot of the cliff. There, *Anomodon* finds its optimum life conditions, and it thrives to an extent unknown elsewhere, forming uninterrupted velvet underneath the slanting quartzite beds. It is also interesting to observe the mode of growth, which is well disclosed at the edge of the extensive patches. The primary stem runs along a strictly straight line, issuing but very few short flagelliform branches, and tightly clinging to the substratum by means of its sucker-like rhizoids. But as the mat thickens with age it can be

[1] D. P. Penhallow. Flora of Cacouna. Can. Rec. of Science 4: 369.

easily removed, probably owing to the partial destruction of the deeper parts which are then deprived of light.

Bartramia pomiformis (L.) Hedw. Mt. Pilot. A very beautiful moss with peculiar globose capsules not met often in this habitat. It prefers the damp walls of river cliffs. Common in the Laurentide district.

Calliergon Schreberi (Willd.) Kindb. Rivière-du-Loup. Quartzite hills. A ubiquitous moss that can live in very dry places.

Dicranella heteromalla (L.) Schimp. Mt. Pilot. *Dicranella* is typical on the quartzite hills, while at a very short distance, on the seashore cliffs it passes to the variety *orthocarpa* (Hedw.) E. G. B. which is the alpine form of the species.

Dicranum undulatum Ehrh. Mt. Pilot. Common.

Drepanocladus uncinatus (Hedw.) Warnst. Gros Pèlerin Island. Common. The species of *Drepanocladus* are generally water-loving. *D. uncinatus* is less exacting as to moisture. *D. vernicosus* (Lindb.) Warnst., and *D. Wilsoni* (Sch.) Roth., are also met in the region but not on the quartzite hills.

Grimmia apocarpa (L.) Hedw. Gros Pèlerin Island. Fruiting on the boulders of the seashore.

Hedwigia albicans (Web.) Lindb. Mt. Pilot. This moss on account of its xerophytic adaptations is the leading form of plant life on the quartzite hills. It spreads on extensive ledges where absolute siccity prevails.

Hypnum fertile Sendt. Gros Pèlerin Island. This moss is common in this habitat, though it is rare elsewhere, and its presence seems to be conditioned more by the subarctic factors of the seashore than by the quartzite-hill habitat itself.

Hypnum imponens Hedw. Gros Pélerin Island. Growing very luxuriantly in this locality.

Hypnum pallescens (Hedw.) B. & S. Gros Pèlerin Island. What has been said of *H. fertile* applies to this arctic-alpine moss which is sometimes considered as the northern form of *H. reptile* Mx.

Leskea polycarpa Ehrh. Gros Pèlerin Island. Common.

Leucodon sciuroides (L.) Schwaegr. Gros Pèlerin Island. Abundant there. This moss is very seldom collected.

Myurella Careyana Sulliv. Gros Pèlerin Island. This is an uncommon moss, growing chiefly on calcareous rocks. The products of the disintegration of the dolomitic nodules included in the quartzite, could perhaps account for the presence of *Myurella* on Gros Pèlerin Island.

Neckera pennata (L.) Hedw. Mt. Pilot.

Pohlia cruda (L.) Lindb. Gros Pèlerin Island. Growing with *Myurella Careyana*, and having the same preferences for limestone. It is considered as a subalpine species.

Polytrichum commune L. var. *uliginosum* Huebener. Mt. Pilot. This variety characterized by its leaves which are spreading-reflexed when dry is characteristic of peat bogs and high altitudes. It is considered as rare outside of the Rocky Mountains and the Pacific Coast. Its presence in Eastern Quebec is indeed worthy of record.

Sphagnum capillaceum (Willd.) Schrank. Gros Pèlerin Island.
Ulota crispa Brid. Gros Pèlerin Island. On trees.

Hepatics

Frullania Asagrayana Mont. Mt. Pilot; Gros Pèlerin Island. Though we have collected *Frullania* extensively in Temiscouata, all our specimens have turned out to be *F. Asagrayana.* It is a remarkable fact that *F. Eboracensis*, so common in western Quebec and in the Laurentides, is missing here.

Porella platyphylla (L.) Lindb. Mt. Pilot. Common.

Ptilidium ciliare (L.) Nees. Mt. Pilot. On rocks.

Ptilidium pulcherrimum (Web.) Hampe. Mt. Pilot. Very common.

Lichens

Alectoria jubata (L.) Ach. Gros Pèlerin Island. Growing with *Usnea dasypoga.*

Cladonia alpestris (L.) Rabenh. Cacouna hills; Mt. Pilot. This boreal species is closely related to the ubiquitous *C. rangiferina* L., but its powdery snow-white balls render it of easy recognition.

Cladonia coccifera (L.) Hoffm. Rivière-du-Loup. Quartzite hills. On rocks.

Cladonia decorticata (Flk.) Spreng. Gros Pèlerin Island).

Cladonia fimbriata (L.) Fr., var. *cornuta* Nyl. Gros Pèlerin Island.

Cladonia foliacea (Huds.) Schrad., var. *alcocornis* (Light.) Schaer. Mt. Pilot. Confined to silicious rocks.

Cladonia furcata (Huds.) Scrad., var. *pinnata* (Flk.) Wain. Gros Pèlerin Island.

Cladonia gracilis (L.) Willd., var. *gracillima* Norrl. Rivière-du-Loup, on quartzite hills. Gros Pèlerin Island. In very dry situations. A very luxuriant form is this fine species.

Cladonia rangiferina L. Rivière-du-Loup, on quartzite hills; Mt. Pilot; Gros Pèlerin Island; Cacouna, on quartzite hills. The commonest of Cladonias.

Cladonia uncialis (L.) Web. & Hoffm. Mt. Pilot; Gros Pèlerin Island.

Cladonia verticillata Hoffm. Rivière-du-Loup, on quartzite hills; Mt. Pilot. Cosmopolitan.

Gyrophora erosa (Web.) Ach. Rivière-du-Loup, on quartzite hills.

Gyrophora hyperborea Ach. Mt. Pilot. Arctic-alpine species.

Gyrophora Muhlenbergii Ach. Rivière-du-Loup, on quartzite hills.

Gyrophora vellea (L.) Ach. Mt. Pilot. An alpine species. No other locality known in eastern Quebec. Occurs in the Monteregian Hills.

Nephroma arctica (L.) Fr. Gros Pèlerin Island. We have found splendid fruited specimens of this large arctic-alpine Lichen, on exposed rocks. It was growing with other distinctly boreal plants such as *Hypnum pallescens* and *Cornus Suecica.*

Parmelia saxatilis (L.) var. *furfuracea* Schaer. Mt. Pilot; Gros Pèlerin Island. Both typical *P. saxatilis* and its variety were recorded from both localities.

Peltigera aphtosa (L.) Hoffm. Gros Pèlerin Island. Growing with *Nephroma arctica.*

Peltigera canina (L.) Hoffm. Gros Pèlerin Island. Commøn.

Physcia pitynea Nyl., var. *pulverulenta* (Schrad.) Nyl. Rivière-du-Loup, on quartzite hills.

Ramalina farinacea (L.) Ach. Gros Pèlerin Island. This species is now known from Alaska to Mexico, and from Labrador to the Carolinas.[1]

Umbilicaria pustulala (L.) Hoffm. Mt. Pilot. Growing with the different types of *Gyrophora.*

Usnea dasypoga (Ach.) Nyl. Gros Pèlerin Island. On trees. Characterized by its fibrillose thallus.

For various information and the critical study of some of the specimens mentioned above, the writer owes much indebtedness to Rev. H. Dupret, p. s. s., of the Seminary of Philosophy, Montreal, to Mr. Geo. B. Kaiser, of Germantown, Pa., to Dr. Geo. H. Conklin, of Superior, Wisc., and to the late Dr. H. E. Hasse, of Santa Monica, Cal. To all these he extends his most sincere thanks.

Longueuil College, Quebec.

ADDITIONAL NOTES UPON NEW MEXICAN HEPATICAE [2]

Paul C. Standley

The list of New Mexican Hepaticae published recently by the writer in The Bryologist[3] was based upon material obtained by various collectors in the last few years. It was not deemed practicable to search out the references in literature because the publications upon North American Hepaticae are so scattered and the New Mexican material available for citation so scanty. Dr. A. W. Evans, however, has kindly communicated certain New Mexican references which make a very considerable addition to the published list. It seems desirable that these additicns should be recorded.

Grimaldia fragrans (Balb.) Corda. Underwood[4] reports this from New Mexico, the specimen collected by Fendler, no definite locality being given. Some of Fendler's plants (1846–47) were collected in Kansas and Oklahoma, although all the labels are headed New Mexico. It is very probable that this specimen came from the mountains east of Santa Fe where Fendler obtained most of his plants.

Asterella fragrans (Nees) Trevis. This species, likewise, is reported from New Mexico by Underwood[1] upon the basis of one of Fendler's specimens, no definite locality being cited.

Lophozia lycopodioides (Wallr.) Cogn. Collected in the Las Vegas Range at an altitude of 3300 meters by Cockerell.

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[1] R. H. Howe, Jr. North American Spcies of Ramalina. Bryologist **17**: 2. Jan. 1914.

[2] Published by permission of the Secretary of the Smithsonian Institution.

[3] **18**: 81–83. 1915.

[4] Bot. Gaz. **20**: 68. 1895.

Porella platyphylla (L.) Lindb. Concerning the material reported by the writer under this name Dr. Evans writes: "I have recently been studying the specimens of *Porella* from New Mexico and it seems to me that they hardly represent the true *P. platyphylla*. In all probability they ought to be referred to *P. platyphylloidea* instead. Unfortunately the most important distinction between these species is found in the elaters and none of the New Mexican specimens which I have seen have mature capsules. The gametophytic characters, however, correspond better with those of *P. platyphylloidea*." Dr. Evans states that he has material of this plant collected on the West Fork of the Gila River, New Mexico, in August, 1903, by O. B. Metcalfe (No. 490), and that specimens collected by Fendler were distributed by Austin (as *Madotheca rivularis* var.) as *No. 91c* of his Hepaticae Boreali-Americanae.

Frullania mexicana Lindenb. Reported from New Mexico by Evans,[2] the specimens collected on an oak at Cloudcroft, August, 1899, by Wooton. This collection was reported earlier as *F. inflata* Gottsche.[3]

Frullania Wrightii Austin, Bull. Torrey Club **3:** 15. 1872. The type is said to have been collected in New Mexico by Charles Wright in "1861" (doubtless 1851). Many plants have been referred erroneously to New Mexico as the result of the misleading labels of Wright's collections of 1849–52, the specific name "*neomexicana*," for instance, having been applied to several plants not known to grow in the State. Although many of Wright's specimens were collected in Texas, Arizona, Chihuahua, and Sonora, all were distributed with labels implying or definitely stating that they came from New Mexico, a decidedly loose use of the name, even for that time. The chances are favorable that this hepatic came from the vicinity of Santa Rita, a locality at which Wright spent much time and one better suited to the growth of hepatics than most of the regions he explored. Dr. Evans states that *Frullania Wrightii* is a doubtful species and may be only a form of *F. riparia*.

The writer is under obligations to Dr. Evans for the data cited above. It thus appears that five species are to be added to the seven reported previously. Very probably still others may be found by a careful search of literature.

U. S. National Museum, Washington, D. C.

LICHENS OF THE MT. MONADNOCK REGION, N. H.—NO. 7

Thomas Durfee

Genus: *Pertusaria* DC.

128. *Pertusaria multipuncta* (Turn.) Nyl. 16 specimens.
129. *P. communis* DC. 10 specimens.
130. *P. velata* (Turn.) Nyl. 16 specimens.
131. *P. glomerata* (Schleich.) Schaer. 1 specimen.

[1] Bot. Gaz. **20:** 61. 1895.
[2] Bryologist **18:** 72. 1915.
[3] Bryologist **13:** 36. 1910.

132. *P. pustulata* Duby. 1 specimen.
133. *P. amara* (Ach.) Nyl. 3 specimens.
134. *P. opthalmiza* Nyl. 1 specimen.
135. *P. leioplaca* (Ach.) Schaer. 6 specimens.
136. *P. Wulfenii* (DC.) E. Fr. 11 specimens.

Genus: *Pyxine* (E. Fr.) Nyl.

137. *Pyxine sorediata* Fr. 1 specimen.

Genus: *Lobaria* (Schreb.) Hue.

138. *Lobaria pulmonaria* (L.) Hoffm. 3 specimens, all fertile.
139. *L. amplissima* (Scop.) Arn. 3 specimens, all fertile.
140. *L. querizans* Michx. 2 specimens, both sterile.

CONCORD, MASS.

SULLIVANT MOSS SOCIETY NOTES

The attention of members is called to the following changes in the List of Members published in the January number: *Add*—Miss M. Edna Cherrington, 96 Gordon Ave., Hyde Park, Mass. *Change*—Mrs. J. F. Merrill *to* Mrs. Ethelwyn F. Merrill.

The following New Members have been added to the list: Miss Lillian Dyer, 104 Hemenway St., Boston, Mass.; Mr. J. Evans, Box 62, Grant Orchards, Washington.

Just as we go to press, word comes of the death in April last of Miss Cora H. Clarke, of Boston, a member of the Society of long standing and active in furthering its work. We hope to issue a further notice in September.

Mr. C. C. Plitt writes that the first twenty-five of the duplicates of Lichens from the Hasse Herbarium are about ready for distribution, and requests that those interested in subscribing for the various fascicles communicate with him at once.

E. B. C.

SHORTER NOTES

The latest issue of "Broteria"[1] to arrive contains the following of interest to members of the Society. On pages 89 to 123, J. Cardosa, Jr., lists the cryptogams of Cape Verde, enumerating 7 species of hepatics, 17 of mosses, and 47 of lichens, besides the ferns, with an extensive bibliography.

ADVERTISEMENT ANNULLED

Too late for change of the advertisement, the set of Austin's *Musci Appalachiana* offered by Mr. Rau has been sold, hence this note, to avoid unnecessary correspondence.

[1] Broteria, Vol. XIII: 1915. Fasc. ii e iii.

VOLUME XIX NUMBER 5

SEPTEMBER, 1916

THE BRYOLOGIST

JOURNAL OF THE

SULLIVANT MOSS SOCIETY

Conducted and Published for the Society by

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

THE BRYOLOGIST

VOL. XIX SEPTEMBER, 1916 NO. 5

FOSSOMBRONIA CRISPULA IN THE DUNE REGION OF INDIANA

E. J. HILL

In 1898 two stations were found for a pseudo-foliaceous hepatic which at the time was referred to *Fossombronia crispula* Austin. The first of these stations is in the town of Westchester, Porter County, two or three miles eastward from Dune Park, and is in the area "between Dune Park and Mineral Springs, Indiana (G. S. Bryan, 1914)" lately given for it by Dr. A. W. Evans in some "Notes on New England Hepaticæ" in *Rhodora* **17**: 105. 1915. In the notes he records some localities for the species outside of New England, in addition to that near Batsto, New Jersey, the type locality, the only one recorded for it until quite recently. Shortly after obtaining it near Dune Park, I came across it again about three miles east of Tolleston, Lake County. This would bring it close to the city of Gary, since built there. This station is a few miles west of the former and in the county at the northwestern corner of the state. The dates of the two collections are, respectively, September 19 and September 23, the plants in both places being in good fruiting condition. The habitat, as recorded in my notebook, was "moist or wettish ground of sloughs," the water of which had been dried away, as usually happens in the shallow sloughs and ponds of the dune region at this time of the year. The soil is prevailingly of a peaty nature, the peat mixed with a little sand washed down, or blown in, from bordering but generally fixed dunes with an open vegetation. The slough east of Tolleston was one of the aquatic grass or sedge type, the vegetation in tufts or bunches, or in little hummocks, with bare spaces between them on which the liverwort grew. I do not recall that of the Dune Park station, whether of this or of the sphagnum bog type, both of which are frequent there.

The stems of the hepatic were 2 to 4 mm. long, closely cæspitose, variously forked or branched, or simple, ascending or prostrate, or with the base prostrate and the tips curving upward and semi-erect; well provided with vinous colored rootlets. The leaves are erect-spreading, or curving outward and upward, subquadrate, or the upper more obovate-quadrate, strongly wavy-crisped, sometimes emarginate, the edges entire to somewhat crenulate. The leaves at the ends of the stems and branches are rather bright green, but fade out and become paler or whitish below. The perianth is campanulate, its leaves wavy-crisped, their edges often more or less indented. The capsule is brownish, globose, almost sessile, immersed or the tip slightly rising above the perianth. The spores are

The July number of the BRYOLOGIST was published July 25, 1916.

yellowish-brown and tawny, orbicular to oval-orbicular, somewhat flattened or discoidal, the surface muricate-reticulate, the reticulations forming a blunt or toothed rim around the edge resembling a crest.

The most decisive factor in the determination of the species is the form of the elaters. They are very small, short, cylindrical, straight or occasionally slightly curved, the ends very obtuse. There is a single feeble spiral. These characters, according to the rather meager literature at hand at the time for determination, did not accord with any but those of *F. crispula* of Austin.*

A favorite place of growth for the plants in the Tolleston locality was the vertical sides of holes left in the mud by the feet of cattle. These were evidently made when the mud of the dessicated slough had reached a consistence that kept it from collapsing and the sides from falling in on the withdrawal of the foot. They were often quite well covered by plants. From its place of growth and its habits, it is evidently an annual, the spores starting the new plant when the ground becomes dry enough for the processes of vegetation. In such situations as these sloughs present, the ground is covered with water for six months or more, from the beginning of the autumnal rains in October or November until evaporation by the heat of the summer in June or July, or by its slow escape by seeping through the sands, such sloughs being commonly without surface drainage. Such being the case it becomes a question of interest in what life condition the plants pass the wet season. Unless the holes made by the feet of cattle last from one year to another or through the winter season, as hardly seems probable from their apparent freshness and the soft nature of the bottom, it seems as if the spores survived in the water and, lying or lodging in the bottom, were, so far as the holes were concerned, pressed into them by the hoofs of the cattle. Either the spores must have a structure capable of enduring this long soaking, or, germinating in the fall, the new plant must undergo these submerged conditions. But it is more likely an annual like *Ricciaceæ* of similar habit, such as *Riccia crystallina*, common on the clayey mud, sometimes quite dry and hard, of dessicated pools and sloughs of the region of argillaceous till, and a terrestrial form of *Ricciella fluitans* var. *canaliculata* (Hoffm.) Lindenb. I have found a single station for the latter in a slough by the railroad about a mile east of the Dune Park station. When the water dries away and recedes from its borders, the terrestrial plants can be found, making little rosettes similar to those of *R. crystallina*, but smaller. The common floating form is seen at the same time on the water or wetter mud. If the summer continues too wet one looks in vain for the fruiting form, the stage of water continuing too high. Like these the *Fossombronia* fruits late in the season and appears on the mud after the summer heat has removed the water. In contrast with these it may be noted that *Ricciocarpus natans*, whose floating forms fruit freely, matures spores in the early summer, as early as June.

7100 Eggleston Ave., Chicago, Ill.

* The descriptions were those of Underwood, one in the 6th edition of Gray's Manual of Botany, the other in his "Descriptive catalogue of North American Hepaticæ North of Mexico," published in the Bulletin of the Illinois State Laboratory of Natural History, Normal, Illinois, **2**: 60. 1884.

MOSSES RARE IN PHILADELPHIA

George B. Kaiser

The study of almost any locality will reveal peculiarities in the distribution of moss species which furnish food for thought and conjecture concerning the why and wherefore of their occurrence in given places, while in other places apparently repeating exactly the same conditions of soil, moisture, and exposure, they are altogether absent.

For instance, in the city of Philadelphia, in clefts of granitic rock along the Wissahickon Creek, there are several stations for *Rhabdoweisia crispata* (Dicks.) Kindb.—long confused with *Rhabdoweisia fugax* (Hedw.) B. & S.—an alpine, subalpine, or mountain moss which is very rarely found in the lowlands. I have searched the clefts of granitic rocks for miles about, but have discovered no other growth of the same species. This moss does not fruit, but vegetatively subsists in these few spots restricted to a limited area.

On a northeasterly facing bank, also along Wissahickon Creek, for five years *Buxbaumia aphylla* L. grew in a colony which increased from 10 to 70 capsules, then decreased, altogether disappearing after 1914. Its neighbors were *Dicranella heteromalla* (Hedw.) Schimp., sparse *Catharinaea angustata* Brid., and immature specimens of a species of *Cladonia*. Although almost numberless banks of a similar nature have been carefully observed for years, I have found *Buxbaumia* elsewhere only in one locality in Delaware County and in the Pocono Mountains near Tobyhanna. How and why did the spores find these rare banks congenial substrata? *Webera sessilis* (Schmid.) Lindb.—though of much more frequent occurence—also seems to display a certain whimsicality in the banks it chooses, leaving scores of similar banks bare of its presence.

There are many rocky stream-beds in our neighborhood, but in only one—that which flows through Highland Glen, near Chestnut Hill—have I ever noted the presence of *Eurynchium rusciforme* (Neck.) Milde. In only one place on rocks near the Wissahickon Creek have I detected non-fruiting patches of *Tortella tortuosa* (L.) Limpr., and the hepatic *Jubula pennsylvanica* (Steph.) Evans grows to my knowledge in but one streamlet, where it covers perpendicular dripping rocks.

How are these anomalies to be explained? I have found *Rhabdoweisia crispata* elsewhere no nearer than in the White Mountains of New Hampshire, *Buxbaumia aphylla* very rarely anywhere else, *Eurynchium rusciforme* and *Tortella tortuosa* elsewhere no nearer than the Delaware Water Gap, and *Jubula pennsylvanica* in only that one glen beside the Wissahickon Creek.

By painstaking explorations of our own neighborhood each of us may bring to light many interesting facts in regard to the distribution of the bryophytes. It is hoped that all members of our Sullivant Moss Society may be on the alert and that, in future, they may have something to say concerning the rarities which occur perhaps at the very threshold of their homes.

508 Locust Ave., Germantown, Pa.

A CORRECTION IN NOMENCLATURE

I. Hagen

On looking over the moss lists given in Seemann's *Botany of the Voyage of H. M. S. Herald* (1852), I became aware of a new species from Alaska named *Polytrichum cavifolium*, by the description of which I was struck. As this has been neglected in all the subsequent bryological literature, I transcribe the passage in question (pages 44–45) here:

> "*Polytrichum cavifolium* Wils. mss.; caule simplici breviusculo, foliis dissitis oblongo-ellipticis integerrimis concavis acutiusculis nervo angustiore parce lamellato, capsula subcylindrica incurviuscula peristomio longiore, calyptra nuda.—*P. lævigatum* Hook. et Arn. in Bot. Beech. p. 133. Kotzebue Sound.
>
> This species differs from *P. lævigatum* of Hook. Musc. Exot. in having the capsule longer and narrower, not contracted at the mouth, teeth of the peristome twice as long, leaves longer and narrower, less obtuse, almost apiculate, margin entire, not crenulate."

While among the characters adduced those taken from the sporogone are individual and do not hold as specific ones, the description of the leaves permits no doubt as to the identity of the plant: they are precisely those by which *Psilopilum tschuctschicum* differs from *Ps. lævigatum;* the entire margin of the leaves, the narrow nerve with fewer lamellæ, and indeed also the almost apiculate summit of the leaves, are fully sufficient for determination. According to this the name *Ps. tschuctschicum* must be changed into

Psilopilum cavifolium (Wils.) Hagen

Syn:—*Polytrichum lævigatum* (haud Wahlenb.) Hook. & W. Arn. in Bot. Capt. Beech. Voy. p. 133. (1841). fide Wils.

Polytrichum cavifolium Wils. in Seem. Bot. Voy. Herald. p. 44. (1852).

Catharinea tschuctschica Müll. Hal. in Bot. Centralb. **16:** 93. (1883).

etc.

Natural History Museum,
Trondhjem

LUNULARIA CRUCIATA (L.) DUMORT., IN THE OPEN

George L. Moxley

On June 7th, last, I noted a hepatic growing freely in front of a house in the southeastern part of Los Angeles. Upon examination it proved to be *Lunularia cruciata* (L.) Dumort. It is noted in our local lists as being "common in greenhouses," but in this case it covers about 30 square feet on the north side of the house and seems in the shadiest part to be crowding out the lawn grass and is also growing freely on the bricks of the foundation of the house. I have not yet noted it in fruit, but expect to keep watch of this most interesting find.

Los Angeles, California, Aug. 7, 1916

DEMETRIO'S MISSOURI MOSSES

Benjamin Franklin Bush

I have just received from Rev. Father Demetrio a copy of a reprint of "A List of the Mosses Collected in Various Parts of Missouri," from the Bryologist, **10:** 103–106. November 1907.

This interesting paper occupies about three pages, and includes 100 species and varieties of mosses, distributed among 51 genera, and is all the more interesting in that it is the first published list devoted exclusively to the mosses of Missouri. The fact that this list includes exactly 100 species, at least 60 not previously reported, many of them rare, or at least but little known, and the omission of many common species and varieties, leads one to believe that this list was intended as an initial publication only, to be followed at a later date by another list. It will, no doubt, be of interest to note some of the more common species omitted by Demetrio, which it would seem impossible not to have collected and recorded.

One of the more common species omitted from the list is *Dicranum sabuletorum*, common everywhere from St. Louis south to Wayne County and west to Taney County. *Fissidens cristatus* is common to all the hill country in Southern Missouri, but it is not given in the list. Another very common species to all the Ozark hills is *Leucobryum albidum*, in some places so abundant as to cover the ground, but Demetrio does not give it in his list. There are two species of *Barbula* not given in his list, *B. squarrosa* and *B. ruralis*, the first very common to all the Ozark hills, the last common on rocks all over southern Missouri.

The delicate little tree-moss, *Ptychomitrium incurvum*, so common on oak trees in the Ozark region, is not given in Demetrio's list, nor are *Orthotrichum Porteri* and *O. ohioense*, the first being common on top of flat boulders, the last common on oak trees in the Ozark region. In the genus *Physcomitrium*, only one species is recorded, but I can not understand how *P. Hookeri* and *P. Drummondii* could have been overlooked, as both are common on damp ground throughout the State. No species of *Bartramia* is given in his list, but *B. pomiformis* is common on gravelly or rocky ground throughout southern Missouri. *Philonotis* is not represented in the list, but *P. fontana* is a very noticeable species found around nearly every spring or springy place in the State. Demetrio apparently neglected the large handsome *Timmia*, common along shaded banks in the State, and the similar *Catharinea undulata*, so abundant on damp shaded banks throughout the State, is also omitted.

One of the most striking species of moss in southern Missouri is *Polytrichum commune*, common everywhere on rocky hills, not given in Demetrio's list. Two species of *Anomodon*, *A. rostratus* and *A. attenuatus*, are abundant in many places in woods in the State, on old logs, tree trunks, and on rocks, but both appear to have been neglected by Demetrio. Another very common moss in the State is *Entodon cladorrhizans*, a species found in woods on old logs, dead trees, and decaying wood, but it is not given in the list. One of the most conspicuous species of moss on rocky ground in the Ozark region is *Thuidium recognitum*, but Demetrio seems to have overlooked it, as well as *T. microphyllum* and *T. virginianum*.

Three common species of *Amblystegium*, *A. orthocladon*, *A. radicale*, and *A. varium*, are not given in Demetrio's list, and, as these are very common species in wet ground, I do not see how they could have been overlooked. The attractive little *Hypnum*, *H. Patientiae*, so common on damp rocks in the Ozark region appears to have escaped the attention of Demetrio, for it is not in his list.

It is true that a number of notes on Missouri mosses had been published previous to Demetrio's list, and references to species found in the State by Renauld and Cardot, Cardot, Mrs. Britton, Best, Grout, Lesquereux and James, Paris, and myself, but none of these were lists of Missouri species.

Probably the first knowledge of Missouri mosses we had was when Drummond in 1841 published or distributed his *Musci Americani* (S. States), of which 21 species were collected in Missouri, some of them being type specimens. Of these 21 species, 4 were new species and have not been collected in the State again, 5 were common species, 7 others have not been collected in the State since then, 1 has been collected once in the State by one other collector, and 3 have been collected by but 3 other collectors in Missouri. Demetrio collected 8 species of those collected by Drummond.

Dr. F. Pech[1], in 1842 and 1843, made a large collection of plants at Louisiana, Missouri, among which were 66 species and varieties of mosses, in 42 genera, which were included in a Catalogue of plants published by the U. S. Department of Agriculture in 1866. Of these 66 species and varities quite a number were doubtfully determined or were errors of locality, as no one has since collected these species in Missouri, and of the more common species Demetrio has collected 30.

In 1884, Lesquereux and James published their *Manual of the Mosses of North America*, in which 6 species of mosses were credited to Missouri, 4 of these having been previously recorded and 2 being new; Demetrio collecting but 1 of these species.

In 1892, Renauld and Cardot published their *Musci Americæ Septentrionalis*, in which 15 species are credited to Missouri, evidently based on the collections of Drummond, Cope, and Hall, and of the 15 cited for Missouri, Demetrio has collected 6. In 1892, Cardot published his *Monograph of Fontinalis* in which one more species new to Missouri is given, but this is also given in Demetrio's list. Between 1892 and 1907, many genera of mosses were revised and many new species were described, and 21 species were recorded for Missouri, only 1 of these being collected by Demetrio.

From the very first publication by Drummond in 1841, up to the time Demetrio published his list, there had been recorded 120 species and varities of mosses for Missouri, of which number Demetrio records 40, the remaining 60 being newly recorded.

Only two species of Demetrio's list are given as determined by himself, the determinations of the others being credited to 8 other bryologists, and, as there seem to be several things worth recording about this interesting paper, I think they will be very appropriate here.

---

[1] The Mosses of the Pech Catalogue—Missouri. BRYOLOGIST **19**: 52-60. July, 1916. B. F. Bush.

The first species recorded by Demetrio, *Ephemerum crassinervium*, may be *E. spinulosum*, and, if either, is not the species collected at St. Louis by Drummond.

Demetrio gives two species of *Phascum* in his list *P. bryoides pilifera* Schultz and *P. piliferum* Schreb., but the former I have been unable to locate in the Paris *Index*. In 1891 Demetrio collected *P. cuspidatum americanum* R. & C., which he does not give in his list, and it may be that the first species of *Phascum* of his list, or both species, belongs to this new variety.

Demetrio lists *Microbryum Floerkeanum*, determined by Cardot, which seems to me to be only another collection of *Phascum cuspidatum americanum*. Two species and one variety of *Dicranum* are given in the list—*D. fulvum*, *D. scoparium*, and *D. scoparium orthophyllum*. The first named may have been determined by Cardot as *D. fulvum*, but in 1896, eleven years before Demetrio published his list, Cardot described this collection as *D. subfulvum*, which Demetrio neglected to list. *D. subfulvum* may not differ in any way from *D. fulvum*, but not having seen the type specimens I can not say. *D. scoparium* is very rare in Missouri, if not wanting altogether, and the variety *orthophyllum* listed by Demetrio may be an error of determination, for the Paris *Index* does not give this variety for North America.

One species and a variety of *Ceratodon* are given in this list, *C. purpureus* and *C. purpureus aristatus*. The specific form is common all over the State on clay banks, but the variety cited does not occur west of New Jersey. There is, however, a variety that has been found in Missouri, *C. purpureus xanthopus*, and, if Demetrio's specimens are not the specific form, I think they may belong here.

The rare little *Physcomitrium immersum*, collected by only one other collector in Missouri, was recorded by Mrs. Britton as collected at Emma, Mo., in 1894, thirteen years before Demetrio published his list, but he must have overlooked it.

Six species of *Brachythecium* are given in Demetrio's list, but one more might have been given, for *B. oxycladon dentatum* is recorded as collected by Demetrio in 1897, ten years before he published his list.

No species of *Bryhnia* is given in Demetrio's list, but *B. graminicolor Holzingeri* is credited to Demetrio in 1898, nine years before the publication of his list.

Courtney, Missouri.

CORA H. CLARKE

Anne L. Read

Through the death of Cora Huidekoper Clarke on April 2d, last, the Sullivant Moss Society has lost a member so devoted and of such long standing, that more than passing comment seems called for.

Miss Clarke was the daughter of the Rev. James Freeman Clarke, and came of a family distinguished for force of character and intellectual culture, her grand-

father being one of the founders of the Meadville Theological Seminary. She began her botanical studies in the school of Horticulture in Jamaica Plain, continuing them by special courses under Gray, Goodale, and Farlow. Her activities, however, were not limited to botany alone, but extended to insects and minerals. On all of these she wrote many short papers, and one considerable article, a monograph upon the habits and life history of the caddis fly. Her careful observation, painstaking notes, and photographs gave her work great value.

She was a Fellow of the American Association for the Advancement of Science, and a member of the Council of the Boston Natural History Society. For more than thirty-five years she was the leader of the Botany Group of the New England Women's Club, to which she imparted her own enthusiasm for the study of all plants, giving assistance to all with a characteristic lack of ostentation. Likewise characteristic of her was the financial assistance that she gave to the publication of several papers. Her collections will be divided among the various societies of which she was a member.

BOOK REVIEWS

How to Know the Mosses

By Elizabeth Marie Dunham[1]

This is a volume of 287 pages. As is announced on the title page, it is "A popular guide to the mosses of the Northeastern United States." It contains keys to eighty genera, and short descriptions of over one hundred and fifty species, with special reference to the distinguishing characteristics that are apparent without the aid of a lens.

Dr. Grout has written his "Mosses with a Hand Lens" in an effort at enlisting a larger number of field botanists with limited equipment for minute examination in the study of these rather ubiquitous denizens of field and woodland. This book by Mrs. Dunham, promises even a little better: it deals entirely with the gross aspect of mosses, as we meet them out of doors, without the aid of a *hand lens.*

The nomenclature followed is that of Dr. Brotherus, in Engler & Prantl's *Pflanzenfamilien.* The list of books used for reference excludes Lesquereux and James' *Manual* and Barnes' *Key to Mosses.*

In her commendable zeal to enlighten nature lovers, the writer, after treating preliminary matters, such as the branching of stems, the shape and disposition of leaves and of capsules, gives even a "Key to distinguish mosses from hepatics and lichens."

Pages 41–69 include two keys: first, a *leaf key;* second, a *capsule key,* both to genera. The student is from these keys referred by number to the eighty numbered genera, pages 73 to 257, to verify or correct the key determination.

Certainly these keys have the very excellent feature of emphasizing and calling attention to the mode of occurrence, substratum, and general fieldaspect of the genera of mosses treated in a way that will be helpful even to the more ex-

[1] Published by the Houghton Mifflin Company, 4 Park Street, Boston, Mass. Price $1.25 net.

perienced field student and collector. The book ought to be especially helpful to high school and college botany teachers who include some field work in their courses, as they should. And whereas, at present, the moss students in any one state can, on the average, be counted on the fingers of one hand, Mrs. Dunham's book is likely to increase them to hundreds.

The book does not pretend to take up the pigmy genera like *Archidium*, *Astomum*, *Bruchia*, *Ephemerum*, *Micromitrium*, *Phascum*, and *Sphaerangium*. It even omits *Ptychomitrium*, *Rhabdoweisia*, *Seligeria*, *Zygodon*, *Coscinodon*, *Dicranodontium*, and *Dicranoweisia*, genera represented by species in the geographic area treated; still, the stimulus from it should be felt in every state east of the Rocky Mountains.

The typography is clear and excellent. The illustrations scattered through the book are helpful to beginners. The accents for the frequently long technical names are given with great fidelity to classical principles. However, I wish here to correct two errors in accent. One is on page 156: *Catharinéa* needs to be accented on the penult, because this is long, being a diphthong. The other is on page 213: *Drepanócladus* must get the accent on the antepenult, because the "a" of the penult is short in quantity, as given in the Greek lexicons, in κλάδος, a shoot or branch. On page 220, the varietal name *Mackayi* ought by rights also to be accented on the penult; but here usage has probably some claim to fix the accent on the antepenult.

WINONA, MINN., AUG. 1, 1916 JOHN M. HOLZINGER

Mosses, in the Natural History of Madagascar

By Renauld and Cardot

"Histoire physique, naturelle et politique de Madagascar, publiée par A. et G. Grandidier: Vol. xxxix. *Mousses*, par F. Renauld et J. Cardot. I vol. gr. in 4to, de 560 pages et atlas de 187 planches. Prix: 467 fr. 50. Librairie Hachette et Cie., 79 boulevard St. Germain, Paris."

After the death of M. Renauld, M. Cardot was forced to continue this great work alone, but fortunately it was finished a few weeks before the opening of the war. In consequence of the outbreak of the war, the printing of the work which was started near the close of 1913, has just been completed. The systematic portion is preceded by two chapters dealing with the topography, climate, geology and bryo-geography of Madagascar. The systematic portion itself includes the description of nearly 550 species, of which more than half are endemic. Each description is accompanied by the necessary synonomy, and by more or less extended critical notes. A rather large number of species are described for the first time, as well as one new genus upon the authority of M. Cardot alone, since it was only recognized after the death of his collaborator. In the 187 plates, 360 species are figured.

Only 150 copies are placed on sale, 100 of which are reserved solely for the subscribers to the complete work.

PARIS, MARCH 26, 1916. J. CARDOT

Die Thueringer Torfmoose und Laubmoose und ihre geographische Verbreitung[1]

Von Julius Roell. 1915

This volume issued in the spring of 1915, without more exact date, consists of two parts, separately paged. The first part, designated as *Allgemeiner Teil*, of 263 pages, is a reprint from "Mitteilungen des Thüringer Botanischen Vereins, Neue Folge, Heft XXXII, 1914, S. 1–263. The second part, designated as *Systematischer Teil*, the author informs us at the very close of the introduction to part one, is reprinted from "Hedwigia, 1915, Bd. LVI, Heft 1–3, and has 287 pages.

It is impossible in a brief statement to our American bryologists to do even partial justice to this remarkably charming publication. I say advisedly "charming," aware as I am that sentiment lies outside of science. The charm of this truly scientific treatise lies in the sustained personal enthusiasm of the writer, maintained for forty-five years, that breathes from every page.

The first part is a veritable storehouse of connected information about European bryologists for nigh onto a century and a half, with special emphasis, of course, on those with whom Dr. Roell has had, and still has, personal intercourse; with whom he has roamed the length and breadth of the haunts of mosses, observing, debating in friendly converse, both in field and from his laboratory, the relationships and the numerous problems arising from the study of mosses. After mentioning Nonner, Planer, Bridel, Nees v. Esenbeck, K. Müller in Halle, and many others, a list of over sixty names, he gives in faithful detail what each contributes to the work in hand, the rare species found, the additions of species new to the area. We learn that A. Roese (+1873), a teacher in Schnepfenthal near Gotha, first introduced the writer to the study of mosses, as far back as 1866. Dr. Karl Schliephacke (+1913) gave him first help in the study of Sphagna. Even the members of his family are appreciatively mentioned.

The region discussed in such interesting detail lies well near the heart of Germany, and this in more than one sense. What historic memories spring up at sight of the Wartburg, of Weimar, of Jena! Luther, Goethe, Haeckel, and many others known in the great world, have lived here. Yet, the author silently and modestly leaves unmentioned this fact, that within this limited area some of our great historic thinkers have lived. It is largely hilly country, being traversed from N W to S E by the Thueringian Forest. Well watered forests interspersed with porphyritic crags afford most diverse scenery.

The chief and distinctive merit of Dr. Roell's publication is due to the fact that all his life he has been a persistent and consistent field student. He lives up to his ideal of recognizing mosses in all their variations in the field. To him, a species is, not a thing, but a conception, capable of being enlarged or narrowed. Too generally the closet-student—one that knows not the field—makes a herbarium *specimen* the all-satisfying basis of a species: whatever disagrees at any point must be something else, a variety or another species. Aberrant forms are

[1] *See*, also, review by A. L. Andrews in BRYOLOGIST for September, 1915.

sedulously suppressed or re-baptised. This, the author contends, is to be avoided by field study, by allowing a range of normal variation. He is rather severe on men like Dr. Warnstorf, who lean on herbarium specimens for an excuse to multiply varieties. Especially in the Sphagna does he urge and practice collecting and preserving series. His dictum is "The study of forms is not labor lost. Whoever neglects this task, errs." And he declares that only the thorough field student, who acquaints himself with physical and climatic influences on organic life becomes able to elaborate the relation of mosses to all nature in a general Bryogeography. One understands after this consideration, why the author's chapters, in the first part, on climatic influences, and geognostic relations of mosses are so full of living interest. His observations on hygrophile, skiophile, photophile mosses; on mosses seeking calcareous soil, siliceous soil, salt soil, humus, rocks of various composition, black and light colored soil, wet and dry soil, shady and sunny soil, bark and wood, on city pavements and in villages—all give a deeper insight into the conditions of the life of mosses.

In this whole work the idea of species-making is subordinated to the study of life conditions. The numbered systematic list of 536 species in the first part is given merely to show their distribution in the four zones he establishes in his area.

In the second, the systematic part, which is accompanied by a map showing the distribution of the Sphagna, Dr. Roell scores with amusing mildness the reprehensible practices of certain bryologists—and other botanists—of juggling with plant names largely for the purpose of getting their names attached to new combinations. In no real sense is any botanist the father of a new combination when he has simply transposed specific names to a new genus, rightly or wrongly.

The problem of varieties receives intelligent attention also here, as must be expected from so keen an observer of mosses in the field. Unfortunately we cannot here enter into details. After discussing the rise of varieties in the last section of part one, the author has a closing chapter on "Explanations by the Darwinian Theory." While he finds that it is possible to explain many phenomena in mosses, especially in the Sphagna, by the struggle for existence, by adaptation to external influences, and the subsequent heritability of acquired characters, etc., this theory is still not sufficient to explain many other facts, and he concludes with the reflection that "Natural Science is not called upon to explain everything, but must often be content with the establishment of that which Nature offers for study." In this establishment of the facts of Nature, Dr. Roell has rendered surely a notable service.

The nomenclature of Sphagna is discussed with great detail. In the first part, referring to the North American Flora, Dr. Roell expresses satisfaction over the reduction of numerous Warnstorfian "herbarium species" of this genus edited by Prof. A. LeRoy Andrews of Cornell; and while he approves on the whole Andrews' treatment of this genus, he disagrees with the treatment of the Subsecunda group.

In the general question of nomenclature Dr. Roell goes with Brotherus, S. O. Lindberg, and Limpricht. He recognizes in the class MUSCI three subclasses,

namely *Sphagnaceæ*, *Andreæaceæ*, and *Bryaceæ*, including here *Archidium*. The Bryales fall into the two groups of *Acrocarpi* and *Pleurocarpi*. His 135 genera are included under 27 families.

The special part begins with page 50. The Sphagna are most exhaustively treated. There are diagnostic keys for his six "groups" and for the species under each group. Under *Bryaceæ* only the larger families, and the larger genera, have such keys to their respective subdivisions. The chief task of the author is the record, under each species, of its geographic and geognostic occurrence.

The whole is the work of a lover of Nature, and of a keen observer and untiring worker. In his analysis of this moss flora, in part one, the author compares his area with the outlying regions, recording species that persisted since the Ice Age, those that came in from the South, the West, the North, and the East: thus giving an exhaustive view of the epochal movements of these interesting organisms since geological time.

John M. Holzinger.

Winona, Minnesota.

SHORTER NOTES

All students of lichens will be interested in the article[1] by Dr. Bernt Lynge, which starts publication in the last issue of the Nyt Magazin to come to hand. Realizing the great value of accurately determined specimens in the case of Lichens, plants that differ in many cases but slightly, and the difficulty of putting such differences into words, Dr. Lynge has long had in preparation an index of the various published collections. There are considerably more than a hundred known exsiccati that contain Lichen material wholly or in part, and the present work attempts an exhaustive catalogue. This is to be in two parts; the first containing a list of the exsiccati under the respective authors; the second, an alphabetic index of all species and varieties. In the present instalment Dr. Lynge makes a beginning of the first part, listing Anzi to Britzelmayr. With each citation is given the complete title of the series, the date, number of specimens, bibliographical references, and a complete list with numbers of the material comprised in the work. E. B. C.

In two of the recent issues of Broteria M. Luisier,[2] the veteran bryologist, contributes under the title "Fragments de bryologie ibérique," several short notes. These comprise the following: Description, with two figures, of *Desmatodon meridionalis n. sp.* from South Portugal, a minute plant apparently related to *D. cernuus;* Note upon the distribution of *Triquetrella arapilensis*, recording two additional localities for this species, a representative of a genus previously considered as belonging exclusively to the southern hemisphere; Description, with a

[1] Index Specierum et Varietatum Lichenum, quae collectionibus "Lichenes Exsiccati" distributae sunt. B. Lynge, Nyt Magazin for Videnskaberne, Bd. **53**: Hefte 3–4 ; 1–112. (1915).

[2] Fragments de Bryologie Ibérique. A. Luisier. Broteria. **13**: Fasc. 2, 3. 149–153. (Dec. 1915). **14**: Fasc. 1. 5–24. (April, 1916.).

fine figure, of *Brachymenium lusitanicum* (Luis.) Hag. *n. sp.*, a representative of a tropical genus that forms an interesting addition to the number of outliers which have been discovered in Europe within the past decade; Notes upon nine species that are new to the moss flora of Spain.

In the last issue of Broteria, Father Luisier continues these notes. The first note describes and figures a new and remarkable species of *Andreaea*, *A. crassifolia* Luis., which seems to have its affinities with the species of the Southern Hemisphere belonging to the Section *Enerviae* of the Subgenus *Euandreaea*. A very detailed description of the plants is given, two localities, one Spanish, the other Portuguese, and a plate of the details of a fruiting plant. The remainder of Father Luisier's article deals with a list of Spanish or Portuguese localities for nearly ninety species of Acrocarps (the Pleurocarps will follow in the next issue) representing the "débris" as the author puts it, saved from his extensive collections and those at the Collège de Campolida when the latter was ransacked at the founding of the Republic. The greater part of the list is merely a catalogue of localities with a few notes upon relative abundance, but more extended mention is made of *Tortula Solmsii* (Schimp.) Roth, *Fissidens serrulatus* Brid., *Grimmia trichophylla* Grev., var *Lisae* (de Not.) Bottini, *Rhacomitrium aciculare* (L.) Brid., *Rh. microcarpon* Brid., and *Philonotis calcarea*. *Aulacomnium palustre* (L.) Schwaegr. var. *cincinnatulum* Luis., is described as new. E. B. C.

Hepaticae Presented to the New York Botanical Garden by Miss Haynes.—We learn from the Journal of the New York Botanical Garden that in connection with the Twentieth Anniversary Celebration of the New York Botanical Garden, Miss Caroline Coventry Haynes presented to that institution the collection of Hepaticae which she had purchased from Dr. M. A. Howe in 1909. The collection contained much European material and was especially rich in Californian species, including most of the specimens cited in Dr. Howe's "The Hepaticae and Anthocerotales of California." The collection included altogether about 1850 pockets. O. E. J.

In the February number of the Bulletin of the Torrey Botanical Club (**43**: 63–81. *Pl. 1.*) under the title, "New and Rare African Mosses from Mitten's Herbarium," Mr. H. N. Dixon describes ten new species from various parts of Africa, ranging from Kilimanjaro to the Cape. There are also notes, critical or descriptive, upon twenty other species, and one new combination. A new section, *Gymno-ischryodon*, is proposed in *Fabronia*. All but one of the new species are illustrated in the accompaning plate. E. B. C.

In the March issue of Torreya (**16**: 67–70. *fig. 1.*) Dr. Evans describes and figures *Metzgeria grandiflora*, a new species from the Galapagos Islands. According to a note by the author this is the first species of the *Metzgeriaceae* to be reported from the islands. E. B. C.

An interesting paper on "Ceylonese Mosses" appeared in the Journal of Botany, Sept.–Oct., 1915, by Mr. H. N. Dixon, this being an account of a collection of over 400 numbers secured by the Rev. C. H. Binstead during February

and March, 1913. The list includes Latin descriptions and notes in English for the following new species: *Dicranodontium sparsum* Dixon, *Fissidens aberrans* Broth. & Dixon, *Macromitrium assimile* Broth. & Dixon, *Bryum ceylonense* Broth. & Dixon, *Camptochaete* (?) *thamnioides* Broth. & Dixon, *Acanthocladium ceylonense* Broth. & Dixon, *Taxithelium Binsteadii* Broth. & Dixon, *T. isopterygioides* Dixon, and *Vesicularia caloblasta* Broth. & Dixon. The article is accompanied by a plate including figures of all but one of the new species, and there are included in the paper characterizations of two new varieties. Critical notes are given on the characters or as to the synonymy of many of the species listed. The article has been repaged in reprinting and there is no statement of its original paging or the number of the volume in which the article apeared—these omissions being likely to cause trouble in citation. O. E. J.

Mr. H. N. Dixon contributes to the Journal of Botany (**53**: 16–23. Jan., 1915) "Miscellanea Bryologica—IV," in which he discusses critically some Australasian species of *Breutelia*, concluding finally that *Breutelia pendula* (Hook.) Mitt. is highly variable and includes in its synonymy five specific and six generic names. *B. fusco-aurea* Broth. is regarded as probably synonymous with *B. Sieberi* (Hornsch.) Mitt. *Microthamnium cavefolium* (Rehm.) Dixon is described as a new species from South Africa; *M. cygnicollum* (Hampe) C. M. is described for the first time, the name cited by Paris in the Index being a herbarium name only; *Neckera Hoehneliana* C. M. is found to be distinct from *N. Hoehnelii* C. M., the two being confused in the Paris Index, ed. 2, so that *N. Hoehneliana* C. M. stands as a good species while the other plant belongs to another genus and should be called *Renauldia Hoehnelii* (C. M.) Broth.
O. E. J.

With the May issue of Torreya the publication of "Common Mosses According to Habitat"[1] is brought to a close. The three articles deal with about a hundred mosses common to the region about New York City. There are a few introductory pages of general description and an explanation of the use of the keys, after which the acrocarpous mosses are classified into five arbitrary habitat-groups. Each group is then keyed out to genera or species by characters drawn from calyptra, shape of capsule, and structure of the leaves. Following this is an alphabetic list with brief descriptions, but no authorities, of the various species. The pleurocarpous mosses are then treated in a similar manner. A maturity table, resume of the habitat groups, glossary, and final list of all species mentioned, completes the series of articles. E. B. C.

Dr. Evans has again brought up to date the various new discoveries in the hepatic flora of New England,[2] but as usual the extensive notes apply to a far

[1] Daisy J. Levy. Common Mosses According to Habitat. Torreya. **16**: 55–67, 80–91, 103–115. *figs. 1–5.* (1916).

[2] A. W. Evans. Notes on the New England Hepaticae,—XIII. Rhodora **18**: 74–85, 103–119. *figs. 1–40.* (1916).

wider territory. The article deals specifically with the five species, *Scapania Oakesii* Aust., *S. paludicola* Loeske & K. Müll., *Porella pinnata* L., *P. platyphylla* (L.) Lindb., and *P. platyphylloidea* (Schwein.) Lindb., but there is much incidental discussion of other species of the genera. Figures are given of all the species of *Porella* discussed. E. B. C.

In a recent article,[1] based mainly upon collections made by the members of the New York Botanical Garden, Dr. Riddle brings up to date our knowledge of the lichen flora of Bermuda, more than tripling the number of forms previously known. For completeness, reference is made to all previous reports and collections. Eighty six species and varieties are listed, of which almost eleven per cent are endemic. Seven new species, one new variety, and two new forms are described, and five new combinations made. E. B. C.

Two collections of mosses frcm Peru have recently been studied by Mr. Williams.[2] The list cites in most cases merely the specific name with data of the specimens, but critical notes are given in some cases. Seventy-one species and varieties are noted, of which seven are proposed as new, all being figured in the accompaning plates. One new combination is made. E. B. C.

Our attention has been called by a recent note from Dr. A. LeRoy Andrews to the death of Dr. Georg Roth which, according to Hedwiga, took place December 5, 1915, in his seventy-fourth year. O. E. J.

MEETING OF THE SULLIVANT MOSS SOCIETY

As previously announced, there will be a meeting of the Moss Society in New York during the Christmas vacation, 1916, in connection with the American Association for the Advancement of Science. The probable date is December 27th or 28th, and it is expected that the meeting will be at Columbia University. A later notice will be sent to each member.

BUT, do not wait for invitation: plan to come, and plan to contribute to the program or to the exhibits. And, if attendance is impossible, send material for exhibition purposes, short notes, and help things along. The Secretary cannot send a personal appeal to everyone, but relies on voluntary contributions. Those who plan to come or to contribute are requested to send notice to Mr. Chamberlain as soon as practicable, so that proper accommodations for all may be assured. Further notice will appear in the Bryologist, and will be sent by mail.

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[1] Lincoln W. Riddle. The Lichens of Bermuda. Bull. Torr. Club. **43**: 145–160. (1916).
[2] R. S. Williams. Peruvian Mosses. Bull. Torr. Club. **44**: 323–334. *Pls. 17–20.* (1916).

SULLIVANT MOSS SOCIETY NOTES

The following changes and additions are to be made in the membership list of the Sullivant Moss Society issued in January.

Change addresses as follows:

Mr. N. Iwasaki.....Fujita, Kurosakimachi, Ogagun, Fukuoka-ken, Japan.
Mr. Alfred C. Kinsey.....391 Hyde Park Ave., Roslindale, Mass.

Add new members:

Miss Eloise Butler.....720 Fourth St., Minneapolis, Minn.
Mr. J. M. Grant.....Sequin, Wash.
Miss Frances E. Newland.....321 Court St., Utica, N. Y.
Mrs. H. R. Robertson.....136 Buffum St., Buffalo, N. Y.

Resigned:

Miss H. Mary Cushman.....Reading, Penna.

Upon the occasion of sending in the article published in this number of the Bryologist, Mr. E. J. Hill writes that he is very feeble after a long-continued illness. The Bryologist extends to Mr. Hill sympathy and best wishes for a speedy recovery.

EXCHANGE DEPARTMENT

Offerings, to members of the Sullivant Moss Society, for postage—

Mr. C. C. Plitt, 3933 Lowndes Ave., Baltimore, Md.—*Ramalina reticulata* (Noehd.) Kremp., collected on Mt. Hamilton, California; also *Usnea ceratina* Ach., offered by Mr. P. G. M. Rhodes of Birmingham, England, who collected it in Switzerland, but for the offerings address Mr. Plitt.

Mr. Roy Latham, Orient, N. Y.—*Lecanora subfusca rugosa* (Pers.) Cromb., collected in New York.

Mrs. Elizabeth M. Dunham, 206 Windsor Road, Waban, Mass.—*Hylocomium umbratum* (Ehrh.) Bryol. Eur., and *Dicranum majus* Smith, both with fruit, collected in Maine.

Mr. Severin Rapp, Sanford, Florida—*Biatora sabuletorum* Flk., and *Biatora niveocincta* Merrill (sp. nov.), collected in Florida.

Mr. Edward B. Chamberlain, 18 West 89th St., New York City.—*Anacolia Webbii* (Mont.) Schimp. st. Sicily, coll. Nicholson & Dixon, *Pogonatum urnigerum* (L.) P. Beauv. *forma.* Wales, coll. Jones & Rhodes.

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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. XIX NOVEMBER, 1916 No. 6

DREPANOLEJEUNEA, A GENUS NEW TO NORTH AMERICAN HEPATICAE

CAROLINE COVENTRY HAYNES

Drepanolejeunea bidens, that we welcome to our Flora, has hitherto been known only in tropical America; western Europe possessing a similar case in the closely-related *Drepanolejeunea hamatifolia* (Hook.) Schiffn.

Mr. Albert Ruth made collections of Hepaticae in Tennessee which were determined by the late Professor L. M. Underwood. There were some "left-overs" that he evidently reserved for future study and among these the pocket "#6 Mts. of E. Tenn. Ruth" containing in mixture a large *Lejeunea* called by him *L. clypeata* and "+*Lej.* (interesting)" as he designated the unknown. Within the pocket a smaller one contained the latter species and was marked "6[a]". The writer, while studying this little collection of "left-overs": the list of which will be given below, was at once attracted by this lovely minute species. Though unfortunately sterile, the strikingly characteristic underleaves and ventral lobes enabled her, after some study, to place it in this genus and Dr. Evans, when sent a specimen, added the specific name. These tiny underleaves stretch their slender widely-spreading divisions beyond the stem and when it is realized that these divisions are composed of not more than four cells placed in a single row, the size of the plant can be appreciated.

Dr. Evans has beautifully described this Genus and the closely-allied *Leptolejeunea* in his series on Hepaticae of Puerto Rico, *Bulletin of the Torrey Botanical Club* **29**: 496. 1902, and **30**: 29–30. 1903, and our species, *L. bidens* (Steph.) Evans, is described and figured in detail. Students will thoroughly enjoy studying these critical notes.

In the tropics this genus prefers to grow on the leaves of trees and occasionally on bark as was the case here in eastern Tennessee.

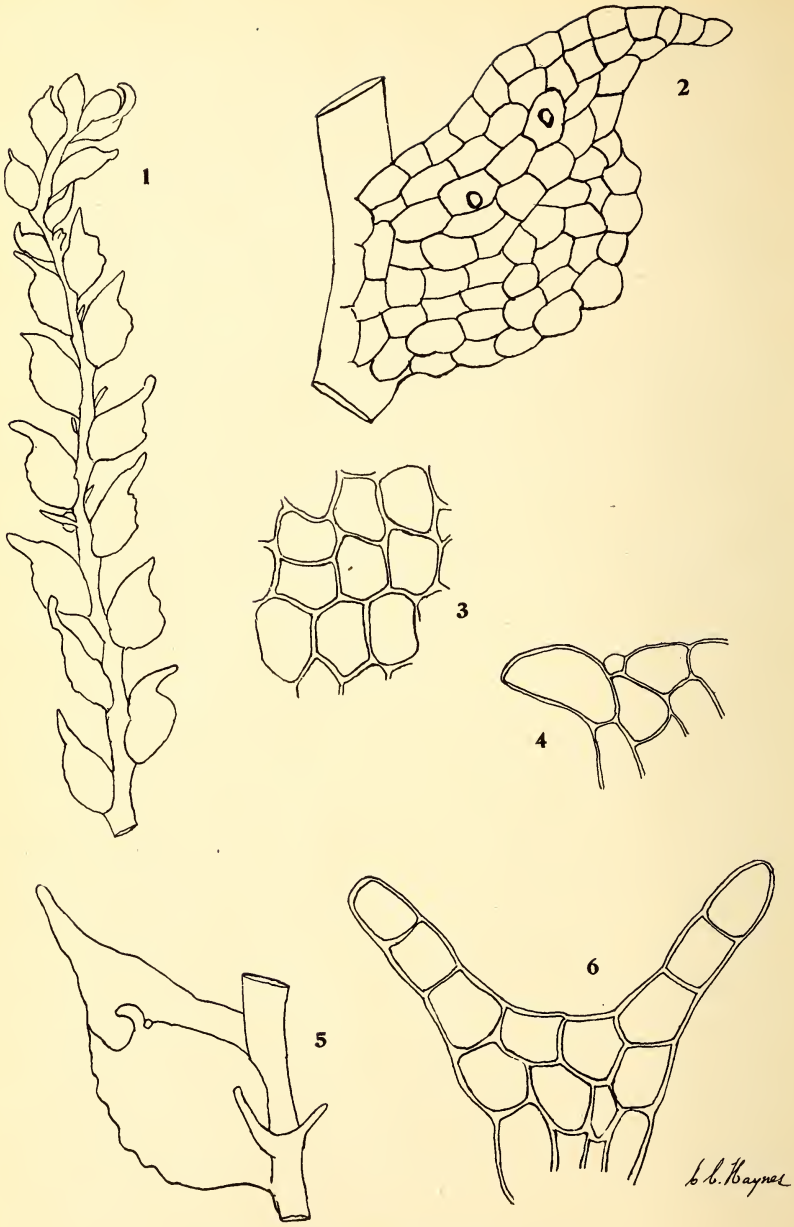
The writer will give the entire specific description and quote from the above two papers with the permission of the author:

"Drepanolejeunea bidens (Steph.) Evans

Lejeunea (*Drepano-Lejeunea*) *bidens* Steph. Hedwigia, **29**: 71. 1890.

"Yellowish-green, growing in thin and loose patches: stems 0.035 mm. in diameter, prostrate, irregularly pinnate, the branches widely spreading; leaves distant to subimbricated, the lobe suberect or obliquely spreading in the lower part, widely spreading above, convex, falcate-lanceolate, 0.35 mm. long, 0.08

The September number of THE BRYOLOGIST was published October 4, 1916.



DREPANOLEJEUNEA BIDENS (Stephani) Evans

mm. wide, somewhat narrowed toward the base and attached by an almost longitudinal line of insertion, margin subentire or slightly crenulate or denticulate from projecting cells, rarely with a larger blunt tooth near end of keel, apex long-acuminate, ending in a row of two or three cells; lobule strongly inflated at base and along keel, broadly ovate, 0.15 mm. long, 0.1 mm. wide, keel strongly arched, slightly roughened in outer part from projecting cells, free margin plane and appressed to lobe, passing beyond apex by a lunulate sinus to end of keel, apical tooth strongly curved; cells of lobe somewhat convex, their walls slightly but uniformly thickened, averaging 19 × 14 μ; ocelli commonly two, one at the base of the lobe, the other at about the middle, indistinct; underleaves distant, basal portion quadrate or rectangular, 0.03 mm. long, marginal cells six, divisions obliquely to widely spreading (up to 0.07 mm.), each consisting of two or three cells in a single row, rarely two cells wide at base: inflorescence dioicous: ♀ inflorescence borne on a very short branch innovating on one side with a simple and sterile innovation; bracts obliquely spreading, unequally bifid, the lobe ovate, 0.35 mm. long, 0.15 mm. wide, long-acuminate, the margin coarsely and irregularly dentate or spinulose-ciliate, usually with from four to seven teeth, lobule irregular in shape, 0.25 mm. long, 0.08 mm. wide, acute to acuminate, margin as in lobe, but usually with fewer teeth (mostly one to five); bracteole connate on one side, ovate, 0.3 mm. long, 0.15 mm. wide, bifid about one-third with erect, subacuminate lobes and narrow sinus, margin as in bracts, usually with from five to twelve teeth in all: perianth broadly obovoid, 0.4 mm. long, 0.3 mm. wide, gradually narrowed toward the base, truncate above and with a short beak, terete below, sharply five-keeled in upper part, the keels projecting outward as subacute, slightly dentate horns; ♂ inflorescence unknown."

Explanation of Plate III

1. Part of plant, antical view × 63
2. Leaf, antical view showing the two ocelli (*See* Note "A" below) × 287
3. Cells from middle of lobe × 520
4. Apex of lobule showing unicellular papilla (*See* Note "B" below) × 520
5. Leaf, lobule and underleaf, postical view × 287
6. Underleaf × 520

Note A. "Ocelli are not usually found in *Drepanolejeunea*. They are never conspicuous and their number (in the vegetative leaves at least) never exceeds two. Even in species in which they are normally present, many of the leaves, especially those which are poorly developed, fail to show them. The ocelli in most cases are no larger than the neighboring cells and usually retain their angular form even when their contents become lifeless. They are distinguished by the granular or fatty bodies which they contain and do not usually become hyaline and empty as in many other Lejeuneae. Sometimes the addition of potash solution brings them out more clearly. With regard to the uses of these ocelli practically nothing is known, although it is probable that they sometimes take part in the formation of the water sack."

Note B. Notice the peculiar curved apical cell or tooth. "At the base of the tooth on the side toward the axis there is present a slight depression or notch in which a unicellular thin-walled and hyaline papilla is situated. The terminal cell curves outward, coming into contact with the postical surface of the lobe and sometimes extending as far as the end of the keel, which in many cases curves forward and meets it."

The writer examined all of Ruth's specimens of Frullaniae and Lejeuneae in the herbarium of the New York Botanical Garden but failed to detect any additional specimens of *D. bidens*.

In the Herbarium of the New York Botanical Garden

List of species collected by Albert Ruth, in Knoxville, Tennessee, in 1891–2:
Metzgeria furcata (L.) Dumort.
Jamesoniella autumnalis (DC.) Steph.
Lophozia bicrenata (Schmid.) Dumort.
Cephalozia bicuspidata (L.) Dumort.
Cephalozia curvifolia (Dicks.) Dumort.
Odontoschisma denudatum (Mart.) Dumort.
Bazzania trilobata (L.) S. F. Gray.
Radula complanata (L.) Dumort.
Porella platyphylla (L.) Lindl.
Microlejeunea bullata (Tayl.) Evans.
Microlejeunea Ruthii Evans.
Drepanolejeunea bidens (Steph.) Evans.
Leucolejeunea unciloba (Lindenb.) Evans.
Frullania Asagrayana Mont.
Frullania Brittoniae Evans.

It is interesting to notice that this last mentioned species, undescribed at the time, occurs in several pockets, on one of which Professor Underwood figured the underleaf, on another he wrote "large auricles, fruit," and on a third wrote "Good, Frull. near Asagray."

Highlands, N. J.

Odor of Conocephalus.—When out in ravines in the vicinity of Pittsburgh on different trips this fall, attention has been called repeatedly to the pungently spicy fragrance of *Conocephalus conicus*. Lately this has become so strong as to be characterized by most people as rank and unpleasant. On quiet days near little falls in our ravines the plant can sometimes be smelled before it is to be seen. Is this odor due to an oil in large brown oil-bodies in certain cells?[1] And is it a reserve food-product stored up with the advent of colder weather?

O. E. J.

[1] Schiffner, V. Die Natürlichen Pflanzenfamilien **1** (III): 18.1909.

NOTES ON FISSIDENS

I. Difficulties in Determining the Oldest Species

Elizabeth G. Britton

The cut given above is taken from the title-page of Hedwig's *Species Muscorum*, published after his death, by Schwaegrichen at Leipzig in 1801. Several interesting facts may be noted, first that it is a simple microscope, second that the object appears to be dry, without slide or cover glass, and furthermore the plant was evidently not much dissected. These limitations, will explain why even "*the father of bryology*" may have occasionally included more than one species under one name! But, when we remember "Gray's Botanist's Microscope" as advertised in the back of Gray's *Manual* as late as 1878 and our first compound microscope, with two or three tiny objectives, and recall the blurry uncertain images that resulted therefrom, we cannot help wondering at the artistic skill and accuracy of many of the old plates published in the last part of the 18th and the early part of the 19th centuries.

The principle of the compound microscope was discovered as early as 1590 but no great improvement was made in it for over two centuries. All the earlier English and French microscopes in the Cox collection, at the New York Botanical Garden, showing the history of the development of the microscope, prove that a very small objective with poor illumination, was in general use and the makers seem to have striven to produce a small, portable and compact instrument, that

could be taken into the field. The improvement of the objectives and the substage illumination did not come till about 1830 and it was not till Schimper's *Bryologia Europæa* was issued a few years later that many species and even genera, in their modern sense, were recognized.

Furthermore the word "*type*" in the sense in which it is here used, meant and still does mean, to many European bryologists, what they consider to be the typical or most common form of a species found in any given locality; and it was not till the Vienna Congress in 1905 adopted the rule for the "*adoption of the oldest specific name*" that it became evident how imperative it is, to find out what the original specimen was to which the name was applied. A critical comparison of specific descriptions will show that various authors had their "personal point of view" and even now it is difficult to coördinate the descriptions of different text-books on mosses. Types of some of the old species still exist in the Herbaria of Dillenius, Linnæus, Hedwig, Swartz, Bridel, etc., but unfortunately the importance of keeping type specimens has not always been understood, and it has often happened that even these are mixtures, and the authors have frequently distributed various species under one name!

Methods of preparing and mounting slides also were still in their infancy up to a very recent date! Karl Müller recommended, and used as a handy method for ready comparison, mica slides made by splitting the plates apart and slipping the object in dry! Sullivant used Canada balsam as a preserving medium, which resulted in such dismal failures, as far as delicate structures were concerned, that it is not surprising that very few of his slides were preserved for future generations to study! Even now, the French and English moss-books show very little of the influence of new methods in histological study! Limpricht's Laubmoose is the only one that gives details of the cross-sections of the stem and the leaf and the measurements of cells and spores. To be sure, some students in various European countries have studied cross-sections of the leaves of *Andreæa*, *Grimmia*, *Orthotrichum*, *Leucobryum*[1], *Dicranum*[2] and *Fissidens*[3], and realized their value in taxonomic studies, but it is becoming painfully evident that in many genera of mosses, no accurate knowledge of specific characters can be had without sections of the leaves.

It is also to be remembered that even before this horrible war began, geographical boundaries, linguistic limitations and racial or political antipathies, have been known to have their influence, even in "*Pure Science*," and that students of Botany are human, and prefer "*the line of least resistance*," sometimes being unable to make long journeys to verify a fact, or were unwilling to write letters, ask questions or exchange specimens with foreign students. The English Channel and the Atlantic Ocean have served as a scientific as well as a political barrier, and some moss-students have been known to be too busy to answer letters; also others who could write English have preferred to answer their letters in German!

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[1] Cardot, Mem. Soc. Sc. Nat. **37**: 84. pl. 1–19. 1900.
[2] Limpricht Laubmoose, **1**: 333–378. 1886.
[3] E. S. Salmon, Ann. Bot. **13**: 103–130. pl. 5–7. 1899.

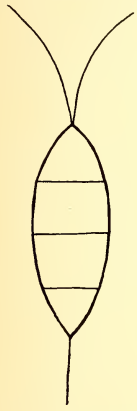
Such are some of the difficulties to be encountered in any search after the truth, and monographic work of any genus will be found both difficult and puzzling. If Hedwig's types at Geneva could be studied by some competent bryologist in the way that Monsieur Cardot[4] studied the North American types, it would probably result in a few changes in some species and genera, and we hope that this may be done soon without any animosities or sarcastic criticisms of those who are endeavoring to find out the facts. The truth cannot be determined without consulting the older authors and herbaria and endeavoring to understand what their limitations were both as to apparatus and collections. I propose in subsequent articles, by reproducing the original descriptions, illustrations and criticisms to show how much we still need the benevolent services of some European bryologist, who will take the time and means to determine what the originals were of some of the older species of *Fissidens*.

New York Botanical Garden.

FUNGUS-SPORES IN A MOSS-CAPSULE

Elizabeth M. Dunham

While examining some mosses collected at Miami, Florida, by Mrs. F. E. Lowe of Worcester, Mass., we found one capsule of *Funaria hygrometrica* var. *patula* Br. & Sch. containing four-celled ciliated bodies in place of the usual moss-spores. These were identified by Dr. Roland Thaxter of Harvard College as the spores of a species of *Pestalozzia*, a genus of the imperfect fungi. This group of fungi may represent special stages in the life cycles of other fungi, since little is known of them at present except the spore-stage. *Pestalozzia* is readily distinguished by the peculiar conidia or spores which are borne on rather short stalks and are spindle-shaped, divided into four parts. The apical and basal cells are hyaline and the central ones dark. The apical cell is provided with one or more filiform appendages. *Pestalozzia* is one of the leaf-blights and the conidia are produced usually beneath the epidermis.



Pestalozzia Spore (Magnified)

Mrs. Elizabeth G. Britton states that fungi often find a moss-capsule a moist, favorable host and fill the spore-sac to the exclusion of the moss-spores, especially in moist warm regions; and that the principal factors in their development seem to be moisture, heat, and the persistency of the capsule. As *Funaria hygrometrica* is an annual species and the capsule lasts but a short time, the occurrence of fungi on this moss is unusual. Mrs. Britton once examined the very rare capsules

[4] Bull. Hb. Boiss. **7**: 300–380. 1899.

of *Ulota phyllantha*, the first reported, collected by Thomas Howell, in Oregon, only to find them ruined by a fungus which had made the peristome imperfect.

On p. 103, Vol. 14 of the BRYOLOGIST, 1911, Mrs. Britton has published a list of mosses that have been reported with fungi on the capsules.

206 WINDSOR ROAD, WABAN, MASS.

EXTRACTS FROM RECENT REPORTS OF THE "MOSS EXCHANGE CLUB"

O. E. JENNINGS

Mr. P. G. M. Rhodes recently sent us a copy of the Twenty-first Annual Report of the Moss Exchange Club (British Isles) together with a page from the Twentieth Annual Report, noting in the accompanying letter that "they contain some interesting notes, chiefly by Mr. Dixon, on American plants. I thought that perhaps you might care to reproduce some of these in the BRYOLOGIST. You will see that Mr. Ingham and I have described a new variety to cover the plants formerly known as var. *subsphaerocarpon* [*Hypnum palustre* var. *subsphaerocarpon* B. & S.]. I have sent a co-type specimen of this to Mr. Kaiser for the S. M. S. Herbarium."

The above quotation is from a letter dated May 6, 1916, and as a bit of personal news, interesting to those of us who may be wondering how the war is affecting our brother bryological students of various nationality on the other side of the Atlantic, we know our friend will pardon us for quoting further from his letter: "I am now on an exemption till July 31 and have been rejected for field-service owing to eye-sight being defective; but I may then be required for garrison duty such as the Army Ordnance Corps. However it is more likely that I shall be kept where I am."

Mr. Rhodes has checked off, in the reports which he sent, the entries relating to American material. This material has been examined by various members of the Moss Exchange Club and their notes are signed with initials only, as follows: *C. H. B.*—Rev. C. H. Binstead; *C. A. C.*—Mr. C. A. Cheetham; *H. N. D.*—Mr. H. N. Dixon; *W. I.*—Mr. W. Ingham; *H. W. L.*—Rev. Canon H. W. Lett; *W. E. N.*—Mr. W. E. Nicholson; *P. G. M. R.*—Mr. P. G. M. Rhodes; *C. H. W.*—Rev. C. H. Waddell. The entries follow in order, as checked off:

Twentieth Annual Report (1915), p. 135—

"*Amblystegium orthocladon* P. Beauv., pierres dans cascade, Mt. St. Hilaire, Quebec, Canada, July /10, H. Dupret, *com.* P. G. M. R., *det.* Cardot.' Cardot est très affirmatif, mais Rénauld préférait l'appeler *A. irriguum*,' H. Dupret. 'I should incline to Rénauld's opinion, strongly, that this is *A. irriguum*, not *A. orthocladon* (which is but a form of *A. varium* according to most authors.) The stout nerve and the basal cells are to me conclusive. The entire margin is in favour of *orthocladon*, if anything, but this is the only character I can find on that side, and certainly I should say does not outweigh the other.' H. N. D. 'I have communicated Mr. Dixon's note to Prof. Dupret, who informs me that Dr. Best has provisionally named this plant var. *perplexum*, presumably of *A. irriguum*.' P. G. M. R.

"*Hypnum riparium* Lindb., var. *elongatum* B. & S., stones in pool, Montreal, Canada, June /14, H. Dupret, *com.* P. G. M. R. 'I should think the var. *elongatum* is correct, judging from the description. According to Paris this is identical with the var. *splendens;* but the present plant does not seem quite such a fine form, though no doubt near it.' H. N. D."

Twenty-first Annual Report (1916) p. 161—

"*Fontinalis antipyretica* L. var. *gigantea* Sull., Magilligan sand dunes (I. 40), May /04, C. H. W. & H. W. L. 'I have compared this plant with Sullivant's var. *gigantea* from North America, and it does not agree with it. The true var. *gigantea* has the leaves *curved on the keel,*and the leaves are not nearly so large and wide as in the Irish plant. I should name the present plant var. *robusta* Cardot, distinguished by its very large and very wide leaves when flattened out.' W. I. 'This appears to me good var. I have not seen the curved back of leaf given as a character of the var., and specimens I have from North America, *det.* Cardot and others, do not show this feature. It appears to me quite as good as the North American plant distributed in 1911. On my specimen of the 'Forma *robusta* Cardot' from Minnesota, I have noted 'it is not very easy to see why this should not be var. *gigantea.*' It also has the leaves markedly curved on the back.' H. N. D.; var. *gracilis* Schp., Trossachs, Perth, July 1898, C. H. W.; and Malham Cove (64), Jan. /12, C. A. A. 'This is an interesting plant. I should name it var. *laxa* Milde. The habit with its spaced leaves makes it distinct from the ordinary var. *gracilis.*' W. I. 'This is not var. *gracilis*, nor should I call it var. *laxa* Milde, though Malham Cove is a locus classicus for that var. This may quite possibly be the same plant in another form; but if so, it throws a strong light on certain species which are clearly derivatives of *F. antipyretica*, *F. gothica*, *F. Camusi*, and *F. arvernica*. This plant with its narrow, flaccid, scarcely keeled leaves, and appearance of *F. hypnoides,* is very different from the var. *laxa* I have gathered at Malham Cove, with rigid, distant, spreading, keeled leaves. I can scarcely find any difference between the present plant and *F. arvernica* Ren.; but these forms are too critical to be decided upon by anyone but an expert. I should suggest withdrawing it for this year, and obtaining Mons. Cardot's opinion on it, if possible in rather better condition; this is poor both in condition and in preparation.' H. N. D."

Twenty-first Annual Report (1916) pp. 146-165—

"*Plagiothecium Roeseanum* (Hampe.) Schp., crevasses des rochers, Westmount, Montreal, Mar. /08; base des arbres dans marécages, Montreal, Sept. /11; and *c. propagulis* rochers terreux, Ile St. Paul, Montreal, Sept. /12, H. Dupret, *com.* P. G. M. R. 'The plants differ a good deal from a plant which I have gathered in Lapland, and also from a specimen of Schimper's herbarium, but it more closely resembles a plant which I have had from Mönkemeyer under the name of *P. Roeseanum* var. *gracile*. *P. Roeseanum* is not a satisfactory plant at the best of times.' W. E. N. 'None of your three mosses have as wide and loose cells as the two specimens I have. *P. Roeseanum* is a synonym of *P. Sullivantiae* Schp. H. N. D. says in Handbook, "Nerve long and rather strong, cells narrower." Dr. Braithwaite in Br. Moss Flora says, "with very short nerve and laxer cells." How can we settle the question?' W. I. 'I have examined the Canadian *Plagiothecia*, and I think without doubt none of them belong to *P. Roeseanum*. That is rather a well-marked plant, in its best forms at any rate, with rather turgid cells, concave, not conspicuously complanate leaves, having narrower cells,—there is no doubt about its having narrower cells than *silvaticum* and most *denticulatum*, though the books do differ. M. Dupret's plants, that of 7/9/11 and 9/9/12 are identical forms, and I should refer them to *P. denticulatum, f. propagulifera.* They are not quite identical with the *f. propagulifera* Ruthe, described and figured by Limpricht, which is a rather larger plant and has

the leaf-margins reflexed, but in the propagula they are identical. The other one 30/3/08, I should also refer to *P. denticulatum*, but as var. *laetum*, so far as can be told from the vegetative characters only.' H. N. D."

Twenty-first Annual Report (1916) pp. 167–168—

"*Hypnum palustre* Huds. vars., boulders in Tyne, Chollerford (67), July /05; R. Tees, Widdy Bank (66), Aug. /96, stones in Wharfe, Ilkley (64), July /96, *leg.* H. N. D. 'I asked Mr. Dixon if he could throw any light on the difficult var. *subsphaerocarpon*, and he kindly sent the above specimens and the following very interesting notes. It will, however, be observed that the effect is to make the existing British records of var. *subsphaericarpon* highly doubtful and exceedingly difficult to verify. The most useful course for practical purposes has seemed to bə that suggested by Mr. Dixon in his article on the Chollerford plant, and a description by Mr. Ingham of a new var. *dolichoneuron*, based on vegetative characters, will be found in an appendix, and Mr. Dixon has kindly consented to the Chollerford gathering, distributed this year, being taken as the type specimens of the new variety. Most, if not all, of the existing records for *subsphaericarpon* can be referred to the new variety.' P. G. M. R.

"'I doubt this being a common var.; I have scarcely seen a British specimen which I should refer to it with certainty. There is a very frequent var. which has the leaves of the var. *subsphaericarpon* and is often sterile, and this I believe is what usually passes for it. But whenever I have found it fruiting the capsules are elongate and cannot be brought under the var." H. N. D. Extract from "Mosses of Northumberland," Berwickshire Naturalists' Club Proc. 1905; on Chollerford plant above. 'A striking form, which I have gathered on boulders partly submerged in several of our rivers in subalpine districts, having a robust habit, large falcate leaves, and especially characterized by the very stout single nerve, reaching well above two-thirds of the leaf. These are the characters of var. *subsphaericarpon* B. & S. (except that the long single nerve in that var. is not described as unusually stout), and I have received sterile plants so named, evidently on the strength of the vegetative characters. I have, however, gathered this plant in the R. Wharfe and elsewhere, bearing capsules of the typical form, and this is the case with the Chollerford plant . . . It is quite clear therefore that these vegetative characters are not always correlated with the type of capsule of var. *subsphaericarpon*, and there is some argument for giving our plant a new varietal name. On the other hand I have gathered a plant in Teesdale (see note below), and Mr. Binstead sends me a similar plant from Clifford, which with these leaf characters combine a shorter and wider capsule than that of the type, and which may be very fairly placed under the variety in question, although the capsule by no means equals the large turgid fruit I have gathered in mountain streams in the Pyrenees; they show an intermediate stage between the extreme Continental variety and the plant now under consideration . . . I have gathered a plant in Cumberland with both forms of capsule, long and narrow, and short and turgid, upon the same stem . . . It would seem that on the whole the variety would have been better established upon the vegetative characters alone, which would have comprised a fairly definite group of forms, including the plant on which these remarks are based . . . as well as the Continental plants with large swollen capsules, on which Schleicher based his *H. subsphaericarpon* . . . . It is a curious fact that in the four localities in England and Scotland in which I have gathered *G. apocarpa* var. *alpicola* . . . it has always been associated with the form or variety of *H. palustre* in question.' H. N. D.

"Mr. Dixon has now erased the words var. *subsphaericarpon* from the Teesdale specimens; the Clifford plant being annotated, 'not very marked var. in the fruit, but may pass.'"

Twenty-first Annual Report (1916) p. 176—

"*Hypnum palustre* Huds. var. *subsphaericarpon* B. & S. This var. of *H. palustre* has proved a stumbling block to students of British Mosses. No doubt

many of the records in the Census Catalogue of British Mosses have been based upon barren specimens, viz., those whose leaves have a long strong single nerve. When such plants are in fruit, the capsules are far from being subsphaerical. In fact they are more like the capsules of the typical plant. The capsules of the var. from the High Pyrenees are short, widely oval and turgid, quite different from any of the capsules of the variety I know in the British Isles. Such being the case, it will be well to have a variety that will include the so-called records of var. *subsphaericarpon* of the British Isles. The long, strong single nerve is an important feature and is found with plants widely distributed in the British Isles. The variety suggested is as follows:

"*Hypnum palustre* Huds. var. *dolichoneuron* Ingh. & Rhodes, var. *nov.* Plants often dark green with elongated stems, occasionally bright green, or brown, usually more robust. Leaf nerve *strong* and long, reacting the apex or vanishing just below it, always single.

"Capsules variable in length and variously inclined, oblong or oval-oblong. Occasionally the capsules are erect.

"*Hypnum palustre* Huds. var. *dolichoneuron* Ingh. & Rhodes. [vel sub *Hygrohypno.*] Plantulae saepe nigro-virides, nonnunquam laetevirentes aut fuscae, caulibus elongatis, plerumque robustiores. Folia costa unica et crassa et longa, ad apicem aut immediate subtus attingente. Thecae longitudine variae, et varie inclinatae, oblongae aut ovali-oblongae, nonnunquam erectae.

"Type-specimens—Chollerford (67), July /05, *leg.* H. N. Dixon, distributed this year throughout M. E. C.

"*Habitat.* On stones in and by streams, both in the lowlands and the highlands. W. I."

We notice also an extract from an article in the *Journal of Botany* as contributed to the Report (1916 p. 175) by Mr. W. E. Nicholson, and, although it is not checked off by Mr. Rhodes, we quote it as being of some interest to American bryologists:

"*Lepidozia sylvatica* Evans, may generally be separated from *L. setacea* by the smaller, more spreading leaves with smaller, less papillose cells, and, when perianths are present, by the more shortly ciliate bracts and mouth of the perfanth. It is separable from *L. trichoclados* by having the bracts and the mouth oi the perianth more longly ciliate, in which respect it occupies an almost exactly intermediate position between *L. setacea* and *L. trichoclados. L. sylvatica*, in the absence of perianths or female bracts, is with difficulty separable from *L. trichoclados*, but the presumption would be in favour of the plant from sandy ground or sand rock being *L. sylvatica*, and one from peat being *L. trichoclados.* The tufts of *L. trichoclados* are also generally thicker.

"Involucral bracts (of *L. sylvatica*) much larger than leaves, innermost ovate, generally bifid from a fourth to a third into two shortly ciliate segments, cells generally longer and thinner-walled than in the leaves. Perianth narrowly ovoid or cylindrical, contracted at the mouth, ciliate, the cilia 1—4 (mostly 3) cells long."

According to the Report, Mr. P. G. M. Rhodes is the official Distributor of the Moss Exchange Club and some of the points which he has brought out in his report are applicable as well to conditions in America as in the British Isles. He notes that "most of the members now appear to have well-stocked herbaria containing all bryophytes likely to be met with in ordinary districts. It now remains to work out the form-cycles of the various species, for which purpose off-type specimens of even the commonest species should be of service. Mr. Wheldon's prediction of last year has already come true, and several common

plants, which I accepted with some hesitation, have proved to be among the most interesting things in the distribution. It is regrettable that members living in the lowlands should so readily decide that their mosses are of 'no use to the Club' and I hope that next year they will overcome their bashfulness, and let us have their plants for comparison."

We gain from the report that there were gotten together for distribution, for 1916, a total of 382 species and varieties of mosses and hepatics,—altogether a total of 2,084 packets. The organization, which has a membership of forty-four, is to be congratulated upon its success and it is to be hoped that nothing will prevent a successful continuance of the work.

The Secretary of the Club, Mr. Wm. Ingham, notes in the report that in order to obviate the difficulty of having two systems of naming Sphagna, Mr. Wheldon has undertaken to draw up a new Sphagnum Catalogue based upon Warnstorf's monumental work, *Sphagnologia Universalis*, and, to make the catalogue more interesting and useful, there will be given short descriptions of the difficult species, varieties, and forms, such as those in the Subsecunda group.

Carnegie Museum, Pittsburgh, Pa.

BORNEAN MOSSES (A REVIEW)

On a collection of Bornean Mosses made by the Rev. C. H. Binstead. By H. N. Dixon, M. A., F. L. S.

This is an extract from the Linnean Society's Journal, Botany, Vol. XLIII, July, 1916. It covers 32 pages and is accompanied by two plates. Of the 138 species and varieties reported, seventeen are new. In the introductory note the author indicates the interesting fact that in this, and doubtless in all tropical areas, the moss vegetation of the jungle is confined to the tops of high trees, where it has some measure of access to the sunlight. In these lofty canopies of the jungle occurs a moss flora almost entirely different from that which is accessible to the ordinary collector who proceeds on foot and collects on or near the ground. This jungle flora becomes accessible only when trees are felled for economic purposes. Mr. Binstead collected only on the ground, and his finds include only five species of thirty-one recorded for Mt. Kinabalu by Mitten and Wright.

The new species and varieties described in this paper are:

1. *Fissidens autoicus* Thér. et Dixon;
2. *Syrrhopodon trachyphyllus*, Mont., subsp. *albifrons* Thér. et Dixon, subsp. nov.;
3. *Syrrhopodon ledruanus* C. Muell., MS in litt. ad E. Levier; with a variety *involutus* Thér. et Dixon;
4. *Syrrhopodon patulifolius* Thér. et Dixon;
5. *Syrrhopodon binsteadii* Thér. et Dixon;
6. *Syrrhopodon tuberculosus* Thér. et Dixon;
7. *Calymperes subsalakense* Thér. et Dixon;
8. *Trichostomum sarawakense* Dixon;

9. *Bryum weberaeforme* Dixon;
10. *Rhizogonium medium laxifolium* Thér., MS in litt. ad auct.;
11. *Atrichum rutteri* Thér. et Dixon;
12. *Pogonatum bornense* Thér. et Dixon;
13. *Homaliodendron fleischeri* Dixon;
14. *Ectropothecium dixoni* Fleisch., sp. nov., MS in litt. ad auct.;
15. *Taxithelium subintegrum* Broth. et Dixon;
16. *Sematophyllum rigens* Broth., MS in litt. ad Rev. C. H. Binstead;
17. *Sematophyllum downii* (Broth.) Dixon, sp. nov. (*Trichosteleum downii* Broth., MS in litt., ad Rev. C. H. Binstead).

The numerous critical notes scattered through this paper, and other results of close study, bear evidence of the friendly care with which Mr. Dixon is accustomed to do his work on mosses.

John M. Holzinger.

Winona, Minn., October 7, 1916.

SHORTER NOTES

Senhor Gonçalo Sampaio[1] has recently published an annotated and descriptive list of fifty lichens belonging to the Portuguese flora, with an additional list of a hundred others for which merely localities are given. The list includes new species in *Omphalaria*, *Lecanora* (2), and *Lecidea;* the details of these species are figured in the text.

Monsieur A. Luisier[2] continues the series of notes on the mosses of Portugal that has already been noticed in these pages. Note eleven is a list of some fifty species of pleurocarpous mosses, with localities; note twelve, a two page article upon *Anacolia Webbii* (Mont.) Schimp. The last note of the series describes and figures two new species, *Didymodon Soaresi* Luis., and *Tortula Abranchesi* Luis., both from near Salamanca.

In an interesting paper Mr. H. N. Dixon[3] has recently described the mosses which were collected by the Rev. C. H. Binstead in British North Borneo. Critical notes are given upon nearly all the species, and attention is called to the large proportion of the collection which belongs to the two genera *Calymperes* and *Syrrhopodon*. The collections seem to emphasize the relationship of the Bornean mosses both to the Indo-Maylayan flora and, on the other hand, to that of New Guinea. [*See* list of new species in review by Dr. Holzinger, pp. 94, 95, this issue.] E. B. C.

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[1] Liquenes novos para a flora portuguesa. Gonçalo Sampaio. Broteria. **14:** 65–84. *fig. 1–4.* (Aug. 1916.)

[2] Fragments de bryologie ibérique. A. Luisier. Broteria. **14:** 106–117. *figs. 1–3.* (Aug. 1916.)

[3] On a collection of Bornean Mosses made by the Rev. C. H. Binstead. H. N. Dixon. Journ. Linn. Soc. Botany. **43:** 291–323. *Pl. 26, 27.* (July, 1916.)

A HUE AND A CRY FOR A LOST AND UNDESCRIBED HEPATIC

CAROLINE C. HAYNES TO FELLOW MEMBERS

May I ask those of you to whom I have sent specimens of Hepatics to see if you have among your pockets of *Cephalozia* one whose label reads: "*Cephalozia bicuspidata* (L.) Dumort. Below Lime Kiln Falls, Adir. League Club—2nd Oct., 1910. C. C. Haynes, No. 1257."

This pocket contains a mixture = *C. bicuspidata* + an undescribed species. Alas, I have but a slide of it. It happened in all probability that a hasty examination showed the common species and the pocket was distributed with others. It was only after a lapse of years that, coming across the slide, I discovered a second species—a joy to behold. I would like the pocket, should it be found, returned to me so that Dr. Evans can describe the species.

Hoping that all will agree with me that this is to a botanist, though one of the minor tragedies, a very real one and awaiting word of it with hopefulness and gratitude.

HIGHLANDS, N. J.

THE HASSE LICHENS

Mr. Plitt announces that the second fascicle, numbers 26–50, of the Hasse Duplicate Lichens will be ready in December, and will be sent to subscribers promptly. The delay in the issue of the first fascicle was due to the printer being unable to furnish the labels in time. The second fascicle will contain the following forms:

Arthonia impolita
" rhoidis
Buellia oidalea
" parasema
" triphragmia
Catillaria franciscana
Cladonia fimbriata subulata
" pyxidata chlorophæa
Hoppia Despreuxii
" Hassei
Lecania Dudleyi
Lecidia atrobrunnea
" cinerata
Opeographa atrorimalis
" vulgata
Parmelia cylisphora
" tiliacea
Parmeliella lepidota coralliphora
Pertusaria flavicunda
Physcia asteroidea
" tribacea
Ramalina combeoides
" pollinaria f. elatior
Rhizocarpon geminatum
Rinodina succedens

E. B. C.

SULLIVANT MOSS SOCIETY MEETING

Be sure not to forget the meeting of the Sullivant Moss Society. A fine programme is assured, and the attendance must keep pace. The date will be December 29th, and the meeting place Room 330, Barnard College, New York. This is easily reached from the various railway stations by taking the Broadway Subway to 116th Street Station, and going north three blocks, then west. Barnard College is on the right-hand side.

Material for exhibition, if sent in advance, should be sent to Mr. Edward B. Chamberlain, Apt. 52, 416 West 118th Street, New York City. Members who cannot attend, are urged to send something for the exhibits at least. The Secretary will gladly answer questions as to any details of the meeting. A further notice will be sent to each member two weeks in advance.

SULLIVANT MOSS SOCIETY ELECTION

Members of the Sullivant Moss Society are requested to send their ballots *promptly* to the Judge of Elections, Mrs. H. C. Dunham, 206 Windsor Road, Waban, Mass. Ballots must be received before December ~~15th~~ 20th, 1916.

The following persons have been nominated by the Executive Committee, but members are reminded that they are free to vote for any others.

For President—Mrs. Elizabeth G. Britton, New York City.

For Vice-President—Mrs. Annie Morrill Smith, Brooklyn, N. Y.

For Secretary-Treasurer—Mr. Edward B. Chamberlain, New York City.

EXCHANGE DEPARTMENT

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

Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.—*Sphagnum platyphyllum* Sull., collected by Dr. Hagen in Norway.

Mrs. F. E. Lowe, 24 Brattle Street, Worcester, Mass.—*Dicranella cerviculata* (Hedw.) W. P. Schimp. and *Thamnium alleghaniense* (C. M.) Bryol. Eur., both collected by Mrs. Lowe in Massachusetts.

Mrs. Frank C. Smith, Jr., Chapin Road, Holden, Mass.—*Dicranum Drummondii* C. M. and *Ptilium crista-castrensis* (L.) DeNot., collected by Mrs. Smith at Upper Dam, Rangeley Lakes, Maine, 1916, with fruit.

Dr. O. E. Jennings, Carnegie Museum, Pittsburgh, Pa.—*Fossombronia Wondraczekii* (Corda) Dumort., collected near Killarney Park, mountains of Fayette County, Pa., September 24, 1916, by O. E. Jennings.

Mr. C. C. Plitt, 3933 Lowndes Ave., Baltimore, Md.—*Alectoria sarmentosa* Ach., specimen collected in Switzerland by Mr. P. G. M. Rhodes.

Miss Helen E. Greenwood, 5 Benefit Terrace, Worcester, Mass.—*Marsupella Sullivantii* (DeNot.) Evans and *Lophozia barbata* (Schreb.) Dumort., both collected on Mt. Wachusett, Princeton, Mass., Oct. 12, 1916.

~~O. E. J.~~

THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY

DEVOTED TO

NORTH AMERICAN MOSSES

HEPATICS AND LICHENS

VOLUME XX

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

PITTSBURGH, PENNSYLVANIA

1917

THE BRYOLOGIST

VOLUME XX, 1917

INDEX TO LATIN PLANT-NAMES

INDEX TO TITLES

INDEX TO AUTHORS

INDEX TO PLATES AND FIGURES

ERRATA

Page 94, read PLATE XXI.
Page 96, read PLATE XXII.
Page 97, for PLATE XXII read PLATE XXIII and for XXIII read XXIV.

VOLUME XX NUMBER 1

JANUARY, 1917

THE BRYOLOGIST

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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Bimonthly Journal of

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

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CAMPTOTHECIUM WOLDENII Grout

THE BRYOLOGIST

VOL. XX JANUARY, 1917 NO. 1

THE EARLY HISTORY OF THE BRYOLOGIST AND THE SULLIVANT MOSS SOCIETY

ANNIE MORRILL SMITH

In the early fall of 1898 Mrs. Britton told me of the plan to form a society devoted to the study of mosses, and asked me if I would become a member and help to work it up. In January of that year there had appeared a new department of the *Fern Bulletin* edited by Willard N. Clute, called the Moss Department, publishing four pages under the editorship of A. J. Grout. Dr. Grout was then living in Plymouth, New Hampshire. He said in the opening paragraph, "This department is opened with the purpose of enabling any one at all interested in mosses to get some knowledge of those plants without excessive labor or expense. The editor will try also to identify for subscribers difficult specimens accompanied by notes and postage. It is also hoped that the BULLETIN may become a medium for communication of bryological notes of interest in the same way that has been so admirably done in the case of ferns and fern allies." Thus was launched the first number, as a four-page moss department of the *Fern Bulletin*. The response was most gratifying and the second number was increased to eight pages and headed "The Bryologist, a Department of the Fern Bulletin, Edited by Dr. A. J. Grout."

In the July number the desire for an organization for the study of mosses was announced. A Chapter somewhat on the same lines as the Fern Chapter was proposed, and all who wished to join such a Chapter were requested to communicate with Dr. Grout so that the organization could be completed before fall. The first article in the October number by Dr. Grout, states that the proposed Moss Chapter had received support beyond the expectation of editor and friends, as not only beginners but several prominent moss students had volunteered their support. To quote, "It is therefore proposed to form a correspondence Chapter of the Agassiz Association for the study of mosses, with a constitution similar to that of the Linnaean Fern Chapter. It seems appropriate that this Chapter should be called 'The Sullivant Moss Chapter' after that 'Prince of American Bryologists' William Starling Sullivant."

Mrs. Britton, Mr. Clute, editor of the *Fern Bulletin*, and Dr. Grout, editor of THE BRYOLOGIST, acted as a committee to name officers for the first year, and their appointment was published in the January number, Dr. Grout acting as Secretary-Treasurer *pro tem.* till that time. The officers for 1899 were: President, A. J. Grout; Vice-President, Prof. J. Franklin Collins, of Providence, R. I.; Secretary-Treasurer, Mrs. Annie Morrill Smith, Brooklyn, N. Y. These

The November number of the BRYOLOGIST was published December 15, 1916.

officers were to draft a constitution, which with the list of 34 Charter members was distributed early in the year, and adopted prior to April, 1899. The Chapter was to be entitled to a page in each issue of THE BRYOLOGIST for notes and news items. The annual dues were to be 50 cents for Active, and 25 cents for Associate members, both classes to receive THE BRYOLOGIST free, also such offerings of mosses as would be from time to time distributed.

The 29 Active Charter Members were:

Mrs. Emilia C. Anthony—Gouveneur, N. Y.
Mr. William C. Barbour—Sayre, Pa.
Miss Elizabeth Billings—Woodstock, Vt.
Mrs. Elizabeth G. Britton—New York Botanical Garden, Bronx Park, New York
Mrs. R. H. Carter—Laconia, N. H.
Mr. Edward B. Chamberlain—Brunswick, Me.
Mrs. Louis N. Chapin—55 Pineapple Street, Brooklyn, N. Y.
Mr. Willard N. Clute—New York Botanical Garden, Bronx Park, N. Y.
Prof. J. Franklin Collins—468 Hope Street, Providence, R. I.
Rev. Charles H. Demetrio—Emma, Lafayette Co., Mo.
Prof. Alvah A. Eaton—Seabrook, N. H.
Mr. Wallace Greenalch—Schuylerville, N. Y.
Dr. A. J. Grout—Plymouth, N. H.
Miss Mary E. Hart—Dept. Biology, Western College, Oxford, O.
Mr. J. Warren Huntington—Amesbury, Mass.
Mrs. Josephine D. Lowe—4305 Walnut Street, Philadelphia, Pa.
Mr. William R. Maxon—N. Y. Botanical Garden, Bronx Park, N. Y.
Mr. Frank E. McDonald—417 California Ave., Peoria, Ill.
Miss Nellie Mirick—38 East Walnut Street, Oneida, N. Y.
Mrs. Adele D. Moore—170 East First Street, Corning, N. Y.
Miss Lura L. Perrine—State Normal School, Valley City, N. D.
Mr. C. F. Saunders—307 Walnut Street, Philadelphia, Pa.
Mrs. Annie Morrill Smith—78 Orange Street, Brooklyn, N. Y.
Mrs. Mary L. Stevens—6 Holyoke Place, Cambridge, Mass.
Mr. W. H. Stultz—203 West Second Street, Duluth, Minn.
Miss Esther H. Thompson—Box 407, Litchfield, Conn.
Miss Edith A. Warner—78 Orange Street, Brooklyn, N. Y.
Mr. John A. Wheeler—Milford, N. H.
Mr. Francis Windle—3 South High Street, West Chester, Pa.

Associate Members

Miss Alice L. Crockett—Camden, Me.
Miss Alice E. Dacy—28 Ward Street, South Boston, Mass.
Prof. John M. Holzinger—Winona, Minn.
Mr. Joseph Jackson—15 Woodland Street, Worcester, Mass.
Mr. Charles D. Lippincot—Swedesboro, N. Y.

The Members were 34 in all. Associate Members were soon merged with the Active, as after the first few months all were found to be active. Of these 34, five have died: Mrs. Emilia C. Anthony, March 17, 1904; Mrs. Adele D. Moore, in 1901 or 1902; Mr. John A. Wheeler, Sept. 4, 1905; Prof. A. A. Eaton, Sept. 29, 1908, and Mrs. Mary L. Stevens, Sept. 17, 1907. Mrs. Stevens, it will be remembered, left a bequest to the Society including her fine compound microscope. Twelve have resigned or been lost track of, leaving 17 Charter Members listed on January 1st, 1916. Rev. Charles H. Demetrio and Mr. J. Warren Huntington have written cordial letters of greeting at this time.

The first ticket for election of officers was printed in the October, 1899, issue with Mrs. M. L. Stevens, Judge of Elections. Candidates for President were Miss Mary E. Hart and Dr. A. J. Grout; for Vice-Pres., J. Franklin Collins and W. R. Maxon; for Sec.-Treas., Miss Harriet L. Wheeler and Mrs. Smith. Result—the election of Messrs. Grout and Collins and Mrs. Smith.

With the January, 1900, number THE BRYOLOGIST began an independent existence, a fully fledged magazine, with covers and all complete, under the joint editorship of Dr. Grout and myself, with 58 members listed and a subscription list of 203 in addition; that is, 261 copies were sent out.

Just here it may be well to clear away the haze which even at this date obscures some of the facts. Strange as it may seem, it is even now too late to be quite certain as to who first thought of having a moss society. Some years ago I contemplated writing an historical sketch for THE BRYOLOGIST, at the time I turned it over to the Society, and in trying to put words on paper I found my own memory at fault. I consulted Dr. Grout and he gave me little satisfaction. Mrs. Britton, when asked who first thought of the idea, would neither claim it for herself, nor impute it to either Dr. Grout or Mr. Clute. It probably shares with so many other large and glorious enterprises and inventions, in being the joint product of several brains. It certainly originated within the trio just named, though I personally feel that Dr. Grout was responsible for starting THE BRYOLOGIST, and that Mrs. Britton stands as the God-Mother of The Sullivant Moss Chapter, and that it is a happy coincidence that she is now our honored President. To many unacquainted with the inner history of the Society it may seem late in the day to pay her this honor, but I can assure you she has always refused heretofore to act in this capacity, though often urged. She has however in an unofficial capacity always done her full share to promote the interests of the Society as well as its magazine.

As you have noted I have used so far "Chapter" more frequently than "Society." From the first I personally was not in favor of placing our organization under the wing of the Agassiz Association, as at that time the latter was only emerging from a protracted sleep. Mr. Clute's only contribution so far as I am aware was insisting on our becoming a Chapter of the Agassiz Association with which he had affiliations. It was soon found that we were tied to a moribund association, and we dropped that connection after the first year. The Chapter paid the Agassiz Association membership dues only that first year, and on January 1, 1899, the President, Mr. Harlan H. Ballard, Pittsfield, Mass., was notified

that nothing further might be expected from us, that we considered the connection at an end. No reply being received I considered my duty done. Unfortunately being entirely new to the editorial business, and not wishing to carry things with too high a hand I let the statement on the inside of the cover stand for some time after this discontinuance, and even yet a communication to the Sullivant Moss Chapter of the Agassiz Association will occasionally be received.

Volumes 1 and 2 were edited by Dr. Grout. With volume 3 (1900) I took up the work, and till volume 9, 1906, our names appear jointly associated, though with the first number of volume 3, I became also proprietor and solely responsible for the management and financing of THE BRYOLOGIST. It was our plan to work together, share and share alike in the good or evil fortunes of the journal. The agreement dated November 16, 1899, is "Dr. Grout and Mrs. Smith begin work together on THE BRYOLOGIST, share and share alike." On that date I sent Mr. Clute $25.00 and took over his share of the interest in the magazine, crediting a like amount to Dr. Grout "For stock in trade, good-will, etc." On November 24, 1899, I paid Mr. Clute $15.00, thereby getting all the back numbers, making my initial outlay $40.00, and for that sum I was the proud owner of various bundles of magazines, plates, electros, etc., and I proceeded to run things as near as I could to my ideals. Of course I had to learn the business, and made many mistakes and committed many extravagances. In order to have a free hand without criticism from a financial point of view, I soon took all the responsibility and made up from year to year the deficit, amounting at last to $2131.28, out of my own pocket, counting it my contribution to the advancement of science. You see my aim was to publish a perfect number and then give up the work, but alas this was never realized, though the later numbers were a vast improvement on the earlier.

As has been stated, the first four volumes were issued quarterly. With January, 1902, volume 5, THE BRYOLOGIST became a bi-monthly of 20 pages, later increased to 24. It is still a bi-monthly though one of my dreams had been to make it a monthly. Alas I was not young and strong enough to do all I would have liked doing. During 1909 I became convinced that a younger person as editor would do better work, and began to look for such a one, going to Boston where our Society held its 6th meeting in connection with the A. A. A. S. in the hope of there finding him. On returning from Cambridge on the afternoon of December 31st, I fell on the ice and broke my arm, being incapacitated for several months. During this time Miss Warner, my ever faithful co-worker, with Dr. Grout's supervision got out the two succeeding numbers.

A plan had been devised and was sent out in a circular letter dated December 9th, 1910, stating that THE BRYOLOGIST had grown from a four-page quarterly to a 24-page bi-monthly, and the Society from 34 to over 200 members. To the Society I proposed to give all my interest in the journal, turn over all back numbers, including the Ten-Year Index, with plates, book accounts, and so called "good-will," the journal to be published for the Society by an Editor-in-chief and a board of Associate Editors. The re-organization was completed in January, 1911, as explained by a second letter dated February 1st, and Dr. Grout was

appointed Editor-in-chief. Dr. Grout accepted this office with reluctance, and only after great pressure from friends of the enterprise had been brought to bear, as absolutely no one could be found at that time willing to undertake the work. Dr. Grout took it at great personal sacrifice to ensure its continuance, adding thereby a heavy burden to his High School duties. The Advisory Board, consisting of the officers of the Society, became responsible for the publication, and four Associate Editors were appointed representing the four groups treated of in THE BRYOLOGIST, namely: Acrocarpous Mosses, Prof. John M. Holzinger; Pleurocarpous Mosses, Dr. George N. Best; Hepatics, Dr. Alexander W. Evans; Lichens, Prof. Lincoln W. Riddle.

It may not be out of place at this time to emphasize what the Society has done in the way of promoting interest in the mosses, and indirectly in making possible such books as Dr. Grout's "Mosses with a Hand-lens"; a second edition "Mosses with hand-lens and Microscope, including the Hepatics"; and the third large volume "Mosses," published in 1903. Prof. Fink has repeatedly expressed to me his appreciation of the way in which his series of articles was illustrated and published, as they brought him to the notice of a wide circle of readers and created a demand for, and fostered further studies culminating in his volumes on the lichens. And we all take pride, I know, in the volume "How to Know the Mosses," recently published by Mrs. Elizabeth M. Dunham, one of our members since 1904. The series of special articles which appeared in the earlier volumes, are worthy of note, as they formed the first popular treatment of the genera, save for that pioneer series of Mrs. Britton's in *The Observer*. For many of us those articles were the foundation on which we reared our later work—they formed the bridge which connected with the Manual.

Then in field work we might fairly claim to have promoted exploration when we recall the collections of A. S. Foster in Oregon and Washington; Severin Rapp in Florida; A. L. Brinkman in British Columbia and Alberta; the late C. C. Kingman in Southern California; Miss Crockett in Maine, and others who contributed ample material for the curators to work up. We should also mention the large number of foreign correspondents, men and women of note in all countries of Europe and Australia, to whom we owe gratitude for material gifts, also for their inspiration to nobler endeavor.

It should be explained that, almost from the first, hepatics and lichens had been sent in for determination, as beginners often confused the groups when found growing together with the mosses. I began at once to form a Chapter Herbarium of mosses, and it was exhibited at the second meeting of the Sullivant Moss Chapter held June 27, 1900, in the Museum Building of the New York Botanical Garden, consisting of 153 sheets. At this time it was proposed to add hepatics and lichens, and Mr. William C. Barbour undertook the hepatics, and Mrs. Carolyn W. Harris, the lichens. The first number of her long and fine series was on "The Usneas," illustrated by a beautiful plate in January, 1901. In the next issue, April, Mr. Barbour began his series on Hepatics with a study of *Marchantia* and *Conocephalum*, and each took charge of the herbarium for their special group. Thus was started the three-fold herbarium of the Society

now reaching large proportions under Dr. Conklin and Miss Haynes for the Hepatics, and Mr. C. C. Plitt for the Lichens, and Mr. Kaiser the Mosses.

If time permitted it would be interesting to dwell on the names of those early contributors to the success of the Society and its journal. Among them stands out as lichenists, Mrs. Carolyn W. Harris, who was constant in her devotion till her death in May, 1910. Prof., now Dr. Bruce Fink was a contributor from March, 1903, closing his most valuable series on *Cladonias* in March, 1908. Mr. G. K. Merrill, Mr. R. Heber Howe, Jr., and our late Curator, Dr. H. E. Hasse, continued valued contributors. For the Hepaticae, Dr. Underwood till his death in 1907; Dr. Evans, Miss Haynes, and Miss Lorenz, all three happily still with us. For the Mosses, Dr. George N. Best, whose carefully written letters of elucidation of doubtful species were a boon to Miss Warner and me in our studies during those early years. Then Prof. Holzinger, Mr. Williams, and Mrs. Britton were ever ready to respond to all calls, either for manuscript or help in determinations.

If Mrs. Britton were not with us today I would feel more free to record the great debt which not only the Society but which I, personally, owe to her ever ready advice and helpful criticism in all times of need. If it had not been for Mrs. Britton's constant companionship and willingness to hear all my trials, and help solve the many problems as they arose, I would never have been able to do my part of the work. To her I owe my education in the study of cryptogams, and in fact all that I have accomplished in this line in the eighteen years since beginning the work in 1898.

It only remains to record the public meetings which we have held in connection with the American Association for the Advancement of Science, this being our eleventh session. I have spoken of the meeting of June 27th, 1900, as our second, though the *first*, held the year previous at Columbus, Ohio, can hardly be called a meeting of the Society in any true sense, but we were glad through Mrs. Britton, to take even a small part in the memorial meeting to William Starling Sullivant and Leo Lesquereux, held in their home city, in August, 1899. The third meeting was held in Philadelphia, in 1904; the fourth here in New York, in 1906; the fifth in Baltimore in 1908; the sixth in Boston in 1909; the seventh in Minneapolis in 1910, where Dr. Conklin did so much to make the meeting a success. The eighth meeting was in Washington, D. C., in 1911; the ninth in Brooklyn in 1913, at the Museum Building of the Brooklyn Institute of Arts and Sciences. The late Mr. Morris doing the honors of the Museum, and Dr. Gager taking us on a walk through the grounds of the Botanic Garden, since enriched by a unique Japanese Garden. The 10th meeting was in Philadelphia in 1914, and today we are holding the eleventh.

It will be seen from this rapid survey how close the connection has been between the Sullivant Moss Society and The Bryologist. The journal starting first, and hinting in its opening paragraph as serving as a medium for communication between students interested in more definite study, the association of such students soon followed, and their history has ever been identical, each serving as an essential support for the other. I have chronicled the main events

only, prior to the closer union in 1911, giving ancient history, leaving the chapters of modern history for those who are so ably carrying on the work. May the Society and its journal live long years, doing much needed work in furthering the study of Mosses, Hepatics and Lichens.

78 Orange St., Brooklyn, N. Y.

Inasmuch as copies of the following letters from Mrs. Smith to Society Members and Subscribers are now rare, it has been thought desirable to print them not only for their interest in connection with the preceding historical review but also as a matter of more general accessibility. Mrs. Smith has suggested cutting them down but we feel that they should be preserved intact.—Editor.

December 9th, 1910.

The Sullivant Moss Society, founded in 1898, has grown from the original 34 Charter members to over two hundred, and The Bryologist from a four page quarterly to a bimonthly of 24 pages, with a world-wide circulation. Since January 1, 1900, I have been solely responsible for the running of The Bryologist, both editorially and financially. Dr. Grout's name, by virtue of his starting The Bryologist, which for two years, 1898 and 1899, was published as a Department of The Fern Bulletin, has always been associated with mine as editor but the responsibility whether for good or ill has been mine. In addition to this work I have been the Treasurer of the Sullivant Moss Society and have supervised its work, keeping two sets of books and looking after all the details of the double enterprise.

Since assuming proprietorship I have paid out to date $2132.98 more than I have received, which I consider my contribution to the advancement of science during the past eleven years. This average amount, I am no longer able to continue. The mechanical work has also outgrown my physical strength. These two reasons combine to make a reorganization necessary at once.

The following plan is submitted: An Editor-in-chief and a board of Associate Editors to be appointed from Society members, and to become responsible, pro rata, for the financing of The Bryologist. The editions must be paid for as issued, requiring the equivalent of a working capital, as receipts come in small amounts through the year. At the close of each year the small deficit (if any) to be divided among the six persons who are pledged to sustain the work for the year.

On my part I turn over to the Society all back numbers, Ten Year Index, plates and the so-called good-will of the journal, book accounts, etc. There is a steady income from the sale of back numbers; the file as it stands to date bringing in $12.50. This includes the Ten Year Index and subscription to volume XIV, 1911, which will certainly be continued on some basis. Volume II is out of print and several numbers are becoming low; fortunately they are the earlier and smaller numbers and detract little from the usefulness of the work as a whole. Some plan may be devised to allow of their reprinting. So much for the few who have this work especially in hand.

On behalf of the Society members at large and the general subscribers, it is proposed to raise the Society dues to $1.50, and the subscription price to $1.25. This is expected to virtually divide the deficit among the members at large, who, heretofore, have contributed little else than dues to the work of the Society, and among the general subscribers.

If you favor the continuation of the Sullivant Moss Society, and The Bryologist conducted as outlined, please write your response—whether in favor of,

or suggesting changes—to me at once, so that consensus of opinion may be determined and report made in the January number of THE BRYOLOGIST.

Respectfully submitted,

ANNIE MORRILL SMITH.

February 1st, 1911.

The plan of reorganization as outlined in my recent circular letter has been modified in order to embody some of the suggestions of those who kindly gave time and thought to the matter. The large number of replies was a source of surprise and gratification. The Society being now the owner of THE BRYOLOGIST outfit, its officers become, logically, the Advisory Board, including the curators of the Herbaria and Foreign Exchanges, eight in all. The Officers for 1911 have appointed Dr. A. J. Grout Editor-in-chief, with the office of publication at New Dorp, New York. As Associate Editors, Dr. Best, Dr. Evans, Profs. Holzinger and Riddle have consented to serve.

Some misapprehension has arisen from my too brief statement as to the deficit. The question has been asked: Why can a new and untried plan succeed financially when *you* have failed to make ends meet? The answer is this: I felt free to use my own money in ways I would not have done had I been accountable to a Society or any person or persons. Owing to ill health I was obliged to employ a high priced city printer who could and would come to me instead of my going to his office. In this way it also came about that supplies were ordered from him which possibly could have been bought cheaper elsewhere. For the same reason advertisements were obtained only as the few, by exchange for the most part, came to me. My deficit represents, therefore, a perfectly free-will gift, for which I ask neither reimbursement nor pity. The time has come, however, when the interests of the publication will be best served by a division of labor, the work having outgrown the ability of any one person to do well.

It is, therefore, quite within bounds to expect that the increase in Society dues, and in the subscription price will, with income from advertisements, and reduced general expenses enable the Society to publish a journal maintaining its previous character in all respects. It is hoped that each one interested in the continuance of the Society and its publication will bring it to the notice of any one likely to join in our work.

The subject of the offerings has been questioned by some, since printing members' names with address has opened the way to demands for collecting and forwarding of specimens especially from members in remote foreign countries. This has come to be a tax on membership, therefore, several have requested to have their names dropped from the Society, while remaining subscribers to THE BRYOLOGIST. This state of affairs should not be allowed to continue. Requests for specimens should be made only from those offering in the Exchange Department. It is urged that *any* member having *anything* to offer will communicate the specimens to the custodian of the group, who will send lists to the editor for use from time to time. In the near future it is expected to establish an "Exchange Bureau" on similar lines to that of our English friends, and to publish a check list on thin paper at small cost. Any suggestions will be gratefully received.

In turning over THE BRYOLOGIST to the Sullivant Moss Society I wish to thank all who have so ably seconded my efforts to build up a strong society of students of cryptogams with the journal as a means thereto. I feel that I have every reason to be, not only satisfied, but proud of the results of my ten year labor. I have enjoyed it all and only wish I were able to continue and to do more than in the past. I mean to do quite as much though in a less conspicuous role. As Treasurer of the Society I am on the Advisory Board, and expect to contribute all in my power to the increased usefulness of our Society and its publication.

ANNIE MORRILL SMITH.

A FOSSIL CAMPTOTHECIUM

A. J. Grout

Early in October, 1916, I received from Mr. B. O. Wolden, of Wallingford. Iowa, a remarkably well preserved moss brought up by a local well-digger from a depth of 80 or 90 feet below the surface in connection with pieces of wood. According to Mr. Wolden this depth is in the Kansan Drift, probably near the bottom of this deposit

The material is somewhat coated with fine soil, although Mr. Wolden says he washed it out from lumps of earth. Otherwise it might have been collected one hundred days ago instead of having been preserved one hundred thousand years, more or less. The plants are green, although no cell contents are observable, and the leaves are perfectly preserved even to all details of cell structure. In fact it seemed so incredible that a moss could have remained so well preserved under such circumstances, that I wrote again to Mr.Wolden asking for additional details. He states that the well-digger, though not an educated man, is accurate and reliable. The moss occurred in a layer of fine sandy clay imbedded between layers of blue clay. He further stated that such an arrangement of soil layers was not unusual at such depths and that this sandy layer often contained plant remains.

Most conclusive of all is the fact that the plants, while characteristically *Camptothecium*, belong to no known American species of today and its most closely allied species (*C. pinnatifidum*) is not found east of the Rockies.

The moss was dug up in 1911, and all the fairly abundant material was sterile. For this most interesting plant I propose the name of:

Camptothecium Woldenii n. sp. Stems slender, fragments at least two inches in length, densely and regularly pinnately branching; leaves broadly lanceolate, slenderly acuminate, entire, strongly plicate, especially when dry, abruptly but rather slightly narrowed to the insertion; branch leaves 2–2.5×0.75 mm.; median leaf cells long-linear; rounded or quadrate alar cells minute, very few, rarely extending above widest point of the leaf-base. Differs from *C. pinnatifidum* and *C. aureum* in its entire leaves and very few isodiametric alar cells.

New Dorp, New York City.

Explanation of Plate I

Camptothecium Woldenii Grout, photographed by the author.

1. Three fragments, × 2.
2. A portion of one of these fragments, × 5.
3. Leaves, × 9.

ANNUAL REPORTS—SULLIVANT MOSS SOCIETY—1916

Report of the President

Dr. Evans has been elected Editor of the Bulletin of the Torrey Botanical Club, and it has become my duty to report on the activities of the members of this Society. The most remarkable contribution during the year has been the publication of the text for the *Moss Atlas* of the Natural History of Madagascar,

prepared by MM. Renauld and Cardot, a review of which may be found in the September number of the Bryologist. Fortunately for posterity, the manuscript was completed before the outbreak of the war and although it was the only possession saved by M. Cardot we have reason to hope that the types and the rest of his bryological collections are still uninjured!

Dr. Hagen is continuing his series of exsiccatae and critical studies of Norwegian mosses, making some changes in nomenclature, which, if adopted, will affect the names of some North American species. M. Thériot has made an interesting correction in the name of a Cuban species. Dr. Evans has made some 35 additions to the Hepatic Flora of Quebec, and Fr. M. Victorin has also been studying the cryptogamic flora of this region. Dr. Nichols has continued his collections in Nova Scotia and Cape Breton. Dixon and Cardot have described a fossil moss from the Pliocene, the only new species, *Mnium antiquorum*, to be found in this volume, though Dr. Grout has made two new varietal combinations in *Drepanocladus*. Professor Holzinger and Professor Chamberlain have continued to give us valuable reviews and Mr. Plitt, Dr. Conklin and Mr. Kaiser still devote much time to the Society's collections. Dr. Jennings continues his able editing of the Bryologist. Mrs. Dunham has written a valuable little introduction for nature students to the mosses, and Mr. Williams, Dr. Andrews and myself are continuing our critical studies for *North American Flora* and making additions to the floras of the West Indies, South America and the Philippines.

Elizabeth G. Britton, *President.*

New York Botanical Garden.

Report of the Secretary-Treasurer

The past year has shown an improvement in the affairs of the Sullivant Moss Society. The Secretary extends his congratulations upon the increase in members and in subscriptions, as well as upon the increase in the number of short notes in the magazine. He wishes members to bear this in mind, lest they feel that some of the statements made below are of too pessimistic a nature.

Eight new members have joined the Society during the past twelve months in addition to seven new subscribers to the Bryologist, the membership now totalling 137, besides a subscription list of over 60. This growth is a source of great satisfaction. But all members of the Society should make every effort to bring about a further increase. We need two hundred members, and *young* members, if the Society is to prosper.

The subscriptions mentioned above are largely those of libraries and represent a source of income that is likely to be steady. A careful estimate of conditions places the probable annual revenue of the Society in dues and subscriptions as approximately $275.00, exclusive of sales of back numbers and other incidentals. An effort has been made this year to keep expenditures at about the figure named above. The item of expense for the Hasse lichens, it is hoped, may be later

written off through the sale of sets of the exsiccati. A word of warning is necessary, however, in view of the steady increase in the cost of paper and printing, since present terms may not continue; in this case additional revenue will be imperative. As it is, plates have been possible during the past year only through the generosity of private parties. It is only fair that the Society should recognize this condition.

During the past year 4 species of hepatics, 12 of lichens, and 9 of mosses have been offered through the exchange department. This is far too small a number, and indicates a serious lack of appreciation of the opportunities afforded by the Society. The Secretary cannot state too strongly what was said in the last report in this connection. Co-operative work is needed. Obviously, the Secretary cannot write each member each time to "drum up" material; the increasing pressure of professional work prevents, even if the financial condition of the Society warranted it. The Curators stand ready at any time to identify material, and to advise in the way of offerings, in which last the Secretary will be only too glad to be of service.

Notice is again given that the chance of securing complete sets of the BRYOLOGIST is rapidly passing. *Only three* sets remain complete, after the sale of which the copies of volume three will lack the first issue. The sale of separate volumes previous to the seventh will also have to be somewhat restricted.

Only wide-spread amateur interest can furnish the backing which makes the more professional student possible. It was hoped that the BRYOLOGIST might publish during the year articles dealing with various genera of hepatics in the informal way shown by Mrs. Dunham's "Mosses." There is a decided need for such work, but hepatic students when approached seemed unwilling to attempt it. Somewhat similar comment is applicable to those members interested in mosses and lichens. The burden of providing manuscript ought not to fall upon the few, however willing. The BRYOLOGIST is *your* magazine. Each member can surely find some point worth a note during the year; a peculiarity of habitat, an extension of range, an observation upon the time of fruiting. Don't think that because a certain species of *Polytrichum* is named *commune*, it is unworthy of attention.

The financial condition of the Society is summarized below. Your attention is called to the fact that the various Curators are giving much more to the Society than their time and services. The herbarium charges represent less than the cost of mounting paper and labels. Certainly, if the Curators are willing to give their time and energy to the identification of material and the distribution of specimens, as well as making a cash outlay, members should repay them by enthusiastic co-operation.

SUMMARY OF ACCOUNTS

RECEIPTS

Balance on hand, December 1, 1915	$1.13
Dues for current year	183.32
Subscriptions for current year	71.43
Arrears collected, dues and subscriptions	22.16

Dues and subscriptions for coming year, already paid	19.72
Sales of back numbers, and incidentals	41.01
Receipts from advertising	10.31
Receipts from sales of Hasse Lichens	10.50
	$359.58

EXPENDITURES

Printing and stationery	$7.48
Postage and bank fees	8.49
Herbarium expenses	8.95
Express charges upon shipments of the BRYOLOGIST	2.67
Express on Hasse lichens	30.00
Intelligencer Printing Co., 5 issues of BRYOLOGIST and Index	223.41
	$281.00
Cash on hand at close, Nov. 30, 1916	78.58
	$359.58

Respectfully submitted,

EDWARD B. CHAMBERLAIN, *Secretary-Treasurer.*

Report of the Election of Officers for the Year 1917

Whole number of votes cast, 14.

For President, Mrs. Elizabeth G. Britton, 14 votes.

For Vice-President, Mrs. Annie Morrill Smith, 14 votes.

For Secretary-Treasurer, Mr. E. B. Chamberlain, 14 votes.

No votes were cast other than as reported above, the candidates thus being unanimously elected to the offices designated.

ELIZABETH M. DUNHAM, *Judge of Elections.*

Report of the Curator of the Moss Herbarium for 1916

During the past year 125 specimens have been mounted in the Moss Herbarium of the Sullivant Moss Society, adding six species new to the herbarium, which now contains 3980 specimens, representing 1179 species and varieties belonging to 253 genera. A generous contributor has been Mrs. E. G. Britton, who has presented duplicates of the Langlois collections in Louisiana, many specimens from the herbarium of the late William Mitten—which have not yet been mounted—and other mosses. Other contributors have been Mrs. E. M. Dunham, John Davis, H. S. Jewett, W. E. Haydock, George H. Conklin, H. Dupret, Frank Dobbin, W. S. Cooper, Mrs. D. W. Jackson, and W. R. Taylor.

In spite of efforts to stimulate interest the Curator has to deplore the fact that the majority of our members seem to remain apathetic in their collections and correspondence. There is so much to be found in every locality that would be valuable material for study that it is most unfortunate in view of the growth of the herbarium that members of the Society can not be induced to be deeply interested in bryology in a substantial way.

Desirable material for exchange is always welcome and our stock affords ample return for those who send in their own collections when they consist of other than the species which are common almost everywhere. The continuation of the European War continues to cut off practically all foreign correspondence.

George B. Kaiser, *Curator.*

Germantown, Pa., Dec., 1916.

Report of the Hepatic Department for 1916

Three hundred and forty-two specimens, representing 79 genera and 162 species, have been placed in the herbarium during the past year. It was found impossible to complete the determination of the A. H. Brinkman collection, from Alberta and British Columbia. One hundred and seven specimens, however, were added this year. Among these are such rare species as *Riccia Lescuriana*, *Lophozia quadriloba*, *L. badensis*, *L. confertifolia*, *L. grandiretis*, *L. longiflora*, *L. Schultzii*, *Sphenolobus politus*, *Gymnomitrium concinnatum*, *Harpanthus Flotowianus*, *Nardia geoscyphus*, *Anthelia Juratzkana*, *Scapania Bartlingii*, *S. uliginosa*, *S. paludosa*, *Clevea hyalina*, *Bucegia romancia*, *Sauteria alpina*, *Asterella Lindenbergiana*, and *Hygrobiella laxifolia*. The most important gift during the year was by Drs. A. W. Evans and Geo. E. Nichols. Dr. Evans gave us 44 specimens collected in Quebec, Ramouski, and Saguenay Counties. This set contains such interesting species as *Metzgeria furcata*, *Lophozia badensis*, *L. heterocolpa*, *L. confertifolia*, *L. inflata*, *L. Hatcheri*, *Scapania umbrosa*, *Sphenolobus minutus*, *Gymnomitrium concinnatum*, *Gym. corallioides*, *Cephaloziella myriantha*, and *C. Hampeana*. (See Bryologist **19**: 27–30. March, 1916.)

Dr. Geo. E. Nichols gave 42 specimens from Cape Breton Island, Nova Scotia, and included many of the species new to Cape Breton as given in the list (See Bryologist **19**: 38–47. May, 1916.). In addition, this gift includes 18 species from Connecticut. Mr. A. S. Foster sent 12 packets, partly Alaskan, and one species, *Lepidozia Sandricensis*, new to North America. Miss H. E. Greenwood, Geo. Moxley, O. E. Jennings, Geo. B. Kaiser, Roy Latham, and Stewart H. Burnham have been contributors of material from their respective locations. In Mr. Burnham's material from Ft. Ann, N. Y., was found *Chiloscyphus ascendens*. Mr. Severin Rapp's gift of 34 hepatics (See Bryologist **18**: 23. March, 1915) has been acknowledged. These have been verified, and make a most valuable addition of new species to the herbarium. Further additions to species from Florida have been made by Prof. N. L. T. Nelson from Gainesville.

Miss Lorenz has sent generously of the new and rare New England species. Who of us would not like also to find in any one year *Pallavicinia Flotowiana*, *Pedinophyllum interruptum*, *Nardia crenuliformis*, *Cephaloziella bifida*, *Anthelia Juratzkana*, *Nardia obovata*, *Lophozia Kunzeana*, and *Jungermannia cordifolia*. The writer has added a full set of the genus *Sphenolobus*, and the following *Cephaloziellas* as found in the Duluth-Superior District: *C. Hampeana*, *C. bifida*, *C. myriantha*, *S. Sullivantii*, *C. elachista*, *C. byssacea*.

The Curator wishes once more to thank Miss Haynes, Miss Lorenz, and Dr. Evans for the unfailing courtesy, generous aid, and vital inspiration which they have given upon every appeal for help.

GEO. H. CONKLIN, *Curator.*

SUPERIOR, WISCONSIN, DEC. 15, 1916.

Report of the Lichen Department, 1916

The year has been one of unusual activity in the Lichen Department. In the early part of the year we received the duplicates of Dr. Hasse's large collections, a report upon which is still in the making.

Thus far, nearly half of the material has been gone over; of course, some of the species are well represented, others not so well. From those of which at least ten good duplicates could be found, 150 specimens have already been set aside. These, as you all know, have been offered for sale, and are being distributed in fascicles of twenty-five each. The first fascicle has been already distributed and the second will be in December. During the coming year we plan to distribute a fascicle every three months; that is, one in March, one in June, one in September, and one in December. Members may be pleased to learn that two of these sets can still be had. It is urged that those desiring a set order at once.

No attempt has yet been made to put into the herbarium a representation of all these specimens. This will only be done gradually, about as fast as they are offered to subscribers. This year, therefore, but 50 specimens (that is, the first two fascicles) have been added to the herbarium.

We have also been remembered by Mr. N. L. T. Nelson, who has sent us specimens collected near Gainesville, Florida, and by Mr. P. G. M. Rhodes, who has sent specimens from England. Altogether 87 specimens have been added to the herbarium, which now numbers 3160 specimens.

It is to be hoped that during the coming year more activity will be shown in the work by our members; we should have at least a dozen contributors. The same might be said regarding our exchange department. During the past year, Mr. Severin Rapp, Mr. Latham, and Mr. Rhodes each did his part. What is the matter with our other lichen friends? Let us all take a little more interest in this work, contribute to the herbarium, and not be afraid occasionally to offer a specimen or two to others.

CHARLES C. PLITT, *Curator.*

BALTIMORE, MD., DEC. 1, 1916.

MISCELLANEOUS NOTES

Editorial.—The New Year is customarily the time to drop bad habits, make general changes in policy, and to express the hope to do better the coming year than we did last year. The Editor is somewhat immune to this New Year's contagion but in conformity with the general practice the present occasion has

been taken to emphasize what has been developing as an idea with a few of us this last year or more.

It is believed that the department of Miscellaneous Notes might be used to great mutual advantage by our readers as a general place for short notes as to the occurrence, distribution, or habitat of species; methods of collection, study, or preservation of specimens; short notes on current literature; personal notes; discussions; in fact anything which will make the BRYOLOGIST of more general use to our readers. The Associate Editors will be asked to contribute short notes on the particular groups of plants with which they are more particularly dealing, and to report on the literature relating to these groups, and, in this connection the Editor wishes particularly to thank Dr. Holzinger and Mr. Chamberlain for their continuous contributions of notes and reviews during the last year. The BRYOLOGIST is now the only magazine in the world devoted to the mosses, hepatics, and lichens, the valued *Revue Bryologique* having (at least temporarily) suspended publication, so let us make our journal worthy of the honor of its position.

The Editor proposes during the coming year to ask more of the Associate Editors in the way of looking over the manuscripts before publication. During the last year this has been in many cases hardly possible owing to the scarcity of suitable manuscripts and the consequent rush in many cases in getting them to the printer, but it is becoming more and more apparent that an examination of certain papers by an associate editor more familiar with the particular subject treated would result in valuable suggestions, or even corrections. We would ask of our readers to ponder carefully the article in this issue by Mrs. Annie Morrill Smith and then decide with us to help the good work along and make the BRYOLOGIST better and bigger and more generally useful than ever before.

Safety-razor Blades for Hand-sectioning.—Several times during the last two or three years we have noted references to the use of the safety-razor blade for cutting hand-sections. Having had occasion recently to make a series of cross-sections of leaves, the safety-razor blade has been tried and can be highly recommended for this purpose. We used the Gem Damaskeene Blades, held by means of the handle which is used to hold the blades when stropping them. This stropping-handle consists of a metal clip into which the blade is slipped and then the base of the clip is pushed into the end of a hollow metal handle. There is thus furnished a very sharp and very thin cutting blade of uniform thickness, held quite securely in a convenient handle and costing but little. The handle costs fifteen cents and the blades cost five cents apiece in packages of seven.

In using the blade we obtained the best results by slicing elder pith crosswise into disks about as thick as a five-cent piece. Then, holding the leaf between two disks, or two pieces of such disks, between the thumb and first finger of the left hand, the finger being on the outer side and a little lower than the thumb, the flat blade of the razor was rested on the top of the finger and then drawn towards the thumb, cutting through the pith and enclosed leaf. By pressing down on the razor or by very slightly lowering the finger the successive slices

may be gauged quite accurately and surprisingly thin sections may be obtained. It is much better to use the pith in such a manner that the cuts through it will be made with the grain (longitudinally), hence the instructions above to prepare the pith by cutting it into disks, crosswise. It is best to dip the blade in water before starting to cut a series of sections, as the sections will then remain on the damp surface of the blade until you are through with the operation. If the blade is used dry the sections will likely be blown away by your breath, unless, as with some workers, steadiness of hands is attained by holding the breath during such an operation. We have had no difficulty in getting sections of Catharinaea of a minimum of two cells in thickness by this method, although at this minimum thickness most of the lamellae were more or less torn.

O. E. J.

SULLIVANT MOSS SOCIETY NOTES

The following new members have been added to our rolls since the last note was published in the September, 1916, number:

Mr. A. T. Beals.....71 West 23rd St., New York City
Mr. E. R. Grose.....Glenville, W. Va.
Mrs. J. Kincaid.....Russiaville, Ind.
Miss Myrtle H. Lewis.....Rockwell Ave., Naugatuck, Conn.
Mrs. Frank E. Lowe.....24 Brattle St., Worcester, Mass.
Mr. Ralph S. Nanz....Dept. Plant Pathology, New York State College, Ithaca, N. Y.
Mrs. Mary Adam Noble.....Inverness, Florida
Dr. Wm. H. Wiegman.....436 East 5th St., New York City

EXCHANGE DEPARTMENT

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

Mr. A. J. Beals, 71 West 23d Street, New York City.—*Fissidens obtusifolius* Wils., collected by Mr. Beals on limestone rocks of the Housatonic River, Falls Village, Connecticut, Sept., 1916, in fine fruit.

Dr. Albert C. Herre, State Normal School, Bellingham, Washington.—*Cyphelium inquinans* (Sm.) Trevis.

Mr. Charles C. Plitt, 3933 Lowndes Ave., Baltimore, Maryland.—*Alectoria jubata* (L.) Nyl., collected in Switzerland by Mr. P. G. M. Rhodes.

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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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THE BRYOLOGIST

VOL. XX MARCH, 1917 NO. 2

NOTES ON NORTH AMERICAN HEPATICAE. VII*

ALEXANDER W. EVANS

(WITH PLATE II)

Of the ten species noted in the present paper five represent additions to the flora of North America, north of Mexico. Four of these additions, including a species of *Cololejeunea* proposed as new, were found in Florida; the fifth was found in Wisconsin and British Columbia. Two other species which are included have recently been reported as American by other writers. Of the three remaining species one is introduced for nomenclatorial reasons and the other two to record extensions of range.

1. PLAGIOCHASMA INTERMEDIUM Lindenb. & Gottsche. *Aitonia japonica* Steph. Bull. Herb. Boissier **5**: 54. 1897. *Plagiochasma japonicum* Massal. Mem. Accad. Verona **73**: 47. 1897.

In the writer's recent revision of the North American species of *Plagiochasma*,[1] specimens from Japan are listed under *P. intermedium*, and the identity of *P. japonicum* with the North American species is claimed. Through an unfortunate oversight, however, the Asiatic species was not formally listed among the synonyms of *P. intermedium*. It is not possible to record any additional stations for the species at the present time.

2. PLAGIOCHASMA WRIGHTII Sulliv.

Collected in March, 1915, in the Arbuckle Mountains, near Davis, Oklahoma, on dry travertine formations, by W. H. Emig (No. 1030). A noteworthy extension of range. Formerly known from one station in Texas, one in Arizona, and four in Mexico.[2]

3. BUCEGIA ROMANICA Radian, Bull. Herb. Inst. Bot. Bucarest 3–4. 1903.

The discovery of this remarkable liverwort by A. H. Brinkman was announced by Miss Haynes[3] over a year ago. His specimens were collected in the following localities, altitudes 7200–8800 feet: Willock Mountain and Mt. Bosworth, near Stephen, Alberta, July, 1913 (Nos. 792 and 822); Long Lake, south of Pharaoh, Alberta, August, 1915 (No. 983); Cathedral Mountain, Hector, British Columbia, July, 1913 (Nos. 810, 811 and 812). They are unfortunately

* Contribution from the Osborn Botanical Laboratory.

[1] Bull. Torrey Club **42**: 259-308. f. *1–8*. 1915.

[2] See Evans, *l. c.* 295. 1915.

[3] BRYOLOGIST **18**: 93, 94. *f. 1*. 1915.

The January number of the BRYOLOGIST was published February 10, 1917.

sterile, but the structure of the thallus, which is figured by Miss Haynes, is so distinctive that there can be little doubt about the correctness of the determination. The genus *Bucegia* is monotypic. The type material was collected by its author, Simeon St. Radian, in the Bucegi Mountains of Rumania, in 1899. Specimens from the same mountains, collected by K. Loitlesberger in 1897, are likewise noted in the original account. The genus is accepted without question by K. Müller,[1] who adds a number of interesting details and figures the structural features of the thallus. He was unable, however, to cite any additional localities. In the following year Schiffner[2] recorded *B. romanica* from five stations in the Tatra Mountains of Austria, as well as from the two Rumanian localities. He likewise gave an exhaustive account of the plant and brought out in his figures the morphological characteristics of the male and female receptacles. A few years later he[3] reported additional stations in the Tatra Mountains and stated that he knew the plant from ten stations in all in that portion of Austria. Apparently no other European localities are known, and the report of the species from British Columbia and Alberta is therefore of unusual interest.

The genus *Bucegia* is a representative of the higher Marchantiaceae, the so-called Compositae of Leitgeb. It agrees with *Marchantia* and *Preissia* in having compound or dolioform epidermal pores in the vegetative thallus. The inner opening of the pore approximates the cruciate condition found in *Preissia* and certain species of *Marchantia* (for example, *M. paleacea* Bertol.)[3] In other words the cells bounding the opening approach one another very closely and leave a narrow four-rayed space, which may be partially or wholly closed by an increase in the turgidity of the cells. Although the pores are essentially the same as in *Marchantia* and *Preissia* the air-chambers and photosynthetic tissue are very different. Instead of being in a single layer the air-chambers are often in two or more layers; while the photosynthetic tissue, instead of being in the form of upright rows of cells, is represented by the walls a single cell thick separating the air-chambers from one another. The type of air-chambers found in *Bucegia* does not recur in any of the other Compositae but is found in *Reboulia*, *Asterella* and other genera belonging to the group Operculatae of Leitgeb. Here, however, it is always associated with simple epidermal pores.

The compact tissue below the air-chambers shows none of the sclerotic cells which form so distinct a feature in *Preissia* and in many of the species of *Marchantia*. It even lacks oil-bodies and is composed of thin-walled parenchyma throughout. The ventral scales are in two rows, differing in this respect from *Marchantia* but agreeing with *Preissia* and the other Compositae. The scales have the usual semicircular or broadly lunulate form and each one bears a single lanceolate appendage. Both rhizoid-initials and cells containing oil-bodies are absent.

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[1] Rabenhorst's Kryptogamen-Flora **6**: 295–298. *f. 180, 181.* 1907.

[2] Beih. Bot. Centralbl. **23²**: 273–290. *f. 1–24.* 1908.

[3] Magyar Bot. Lapok **10**: 280. 1911.

[4] For a description of the morphological features of *Marchantia*, see Evans, Trans. Conn. Acad. **21**: 208–228. 1917.

For full accounts of the receptacles reference may be made to the published descriptions and especially to the work of Schiffner. It is sufficient to state here that the male receptacle is stalked as in *Preissia* and *Marchantia*, that the disc of the female receptacle is bluntly lobed, that the groups of archegonia (each enclosed by a membranous involucre) lie beneath the lobes, and that each sporophyte is enclosed within a pseudoperianth. Here again *Bucegia* resembles *Preissia* closely and also agrees with such species of *Marchantia* as the Asiatic *M. geminata* R. Bl. & N. and its allies. The photosynthetic tissue of both receptacles is, however, essentially the same as in the vegetative thallus and therefore differs markedly from the branched rows of cells found in both *Preissia* and *Marchantia*.

4. Fossombronia lamellata Steph. Hedwigia **33**: 9. 1894. *F. tuberifera* Goebel, Organographie der Pflanzen 292. *f. 190, 191.* 1898. [Figs. 1–4.]

Collected in December, 1915, May, 1916, and January, 1917, at Sanford, Florida, by S. Rapp (No. 80). New to North America. The species is characterized by the possession of numerous tubers, some of which are highly differentiated while others are more rudimentary. The material collected in 1917 shows mature capsules.

Apparently Ruge, in 1893, was the first to describe tubers in the genus *Fossombronia*.[1] His material, which he does not attempt to name, was collected by Goebel at Tovar, Venezuela. He states that the stem of a tuberiferous plant turns downward instead of upward and becomes swollen at the apex, the enlarged portion, or tuber, being filled with stored food, some of which is in the form of starch. One of his figures shows the change in the direction of growth, but no sign of a tuber, although the leaves exhibit a characteristic reduction in size.

The following year Stephani described *F. lamellata* from Argentine specimens in the Otto Kuntze herbarium, collected by R. Hauthal at Buenos Aires, no other material being cited. He makes no mention of tubers but gives an account of the vegetative structure and capsules and doubtfully assigns a monoicous inflorescence to the species.

A few years afterwards, in 1898, Goebel published his *F. tuberifera*, giving a general account of the plant and two interesting figures in which the characteristic tubers are brought out. One figure (*f. 190*) shows a short plant with archegonia, which has grown out from the tip of an old tuber; the stem, without branching, turns abruptly downward and swells distinctly at the apex into a new spherical tuber. The other figure (*f. 191*) shows a plant which bears a sporophyte, while the apex of the stem is beginning to show the characteristic modification into a tuber. Goebel's material of *F. tuberifera* came from Peldegue, Chile, and he doubtfully assigned to the same species the *Fossombronia* from Venezuela which Ruge had already discussed.

In 1900 Stephani[2] published a new description of his *F. lamellata* and cited *F. tuberifera* definitely as a synonym. In addition to Hauthal's specimens he

[1] Flora **77**: 305, 306. *pl. 4, f. 6; text f. 14.* 1893.
[1] Mém. Herb. Boissier **16**: 30. 1900.

listed Goebel's Venezuelar material but made no mention of the Chilean type of *F. tuberifera*. This time he described the tuberous and leafless apices of the stem and stated definitely that the inflorescence was dioicous.

It will be seen that *F. lamellata*, according to the published records, has a wide distribution in South America, being known from Argentina and probably from Venezuela and Chile as well. Mr. Rapp's specimens seem to be constantly dioicous, and the spores agree closely with Stephani's description. It seems safe, therefore, to refer the plants to *F. lamellata*, and the discovery of this species in Florida marks an interesting extension of range to the northward. The spores measure 36–44μ in diameter and the spherical surface is covered over with a fine reticulum, the meshes measuring 8–9μ across. In most cases the reticulum is regular, but sometimes the low ridges of which it is formed leave an occasional mesh incomplete. The elaters are about 8μ wide and show two distinct spirals. It will be seen from this description that the spores and elaters are much like those of the more northern *F. foveolata* Lindb. This species differs, however, in its annual habit, lack of tubers and monoicous inflorescence. In *F. salina* Lindb., a common Florida species, the spores are likewise reticulated, but the meshes are coarser and are often incompletely formed. This species is likewise monoicous and lacks tubers, although it agrees with *F. lamellata* in being perennial.

One of the largest of the Florida specimens is shown in Fig. 1. After bearing a series of leaves and a small cluster of archegonia, one of the branches abruptly turned downward, ceased forming leaves, and became swollen into a spherical tuber densely covered with rhizoids. The other branch, only the base of which is shown, behaved similarly. In addition to these terminal tubers the plant bore a number of smaller oval or clavate tubers on the tips of leafless and short adventitious branches arising from the ventral surface. These tubers lacked rhizoids completely although some of them showed indications of very rudimentary leaves.

A much simpler condition is shown in Fig. 2. In this case a tuber gave rise to a leafy shoot from the apex, and this shoot, without branching, developed a new apical tuber. The leaves produced were all irregular and rudimentary, there were no sexual organs, and the new tuber was destitute of rhizoids; on its surface it bore a series of projecting cells or groups of cells, but these were irregularly arranged and could hardly be interpreted as leaves. The plant here figured behaved in much the same way as the one shown in Goebel's *f. 190*, except that the latter developed archegonia and much larger leaves.

Conditions approximating those shown by Ruge are represented in Figs. 3 and 4, although a change in the direction of growth is scarcely or not at all apparent. The plants here figured showed a gradual decrease in the size of the leaves, accompanied by a marked irregularity in their form, while the apices of the stem were leafless or nearly so without being tuberous. In Fig. 3 a single antheridium with a small subtending scale is shown.

In some of Mr. Rapp's specimens the tuberiferous shoots are much more elongated than any of those figured, but the more important variations have been

shown. Most of the rhizoids, as is usual in *Fossombronia*, are deep vinous purple. They are represented in Fig. 2 and on the terminal tuber in Fig. 1. The small tubers in Fig. 1 were practically free from rhizoids, and the same thing was true of the two shoots shown in Figs. 3 and 4 and of the long leafless portion of the shoot in Fig. 1. In the leafy portion of this shoot, however, rhizoids were present in abundance, although omitted from the drawing.

In connection with *F. lamellata* it should be remembered that tubers have been described in the case of the Californian *F. longiseta* Aust. In his description of this species Howe,[1] in 1899, stated that the stems were "commonly somewhat tuberously thickened at the apex and perennial through the resumption of apical growth on termination of the dry season." Humphrey,[2] several years later, treated the matter at greater length and figured "an example of tubercular thickening of stem," which bears a striking resemblance to some of the small tubers shown in Fig. 1. He found that fungal hyphae were present in the tubers and thought at first that the fungus might bear a causative relation to them. He afterwards found, however, that plants which were kept moist produced no tubers, although fungi were still present, and he decided that the tubers were adaptive and largely dependent upon external factors for their development.[3] *F. longiseta* seems to be amply distinct from *F. lamellata:* the spores are strikingly different, and the tubers seem to be less abundant and less highly differentiated.

5. **Jungermannia Schiffneri** (Loitles.) comb. nov. *Aplozia Schiffneri* Loitles. Verhandl. der k.k. zool.-botan. Gesellsch. in Wien **55**: 482. 1905.

Collected in April, 1915, at Manitou Falls, Black River, Douglas County, Wisconsin, by G. H. Conklin (No. 1255); also in July, 1913, at Hector and Stephen, British Columbia, by A. H. Brinkman (Nos. 806, 823). New to North America.

The type material of this interesting species was found by C. Loitlesberger in the vicinity of Görz, Austria. Its occurrence in Switzerland and Tirol was soon reported by Schiffner,[4] who described a number of structural details not brought out in the original account and added a series of figures. It has since been recorded and figured from Scotland by Macvicar.[5] The illustrated description of Müller[6] may likewise be consulted.

The section or subgenus *Luridae*, to which *J. Schiffneri* belongs, is characterized by a dark green color, often masked by a brownish or purplish pigmentation; by ovate to cordate leaves; by thin-walled leaf-cells, with or without trigones; and by an ovate to clavate perianth, plicate at the mouth but not contracted into a beak. Four other species of this section are known from both Europe and North America, namely: *J. cordifolia* Hook., *J. riparia* Tayl., *J. atrovirens* Schleich., and *J. pumila* With. The first three of these are dioicous and thus

[1] Mem. Torrey Club **7**: 80. 1899.
[2] Ann. Bot. **20**: 86. *text f. 3.* 1906.
[3] Proc. Washington Acad. **10**: 6. 1908.
[4] Hedwigia **48**: 184–187. *f. 1–13.* 1909.
[5] Student's Handb. Brit. Hep. 147. 1912.
[6] Rabenhorst's Kryptogamen-Flora **6**: 570. *f. 285.* 1909.

differ from *J. Schiffneri* and *J. pumila*, both of which are characterized by a paroicous inflorescence.

If the dioicous species are left out of consideration and the two paroicous species compared, it will be found that the latter are very closely related. The size, habit, and color are much the same in both, and there are no essential differences in the shape of the leaves, in the size of the leaf-cells, in the walls of the cells, or in the perichaetial and perigonial bracts. The perianths and the valves of the capsule, however, yield important differences. In *J. Schiffneri* the perianth contracts abruptly in the upper part, the broadest part being above the middle; in *J. pumila* the perianth is gradually contracted toward the mouth, the broadest part being usually at or below the middle. In *J. Schiffneri* the cells in the outer layer of the valves have the thickenings in their radial walls arranged in such a way that every alternate wall is nearly or quite free from thickenings; in *J. pumila* the thickenings are present in equal abundance in all the walls. The walls of the inner layer, moreover, are about half as large in *J. Schiffneri* as in *J. pumila* and the spores are considerably smaller (about 15μ and 21μ, respectively). These differences are clearly brought out in the published descriptions.

A third paroicous species of the *Luridae* was recently described by Schiffner under the name *Aplozia rivularis* Schiffn.[1] He had already called attention to the plant under the name *A. pumila* var. *rivularis* Schiffn.,[2] and it is described under this name by Müller.[3] The species is now known from Bohemia, the Harz Mountains and Saxony, specimens from the last region having been distributed by Schiffner in his Hep. Europ. Exsic. No. 402. Since *A. rivularis* is probably to be expected in North America a few words about its characteristics are perhaps in place. It agrees closely with *J. pumila* but is much larger and has larger leaf-cells (40 x 20μ in the middle of the leaf, instead of 25 x 18μ). It differs also in its large cylindrical or clavate perianths, in the narrower cells of the inner layer of its capsular valves, and in its slightly smaller spores (about 16μ in diameter). *A. rivularis*, as its name implies, grows on stones in streams.

6. Cephalozia Loitlesbergeri Schiffn. Oesterr. Bot. Zeitschr. **62:** 9. 1912; K. Müller, Rabenhorst's Kryptogamen-Flora 6^2: 45. *f. 12.* 1912.

Collected in 1915, at Barrasois, Cape Breton, Nova Scotia, by G. E. Nichols (No. 1243 b); already reported by its collector.[4] The type material of this distinct species was found near the Ladachsee in the vicinity of Gmunden, Austria, by C. Loitlesberger. Müller was able to add several new stations from Baden, Styria and Switzerland, and Schiffner soon afterwards reported the plant from Bavaria[5] and Sweden.[6] For the British Isles Macvicar[7] doubtfully recorded the species from Lancashire, the specimens which he cites having poorly developed

[1] Lotos **59:** 2. 1911.
[2] *l. c.* **48:** [5]. 1900.
[3] Rabenhorst's Kryptogamen-Flora **6:** 568. 1909.
[4] Bryologist **19:** 42. 1916.
[5] Oesterr. Bot. Zeitschr. **62:** 162. 1912.
[6] Ibid. **63:** 455. 1913.
[7] Student's Handb. Brit. Hepat. 454. 1912.

perianths and bracts. Ingham,[1] however, lists it without question from West Lancashire and from South Aberdeen. Specimens from the original locality and from Koppelsberg in Pomerania have been distributed by Schiffner in his Hep. Europ. Exsic., Nos. 543 and 544.

The group of *Cephaloziae* in which the leaves have more or less connivent lobes includes a number of closely related species. Of this group *C. catenulata* (Hüben) Dum., *C. connivens* (Dicks.) Lindb., *C. media* Lindb., and *C. pleniceps* (Aust.) Lindb. have long been known in both Europe and North America, while *C. affinis* Lindb., *C. compacta* Warnst., *C. Loitlesbergeri* Schiffn., and *C. macrostachya* Kaalaas have been published during the past few years. These recent segregates were based on European material, but *C. affinis*[2] and *C. macrostachya*[3] have since been definitely reported from North America. Now that *C. Loitlesbergeri* has been added to our flora, the discovery of *C. compacta* would not be surprising.

The essential characters of *C. Loitlesbergeri* may be briefly described as follows: the color is pale or yellowish green; the lobes of the leaves are long, entire, and usually connivent and acuminate, each being tipped by a row of from two to four cells; the leaf-cells have firm walls without trigones and average about 30μ in diameter; the inflorescence is autoicous; the innermost perichaetial bracts are deeply divided into four or more, sub-parallel and long-acuminate lobes separated by narrow sinuses; the mouth of the perianth is long-ciliate. Although the lobes of the bracts are sometimes subequal in size, the two median lobes are often longer and broader than the others, so that the lobes might be described as bifid with accessory lobes.

It will at once be seen that the essential characters of *C. Loitlesbergeri* are shared by other members of the group to which it belongs, although they occur in different combinations. In *C. connivens*, for example, the inflorescence is autoicous, the lobes of the bracts are numerous and long-pointed, and the perianth is ciliate at the mouth; in *C. affinis* the inflorescence is autoicous, and the mouth of the perianth is ciliate; in both *C. macrostachya* and *C. catenulata* the perianth is long-ciliate; and in *C. pleniceps* the inflorescence is autoicous. In *C. connivens*, however, the cells are much larger than in *C. Loitlesbergeri*, averaging 50μ or more in diameter; in *C. affinis* the lobes of the bracts are broader and blunter, and the cilia at the mouth of the perianth are shorter; in *C. macrostachya* the inflorescence is dioicous and the bracts are distinctly bifid with shorter lobes; in *C. catenulata* the inflorescence is dioicous, and the shortly bifid bracts are coarsely dentate; in *C. pleniceps* the lobes of the bracts, although sometimes more than two, are broader and acute, rather than acuminate, while the mouth of the perianth is crenulate. In *C. media*, which often grows with *C. Loitlesbergeri*, the inflorescence is dioicous, the bracts are distinctly bifid (although sometimes with supplementary teeth), and the mouth of the perianth is crenulate.

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[1] Census Cat. Brit. Hepat. 26. 1913.

[2] See Evans, Bryologist **17**: 89. 1914.

[3] See Schiffner, Hedwigia **54**: 322. 1914; also Evans, Rhodora **17**: 114. 1915.

As Schiffner has pointed out, however, the closest ally of *C. Loitlesbergeri* is *C. compacta*. In this species the inflorescence is autoicous and the mouth of the perianth long-ciliate, while the size and color of the plant and the size of the leaf-cells are much the same as in *C. Loitlesbergeri*. In *C. compacta*, nevertheless, the lobes of the leaves are acute rather than acuminate, the bracts are distinctly bifid, their divisions are shortly acute instead of being long-acuminate, and the cilia at the mouth of the perianth are shorter.

7. Radula flaccida Lindenb. & Gottsche; G. L. & N. Syn. Hep. 726. 1847.

Collected in March, 1915, on leaves of *Trichomanes sphenoides* Kunze, on Hattie Bauer Hammock, Dade County, Florida, by J. K. Small and C. A. Mosier. New to the United States but widely distributed in tropical North and South America.

In its constantly epiphyllous habit *R. flaccida* is almost unique among the American species of *Radula*. It lies closely appressed to the leaves upon which it grows, its lobes are rounded, its lobules are more or less sharp-pointed and its long, funnel-form perianth narrows very gradually toward the base. The most distinctive organs of the species, however, are its discoid gemmae, which are characterized by their large size and complex structure. Since the development, mature structure, and germination of these gemmae have been fully described and figured by Miss Williston, it will be sufficient here to refer to her paper.[1] Similar gemmae had been described a few weeks earlier in the African *E. epiphylla* Mitt. by Goebel.[2]

8. **Cololejeunea subcristata** sp. nov.

Collected in March, 1915, on leaves of *Tectaria minima* Underw., on Hattie Bauer Hammock, Dade County, Florida, by J. K. Small and C. A. Mosier (No. 5327); also on leaves of *Trichomanes Krausii* Hook. & Grev., on Nixon-Lewis Hammock, Dade County, by the same collectors (No. 6008). No. 5327 may be designated the type.

Plants delicate, pale green, often becoming bleached with age, scattered or growing in small thin patches: stems prostrate, about 0.05 mm. in diameter, irregularly and sometimes rather abundantly branched, the branches widely spreading, essentially like the stem but usually with somewhat smaller leaves: leaves loosely imbricated, obliquely to widely spreading, plane or nearly so, the lobe ovate, often arching partially across the axis dorsally, when well developed 0.4–0.45 mm. long and 0.25–0.3 mm. wide, but often considerably smaller, abruptly narrowed to a broad, acute to rounded apex, margin varying from subentire to vaguely and irregularly crenulate from projecting cells; lobule usually well developed, strongly inflated with an arched keel, ovate, about 0.15 mm. long and 0.09 mm. wide, free margin involute as far as the apical tooth, the latter usually consisting of two cells in a row, the hyaline papilla at the base of the tooth on the inner surface, proximal tooth indistinct, consisting of a rounded

[1] Bull. Torrey Club **39**: 329–336. *f. 1–20.* 1912.
[2] Flora **104**: 156. 1912.

projecting cell separated from the apical tooth by a single cell, sinus shallow and only one or two cells long; cells of lobe averaging about 14μ along the margin and 24 x 22μ in the middle and at the base, slightly convex, trigones small but distinct, sometimes coalescent, triangular, with straight or rounded sides, intermediate thickenings occasionally present, oval; stylus reduced to a hyaline papilla: inflorescence autoicous: ♀ inflorescence borne on a more or less abbreviated branch, innovating on one side, the innovation more or less elongated, usually sterile but sometimes with a second ♀ flower; bracts obliquely spreading, complicate, vaguely crenulate along the keel but not winged, the lobe ovate to obovate, 0.45–0.5 mm. long, 0.25–0.3 mm. wide, rounded to acute, margin as in the leaves, lobule ovate, 0.2–0.3 mm. long, 0.12–0.2 mm. wide, the broad apex varying from acute to rounded, often shortly indented, margin irregularly crenulate; perianth obovoid, about 0.75 mm. long and 0.45 mm. wide, rounded to truncate at the apex with a short but distinct beak, sharply five-keeled, the keels extending below the middle, vaguely and irregularly cristate, the crests sometime double, usually interrupted, rarely more than one cell wide, irregularly crenulate or denticulate from projecting cells, surface of perianth otherwise smooth: ♂ inflorescence (so far as known) terminal on a more or less elongated branch, not proliferating; bracts in three to five pairs, imbricated, similar to the leaves but with smaller lobes and larger lobules, apparently monandrous: capsule about 0.15 mm. in diameter: gemmae broadly orbicular, about 0.04 x 0.035 mm. composed of sixteen cells, each apical quadrant cutting off two segments, margin subentire, organs of attachment not present. [Figs. 5–14.]

The genus *Cololejeunea* is now represented in Florida by six distinct species, while the related genera *Leptocolea* and *Aphanolejeunea* are represented by one species apiece. Since all three genera include species which are exceedingly minute and inconspicuous, it would not be surprising if these numbers were substantially increased in the future. In *C. subcristata* the characteristic features are the following: the ovate leaf-lobes, longer than broad, with the apex varying from acute to rounded; the inflated lobules, with rudimentary proximal teeth; the leaf-cells with distinct trigones but without surface-papillae of any sort; and the five-keeled perianth with rudimentary crests on the keels. The crests are very variable and sometimes scarcely distinguishable; when well developed they are sometimes doubled and may show a width of two cells. This increased width, however, is usually localized and may involve a single cell only, in which case a larger tooth than the ordinary marginal crenulations is present. The gemmae belong to the simplest type known in the genus and are comparable with those found in *C. myriocarpa* (Nees & Mont.) Evans, *C. tuberculata* Evans and the various species of *Aphanolejeunea*.[1] In their lack of marginal projections and organs of attachment they come especially close to the gemmae of *C. myriocarpa*, where, however, the marginal crenulations are much more pronounced.

Among the Florida species of *Cololejeunea*, *C. subcristata* is perhaps most closely related to *C. minutissima* (Sm.) Schiffn, and *C. setiloba* Evans,[2] but in

[1] See Evans, Bull. Torrey Club **38**: 281. 1911; also Bryologist **18**: 68. 1915.

[2] Bryologist **16**: 51. 1913.

both of these species the leaf-cells are somewhat smaller, averaging about 18μ in the middle of the lobe, the walls show no local thickenings whatever, and the gemmae are larger and more complex. *C. minutissima* is further distinguished by its convex, more distant, smaller and relatively broader leaf-lobes, by its larger lobules, and by the distinctly and regularly crenulate margins of its leaves and bracts. In *C. setiloba* the remarkable lobules ,each a long and slender tooth, afford excellent differential characters. The other Florida species would hardly be confused with *C. subcristata*. *C. Biddlecomiae* (Aust.) Evans and *C. tuberculata* are both distinguished by their roughened leaves and perianths, while *C. diaphana* Evans is a much more delicate species with narrower and more pointed leaves, the elongated cells of which are almost or quite destitute of trigones.

9. Leptolejeunea elliptica (Lehm. & Lindenb.) Schiffn.

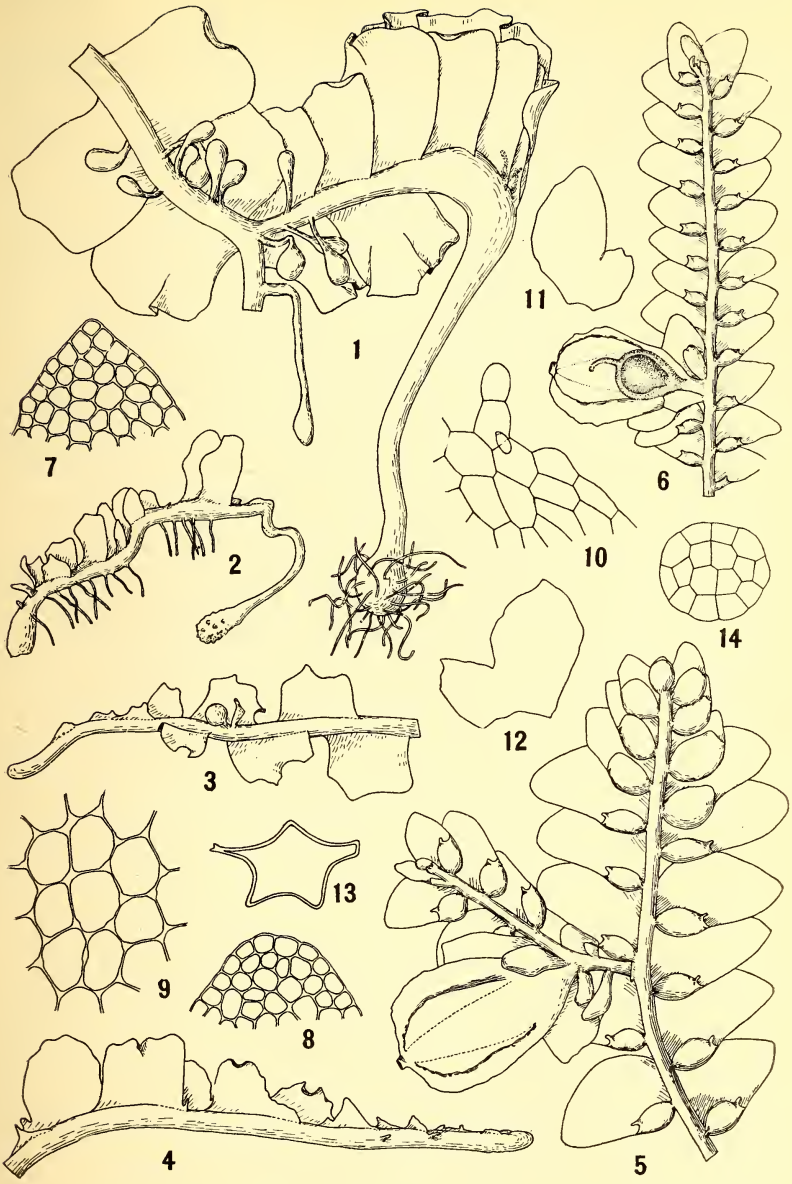
Collected in January, 1916, on the leaves of various plants, on Royal Palm Hammock, Dade County, Florida, by J. K. Small & R. L. Lowe (Nos. 7024, 7036, 7041, 7042); also in February, 1916, at the same locality, by J. K. Small (Nos. 7045–7047, 7050–7058, 7060–7062); also in January, 1916, on Long Key Hammock, by J. K. Small (No. 7063). Genus and species new to the United States. In some of the packets listed the species is abundantly represented, in others traces only are present. Although it is not possible to give a complete list of the plants upon which the *Leptolejeunea* was found, the following partial list may be of interest: *Anacheilium cochleatum* (L.) Hoffmgg. (No. 7045), *Auliza nocturna* (L.) Small (No. 7046), *Calyptranthes Zuzygium* (L.) Sw. (No. 7060), *Chrysobalanus Icaco* L. (Nos. 7041, 7055), *Encyclia tampensis* (Lindb.) Small (No. 7050), *Guettarda scabra* Vent. (No. 7054), *Hippocratea volubilis* L. (No. 7036), *Icacorea paniculata* (Nutt.) Sudw. (No. 7062), *Ilex Krugiana* Loesener (No. 7025), *Laurocerasus myrtifolia* (L.) Britton (No. 7051), *Ocotea Catesbyana* (Michx.) Sarg. (No. 7056), *Psychotria undata* Jacq. (No. 7057), *Schoepfia chrysophylloides* (A. Rich.) Planch. (No. 7058), *Simaruba glauca* DC. (No. 7061), *Spathiger rigida* (Jacq.) Small (No. 7047), *Zamia pumila* L. (No. 7053).

The discovery of this widely distributed tropical species in Florida is of noteworthy. Although almost always epiphyllous in habit, the plants sometimes grow on bark. The blunt leaf-lobes with ocelli in a median row, the distant underleaves with setaceous divisions, the five-keeled perianth with the smooth keels projecting upward as acute or truncate horns, and the specialized caducous branches will serve to characterize the species. For a full description, with figures, reference may be made to an earlier paper of the writer.[1]

10. Leucolejeunea clypeata (Schwein.) Evans.

Collected in April, 1915, at Monticello, Florida, by E. Nelson (No. 1). The species is widely distributed in the eastern United States, but this is apparently the first record for Florida. It represents the fourth species of *Leucolejeunea* and the thirty-eighth member of the Lejeuneae to be definitely reported from

[1] Bull. Torrey Club **29**: 499. *pl. 23, f. 1–7.* 1902.



Fossombronia lamellata Steph. Figs. 1–4.
Cololejeunea subcristata Evans. Figs. 5–14.

the state. In the writer's revision of the Lejeuneae of the United States and Canada,[1] published in 1902, only seventeen Lejeuneae were known from Florida and only twenty-one from the whole United States.

Sheffield Scientific School, Yale University.

Explanation of Plate II

Fossombronia lamellata Steph.

Fig. 1. Part of a robust female plant with a large terminal tuber and numerous small tubers, × 8.

Fig. 2. Small unbranched sterile plant with a terminal tuber, × 14.

Fig. 3. Tip of a male plant with rudimentary leaves, × 14.

Fig. 4. Tip of a sterile plant with rudimentary leaves, × 14.

The figures were all drawn from the specimens collected by Mr. Rapp.

Cololejeunea subcristata Evans

Fig. 5. Part of a plant with a perianth and a male inflorescence, ventral view, × 40.

Fig. 6. Branch with a perianth, ventral view, × 32.

Figs. 7, 8. Apices of lobes, × 200.

Fig. 9. Cells from the middle of a lobe, × 240.

Fig. 10. Apex of a lobule, × 240.

Figs. 11. 12. Bracts from a single inflorescence, × 40.

Fig. 13. Transverse section of a perianth at about the middle, × 40.

Fig. 14. Gemma, × 240.

The figures were all drawn from the type specimen.

BOOK REVIEW

"The Moss Flora of New York City and Vicinity"

By A. J. Grout, Ph. D.

This interesting volume of 119 printed pages and 12 plates of photographic reproductions of some 20 species, is in the announcement designated as an "annotated list." The modesty of the author is the only explanation for this designation; for it is far more. It will serve very well as a true handbook for studying the mosses of the environs of New York City. The descriptions of families and genera, and the excellent keys to genera and species, with many independent and practically tried diagnostic characters, will prove helpful and inspiring to amateurs and even to professional students. In the genus *Sphagnum* only, the author states, the list and key are "frankly a compilation."

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[1] Mem. Torrey Club 8: 113–183. *pl. 16–22.* 1902.

[2] Published by the author, New Dorp, Staten Island, N. Y. Oct., 1916.

Composition, arrangement, use of type, freedom from typographical errors, all are very satisfactory to the critical eye. The devotion of the author, shown by publishing the volume at his personal expense, adds to the feeling of satisfaction: an earnest enthusiastic moss student is behind the work, a man who enjoys the consciousness of doing helpful things for fellow workers.

The book lists 29 species of *Sphagnum*, and some 350 species and varieties of true mosses, under 107 genera. The classification adopted is modern, with a reasonable regard for good sense and convenience. The most impressive feature of the volume, at least to the writer of this brief review, is the wealth of pigmy mosses represented: there are found in the area treated two species of *Andreaea*, two of *Archidium*, two of *Bruchia*, five of *Pleuridium*, two of *Seligeria*, one *Astomum*, one *Pottia*, two of *Nanomitrium*, six of *Ephemerum*, and two of *Acaulon*.

Such a list of minute mosses, in so limited a floral area, is possible only as a result of painstaking, long-continued field study. The author gives credit for the majority of these minute mosses largely to the late C. F. Austin, whose collecting grounds near Closter, N. J., are included in the area treated, modestly adding the results of his own field study for the past fifteen years.

John M. Holzinger.

Winona, Minnesota.

THE NEW YORK MEETING OF THE SULLIVANT MOSS SOCIETY

Edward B. Chamberlain, *Secretary*

According to the announcement sent to all members early in December, the Sullivant Moss Society held its eleventh public meeting at Barnard College, Columbia University, on December 29th, 1916, in connection with the Convocation Week of the American Association for the Advancement of Science. The registered attendance was between forty and fifty. Mention should be made of the noteworthy attendance from Massachusetts, and from among the Philadelphia members, whose coöperation made the work of preparing the meeting much easier. Since a formal programme has already been sent to the members, and as the most of the papers presented will appear in The Bryologist, no attempt is made here to present formal abstracts.

Members began arriving soon after nine o'clock, and from then until the opening session at eleven there was an acquaintanceship meeting that was among the most pleasant features of the day. To our great regret a recent illness prevented the attendance of our President, Mrs. Britton, save in the afternoon, and stopped all active participation in the meeting upon her part. We greatly appreciate her energy and interest in coming so far especially for the one session.

The exhibits were arranged around two sides of the room before the windows, giving an abundance of light for all microscopic purposes, as well as for examining the individual specimens under favorable conditions. Dr. Grout showed slides and preparations of *Camptothecium Woldenii*, recently described by him. This moss, as the label accompanying it announced, came "from the Kansan Drift,

which Dr. Osborn says is 400,000 years old." In spite of this great age, our new friend seemed remarkably well preserved. Miss Alice Kendall brought with her a series of exquisite glycerine mounts of complete moss-plants, showing in full detail the gross and microscopic structure of the various species, as well as permitting microscopic examination. It is certainly a pity that so few of our members could have the opportunity of examining these mounts at first hand. In addition to this, Miss Kendall had a large amount of material from North Greenland, collected in "chunks," as it grew, and dried without pressure, giving a vivid idea of the state in which the plants naturally exist. These latter specimens she most generously distributed at the close of the meeting to all who desired them. Miss Daisy Levy, besides many microscopic slides, had a number of Petri dishes containing growing material of moss-protonema, which had been germinated upon agar. These showed various stages from the spore to the minute buds of the future gametophytes, and served to illustrate her paper later in the morning.

To render more clear the details of his paper upon the lichens of Whatcome County, Washington, Dr. Herre had forwarded various official maps, showing the general relationships of the topography and altitudes, as well as surface conditions. From Mr. Plitt and the Lichen herbarium there were two complete fascicles of the Lichens now in course of distribution from Dr. Hasse's duplicates, and additional material illustrating the original state in which the specimens were received from Dr. Hasse. It was a source of regret to all that an accident at the last moment prevented Mr. Plitt from telling us in person about the collection. A large number of photo-micrographs of mosses or hepatics were shown by Miss Helen Greenwood, and these were eagerly examined by the members, many of whom remembered those shown at Philadelphia two years before. These, and the slides later shown by Dr. Grout, indicate what a wide range of usefulness is open to the camera in rendering accessible and intelligible both the gross and the minute features of mosses and hepatics. In both these cases we regret that the present situation in the paper trade does not permit us to offer illustrations of the photographs to members.

Mrs. Frank Lowe brought to the meeting, at no small trouble, several boxes of "naturally dried mosses." These consisted of turfs of the various species cut out to fit small pasteboard boxes, and then dried without pressure, so as to preserve the natural appearance of the plant as usually seen growing. To the Secretary, this was one of the most interesting exhibits, and, in connection with the material shown by Mrs. Dunham, seemed to open new opportunity for the local museum. The average exhibition specimen of a moss is a sad corpse. Save to an expert, it presents little of interest and is of slight help in determining specimens. These specimens of Mrs. Lowe's actually bring into the museum the characteristic facies of the out-of-door plant, and make amateur study possible without technical description, in the same manner that a well selected series of local birds does. Mrs. Dunham's specimens were of single moss plants, or groups of plants, specially mounted between sheets of celluloid which in turn were fastened to cardboard frames. In this form material can be passed from hand

to hand without injury, and be submitted to close examination. For talks to beginners, we can think of nothing more useful than such a series. Miss Haynes's exhibit was a checklist of North American hepatics, in card-catalogue form, which has formed the basis of the various checklists which have been issued by her and Dr. Evans. A new and revised edition of this is promised for the coming spring.

The formal session for the reading of papers was opened shortly after eleven o'clock. In the absence of the President, Mr. Chamberlain was appointed President, *pro tem.*, and Mr. Kaiser, Secretary for the meeting. The first paper, by Dr. Evans, discussed various species of hepatics that have recently been found in the United States, each being illustrated by lantern slides. Dr. Herre's paper gave a resume of the physical and floral conditions that characterize Whatcome County, Washington, which occupies what may be called "the northern northwest corner of the United States." The paper concluded with a tentative list of 124 species and varieties from the region. The morning session closed with Miss Levy's description of the successful experiments she had made in germinating the spores of various species of mosses upon nutrient agar, as illustrated by the material on exhibition. The meeting then adjourned for luncheon.

At the afternoon session, Mrs. Dunham told of the methods used by her in talking about the common mosses to audiences of school children in connection with museum talks. She spoke especially of the interest taken by the Camp-fire Girls and the Boy Scouts, and by still younger children as well, and of the readiness with which they learn to distinguish many of the commoner species. Dr. M. A. Howe then spoke of the interesting species of the *Ricciaceae* that have recently been discovered in the Southern United States, illustrating his remarks by lantern slides and photographs of living material from the green-houses of the New York Botanical Garden. Dr. Riddle gave a historical summary of the genus *Parmeliopsis*, Nyl., illustrating the talk by sketches, and outlining the difficulty that often exists in determining the precise application of specific and generic names. Miss Lorenz outlined a trip taken to Mr. Katahdin, Maine, during the past summer, and the various collections of hepatics made during that time. This article will be published in the next issue of THE BRYOLOGIST. It is unnecessary to describe, also, Mrs. Smith's historical account of the Society, from the start as a "corner" in the "*Fern Bulletin*" to its present condition. We have all read it. But the Secretary is sure that Mrs. Smith will accept our expression of pleasure that she could meet with us, and our appreciation of all that she has done herself to make the Society possible.

The meeting closed with an exhibition of over fifty lantern slides of mosses, photographed by Dr. Grout, who accompanied the slides with a running comment, and prefaced this by a brief outline of the methods used in obtaining the photographs. This was a most interesting feature of the meeting, and served to bring to all the real atmosphere of outdoors. Adjournment followed at about four o'clock. The Society is indebted to the courtesy of the Botanical Department of Columbia University for the arrangements for the meeting place and for many

conveniences that were placed at the disposal of the local members. For this the Secretary has already made suitable acknowledgment.

18 W. 89TH ST., NEW YORK CITY.

SULLIVANT MOSS SOCIETY NOTES

We clip the following from the Chicago daily papers, and hope later to publish a more extended notice:

"Mr. Ellsworth Jerome Hill died at his home in Chicago, January 22d, last. Mr. Hill was known to thousands of Chicagoans who had been his pupils at the Englewood High School, where he taught physics and natural history. He was ordained a Presbyterian minister fifty-one years ago, but gave up preaching after several years to become a teacher. He was known as an authority on the plant life of the Lake Michigan region. Mr. Hill was born in 1833 in LeRoy, N. Y. He leaves a widow, daughter, and two sons." E. B. C.

MISCELLANEOUS NOTES

Cooked Lichens for Food.—In an article in the Ottawa Naturalist,[1] Tom Wilson writes from Vancouver, British Columbia, concerning a number of wild plants used as food by the Indians of that province. Most of our readers will probably not see the article, hence we quote: "I come now to one of the strangest looking materials for food purposes, namely, the lichens of the dry belt, which hang like old men's beards from all the coniferous trees, *Alectoria jubata* L. The process of preparation was something like this: A large pit was dug in the ground and the inside made as smooth as possible. A fire was then built inside, and the pit thoroughly heated. The ashes were then thrown out and the pit received a lining of damp grass, on which was laid a layer of "moss" (lichen). Another layer of damp grass, then more lichen, and so on till the pit was full. It was then topped off by more grass, and hot stones were laid around and over the whole mass, and it was kept as hot as possible for a day or more, when it was then supposed to be cooked. If not well prepared it was apt to mildew, but I have eaten it a month after cooking and it was quite good." O. E. J.

EXCHANGE DEPARTMENT

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

Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.—*Rhacomitrium patens* (B. & S.) Huebn., *c. fr.* Switzerland, collected by Mr. P. G. M. Rhodes.

Mr. A. J. Beals, 71 West 23rd Street, New York City.—*Fontinalis gigantea* Sulliv. Sterile, collected by Mr. Beal at Hoboken, N. J., early December, 1916.

[1] Wilson, Tom. The Use of Wild Plants as Food by Indians. Ottawa Naturalist **30**: 17–21. May, 1916.

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Conducted and Published for the Society by

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

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

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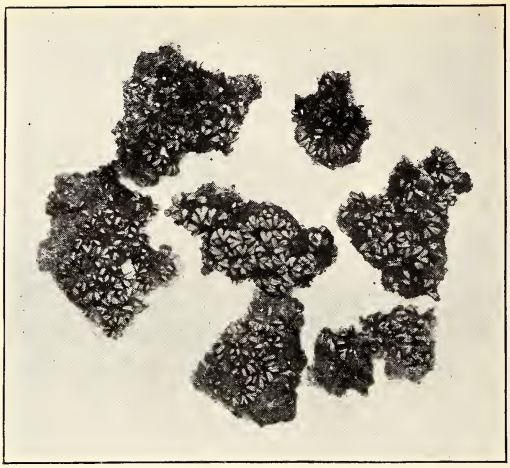
All material for identification should be sent to the respective curators, also all correspondence relating to the Exchange Department.



EXPLANATION OF PLATE III

1. *Riccia violacea* M. A. Howe. Photograph, natural size, of specimens collected on Cayo Muertos, Porto Rico, March 9–12, 1915, by Britton, Cowell and Brown (*no. 5089*). The specimens, still living, though dried for about ten weeks, were soaked out and photographed on May 20, 1915.

2. *Riccia McAllisteri* M. A. Howe. Photograph, natural size, taken in October, 1914, of type specimens grown at The New York Botanical Garden; original from Granite Mt. (about 70 miles northwest of Austin), Texas, collected by F. McAllister (*no. 3*) in May, 1914.

THE BRYOLOGIST

VOL. XX MAY, 1917 NO. 3

NOTES ON NORTH AMERICAN SPECIES OF RICCIA*

MARSHALL A. HOWE

(with plate iii)

RICCIA BEYRICHIANA Hampe and RICCIA LESCURIANA Austin

Riccia Beyrichiana I have discussed briefly on two former occasions,[1] but will here review some of the main points in its history, even at the risk of repeating some of the things that have elsewhere been said about it. The species was originally described in Lehmann's "Pugillus Septimus", published in Hamburg in 1838. The name was attributed to "Hampe Ms". It is probable, however, that the description was written by Lindenberg, whose classical monograph of the Ricciaceae had been published two years earlier, though Lindenberg's name appears only in the preface to Lehmann's work. The plant is said to have been collected in North America, between Jefferson and Gainesville, by a German botanical traveler, Beyrich. From what is known of Beyrich's travels it is evident that the Jefferson and Gainesville in question are in northern Georgia, where towns bearing these names are county seats about twenty miles apart. Until recent years *Riccia Beyrichiana* remained apparently unknown except from the original description. In some critical notes on the American species of *Riccia*, published by Professor Underwood in *The Botanical Gazette* in 1894, *Riccia Beyrichiana* was omitted on the ground that there was no recent evidence that it was a member of our flora. In 1898, however, Stephani, in his Species Hepaticarum[2] stated that he had seen Beyrich's plant, that it was collected in Jefferson, North America, and that it is doubtless a good species. And he gives a new description of it. Three years later, in 1901, I wrote to the Naturhistorisches Hofmuseum in Vienna, where the Lindenberg herbarium is preserved, and secured for study the pocket containing the apparent type of the species. I then published some notes on it, expressing the opinion that the species was a valid one and adding to the previous descriptions a more detailed account of the spores. Three years ago, after the meeting of the American Association for the Advancement of Science and the Botanical Society of America at Atlanta, Georgia, I took advantage of the opportunity to visit Jefferson and Gainesville and some of the intervening territory, with the hope and purpose of rediscover-

[1] Bull. Torrey Club **28**: 161–165. 1901.
Jour. N. Y. Bot. Gard. **15**: 60–63. 1914.

[2] Bull. Herb. Boiss. **6**: 318.

* Abstracted and revised from an illustrated paper presented under a slightly different title before the Sullivant Moss Society at its New York meeting, December 29, 1916.

The March number of the BRYOLOGIST was published March 23, 1917.

ing this long-lost species. I did not find it at just those points, but at Athens, Georgia, in the same general region, I did find what I took to be it and so announced the rediscovery of the species. Since that time, however, I have felt that there were difficulties in the way of distinguishing the Georgian *Riccia Beyrichiana* from *R. Lescuriana*, which was described from New Jersey in 1869 and has since been reported from as far south as Florida, as far west as California, and has been alleged to occur in Europe also.

At the time of examining the original material of *Riccia Beyrichiana*, the thallus seemed to me so much smaller than that of *R. Lescuriana* as I then knew it, while the spores were so much larger and so much more opaque, that it hardly occurred to me that the two were closely related. Stephani, in his somewhat artificial arrangement of the species in his Species Hepaticarum, had placed them fifteen numbers apart. He had, by the way, described the thallus-margins of *R. Lescuriana* (name modified to "*Lesquereuxii*") as naked, although Austin's original diagnosis had stated that they were ciliate, and, on the other hand, he had attributed cilia to the thallus-margins of *R. Beyrichiana*, even though the original description of this species had implied that they were naked. The facts are that the original specimen of *Riccia Beyrichiana* shows a few inconspicuous cilia and authentic specimens of *R. Lescuriana* show more obvious ones. A study of a considerable series of living American specimens referred to *R. Lescuriana* indicates that the thallus-margins normally and usually show a few cilia, but that, as in most ciliate-margined species, the cilia are occasionally wanting or deciduous or are so few and small as to be easily overlooked. In the matter of the size of the thallus it is to be noted that, although the type of *Riccia Beyrichiana* seemed to me a much smaller plant than *R. Lescuriana*, Stephani, who also saw authentic material of *R. Beyrichiana*, makes it out to have at least a longer thallus (max. 10 mm. vs. max. 7 mm.) than does *R. Lescuriana*. In the matter of the size of the spores, one sometimes finds in *Riccia* a good deal of variation in the spores from a single capsule and in spores from different capsules on a single plant. And in this matter of size of spores, specimens of undoubted *Riccia Lescuriana* from Florida and California make a close approach to the type of *R. Beyrichiana* from Georgia. And the same may be said in regard to the opacity of the older spores. More constant and reliable than the size of the spores as a specific character are their surface markings, and in this respect the spores of the type of *R. Beyrichiana* are essentially like those of authentic specimens of *R. Lescuriana*, that is to say, the outer face of the spore is strongly areolate with large meshes, while the inner faces are nearly smooth or are at most only faintly and imperfectly areolate. When all of the supposedly distinctive characters of *Riccia Beyrichiana* and *R. Lescuriana* are compared, in a good series of specimens from various localities, one, I think, is forced to the conclusion that they do not offer a safe and satisfactory basis for specific distinctions. The name of the species then becomes *Riccia Beyrichiana* Hampe, a name that was published thirty one years earlier than *Riccia Lescuriana* Aust. The species evidently has a wide range in North America. Its most northeastern station, so far as now known, is at Northampton, Massachusetts, where it has

been found by Miss Annie Lorenz, who, by the way, states that at West Hartford, Connecticut, plants of this species persisted alive through the unusually severe winter of 1914 and that the species is apparently a perennial. Besides Massachusetts, Connecticut, New Jersey, and Georgia, the species has been found also in Illinois, Florida, Texas, Colorado, California, and Alberta (Brinkman). Under the name *Riccia Lescuriana* several European hepaticologists have attributed the species to Europe also, and as is the case with several other species in this genus, it seems impossible to separate some of the European material from the American. However, some of the non-ciliated European specimens that have been referred to *R. Lescuriana* seem to be more closely related to *Riccia glauca* or *R. bifurca* than to this species.

Riccia McAllisteri sp. nov.

Thallus 2 or 3 times rather divergently forking, often forming densely gregarious more or less radiating masses, bright green when living, often whitish- or yellowish-green with age or on drying, violet-purple or sometimes decolorate at margins and on sides, regularly reticulate above, 5–8 mm. long, the main segments oblong or oblong-obovate, 1.5–2.5 mm. wide, the terminal segments ovate, subquadrate, or somewhat obcordate, rounded-obtuse or subacute; median sulcus acute and sharply defined in anterior parts, becoming obscure in the posterior; ventral scales entire, reddish violet, claret-colored, or sometimes decolorate, imbricate, slightly exceeding the acute ascending margins, the extreme margin hyaline or violet and unistratose for a width of one or two cells; transverse sections of the thallus mostly 2–3 times broader than high, the ventral outlines rounded-convex or occasionally somewhat flattened; dorsal epidermis of two (or three) layers of cells, the cells of the primary stratum mostly mammiform-apiculate, soon collapsing and leaving rather inconspicuous, or sometimes cup-like vestiges, the cells of the secondary superficial stratum mostly 26–78μ broad, these and underlying cells in very distinct and regular rows when viewed from above; monoicous; antheridial ostioles elevated 50–160μ, often violet; capsules usually numerous, soon exposed, the spores lying conglobate in long masses at the bottom of a deep widely open pit or trough; spores at first violet or violet-brown, soon violet-black and opaque, 96–132μ in maximum diameter, ellipsoid, ovoid, subspheric, or obscurely tetrahedral, wholly destitute of wing-margins, at first almost uniformly areolate over the whole surface, the areolae mostly 7–15μ in diameter, soon obscure, and the spores finally appearing densely echinulate, the spinulae 5–11μ long, truncate or obtuse, or occasionally subacute, sometimes cristate-furcate.

On moist ground near standing water in quarry-holes, Granite Mountain (about 70 miles northwest of Austin), Texas, *Dr. F. McAllister*, May, 1914. The technical type specimens were grown in the Propagating House of the New York Botanical Garden, whence they were collected and placed in the herbarium of that institution on December 8, 1914.

Plants that are doubtless to be referred to this species have been collected also at Glencoe, Missouri, by Dr. N. L. T. Nelson (in herb. A. W. Evans), though its spores are rather more obviously reticulate and less strikingly echinulate than those of the Texan type.

Riccia McAllisteri is related to *R. dictyospora* M. A. Howe, originally described from Athens, Georgia, yet appears to be specifically distinct, differing in the less elongate, less linear, less conspicuously marginate, more freely fork-

ing thallus, with less acute apices and rather more pronounced anterior sulcus, in the red-violet instead of black-purple scales, in the apparent absence of special "oil-body" cells, in the more elevated antheridial ostioles (50–160μ vs. 0–50μ), in the more apiculate and more persistent cells of the primary epidermis, in the usually larger (mostly 1½ diameters) cells of the secondary epidermis, in the more regularly seriate arrangement of these and the subjacent cells when viewed from above, in the violet-black and soon opaque instead of brown and rather translucent spores; and the spores of *R. McAllisteri*, except in the younger stages, impress one as echinulate rather than areolate; short spines or papillae are finally developed in *R. dictyospora*, but they rarely reach a length of 5μ.

Riccia violacea M. A. Howe, Ann. Missouri Bot. Gard. **2**: 51. 1915.

Since the type of *Riccia violacea* was collected on Mona Island, between Porto Rico and Santo Domingo, in 1914, by Britton, Cowell and Hess, the species has been found by Dr. Britton and associates in two more Porto Rican localities, namely, Salinas de Guanica (*Britton, Cowell, & Brown, 4919*) and Cayo Muertos (*Britton, Cowell, & Brown, 5089*). And what appears to be the same thing from the Bay of Mariel, Province of Pinar del Rio, Cuba, where it was collected by N. L. Britton and F. S. Earle, Sept. 21, 1910 (*no. 7594*), has been discovered among the undetermined West Indian Hepaticae in the collections of the New York Botanical Garden. The species is, accordingly, now known from four stations, representing four West Indian Islands, if two small "Keys" are counted as islands. As the plants are very small (1.5–4.0 mm. long and 0.6–1.15 mm. wide) and easily overlooked, it now seems reasonable to suppose that critical field work might show the species to be widely distributed in the West Indian region. The new material permits the addition of certain characters that were unknown at the time of publishing the original description. Few well-developed archegonia and few spores have been seen, but it seems nearly certain that the species is dioicous; at least, numerous plants have been seen that appear to bear antheridia only, while most of the Cuban material appears to bear abortive or unfertilized archegonia only. The antheridial ostioles are elevated 20–150μ and are often violet. The spores, seen sparingly in the Salinas de Guanica specimen after cultivation at the New York Botanical Garden, are soon fuscous and very opaque, 80–105μ in maximum diameter, obscurely angled or flattened-sphaeroid, destitute of wing-margins, finely, irregularly, and almost uniformly areolate over the whole surface, the areolae 7–11μ wide, soon very obscure and the spores appearing minutely and densely verruculose, the verruculae obtuse or truncate, 2–4μ high.

In studies of the terrestrial *Ricciae*, it is of great advantage to have access to living material, and it is especially illuminating to have closely related species and forms growing side by side as has been done for two years or more in the Propagating House of the New York Botanical Garden. I am greatly indebted to readers of The Bryologist for kindly supplying living material of various species and I would earnestly solicit a continuance of these favors during the coming season.

The New York Botanical Garden,
Bronx Park, New York City

MOSS NOTES. I

A. J. Grout

Recently it was my good fortune to obtain the first ten volumes of the *Bulletin of The Torrey Botanical Club* complete. I read the first numbers with as much interest as a school girl reads a love story.

Vol. 1, No. 1, N. Y., Jan., 1870, begins: "The object of this bulletin is primarily to form a medium of communication for all those interested in the Flora of this vicinity, and thus to bring together and fan into a flame the sparks of botanical enthusiasm, at present too much isolated."

Reading Mrs. Smith's account of the early history of The Bryologist led me to draw comparisons and to ask questions. Why is it that the *Torrey Bulletin* and the *Botanical Gazette* that started out to help and encourage the amateur have so far changed their nature? And why is it that The Bryologist seems to be traveling along the same road?

There are several obvious reasons, but my point is this: The Bryologist was founded to bring together and encourage large numbers of amateur observers all over our country, so that they might find enjoyment for themselves and furnish to scientists and to each other data that would enable some one to write a really comprehensive manual of our moss flora. Several times contributions have been solicited, contributions of short and interesting observations by any and every Society member.

Personally I have felt that it was time for some one else to speak. Others have spoken to be sure, but we have not received the amount of material of this sort that we should have, so this series of articles has been started to give to our Society members something of the kind originally planned. Suggestion as well as statement of fact is a part of the plan.

Buxbaumia indusiata Brid. is one of the rare mosses that I have never collected and which others must have overlooked. Miss Lorenz found it at Willoughby. Prof. Peck collected it near Haines Falls, N. Y., "Probably in the swampy lowlands between Haines Falls and Tannersville."

Prof. E. J. Durand collected it in Enfield Ravine, Ithaca, N. Y. Specimens of this collection were photographed for the present article. According to Mrs. Britton in *The Observer* for March, 1896, it has also been collected at Horseshoe Pond in the Adirondacks; near Syracuse, N. Y.; also in Nova Scotia, Idaho, Montana, Washington, British Columbia, and in the White Mountains by Oakes. The plants always grow on decayed wood; one collector says birch, another says that the wood was coniferous and that they grew associated with *Georgia pellucida*.

Judging by the published notes and available illustrations, the species are not easily distinguishable without careful study, but if the plants photographed are typical, and there is no reason to think otherwise, one can distinguish *B. indusiata* at first sight. I wish I might get fresh specimens to photograph. *B. aphylla* grows on soil, is dark colored, as near a chestnut as anything, flattened with a thickened ridge between the upper and the lower surfaces; spores 5–8μ, maturing late autumn to spring. *B. indusiata* grows on decaying wood, is a

much lighter red-brown, almost tawny, is not noticeably flattened or ridged; spores two to three times as large as in *aphylla*, maturing spring to autumn.

Let us all watch rotten logs in cool moist places and if we are successful in finding this shy "Humpbacked Elf" take full notes for Dr. Jennings.

Curtis High School,
New Brighton, N. Y. City

Buxbaumia × 9. *B. aphylla* (left) and *B. indusiata* (right). From herbarium specimens

ELLSWORTH JEROME HILL

Albert E. Hill

Ellsworth Jerome Hill was born December 1, 1833, in LeRoy, New York, a prosperous and charming town in the rich valley of the Genesee. His father, a thrifty farmer, sprang from English stock that emigrated to Guilford, Connecticut, in the middle of the seventeenth century. His mother was descended on the maternal side from the Dutch of the Mohawk and Hudson River valleys.

His early education was for the most part of the primitive country-school sort. From the age of four to twelve he went, summer and winter, to a cross-roads school. Afterwards, when his help was needed on the farm in summer, his attendance was limited to the winter term. Three winters in the academy at Le Roy, in which he began the classics and took up such other studies as would be of help in teaching, completed his formal preparatory work. There was, however, another kind of education he pursued with increasing fervor almost from childhood to the end of his life—the education derived from the constant and thorough reading of good books. As a young man he became convinced, in his own words, "that where one had gone before it was possible for another to follow, with or without a teacher, if every step was mastered as one went along." No man was ever more faithful than he in mastering each step, or more thoroughly in command, as he was till his last hour, of the wide range of facts that his reading covered.

What seemed at the time a fatal handicap came to him when he was twenty. For a year he was almost helpless from an affection of the knee. Yet there was an element of good fortune in his affliction, since it led him to the study that later became his passion. To get out of doors he began, on the advice of his physician and with the aid of Wood's text-book, the study of Botany. Crawling painfully on crutches to the edge of the orchard he secured a few flowers and these he succeeded in identifying. When next year he went to Mississippi to escape the rigor of a northern winter, he pursued the study as constantly as his preparatory teaching of boys and girls would permit. A camp stool strapped on his back, for use when he must rest, and with two canes to support his weak steps, he would make such excursions as he could to the woods and fields in search of specimens. These he classified with a high degree of accuracy, considering the meagerness of the available material on the subject.

After three years in Mississippi he returned to Le Roy where he continued to prepare himself for college and to study Botany. In 1860 he entered Union Theological Seminary in New York City from which he graduated in 1863.

From 1863 to 1869 he was a pastor of the Presbyterian church in the district of eastern Illinois. A return of his old trouble, this time affecting his hip-joint, compelled him to lay aside his pastoral work. He never actively resumed it, though he continued to be a member of the Chicago Presbytery for the rest of his life.

These were hard days. But for the courage and helpfulness of his wife to support his own determination to achieve something of worth it is difficult to see how he could have survived the trial. He returned to teaching when his

strength was barely enough to sustain existence. From 1870 to 1874 he taught the languages, botany, and geology in the high school of Kankakee, Illinois. While he was still lame he went to Minnesota for a few months, broken in health, but unshaken in purpose. Again his wife's help saved the day for his botanical studies. She gathered the plants that he had not the strength to hunt, while he wrote out their descriptions, there being no books at hand by which to identify them. In every way, as she did throughout the years that followed, she gave richly of her strength and encouragement that he might succeed.

Though it was years before he fully regained his health he was never troubled with another attack of lameness. By the exercise of the utmost care he slowly regained strength. He moved to Chicago in 1874. From this date to 1888 he taught physics and the natural sciences in the high school at Englewood, now a part of the great city. On holidays in the spring and fall he still further built up his strength and added to his knowledge of his favorite subject by making botanical excursions to the country within reach The summer vacations he spent, when he could, in extended trips to places farther away, chiefly to the regions bordering on the Great Lakes.

In 1888 he abandoned teaching as a profession. Having inherited some property from his father he was able, by careful management, to spend most of his time in the intensive study of his chosen science. Until three or four years ago he continued to make short trips to gather specimens and study the conditions of the plants in which he was most interested. It was a sad day for him when he discovered that his expeditions must be given up. His work in his own study, however, he never abandoned. Even so late as the fall of 1916 he prepared an article for the press.

A severe attack of pneumonia in the spring of 1915, from which his indomitable will rescued him, left him weakened. After that he hardly left the house. In fact, for more than a year previous to his death he did not stir abroad. The last year he had not the strength to go down stairs. Yet daily he was dressed and sat in his easy chair beside his writing table. He kept track of world events to the last. His mind remained as clear as it had been in his youth, as firmly in command of its great store of knowledge. Death came to him gently on January 22, 1917.

It does not often happen in these days that a scientist is also a man of wide learning in the humanities. Ellsworth Jerome Hill was one of these few men. He maintained to the end his hold on Hebrew and the Latin and Greek classics. He had a good knowledge of French and German literature as well as that of his own tongue. He kept thoroughly posted on the political, religious, philosophical and social movements of his time. And, naturally, he knew much of the other sciences besides botany, in particular of geology, into which at one time he had gone rather deeply. As he gave freely of his means to charity, so he gave generously of his knowledge to the many that came to him for help.

University of Nevada,
Reno, Nevada

LIST OF WRITINGS ON BRYOPHYTES BY REV. E. J. HILL*

AGNES CHASE

1. *Fissidens grandifrons*, its Habits and Propagation. BRYOLOGIST **5**: 56. 1902.
2. Branched Paraphyses of *Bryum roseum*. BRYOLOGIST **6**: 80. 1903.
3. *Encalypta procera* Bruch. BRYOLOGIST **8**: 107. 1905.
4. The Validity of some Species of *Fissidens*. BRYOLOGIST **10**: 67. 1907.
5. Note on *Amblystegium noterophilum*. BRYOLOGIST **12**: 108. 1909.
6. Charles R. Barnes and Julius Röll's Collection of Mosses in North America. BRYOLOGIST **13**: 105. 1910.
7. Notes on *Lepidozia setacea*. BRYOLOGIST **15**: 44. 1912.
8. The Annulus of *Tortella caespitosa*. BRYOLOGIST **16**: 17. 1913.
9. Notes on the Distribution of *Polytrichum strictum* and some associated Sphagna. BRYOLOGIST **17**: 63. 1914.
10. *Fontinalis Umbachii* Cardot. BRYOLOGIST **18**: 10. 1915.
11. Notes on *Funaria*. BRYOLOGIST **19**: 35. 1916.
12. *Fossombronia crispula* in the Dune Region of Indiana. BRYOLOGIST **19**: 67. 1916.

WASHINGTON, D. C.

NOTES ON THE HEPATICAE OF MT. KTAADN

ANNIE LORENZ

Mt. Ktaadn's *massif* was fairly well explored for mosses by Messrs. Kennedy and Collins during their expedition of July, 1900. For the extremely interesting illustrated account of this expedition the reader is referred to *Rhodora* for June, 1901. It was this report which first aroused the writer's desire to visit the mountain, and the opportunity offered by the Appalachian Mountain Club's 1916 August Camp was too providential to be lost.

Our camp was on the north shore of Chimney Pond, a few rods back from the beach. The cliffs towered above us for over 2000 ft., to the Cairn on the summit of West Monument Peak, an impressive and awe-inspiring spectacle. During the whole trip, a well-thumbed copy of that *Rhodora* enabled us to follow the various activities of the Kennedy party. Camp Kennedy, close to our camp, was practically in ruins, and helped to heat our cooking-fires, but it was most entertaining to find everything just as it had been described.

It was also interesting to note the differences caused by the season, as they were there early in July when the water was high; in late August the "bog around the edge of the pond" was practically dry, with a beach of loose stones and boulders all the way around. The "brook by the camp" was also a delusion. They had rain every day, we had no regular rainy day, and

*For a complete list of botanical papers written by Rev. E. J. Hill, 162 titles, see an article by Miss Chase in *Rhodora* **19**: 61–69. April, 1917.

only once was any party soaked bya shower. The weather for the first few days was excessively hot and smoky, and everything around the camp was so dry that the fire committee said that we were living in a powder-keg, and issued strict rules about the use of fire in the camp.

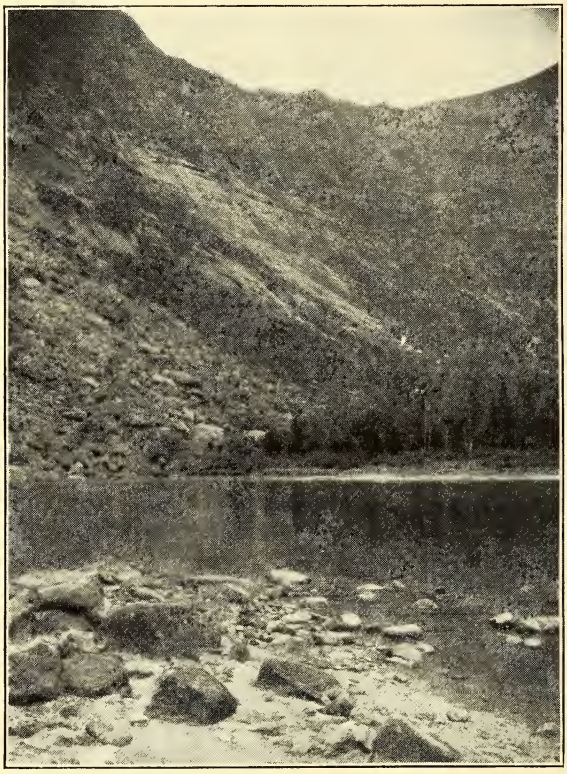


Fig. 1.—Chimney Pond from the Appalachian Mountain Club camp. Photo by Mr. Parker B. Field.

Chimney Pond was the only water-supply, and the farthest corner was assigned as a bathing and laundry place, and the water thereof was aptly described by Judge Churchill as "alpine." Camp was run on a daylight-saving schedule, breakfast being at 6, lunch at 11, dinner at 5. Darkness by 7, and bed very shortly thereafter.

The writer served as camp botanist, and while not paying sufficient attention to the flowering plants to collect any properly, only bringing out a small bale of hay, without pressing, managed to check off at least half of those on Mr. Fernald's list. Hepaticae received the most attention, and the mosses some slight amount, and this often hastily, as there was little time for collecting with a large party, while en route. Chimney Pond had the most careful exploration at odd times about the camp, and yielded the majority of the novelties.

The writer did no collecting on the first day's trip in as far as Cushman's Camp, on beautiful Ktaadn Lake. On the way up to Camp, however, the next day, one crossing of Ktaadn Brook was full of fine *Jungermannia cordifolia* Hook. On examining the pond shore near the camp, the most conspicuous species were

Pellia epiphylla (L.) Corda, and a large and luxuriant *Fossombronia*, without mature capsules, probably *foveolata*, *Marsupella emarginata* (Ehrh.) Dum., all sizes, *Nardia Geoscyphus* (De Not.) Lindb., new to Maine, in the peaty corners of the sedge tufts, mixed with *Lophozia inflata* (Huds.) Howe, and *L. alpestris* (Schleich.) Evans. This latter was collected new to Maine by Mr. Collins in 1900 because he could not help it, being as it is the dominant *Lophozia* of the region, and occurring in 57 varieties.

A preliminary circuit of the pond produced *L. Kunzeana* (Hüben.) Evans, also new to Maine, on the big boulder-talus at the southeastern end of the pond, also *Diplophylleia taxifolia* (Wahl.) Trev., *Lophozia Hatcheri* (Evans) Steph., *L. lycopodioides* (Wahl.) Cogn., *Rhytidium rugosum* (Ehrh.) Kindb. This latter was the only moss noted by the writer which was not on Dr. Kennedy's list.

On the peat among the cranberries along the camp side of the pond was more *L. Kunzeana* (Hüben) Evans, this habitat, on *Sphagnum*, being its usual one in the White Mts. Nearby, on the edges of the peat and pond, were *Marsupella ustulata* (Hüben.) Spruce, and *Cephaloziella Starkei* (Funck.) Schiffn., this latter also new to Maine.

Along the southwestern shore was first, plenty of *L. confertifolia* Schiffn. on small boulders at the edge of the woods. Further on, one was curiously reminded of Lower Greeley Pond, Waterville, N. H., with its pebbly peaty shore supporting a mixed turf of *Marsupella emarginata* (Ehrh.) Dum., *M. Sullivantii* (De Not.) Evans, *Nardia obovata* (Nees.) Carringt., *Lophozia alpestris* (Schleich.) Evans, *L. inflata* (Huds.) Howe, *Odontoschisma elongatum* (Lindb.) Evans, *Scapania dentata* Dum., *S. subalpina* (Nees.) Dum., etc. A delightful little beach bore above highwater mark a garden of hare bells, *Aster Radula* Ait., alpine *Solidago*, and *Arenaria groenlandica* Spreng., with alpine grasses and sedges. The ground beneath was covered with a mixture of *Cephaloziella Starkei* (Funck.) Schiffn., *Cephalozia bicuspidata* (L.) Dum., 3 species of *Marsupella*, small tufts of *Scapania subalpina* (Nees.) Dum., *S. dentata* Dum., *S. irrigua* (Nees.) Dum., and even an occasional tumbledown bit of *Gymnomitrium concinnatum* (Lightf.) Corda. from the heights above. *Marsupellae* were in assorted sizes; some of the *Sullivantii* was almost robust enough for *sphacelata*, but was on the beach and not in the water.

Following up the dry brook at the southwest corner of the pond were more *Marsupellae*, *Nardia obovata*, *Dicranum longifolium* Ehrh., *Andreaea petrophila* Ehrh., and a few bits of *Frullania Oakesiana* Aust. on the larger birches. Our first official expedition was up this brook via the slide to the mouth of the Chimney, which contained a rivulet, but nothing particularly exciting in the way of hepatics.

Our usual route up the mountain, taking about an hour and a half from camp on to the Tableland, was via a slide just south of the Saddle Slide used by the Kennedy party, as that was too much overgrown. A cold spring near the top of this slide was the only water-supply on the mountain (barring the Abol spring) except certain dubious rain-pools in the rocks. The Tableland itself (about 4300 ft.) is very dry and barren, with a markedly acid-soil flora. *Dia-*

pensia, Salix Uva-ursi Pursh, *Vaccinium uliginosum* L., *Rhododendron lapponicum* Wahl., *V. Vitis-Idaea* L., *Lycopodium Selago* L., *L. annotinum* L., var. *pungens, Ptilidium ciliare* (L.) Nees., *Rhacomitrium lanuginosum* (Hedw.) Brid., *Ptilium Crista-castrensis* (L.) De Not., *Hypnum Schreberi* Willd., with balsam scrub, comprised the flora at first glance. "Our little Labrador" some one called it. The caribou have all moved further north; of the herd of 80 formerly inhabiting the tableland, the last one was seen there in 1908.

The whole top of the mountain is much more barren than the Presidential Range at similar altitudes, in fact, it more resembles the cone of Washington. There are very few little damp *Sphagnum* holes, or permanent rivulets, like those at the head of Tuckerman's. The west side of West Monument Peak has little glades full of vegetation, but nothing as good as the Alpine Garden.

Once on the Tableland, the peaks were a mere amble. The writer made four ascents, which was about the average. The hepaticae up above were mainly *Gymnomitrium concinnatum* (Lightf.) Corda., *G. corallioides* Nees, new to Maine (only one bit collected), *Temnoma setiforme* (Ehrh.) Howe, *Lophozia attenuata* (Mart.) Dum., *L. Hatcheri* (Evans) St., *L. lycopodioides* (Wallr.) Cogn., largely *var. obliqua* K. M., *L. Kunzeana* (Hüben.) Evans, *Cephalozia bicuspidata* (L.) Dum., *Diplophylleia taxifolia* (Wahl.) Trev.

FIG. 2.—Pomola and Chimney Pond (lower left-hand corner) from top of Saddle Slide. Photo by Mr. W. H. Dawson.

Of the mosses, besides those mentioned above, there occurred *Dicranum elongatum* Schwaegr., *Grimmia Doniana* Sm., *Conostomum boreale* Swz., *Poly-*

trichum strictum Banks. There was on the Tableland no bare peaty ground like that along the Carriage Road and about the Lakes of the Clouds.

The party went over to the North Basin one afternoon, but penetrated only as far as the pond across its mouth, as the clouds were down to the floor of the Basin. It was primarily a blueberrying expedition, as we had to cross a big brûlée, or dri-ki, as they are called up there, which had been made since the Kennedy expedition. All through this the ground was carpeted with *Cephaloziella bifida* (Schreb.) Schiffn., new to Maine. The pond was very low, surrounded by scrub and very poor hepatic pickings, only a few bits of *Plagiochila*, *Scapania*, etc. So the writer had not the opportunity of examining the head-wall of the Basin, which was recommended by the Kennedy party as affording some of the best collecting in the region.

One of the most attractive of the many places upon which the writer would have liked to have spent more time was the long steep eastern slope of Pomola, as all the plants thereon looked less stunted and more luxuriant than those upon the Tableland.

The knife-edge, from Pomola to West Monument Peak, while extremely entertaining, was as dry as the brick wall it much resembles in places. The upper 700 ft. of the mountain, from above the grey granite of the Tableland, are of a pink granite like that of Chocorua. It is fairly covered with small crustose lichens, one black, and one "greenery-yallery." This latter is *Buellia geographica* (L.) Th. Fr., a species confined to granite rocks, and equally abundant upon Mt. Washington. The color effect of the rocks is consequently grey, except when close to them.

At the top of the Chimney was a little more vegetation, including some good *Rhytidium rugosum* (Ehrh.) Kindb.

From the summit we had observed a small pond in the South Basin, northwest of Chimney Pod, and some of the men started a trail thereto. As the trail reached there only eventually, it was christened Lost Pond, and proved to be a most attractive little place, with a new and striking view of the great cliffs. Here again the water was low, with peaty banks, with a fine mixture of *L. longiflora* (Nees) Schiffn., *L. Kunzeana* (Hüben.) Evans, *L. inflata* (Huds.) Howe, *Mylia anomala* (Hook.) S. F. G., *Cephalozia bicuspidata* (L.) Dum., *C. Francisci* (Hook.) Spruce, &c. This was our last official expedition, as camp broke up on August 31, and we left Staceyville on the sleeper September 2.

Mr. Collins's sketch-map in the old *Rhodora* was the most accurate that we had in camp. He had not, however, indicated the two great basins on the west side of the mountain, known as Klondike and Northwest, owing to lack of clear views while he was on Ktaadn.

In a cold brook not far below the Pomola trail was much excellent *Scapania dentata* var. *speciosa* (Nees) K. M. A little farther down, above Depot Pond, was an old bog, of perhaps an acre, full of *Mylia anomala*, *Lophozia marchica* (Nees) St., *Lepidozia setacea* (Web.) Mitt., *Cephalozia macrostachya* Kaal., *C. fluitans* (Nees) Spruce, besides many attractive sedges. In the buck-board road at Dacey's Dam were a few bits of *Ricciella Sullivantii* (Aust.) Evans,

besides much *Anthoceros laevis* L. Along the wet clayey road between Lunkasoo and Staceyville there were unlimited quantities of *A. Macounii* Howe.

Of former additions to the Maine hepatic list first collected on Ktaadn., E. D. Merrill, in 1898, got *Scapania convexula*, described as new by Müller.*

Mr. Collins, in 1900, found *Gymnomitrium concinnatum* (Lightf.) Corda, *Nardia obovata* (Nees) Carringt., *Lophozia barbata* (Schmid.) Dum., *L. lycopodioides* (Wallr.) Cogn. (new to New England), *L. alpestris* (Schleich.) Evans, and *Scapania umbrosa* (Schrad.) Dum.

The Cowles party, in 1902, working in the North-West Basin, acquired *Marsupella aquatica* (Lindenb.) Schiffn., *Lophozia confertifolia* Schiffn., (new to North America) and *Ptilidium pulcherrimum* (Web.) Hampe.

Dr. Evans, in 1908, in an ascent via the Abol Slide, collected *Marsupella ustulata* (Hüben.) Spruce, and *Lophozia bicrenata* (Schmid.) Dum.

The writer, in 1916, added *Gymnomitrium corallioides* Nees, *Nardia Geoscyphus* (De Not.) Lindb., *Lophozia Kunzeana* (Hüben.) Evans, *Cephaloziella bifida* (Schreb.) Schiffn. and *C. Starkei* (Funck) Schiffn.

Some notes on the species either lacking, or overlooked, may be of interest. The writer collected all the hepaticae on Mr. Collins's list, with the exception of *Scapania umbrosa* (Schrad.) Dum. Of the two closely related *Sphenolobi*, everything collected was *exsectaeformis* (Breidl.) Steph. No *Lophozia longidens* (Lindb.) Macoun was noted, and no *Scapania nemorosa* (L.) Dum.

Marchantiaceae were entirely lacking until well down the trail, and then mainly *Conocephalum*. *Lophozia lycopodioides* (Wallr.) Cogn., while abundant and typical about the camp, was inclined to be var. *obliqua* K. M., up above. *Cephaloziella* species were less numerous than in the White Mts. No *Porella* or *Radula* was collected by the writer.

A more leisurely survey of the mountain is necessary than that which the writer was enabled to bestow upon it during her ten-days' stay, but it would undoubtedly yield many species, including some more denizens of a distinctly arctic character, besides those already upon our list.

The attention of collectors is called to this mountain, a New England—No! a National asset, as yet unrealized by the majority of our fellow-citizens—Ktaadn the Magnificent! far to the north of Boston!

HARTFORD, CONNECTICUT,
DECEMBER, 1916

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* A quantity of Mr. Merrill's bryophytes, presumably from the same expedition, now in the hands of Dr. Riddle, may prove to contain some of the additional species listed below, in which case they will antedate these records.

MUSCI NOVI PARAGUENSES*

Descripsit

V. F. Brotherus

Porotrichum cavifolium Broth. sp. n. Dioicum; robustiusculum, viride, aetate lutescenti-viride, nitidiusculum; caulis primarius elongatus, caules secundarii inter se remoti, usque ad 5 cm. longi, brevistipitati, densiuscule foliosi, dense pinnatim ramosi ramis patentibus, infimis usque ad 2 cm. longi, dein descrescentibus, vix complanatis, subpinnatim ramulosis vel simplicibus; folia concavo, stipitis erecto-patentia accrescentia, caulina patentia, oblongo-ligulata, obtusissima, apiculata, superne argute et inaequaliter serrata, nervo longe infra apicem folii evanido, cellulis superioribus hexagono-rhombeis, dein sensim longioribus, alaribus sat numerosis, ovalibus, minutis, ramea conformia, sed minora. Caetera ignota.

Paraguay, sine loco designato (Alfred Russell Wallace, in Herb. Mitten).

Species ob folia concavo speciebus nonnullus americanis *Porotrichodendri*, ex. gr. *P. superbo* similis, sed foliis obtusissimis, superne argute et inaequaliter serratis, cellulis superioribus laxioribus facillime dignoscenda.

Porothamnium parvirete Broth. sp. n. Dioicum; gracile, viride, vix nitidiusculum; caulis primarius elongatus, caules secundarii inter se remoti, usque ad 5 cm. longi, brevistipitati, densiuscula foliosi, obtusi, raro flagelliformi-attenuati, dense pinnatim ramosi, ramis patentibus, usque ad cm. longis, complanatis, subpinnatim ramulosis vel simplicibus; folio stipitis destructa, caulina sicca indistincte plicatula, humida patentia oblongo-ligulata, obtusissima apiculata, margine inferiore inflexo, superne argute et inaequaliter serrata, nervo longe infra apicem folii evanido, cellulis superioribus minutis, rhombeis, dein sensim longioribus, oblongo-hexagonis, basilaribus linearibus, apice papillose exstante, ramea conformia, sed minora. Caetera ignota.

Paraguay, sine loco designato (Herb. Mitten).

Species *P. porrectulo* (C. Müll.) habitu simillima, sed ab hac ut etiam a caeteris speciebus generi cellulis folii superioribus minutis dignoscenda.

LICHENS OF THE MT. MONADNOCK REGION, N. H.—No. 8†

Thomas Durfee

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

Genus: Lecanora

Section: Aspicilia

141. *Lecanora calcarea* (L.) Sommerf. Two specimens, both fertile.

142. *L. cinerea* Ach. Eleven specimens, all fertile.

143. *L. laevata* (Ach.) Nyl. Two specimens, both fertile.

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* These mosses were sent to Dr. Brotherus to be determined because the collections at the New York Botanical Gardens are not particularly rich in mosses from Paraguay, and there are over 30 species of the genus from S. A. described by various authors, principally Hampe and C. Müller, which were lacking in Mitten's Herbarium. Specimens of *P. cavifolium* Broth. n. sp. were probably sent to Alfred Russell Wallace with orchids, as it was his custom to send to his father-in-law, William Mitten, all mosses received in this way.

E. G. Britton,
New York Botanical Garden

* No. 7 of this series appeared in the Bryologist **19**: 65–66. July, 1916.

144. *L. gibbosa* (Ach.) Nyl. One specimen, fertile.

Section: Eulecanora

145. *L. subfusca* (L.) Ach. Thirty-one specimens, all fertile.
146. *L. subfusca* var. *distans* (Ach.) Nyl. Seven specimens, all fertile.
147. *L. coilocarpa* Ach. Nine specimens, all fertile.
148. *L. varia* (Hoffm.) Ach. Nine fertile specimens.
149. *L. varia* var. *saepincola* (Ach.) Nyl. Six specimens, all fertile.
150. *L. varia* var. *symmicta* Ach. One specimen, fertile.
151. *L. albella* (Pers.) Ach. Twelve fertile specimens.
152. *L. albella* var. *canoriformis* (Hoffm.) Herre. One fertile specimen.
153. *L. Willeyi* Tuck. One fertile specimen.
154. *L. Hageni* Ach. One specimen, fertile.

Section: Placodium

155. *L. rubina* (DC) Ach. Three fertile specimens.
156. *L. muralis* (Schreb.) Tuck. Four specimens, all fertile.

Genus: Ochrolechia

157. *Ochrolechia pallescens* (L.) Mass. Nine specimens, all fertile.
158. **O.pallescens** var. **rosella** (Tuck.) nov. comb. Nine specimens.

Genus: Haematomma

159. *Haematomma elatinum* (Ach.) Koerb. Two specimens.

Genus: Acarospora

160. *Acarospora fuscata* (Schrad.) Arn. Two specimens, both fertile.

Middlesex School, Concord, Mass.

MISCELLANEOUS NOTES

Noteworthy forthcoming articles will appear in early numbers of The Bryologist as follows:

"The Genus Parmeliopsis of Nylander," by Dr. Lincoln W. Riddle.

"Illustrated Key to the Western Ditrichaceae," by Dr. T. C. Frye.

EXCHANGE DEPARTMENT

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

Mrs. Horace C. Dunham, 206 Windsor Road, Waban, Mass.—*Hylocomium pyrenaicum* (Spruce) Lindb., and *Rhytidiadelphus squarrosus* (L.) Warnst., collected by Mrs. Dunham in Maine.

Mr. Roy Latham, Orient, N. Y.—*Arthonia radiata* (Pers.) Th. Fr., and *Parmelia rudecta* Ach.

Mr. Charles C. Plitt, 3933 Lowndes Ave., Baltimore, Md.—*Ramalina Menziesii* Tuck.

Dr. Wm. C. Wiegmann, 436 East 5th St., New York City.—*Plagiothecium latebricola* (Wils.) B. & S., sterile, collected in New Jersey.

Mr. E. B. Chamberlain, 18 West 89th St., New York City.—*Drepanocladus scorpioides* (L.) Warnst., sterile, collected in Connecticut by Dr. G. E. Nichols.

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THE BRYOLOGIST

VOL. XX JULY, 1917 NO. 4

ILLUSTRATED KEY TO THE WESTERN DITRICHACEAE[1]

T. C. FRYE

KEY AND COMPARISON OF THE GENERA

1a. Seta .4–1 mm. long, not projecting above the upper leaves; lid none; peristome none; (2) leaves not 2-ranked; (3) teeth none; (4) leaves ovate or lanceolate at base, subulate or mucronate at tip; capsule ovoid-apiculate, not strumose, not grooved; (5) leaves not glaucous, not circinate nor secund. 1. PLEURIDIUM

1b. Seta 5–40 mm. long, usually projecting above the upper leaves; lid present; peristome of 16 often split or perforate teeth.

2a. Leaves 2-ranked; (3) teeth perforate to regularly bifid or trifid, the joints not thickened; (4) leaves subulate from a broader base; capsule cylindric or ovoid, not strumose, not grooved; (5) leaves not glaucous, not circinate nor secund. 2. SWARTZIA

2b. Leaves not 2-ranked.

3a. Teeth regularly bifid, the joints thickened.

4a. Leaves subulate; capsule narrowly cylindric, not strumose, not grooved; (5) leaves not glaucous, circinate. 3. TRICHODON

4b. Leaves lanceolate or mucronate; capsule ovoid, strumose, grooved; (5) leaves not glaucous, not circinate nor secund. 4. CERATODON

3b. Teeth irregularly split, slender, papillose, the joints not thickened; (4) leaves lanceolate to subulate; capsule ovoid to cylindric, not strumose, smooth or slightly grooved.

5a. Leaves glossy, often secund and subulate. 5. DITRICHUM

5b. Leaves glaucous with a waxy bloom, not secund. 6. SAELANIA

KEY TO THE GENERA, BASED ON VEGETATIVE PLANTS

A. Leaves glaucous with a white-filamentous or granular dorsal surface; cells of leaf-apex quite long and narrow in the lower leaves. 6. SAELANIA

AA. Leaves not glaucous; cells of leaf-apex shorter for the width than in A.

B. Leaves lanceolate, not subulate, green but not glossy; cells of the leaf-middle isodiametric. 4. CERATODON

BB. Leaves lanceolate-subulate or narrower; most species but not all with cells of leaf-middle 2 or more times as long as wide.

C. Leaves 2-ranked; cells of the leaf-middle irregular. 2. SWARTZIA

CC. Leaves not 2-ranked.

D. Cells of the leaf-middle irregular or roundish or square. 5. DITRICHUM

[1] Geographically this paper covers the region from the Rocky Mountains to the Pacific Ocean from Mexico to the Arctic Ocean. The aim has been to make useful what is already known, rather than add to our knowledge of the group. The work of E. G. Britton in "North American Flora" has been specially helpful.

The May number of THE BRYOLOGIST was published May 29, 1917.

DD. Cells of the leaf-middle 2 or more times as long as wide.
E. Cells of the leaf-base 5–8 times as long as wide; marginal cells of leaf-apex mostly 1–2 times as long as wide. 3. TRICHODON
EE. Cells of the leaf-base 1–5 times as long as wide; marginal cells of apex longer than in E.
F. Leaves 3–7 mm. long. 5. DITRICHUM SCHIMPERI
FF. Leaves 1–3 mm. long.
G. Leaves abruptly narrowed. 5. DITRICHUM HETEROMALLUM
GG. Leaves gradually narrowed.
H. Stems 2–5 mm. long; cross section of leaf-vein with 2 rows of guide cells. 1. PLEURIDIUM
HH. Stems 10–20 mm. long; cross section of leaf-vein with 1 row of guide cells. 5. DITRICHUM

1. PLEURIDIUM

Plants in low dense cushions. Leaves not crispate when dry, entire or minutely serrulate; vein filling most of the awn, usually rough. Calyptra cucullate. Seta very short. Capsule immersed, ovoid; lid none; peristome none; spores brown, rough.—(Gk. *pleuridion* = on one side; because the capsule occasionally appears to arise laterally on the stem.)

1a. Vein rough at tip only; paroicous; perichaetial leaves gradually subulate; spore surface finely granular.
Pleuridium bolanderi[2] C. Müll.—Wash. to Calif.

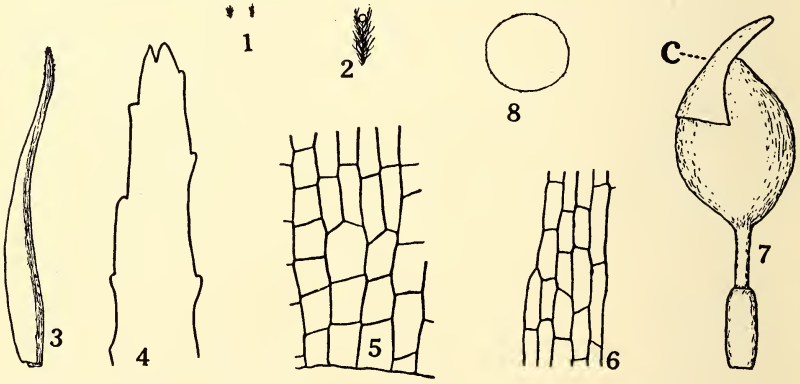

PLATE IV.—Pleuridium bolanderi

(1) Plants, ×1. (2) Plants, ×3. (3) Leaf, ×32. (4) Leaf-tip, ×400. (5) Cells from leaf-base, ×400. (6) Cells from leaf-middle, ×400. (7) Capsule; c, calyptra; (after Cardot and Thériot) × about 13. (8) Spore, ×550.

1b. Vein rough some distance down from the tip; autoicous; perichaetial leaves abruptly subulate; spore surface densely papillose.
Pleuridium alternifolium Brid.—Calif.; Kan. and eastward in the U. S.

[2] *P. stramineum* Lesq.; *P. alternifolium howei* R. & C.; *P. bakeri* C. & Th.

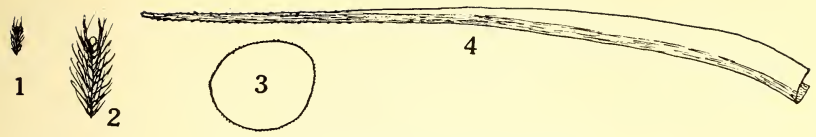

PLATE V.—Pleuridium alternifolium

(1) Plant, ×1. (2) Plant, ×3. (3) Spore, ×550. (4) Leaf, ×32.

2. SWARTZIA (Cynodontium, Distichium)

Plants in dense matted tufts. Stem dichotomous, tomentose. Leaves in 2 ranks, not crowded; vein excurrent in the awn. Calyptra cucullate. Seta pale yellow, long, slender, twisted. Capsule small; lid conic; peristome single, divided to base; teeth 16, perforate or split. Spores rough.—(Honor of Olaf Swartz, an 18th-century botanist.)

1a. Leaves very rough at apex; capsule erect, cylindric, about 3–4 times as long as wide.

Swartzia montana[3] (Lam.) Lindb.—Arctic America to Wash. and Ariz.; northeastern N. Amer.

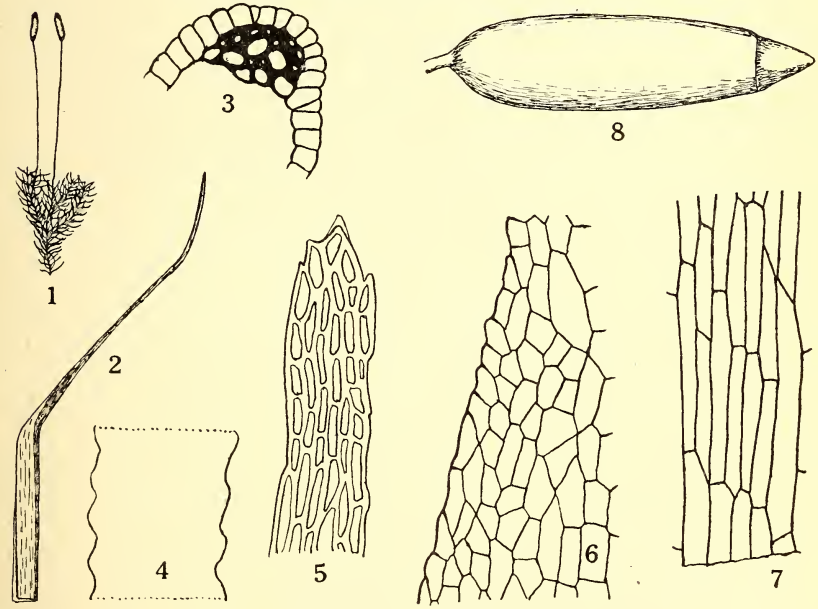

PLATE VI.—Swartzia montana

(1) Plant, ×1. (2) Leaf, ×18. (3) Cross section of leaf-vein, ×400. (4) Portion of subula about its middle, ×400. (5) Leaf-tip, ×400. (6) Cells of leaf-middle, ×400. (7) Cells of leaf-base, ×400. (8) Capsule, ×22.

[3] *Distichium capillaceum* B. S. G.

1b. Leaves slightly rough at apex; capsule inclined, ovoid, about 2–2.5 times as long as wide.

Swartzia inclinata[4] Hedw.—Calif.; Mont. to Utah and Colo.; northeastern N. Amer.

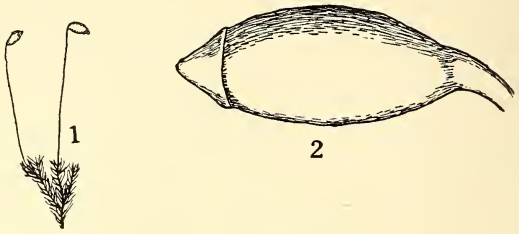

PLATE VII.—Swartzia inclinata

(1) Plant, ×1. (2) Capsule, ×22.

3. TRICHODON

Stem slender, 3-angled. Leaves not crowded, not 2-ranked, sheathing, reflexed, awned, serrulate. Calyptra cucullate. Seta slender. Capsule narrowly ovoid or cylindric, straight or slightly curved; lid conic-rostrate; peristome single; teeth 16, slender, papillose, bifid almost to base, thick-jointed. Spores smooth.—(Gk. *thrix* = hair; *odous* = a tooth; referring to the long, thin teeth of the peristome.)

1a. Seta 10–15 mm. long; capsule narrowly cylindric.

Trichodon tenuifolius[5] (Schrad.) Lindb.—Yukon to Wash., Nev. and Mont.

1b. Seta 5–7 mm. long; capsule ovoid-cylindric.

Trichodon borealis Wms.—Known only from Dawson, Yukon.

4. CERATODON

Plants matted together with rhizoids, green, not glossy. Stem 3–5 angled. Leaves small, ovate-lanceolate, acuminate or subulate; cells isodiametric. Calyptra cucullate. Seat purple or yellow, slender. Capsule exserted, small, somewhat sulcate when dry, abrupt at base, with goitre; lid conic-rostrate; peristome single; teeth 16, split nearly to base, nodose. Spores small.—(Gk. *keras* = a horn; *odous* = a tooth; the teeth of the peristome suggested the horns of a goat.)

1a. Leaf-vein usually not or hardly excurrent; seta purple; capsule from inclined to horizontal, 2.5–3.5 times as long as wide exclusive of lid.

Ceratodon purpureus[6] (L.) Brid.—Cosmopolitan.

1b. Leaf-vein strongly excurrent; seta yellow or red; capsule usually erect, about twice as long as wide exclusive of lid.

Ceratodon conicus[7] (Hampe) Lindb.—Alaska to Wash. and Idaho; Minn.

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[4] *Distichium inclinatum* B. S. G.

[5] *Trichostomum tenuifolium* Schrad; *Trichostomum cylindricum* Hedw.; *Trichodon cylindricus* Schimp.

[6] *C. heterophyllus* Kindb.; *C. columbiae* Kindb.

[7] *Trichostomum conicum* Hampe; *Ceratodon minor* Aust.

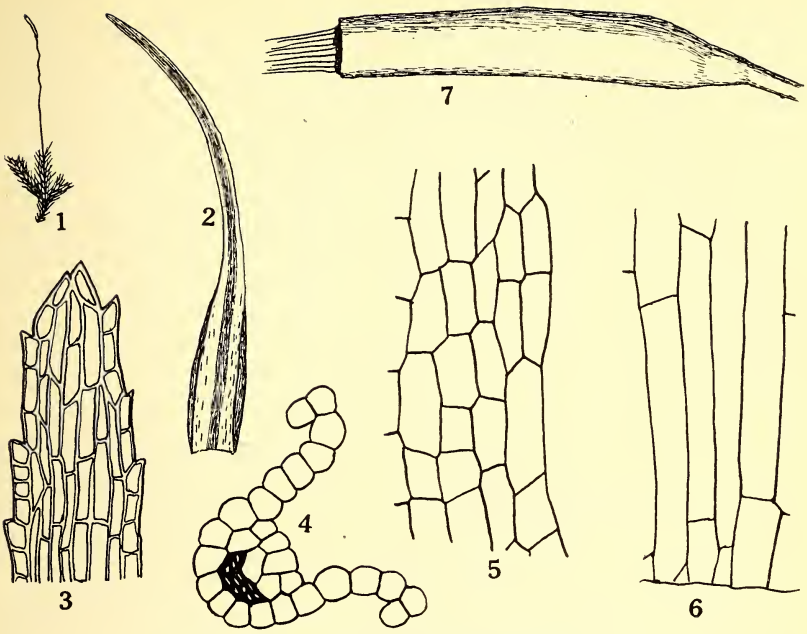

PLATE VIII.—Trichodon tenuifolius

(1) Plant, ×1. (2) Leaf, ×18. (3) Leaf-tip, ×400. (4) Cross section leaf-vein, ×400. (5) Cells of leaf-middle, ×400. (6) Cells of leaf-base, ×400. (7) Capsule, × 22.

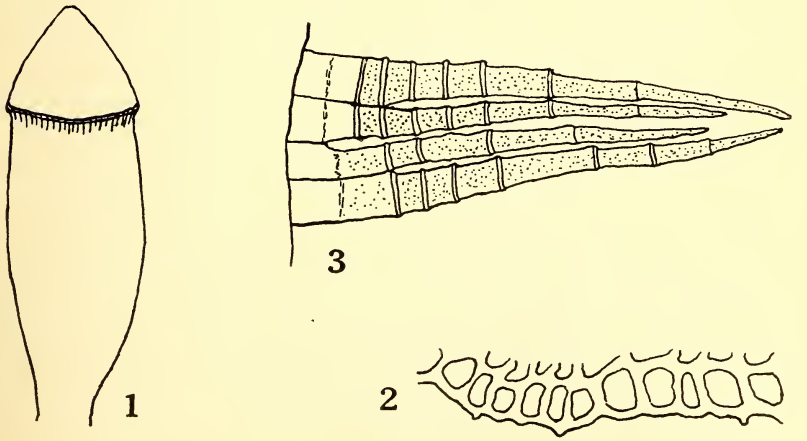

PLATE IX.—Trichodon borealis

(1) Capsule, ×50. (2) Part of base of lid, ×270. (3) Portion of the peristome, ×270.—(After R. S. Williams.)

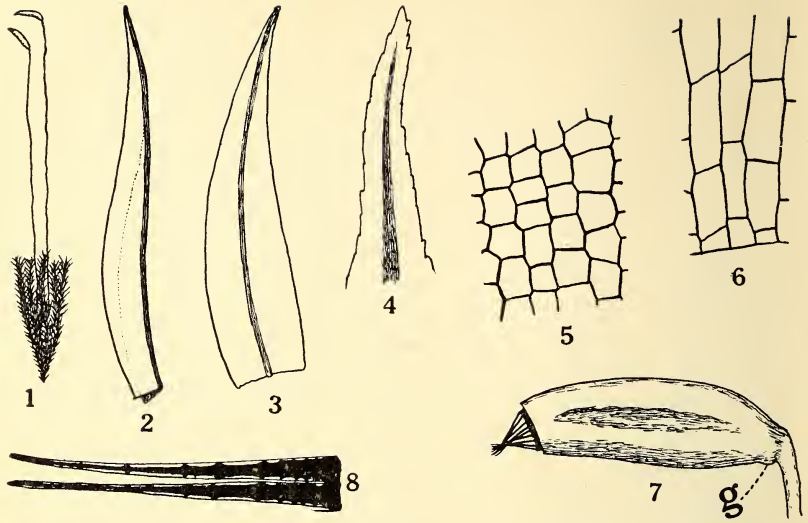

PLATE X.—Ceratodon purpureus

(1) Plant, ×1. (2) Leaf, ×44. (3) Leaf, ×44 (4) Leaf-tip, ×125. (5) Cells of leaf-middle, ×400. (6) Cells of leaf-base, ×400. (7) Capsule; g, goitre, ×18. (8) A split tooth of the peristome, ×125.

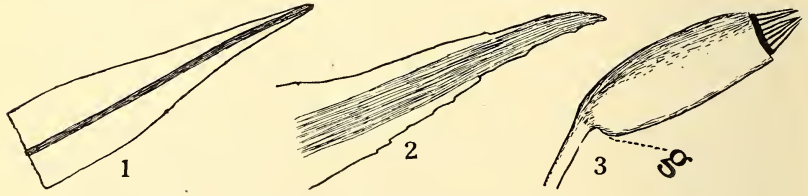

PLATE XI.—Ceratodon conicus

(1) Leaf, 1. ×(2) Leaf-tip, ×125. (3) Capsule; g, goitre, ×18.

5. DITRICHUM (Leptotrichum)

Stem usually short, sparingly branched. Leaves not 2-ranked, lanceolate or subulate, entire or serrulate. Cells at leaf-base rectangular, not enlarged in basal angles; tip cells mostly narrow. Calyptra cucullate. Seta slender, erect, twisted. Capsule erect, ovoid or cylindric; lid conic to rostrate; teeth 16, split nearly to base, slender, nodose, smooth or papillose. Spores small.—(Gk. *di* = 2; *thrix* = hair; because the teeth of the peristome are commonly split into 2 hair-like parts.)

1a. Leaves 3–7 mm. long, only the shorter remaining 3 mm.

2a. Marginal 2 or more rows of cells at leaf-middle irregular; (3) leaf-margin incurved, serrulate; (4) seta pale red, 3–3.5 cm. long; (5) stems up to 150 mm. long.
Ditrichum giganteum[8] Wms.—Yukon to Mont.; Mich., Minn.

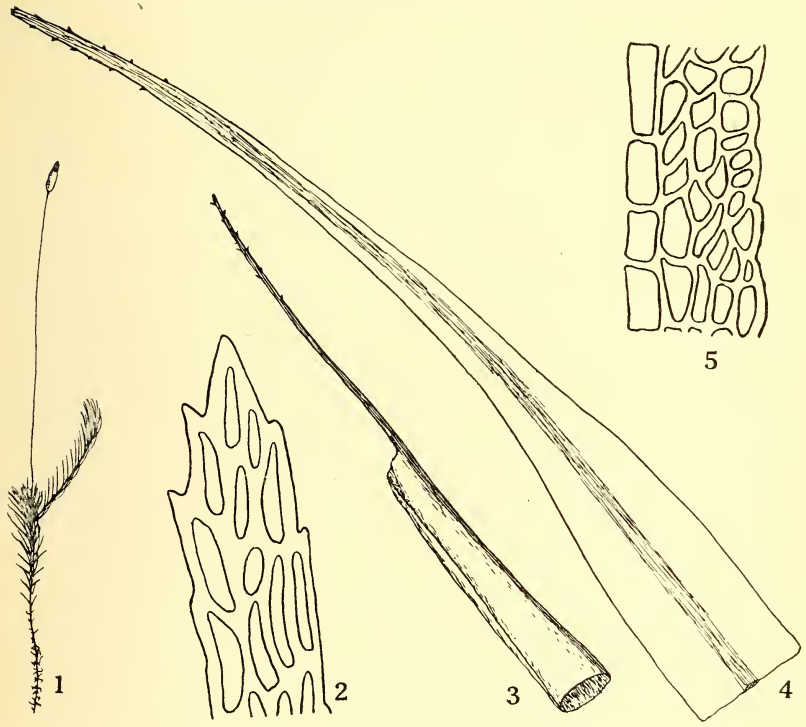

PLATE XII.—Ditrichum giganteum

(1) Plant, × about 1. (2) Leaf-tip, × about 350. (3) Perichaetial leaf, × about 18. (4) Leaf, × about 22. (5) Cells of leaf-middle, × about 350.—(After R. S. Williams.)

2b. Marginal 2 or more rows of cells at leaf-middle rectangular, 2–8 times as long as wide; (3) leaf-margin incurved, entire to faintly serrulate; (4) seta pale yellow, 1–2 cm. long; (5) stems up to 5 mm. long; spores 21–27 μ, in all our other species 14 μ or less.
Ditrichum schimperi[9] (Lesq.) Paris—B.C. to Calif.

1b. Leaves 1–3 mm. long, only the longer reaching 3 mm.

2a. Marginal 2 or more rows of cells at leaf-middle isodiametric or nearly so, irregular; (3) leaf-margin incurved, entire or with a few teeth

[8] *D. flexicaule longifolium* Hag.
[9] *Leptotrichum schimperi* Lesq.

near the tip; (4) seta red below, paler above, 1–2 cm. long; (5) stems up to 100 mm. long.

Ditrichum flexicaule[10] (Schwaegr.) Hampe—Alaska to B.C.; northeastern N. Amer.

2b. Marginal 2 or more rows of cells at leaf-middle square or nearly so, not irregular; (3) leaf-margin incurved, serrulate above; (4) seta pale yellow, 1.5–2.5 cm. long; (5) stems up to 10 mm. long.

Ditrichum montanum Leib.—Wash. and Idaho.

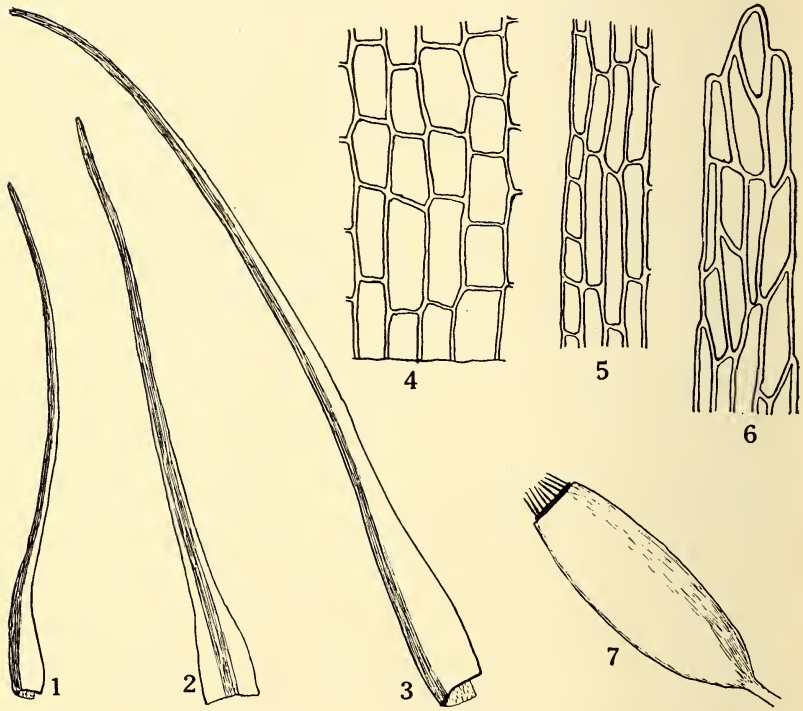

PLATE XIII.—Ditrichum Schimperi

(1) Leaf, ×22. (2) Leaf, ×22. (3) Leaf, ×22. (4) Cells of leaf-base, ×400. (5) Cells of leaf-middle, ×400. (6) Leaf-tip, ×400. (7) Capsule, ×18.

2c. Marginal 2 or more rows of cells at leaf-middle rectangular and about 2–4 times as long as wide.

3a. Leaves not revolute, almost entire, abruptly narrowed; (4) seta dark red, 1–2.5 cm. long; (5) stems up to 10 cm. long.

[10] *Trichostomum flexicaule* B. & S.; *Distichium macounii* Müll.; *Leptotrichum flexicaule brevifolium* Kindb.; *Ditrichum brevifolium* Paris; *Ditrichum flexicaule brevifolium* Barnes; *Ditrichum elatum* Kindb.

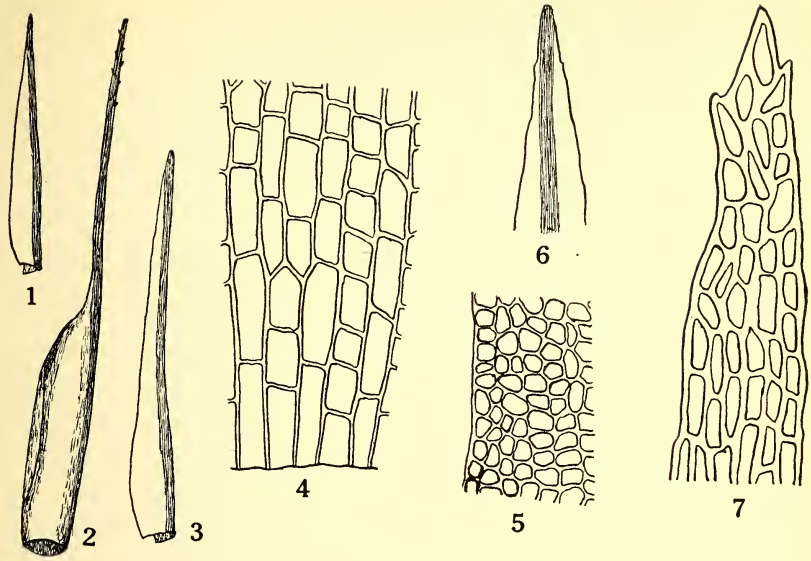

PLATE XIV.—Ditrichum flexicaule

(1) Leaf, ×22. (2) Perichaetial leaf, ×22. (3) Leaf, ×22. (4) Cells of leaf-base, ×400. (5) Cells of leaf-middle, ×400. (6) Leaf-tip, ×32. (7) Leaf-tip, ×400.

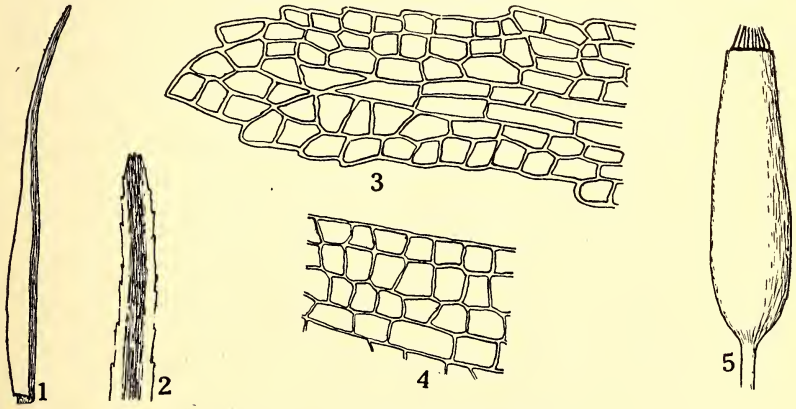

PLATE XV.—Ditrichum montanum

(1) Leaf, ×22. (2) Leaf-tip, ×32. (3) Leaf-tip, ×400. (4) Cells of leaf-middle, ×400. (5) Capsule, ×18.

Ditrichum heteromallum[11] (Hedw.) E. G. B.—Alaska to Oreg.; N. H.

3b. Leaves somewhat revolute, gradually narrowed; (4) seta red, 1–2 cm. long; (5) stems up to 10–20 mm. long.

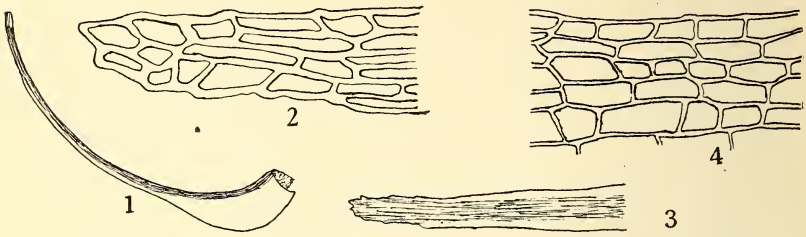

PLATE XVI.—Ditrichum heteromallum

(1) Leaf, ×22. (2) Leaf-tip, ×400. (3) Leaf-tip, ×32. (4) Cells of leaf-middle, ×400.

4a. Peristome-teeth bifid to base, not connate nor perforate; leaf-tip wide; basal marginal leaf-cells short.

Ditrichum ambiguum Best—Wash. and Oreg.

4b. Peristome-teeth not bifid to base, more or less connate or perforate; leaf-tip narrow; basal marginal leaf-cells long.

Ditrichum pusillum[12] (Hedw.) Timm.—Wash., Calif.; eastern N. Amer.

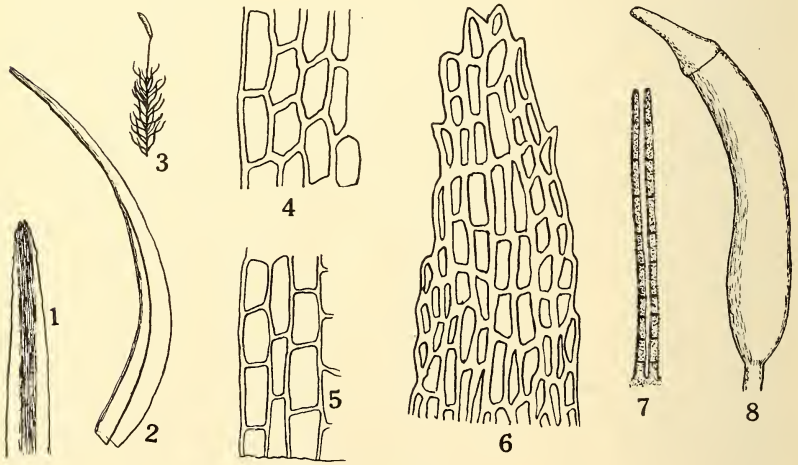

PLATE XVII.—Ditrichum ambiguum

(1) Leaf-tip, ×32. (2) Leaf, ×22. (3) Plant, ×1. (4) Cells of leaf-middle, ×400. (5) Cells of leaf-base, ×400. (6) Leaf-tip, ×400. (7) A split tooth of the peristome, ×125. (8) Capsule, ×18.

[11] *Ditrichum homomallum* Hampe; *Trichostomum heteromallum* Lindb.

[12] *Leptotrichum pusillum* Hampe; *Ditrichum tortile* Müll.;*Leptobarbula berica* Mac.

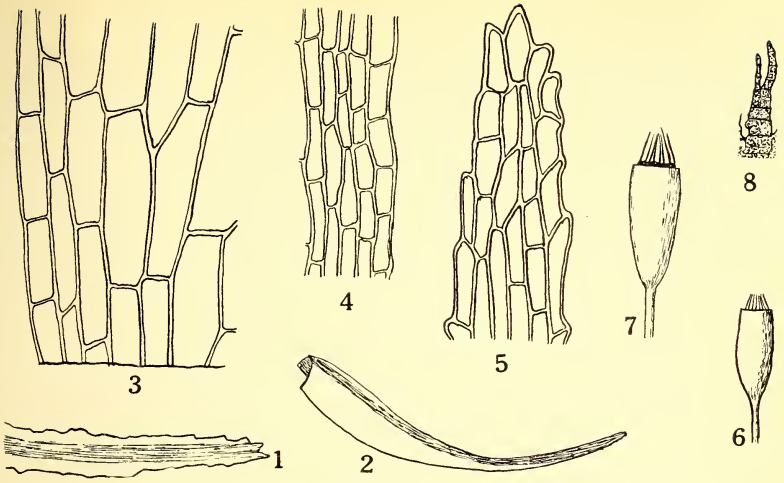

PLATE XVIII.—Ditrichum pusillum

(1) Leaf-tip, ×32. (2) Leaf, ×22. (3) Cells of leaf-base, ×400. (4) Cells of leaf-middle, ×400. (5) Leaf-tip, ×400. (6) Capsule, ×18. (7) Capsule, ×18. (8) Tooth of peristome, ×125.

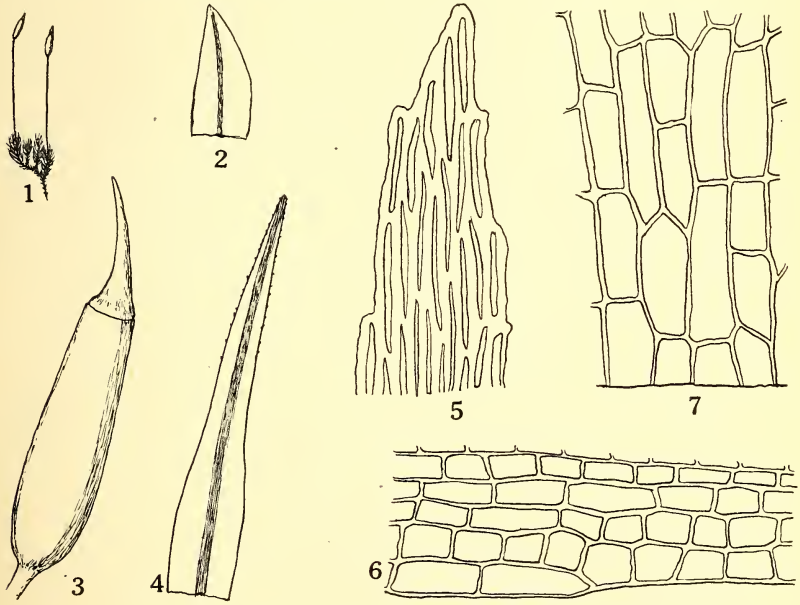

PLATE XIX.—Saelania glaucescens

(1) Plant, ×1. (2) Leaf, ×22. (3) Capsule, ×18. (4) Leaf, ×22. (5) Leaf-tip, ×400. (6) Cells of leaf-middle, ×400. (7) Cells of leaf-base, ×400.

6. Saelania

Stems bluntly triangular in cross section. Leaves linear-lanceolate, serrate, glaucous, with white-filamentous or granular dorsal surface; vein extending to apex. Calyptra cucullate. Seta erect. Capsule exserted, ovoid-cylindric, erect, smooth or slightly furrowed when dry; lid conic; annulus single; peristome-teeth 16, split, nodose, papillose. Spore small, papillose.—(Honor of Saelan, a Scandinavian bryologist.) We have only the following species.

Saelania glaucescens[13] (Hedw.) Broth.—Alaska to B.C.; northern N. Amer.

University of Washington, Seattle

PRELIMINARY LIST OF ARIZONA HEPATICAE[1]

Alexander W. Evans

Very few species of Hepaticae have been reported from Arizona. The first records for the state were made in 1895 by Underwood,[2] who noted the occurrence of *Marchantia polymorpha* and *Reboulia hemisphaerica*, without citing definite stations. Four additional species have since been reported by the writer, as follows: *Plagiochasma rupestre* and *P. Wrightii*, in 1915;[3] *Frullania mexicana*, also in 1915;[4] and *Marchantia paleacea*, in 1917.[5] Of these six species, *Marchantia paleacea*, although not endemic to Arizona, is known from no other stations in the United States.

The following list is based largely on the collections made by G. E. Nichols, while participating in the International Phytogeographic Excursion in America. This has been supplemented by the material in the herbarium of the New York Botanical Garden and by specimens kindly communicated by W. A. Cannon, D. S. Johnson, F. Shreve, and J. J. Thornber. Although future collections will undoubtedly lengthen the list appreciably, it is hardly to be expected that many conspicuous species remain to be discovered.

1. Riccia glauca L. Bear Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols.*

2. Riccia sorocarpa Bisch. Cherry Creek, Santa Catalina Mountains, 1913, *G. E. Nichols;* summit of Mt. Lemmon, Santa Catalina Mountains, *F. Shreve.*

3. Ricciella fluitans (L.) A. Br. Soldier Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols;* Sabino Canyon, Santa Catalina Mountains, *F. Shreve.*

4. Targionia hypophylla L. Bright Angel Trail, bottom of Grand Canyon, 1913, *G. E. Nichols;* Sabino Canyon, Santa Catalina Mountains, *J. J. Thornber;* Miller Canyon, Huachuca Mountains, *F. Shreve.*

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[13] *Saelania caesia* Lindb.; *Ditrichum glaucescens* Hampe.

[1] Contribution from the Osborn Botanical Laboratory.

[2] Bot. Gaz. **20**: 69, 70. 1895.

[3] Bull. Torrey Club **42**: 279, 295. 1915.

[4] Bryologist **18**: 88. 1915.

[5] Trans. Connecticut Acad. **21**: 254. 1917.

5. Plagiochasma rupestre (Forst.) Steph. Without definite locality or date, *H. H. Rusby;* Soldier Canyon, Santa Catalina Mountains, 1913, *W. A. Cannon;* same locality, *G. E. Nichols.*

6. Plagiochasma Wrightii Sulliv. Nogales, 1902, *D. T. MacDougal.*

7. Grimaldia californica Gottsche. Cottonwood Springs and Soldier Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols;* Bear Canyon and Sabino Canyon, Santa Catalina Mountains, *F. Shreve.* The specimens are all sterile, so that their determination must be considered provisional.

8. Reboulia hemisphaerica (L.) Raddi. Willow Spring, 1890, *E. Palmer 535;* Huachuca Mountains, *J. G. Lemmon 210; L. N. Goodding 752;* Soldiers Canyon, Santa Catalina Mountains, *G. E. Nichols;* Sabino Canyon, Santa Catalina Mountains, *J. J. Thornber;* same locality, *F. Shreve;* Clearson's Mill, Graham Mountains, *F. Shreve.*

9. Asterella californica (Hampe) Underw. Bright Angel Trail, botton of Grand Canyon, 1913, *G. E. Nichols.* The specimens seem to be dioicous, but the absence of carpocephala makes their determination doubtful.

10. Conocephalum conicum (L.) Dumort. Frye Canyon, Graham Mountains, 1914, *F. Shreve.*

11. Marchantia paleacea Bertol. Huachuca Mountains, 1910, *L. N. Goodding 824.*

12. Marchantia polymorpha L. Miller's Canyon and Wickersheim's Cabin, Huachuca Mountains, 1909, *L. N. Goodding 111, 362.*

13. Fossombronia longiseta Aust. Cherry Creek, Santa Catalina Mountains, 1913, *G. E. Nichols.*

14. Plagiochila asplenioides (L.) Dumort. North side of Mt. Lemmon, Santa Catalina Mountains, 1912, *D. S. Johnson.*

15. Cephaloziella Hampeana (Nees) Schiffn. Cottonwood Springs, Santa Catalina Mountains, 1913, *G. E. Nichols.*

16. Cephaloziella myriantha (Lindb.) Schiffn. Bear Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols.*

17. Cephaloziella papillosa Douin. Bear Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols.*

18. Scapania undulata (L.) Dumort. Marshall Gulch, Santa Catalina Mountains, 1912, *D. S. Johnson.*

19. Radula complanata (L.) Dumort. Bear Canyon, Santa Catalina Mountains, 1913, *G. E. Nichols.*

20. Frullania mexicana Lindenb. North side of Mt. Lemmon, Santa Catalina Mountains, 1912, *D. S. Johnson.*

21. Anthoceros laevis L. Xero-montane Garden and Sabino Canyon, Santa Catalina Mountains, 1914, *F. Shreve.*

Of the species listed Nos. 1–12 belong to the Marchantiales, Nos. 13–20 to the leafy Jungermanniales, and No. 21 to the Anthocerotales. The large proportion of thalloid forms is an interesting feature of the flora and indicates its strongly xerophilous character. Many of these forms are able to pass through long periods of drought in a quiescent state and then to recover and resume their

growth when conditions become more favorable. In some cases the dry plants are so inconspicuous that it is almost impossible to detect them. In discussing the hepatic flora of western California, Campbell[6] calls attention to many interesting peculiarities of xerophilous species, and his remarks would apply equally well to the hepatic flora of Arizona.

The state of Arizona is bounded by Mexico, California, Nevada, Utah, and New Mexico, while its northeastern corner meets the southwestern corner of Colorado. The Hepaticae of Nevada and Utah are almost unknown, so that it is impossible to make profitable comparison between the hepatic floras of these states and that of Arizona. The Hepaticae of California, however, are known to us through the thorough and comprehensive work of Howe,[7] who recognizes eighty-six species, inclusive of the Anthocerotes. For Colorado the writer[8] has listed forty-one species, while Standley[9] has reported twelve species from New Mexico. The Hepaticae of Mexico were long ago described by Gottsche,[10] and only scattered references to them have since been published. Perhaps four hundred species would be a conservative estimate for the entire country. Of the twenty-one species listed from Arizona, fifteen have been recorded from California, nine from Colorado, five from New Mexico, and twelve from Mexico. These figures would indicate a close relationship between the species of Arizona and those of California and Mexico. The number of Arizona species known from New Mexico is surprisingly small and would probably be increased by careful exploration. A closer relationship between the species of these two states is certainly to be expected.

Sheffield Scientific School, Yale University.

SOME EXPERIMENTS ON THE GERMINATION OF MOSS SPORES ON AGAR

Daisy J. Levy

In November, 1915, I collected *Pogonatum brevicaule*. This moss is quite common on freshly turned clay banks. It is characterized by a persistent protenema, the leaves being few and short. It fruits in the autumn.

The material was kept in clay dishes in the greenhouse of Columbia University. In April, I sowed spores of these plants in petrie dishes in which I had prepared a Bejerink agar culture.

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[6] Torreya **4**: 81–86. 1904.

[7] The Hepaticae and Anthocerotes of California. Mem. Torrey Club **7**: 1–208. *pl. 88–122*. 1899.

[8] Preliminary list of Colorado Hepaticae. Bryologist **18**: 44–47. 1915.

[9] Hepaticae of New Mexico. Bryologist **18**: 81–83. 1915. Additional notes upon New Mexican Hepaticae. Bryologist **19**: 64, 65. 1916.

[10] De mexikanske Levermasser. Kongel. Danske Vidensk. Selsk. Skr. V. Naturv. og Math. Afd. **6**: 97–380. *pl. 1–20*. 1863.

Distilled water	500	cc.
Ammonium nitrate	.25	gr.
Potassium phosphate	.1	"
Magnesium sulphate	.1	"
Calcium chloride	.05	"
Dextrose	.005	"
Trace of ferrous sulphate		
Agar	7	gms.

The cultures were placed under bell jars in a north window and were examined almost daily. The spores continued to look green and healthy. After a few days, probably through faulty sterilization or because of the dextrose, bacteria destroyed six out of ten plates. About four weeks later, the spores in the good plates showed signs of swelling which is the first indication of spore germination. This was followed by a hyaline appearance at one end of the spore which became egg-shaped because of the protruding germ tube through the ruptured spore coat.

Protenemal growth took place rapidly, the protenema being filamentous alga-like in appearance. Transverse cross walls were cut off, the plate soon becoming filled with this branching growth. In none of my cultures did I observe any oblique septa, which are indicative of rhizoid formation. The growth was entirely apical, the lateral branches being formed behind septa.

The buds were formed on the lateral branches. Walls intersecting each other cut off portions of the ends of the filaments until a pear-shaped structure resulted with cell division in three dimensions. From these buds the leafy branch will originate.

I made sections and then triple-stained portions of the cultures in order to preserve the facts stated above:

1. Spores before germination.
2. Spores in the egg-shaped stage, showing the hyaline spot.
3. Germ tube in the one- and two-celled stage.
4. Buds in several stages.

403 West 115th St., New York City.

HABITAT OF CEPHALOZIA FRANCISCI ON LONG ISLAND, N. Y.

Roy Latham

Fifteen miles west from the eastern extremity of the north prong of Long Island is located Horton's Point, just north of the village of Southold. This is a sandy beach, one to two hundred yards in latitude, extending two miles along the coast of Long Island Sound. Inclosed on east and south by wooded hills and shifting sand-dunes, on the west cut off by an inlet from the Sound.

For a short distance back from the flood tide margin the beach is high and dry and vegetated with *Cladonia rangiferina*, *Panicum amarum*, *Prunus maritima*, *Hudsonia tomentosa*, *Crysopsis*, and clumps of shrub oak, *Quercus stellata*.

South of this drier section the surface dips for about two-thirds the length, forming a narrow trough of sandy bog, covered with a various growth, including *Pinus rigida* and Vacciniaceae, offering continuous shade. Here is the habitat of *Cephalozia Francisci* growing mostly on small plots of barren sands, forming beautiful dark-green mats from a few inches to ten feet in diameter. In one spot where a slight gully transverses the depression, the plant follows the shady western edge for fifty feet.

Growing contiguously and abundantly is *Cephalozia macrostachya* and more rarely *C. fluitans*. *Riccardia pinguis* and *Fossombronia foveolata* occupy more rush-grown localities in the region.

The Musci are meagrely represented by *Leucobryum glaucum*, *Sphagnum inundatum* and *S. subsecundum*.

Orient, New York

NOTE ON BUXBAUMIA INDUSIATA BRIDEL

Ralph S. Nanz

Dr. Grout's note in the May number of The Bryologist indicates the wide range of *Buxbaumia indusiata* Brid., in spite of its rarity. This species of *Buxbaumia* has been found twice within the past year in the vicinity of Ithaca, N. Y. On September 7, 1916, Dr. Andrews and I found the moss on a decayed stump, probably hemlock, in a very moist woods near the McLean bogs, about fifteen miles northeast of Ithaca. The capsules, four in number, were immature and green in color. On April 9, 1917, Prof. K. M. Wiegand and Mr. F. B. Wann discovered it in Coy Glen Ravine, two miles south of Ithaca. Ten mature capsules were found on a log, growing together with *Lophocolea heterophylla* (Schrad.) Dum. The specimens collected agree in appearance with Dr. Grout's photographs. The mature capsules are light brown in color, in contrast to the deep red brown of *B. aphylla*. The two very opposite types of situation are worth noting; in the one case a swampy woods, and in the other a rocky ravine.

Cornell University, Ithaca, New York

MISCELLANEOUS NOTES

A Record to be Envied.—Under date of January 29, 1917, Dr. John Macoun writes from Sidney, B. C., as follows:

"I take quite an interset in the Bryologist and am still collecting. Think of it! I sent my first mosses to Sullivant in 1861. The first new species I found was *Leptodon nitidus*, named by him from my specimens.

"Since then I have found nearly one thousand of all kinds, from trees to seaweeds, and I am at it yet."

Four-lobed spore mother cells in Catharinaea.—Most students of the mosses, hepatics, and lichens are interested primarily in the collection and identification of the various species of these plants, or in studying their distribution

and general life-habits. A limited number of botanists have confined their studies, or at least have devoted much time, to the investigation of the microscopic internal structure of these plants (anatomy), the more minute structure of the cells themselves (cytology), or the study of the embryo (embryology). A recent contribution by Allen[1] in the *American Journal of Botany* relates to the four-lobed form taken by the cells in the capsule of Catharinaea. It will be recalled by our readers that the cells in the capsules of the mosses and hepatics which give rise directly to spores are termed "spore mother cells," and that such cells always normally give rise to four spores often termed tetraspores. The formation of tetraspores has been for a long time a subject of great interest in that certain structures in the nucleus of the cells of the capsule, and indeed of the whole sporophyte, known as chromosomes, are twice as many in each nucleus as in the nuclei of the gametophyte. The number of these chromosomes is doubled whenever the egg-cell is fertilized by the sperm and the number is not again reduced until the four tetraspores are formed in the spore mother cells of the capsule. This division of the material in the spore mother cells to form tetraspores is for this reason known as the "reduction division."

Allen reports that from living immature capsules of Catharinaea collected in southern Wisconsin in August, 1915, he pressed out the spore mother cells and found them to be strongly four-lobed. This lobing is, as he notes, almost universal in the Jungermanniales but further notes: "That is, I think, the first observed case of the occurrence of four-lobed spore mother cells in a bryophyte not a member of the Jungermanniales. It remains to be seen to what extent this character appears among the Bryales." Here is a good chance for our readers to contribute something new to science. When you find nearly mature capsules press out the contents and examine under the microscope, then record carefully the results and contribute your notes to the BRYOLOGIST.

Another interesting point noted by Allen was that there is a plastid in each lobe of the spore mother cell and that the early division of a single plastid into four has been known for some time to occur in Anthoceros,[2] and also, to judge from the work of Sapehin[3] and Melin,[4] it is of common occurrence among the Musci.

Allen reports that "There are rather striking differences in size between the spore mother cells of plants collected in different localities, although the mother cells borne in a single capsule differ little in size, and, so far as my observations have gone, there is no great variation in this respect as between different plants growing in the same clump. Along with these differences in size of the spore mother cells between plants of different localities go other well-marked differences in such characters as size of plant, size of leaf, number of lamellae on the

[1] Allen, Charles E. Four-lobed Spore Mother Cells in Catharinea. Amer. Journ. Botany **3**: 456–460. Oct., 1916.

[2] Davis, B. M. The Spore-mother-cell of Anthoceros. Bot. Gaz. **28**: 89–109. 1899.

[3] Sapehin, A. A. Ueber das Verhalten der Plastiden im sporogenen Gewebe. Bericht. Deutsch Bot. Ges. **29**: 491–496. 1911.

[4] Melin, E. Die Sporogenese von *Sphagnum squarrosum* Pers. Nebst einigen Bemerkungen über das Antheridium von *Sphagnum acutifolium* Ehrh. Svensk Bot. Tidsk. **9**: 261–293. 1915.

upper surfaces of the leaves, and number of spines on the lower surfaces. While doubtless some of these characters are influenced by external conditions, it seems not unlikely that the plants in question may represent distinct races, all of which, however, seem to fall within the limits of *C. angustata* Brid., as at present defined; although since this species intergrades with *C. undulata* Web. & Mohr, it is possible that some of the forms observed should be referred to the latter species."

O. E. J.

Hermann Edward Hasse—Lichenist.—Dr. Bruce Fink[5] has contributed to the September, 1916, number of *Mycologia* an excellent brief account of the life and botanical activities of our late lamented Curator of Lichens. Dr. Fink speaks of him as "the man who has added, it seems, the largest number of lichens to our North American flora, through his own collecting, since the days of Tuckerman." About twenty-five years of his collecting in southern California added about seventy-five new species, the earlier ones being named mainly by Stizenberger, Nylander, or Zahlbruckner, the later ones mainly by Hasse himself. Fink notes that Mr. John I. Kane presented to the New York Botanical Garden, in 1906, about 3000 species and many duplicates from Hasse's herbarium. Recently a large collection of lichens was purchased from Mrs. Hasse for the Cryptogamic Herbarium at Harvard University, this collection probably comprising the specimens used in the preparation of Hasse's *Lichen Flora of Southern California*. Our readers will recall also that our present Curator of Lichens, Mr. Plitt, is busily working over a large collection of duplicates from the lichen herbarium given to the Sullivant Moss Society by Mrs. Hasse and numbering several thousands of specimens, and that sets of these lichens from the Lichen Herbarium of the Society are now being issued to subscribers. Dr. Fink's article includes a list of thirty-two published papers on lichens written by Dr. Hasse. This biography and the one written by Plitt,[6] for the BRYOLOGIST together constitute a valuable record of the life and work of one of America's foremost lichenists.

O. E. J.

The Vegetation of Connecticut.—In a former number of the BRYOLOGIST[7] attention has been called to numbers I–IV of Nichols's "The Vegetation of Connecticut." Number V is entitled "Plant Societies along Rivers and Streams"[8] and the author considers in considerable detail the changes in vegetation that occur as a valley passes through the stages from youth to old age.

The Rock Ravine is first considered and, under the heading of "The Bryophytic Flora of Rock Ravines" lists are given:

(*a*) The hydrophytic species appearing on the rocky sides and bottom of the stream and on spray-dashed rocks at waterfalls: *Chiloscyphus rivularis*,

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[5] Fink, Bruce. Hermann Edward Hasse—Lichenist. Mycologia **8**: 243–248. Sept., 1916.

[6] Plitt, Charles C. Dr. Hermann Edward Hasse. BRYOLOGIST **19**: 30–33. March, 1916.

[7] BRYOLOGIST **19**: 49–50. May, 1916.

[8] Nichols, George E. The Vegetation of Connecticut. Bull. Torr. Bot. Club **43**: 235–264. May, 1916.

Scapania undulata, *Porella pinnata*, *Fontinalis dalecarlica*, *F. gigantea*, *F. Lescurii*, *Oxyrrhynchium rusciforme*, *Amblystegium fluviatile*, *A. irriguum*, *Hygrohypnum dilatatum*, *H. eugyrium*, and *H. ochraceum*.

(*b*) On periodically inundated rock surfaces: *Fissidens incurvus*, *Grimmia apocarpa*, *Racomitrium aciculare*, and *Brachythecium plumosum*.

(*c*) Along with "*b*" but usually on springy banks, or on continuously moist rock surfaces, where they may or may not be submerged during floods: *Conocephalum conicum*, *Pellia epiphylla*, *Plagiochila asplenioides*, *Lophocolea bidentata*, *Jubula pennsylvanica*, *Anthoceros laevis*, *Fissidens adiantoides*, *Mnium hornum*, *M. punctatum*, *Philonotis fontana*, *Thuidium delicatulum*, *Brachythecium rivulare*, *Climacium americanum*, and *Catharinaea undulata*.

(*d*) Wet or moist overhanging cliffs and precipitous cliffs higher up: *Marsupella emarginata*, *Plagiochila asplenioides*, *Scapania nemorosa*, *Radula complanata*, *Lejeunea cavifolia*, *Hymenostylium curvirostre*, *Didymodon rubellus*, *Anoectangium Mougeotii*, *Plagiopus Oederi*, *Plagiothecium denticulatum*, *Hylocomium brevirostre*, and *Thamnium alleghenience*.

(*g*) On crevices or rock faces of drier cliffs: *Metzgeria conjugata*, *Cephaloziella Hampeana*, *Porella platyphylloidea*, *Leucolejeunea clypeata*, *Frullania Asagrayana*, *Rhabdoweisia denticulata*, *Grimmia conferta*, *Ulota americana*, *Bartramia pomiformis*, *Hedwigia albicans*, *Neckera pennata*, *Haplohymenium triste*, *Anomodon attenuatus*, and *A. rostratus*.

Nichols notes that "Owing to their frequently intimate association with rock surfaces, no group of plants, with the possible exception of the lichens, is better qualified to demonstrate the influence of the chemical composition of the substratum on vegetation than the bryophytes." He notes that in Connecticut this influence is largely that of calcareous as against potassic rocks and gives in that connection the following lists:

Species favoring calcareous rocks (mostly on marble, some on trap): *Grimaldia fragrans*, *Preissia quadrata*, *Pellia Fabroniana*, *Lophozia badensis*, *Lophocolea minor*, *Cololejeunea Biddlecomiae*, *Frullania riparia*, *Saelania glaucescens*, *Fissidens cristatus*, *Cratoneuron filicinum*, *Hymenostylium curvirostre*, *Tortella tortuosa*, *Encalypta contorta*, *Mnium orthorrhynchum*, *Plagiopus Oederi*, *Myurella julacea*, *Amblystegiella confervoides*, and *Amblystegium noterophilum*.

Mostly restricted to potassic rocks (i. e. "lime-avoiding"): *Marsupella emarginata*, *Sphenolobus exsectus*, *Scapania nemorosa*, *S. undulata*, *Radula obconica*, *Andreaea petrophila*, *A. Rothii*, *Rhabdoweisia denticulata*, *Dicranum fulvum*, *Glyphomitrium incurvum*, *Racomitrium aciculare*, *Ulota americana*, *Pterigynandrum filiforme*, *Brachythecium plumosum*, *Sematophyllum carolinianum*, *Hygrohypnum dilatatum*, and *H. eugyrium*.

Farther on in the article Nichols discusses the boreal aspect of the vegetation in rock ravines, noting that locally rare Canadian plants such as *Lophozia alpestris*, *L. attenuata*, *Gymnostomum rupestre*, and *Polytrichum alpinum* have been collected only in rock ravines. Further he notes that of the bryophytic flora in the forests of these ravines "the mossy carpet of *Bazzania trilobata*, *Hylocomium splendens*, *Ptilium Crista-castrensis*, and *Hypnum Schreberi* which frequently covers the forest floor—likewise is strongly suggestive of the north."

In comparison with the bryophytic flora of the ravines in the Pittsburgh region[9] the reviewer is forcibly struck by the lack of correspondence in the characteristic mosses of the two regions, very few of the mosses emphasized by Nichols being important, or even present at all, in the sandstone and shale ravines of the Pittsburgh region. While no experts on the hepatics have worked in the Pittsburgh ravines, it can probably be definitely stated that there is here no such hepatic vegetation as is listed by Nichols for Connecticut, his lists of characteristic species being about two-fifths hepatics. His description of the boreal carpet recalls very vividly to the writer the bryophytic carpet in the spruce forests on the islands of northwestern Lake Superior and the islands and surrounding hills of the Lake Nipigon region in northwestern Ontario.

O. E. J.

EXCHANGE DEPARTMENT

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

Mr. Roy Latham, Orient, N. Y.—*Biatora rubella* (Ehrh.) Rabenh., and *Physcia obscura* (Ehrh.) Nyl. var. *endochrysea* Nyl.

Mr. C. C. Plitt, 3933 Lowndes Ave., Baltimore, Md.—*Cetraria islandica* (L.) Ach., collected in Maryland.

Mr. Severin Rapp, Sanford, Florida.—*Calicium trachylinum* Ach., and *Ricciella Sullivantii* (Aust.) Evans.

Mrs. Frank E. Lowe, 24 Brattle St., Worcester, Mass.—*Grimmia leucophaea* Grev., from Oklahoma.

[9] Jennings, O. E. Systematic and Ecological Notes on the Mosses of Western Pennsylvania. Bryologist **18**: 83–93. Nov. 1915.

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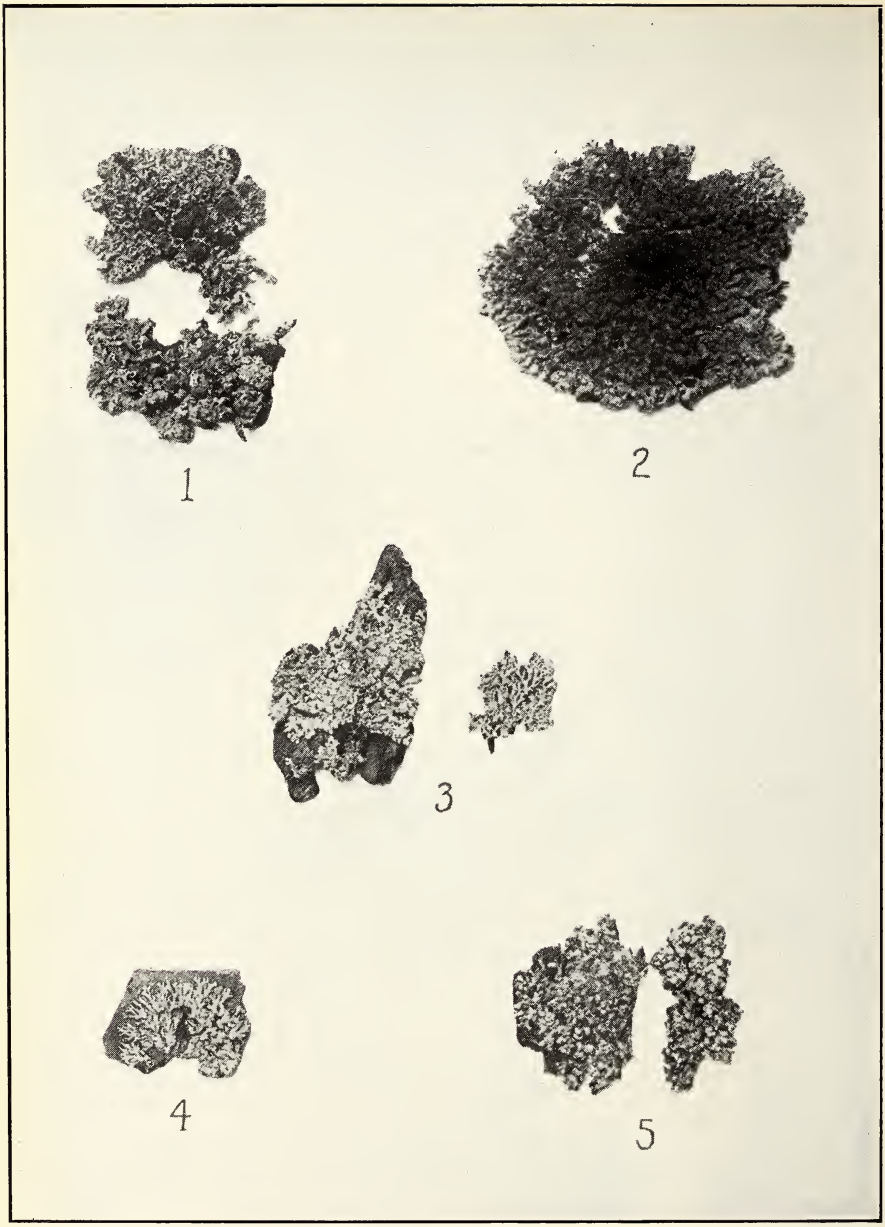


EXPLANATION OF PLATE XX

(Photographed natural size from specimens in the writer's herbarium)

Fig. 1. *Parmeliopsis placorodia* (Ach.) Nyl.
Fig. 2. *Parmeliopsis aleurites* (Ach.) Nyl.
Fig. 3. *Parmeliopsis aleurites* var. *diffusa* (Ach.) Riddle.
Fig. 4. *Parmeliopsis ambigua* (Wulf.) Nyl.
Fig. 5. *Parmeliopsis diffusa* (Weber) Riddle.

THE BRYOLOGIST

VOL. XX SEPTEMBER, 1917 NO. 5

THE GENUS PARMELIOPSIS OF NYLANDER[1]

LINCOLN W. RIDDLE

(With Plate XX)

The writer's interest in the group of lichens to be discussed in this paper was first aroused by collecting from an old fence in Needham, Massachusetts, a small, gray, foliose lichen, densely covered with isidia, and suggesting *Parmelia rudecta* Ach., but lacking the white punctations of that species. In subsequent collecting the lichen was found to grow also on the bark of pines, and proved to be common in Massachusetts, although apparently not much collected. A comparison with material in the Tuckerman Herbarium showed that the plant was what he had called *Cetraria aleurites* (Ach.) Th. Fr. But when the European authorities were consulted, it was found that there was much confusion in their interpretation of the *Lichen aleurites* of Acharius. Visits to the leading European herbaria in 1912–1913, including the original herbarium of Acharius now in the Botanical Museum at Helsingfors, gave an opportunity to study first hand the problem of *Lichen aleurites* and its allies.

These lichens have been known by American students under the names used in Tuckerman's "Synopsis of North American Lichens": *Cetraria aleurites*, *Cetraria aleurites* var. *placorodia*, *Parmelia ambigua*, and *Parmelia ambigua* var. *albescens*. Tuckerman thus considered two of these to be varieties of the other two, but most authors hold the view that there are four distinct species, and as will be shown later there are actually five recognizable forms. A glance at the synonymy cited below under the species *aleurites* will show how various have been the ideas in regard to the affinites of this plant. Furthermore, although Tuckerman and others have distributed these lichens between two genera, they are closely related, this close relationship leading to the confusion which has existed in regard to the names.

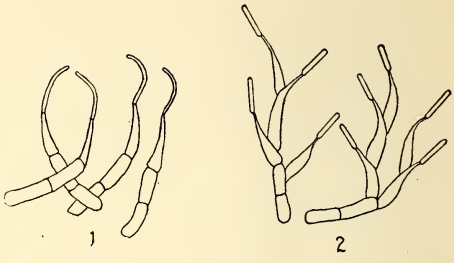
For this group of species, Nylander in 1861 (Lichenographia Scandinaviae, p. 105) proposed the name Parmeliopsis as a section of the genus Parmelia. Five years later (Lichenes Lapponiae Orientalis in Not. Sällsk. pro F. et Fl. Fenn. Forh. n. s. 5: 121) he established Parmeliopsis as a genus with *Lichen ambiguus* Wulfen as the type-species; and he continued this treatment of the group in the part of the second volume of his Synopsis Lichenum (page 53) published in 1888.[2]

[1] Read at the December, 1916, meeting of the Sullivant Moss Society, New York City.

[2] This part of the Synopsis Lichenum bore no date. The date of publication as given by various authors varies considerably. I am adopting the date given by the Abbé Hue, who should certainly have been in a position to know.

The July number of the BRYOLOGIST was published August 15, 1917.

The genus is distinguished from Parmelia by a purely technical character. In the spermagonia of Parmelia, the spermatia are borne laterally from joints of the sterigmata ("fulkren endobasidial" of Zahlbruckner, see text-figure 2) while in Parmeliopsis the spermatia are terminal only ("fulkren exobasidial," see text-figure 1). This distinction would be of doubtful generic value if it were not for the fact that these species obviously form a natural group, not conveniently classified with either Parmelia or Cetraria. It is an advantage, therefore, to have a name to designate the group, and Zahlbruckner (Engler and Prantl: Die Natürlichen Pflanzenfamilien, Teil I, Abteilung I,* p. 209, 1905) has accepted Nylander's name and conception of the group.



Sterigmata and spermatia of Parmeliopsis (fig. 1) and of Parmelia (fig. 2). Semi-diagrammatic.

The generic name to be used is, however, of less importance than the question of the specific names. But before discussing the nomenclature it will be well to have in mind the distinctive characters of the plants that are to be considered. There are four species, all foliose, and more or less closely appressed to the fence-rails, or to the bark of conifers upon which they grow:

A. A lichen with gray upper side, whitish under side, radiating lobes, and entirely free from isidia or soredia (Plate XX, fig. 1).

B. A lichen with gray upper side, whitish under side, occurring in two forms: the typical form with radiate lobes and dense isidia (Plate XX, fig. 2), and a variety with irregular lobes and scattered isidia (Plate XX, fig. 3).

C. A lichen with gray, often dirty-looking, upper side, and dark (castaneous to black) under side, with radiate lobes and powdery white soredia (Plate XX, fig. 5).

D. A lichen with straw-colored or sulphury upper side, dark (castaneous to black) under side, more or less radiate lobes, and soredia which are sulphury to distinctly yellow (Plate XX, fig. 4).

To give some idea of the confusion that exists, it may be pointed out that the name *placorodia* has been applied to forms A and B, the name *aleurites* to forms B and C, the name *diffusa* to forms B, C, and D. The isidiose plant, B, has been called *placorodia*, *aleurites*, *diffusa*, and *obsessa!*

The writer has adopted the names used in this paper after a careful study of all the types in the herbarium of Acharius. After repeated attempts to obtain information in regard to Weber's type of *diffusa* from the curator of the herbarium at Goettingen, without receiving any reply, it has been necessary to depend upon Weber's original description. This is, however, a long and detailed description, and as will be shown can apply to one of these plants only.

Most of the perplexity in the nomenclature of the species of Parmeliopsis has arisen through the confusion of the isidiose plant "B," with the sorediate plant "C" and through the confusion of the names *aleurites* and *diffusa*. It will, therefore, be convenient to discuss the two together. In trying to clear up the confusion, it is necessary to keep in mind that species "B" is isidiose above and pale beneath, while species "C" is sorediate above and dark brown to black beneath. The confusion between the two seems to have originated with Acharius himself in the use of the word "farinosus" (mealy) in his original description of *Lichen aleurites* (Lichenographiae Prodromus, p. 117) and his subsequent use of the word "pulverulentus" (powdery) in the description of *Parmelia aleurites* in the Synopsis Lichenum (page 208), these terms evidently applying to plant "C." But in both descriptions the plant is said to be "subtus cinerascens" (ashy beneath), which could apply only to plant "B." Nothing is said in Acharius' descriptions about isidia, although he uses the term "coralloideus" in describing the comparable isidiose species, *Parmelia rudecta*. When we turn to the plates cited by Acharius, we find the same confusion existing. The figures in Hoffmann's Enumeratio Lichenum (*Pl. 10, fig. 2.* 1784.) and in Dickson's Fasciculus Plantarum Cryptogamicarum Brittaniae (*Fasc. 3, t. 9, fig. 6.* 1793.) are too poor to show which plant is intended. In Hoffmann's Plantae Lichenosae (*T. 65, fig. 2.* 1801.) the figure represents what is here referred to as plant "A," while the text describes our plant "C." In the English Botany (*T. 858.* 1801.) the figure represents clearly an isidiose plant, but the text describes a sorediate plant.

The question could be settled only by examining the Acharian types. This the writer has done. The type of *Lichen aleurites* consists of six specimens mounted together on one sheet. Five of the specimens (four from Sweden and one from Germany) are all alike and are the radiate, densely isidiose plant, "B"! The sixth specimen is the stramineous, sorediate plant "D," and as Acharius invariably refers to his species as cinereous, the presence of this plant on the sheet must have been a slip. There can be no doubt, then, that the name *aleurites* Ach. should be used for the isidiose plant, "B."

In the application of the name *diffusus* Weber, it would seem as if there could be little doubt, although the synonymy cited below would indicate that there has been plenty of confusion. Weber's original description (Spicil. Flor. Goett., p. 250. 1778.) is unusually full and states: "In centro pulverulentus est . . color superne ex glauco albescens, inferne *ater*." This certainly can not apply to a plant that is isidiose above and whitish to ashy beneath. Neither can it be applied, as Theodore Fries has done (in Lichenes Arctoi, p. 60, and in Lichenographia Scandinavica, p. 131) to a plant that he describes as "totus ochroleucus." The name *diffusus* Web. must be used for the gray sorediate plant with dark under side that is here discussed as "C."

Nylander in addition to misapplying the name *aleurites* to the sorediate plant, has applied the name *placorodia* Ach. to the isidiose plant. Acharius' original description (Synopsis Lichenum, p. 196. 1814.) applies exactly to the species here called "A," and does not mention isidia or soredia. The type-

specimen came from North America, being sent to Acharius by Muhlenburg. It is the plant distributed under the name *placorodia* by Tuckerman in his Lichenes Americae Septentrionalis Exsiccati No. 71. Nylander's use of the name for the isidiose plant is, therefore, incorrect and should not be continued.

With few exceptions authors have correctly applied the name *ambiguus* Wulfen. The original description (in Jacquin's Collectanea Botanica **4**: 239. 1790.) states that the plant is "flavo-virescens . . tuberculis concoloribus farinaceis" and the accompanying plate (*T. 4, fig. 2.*) shows the plant here referred to as "D."

There remain to be considered three other names that have been connected with the species under discussion. These are *aleurites* var. *diffusa*, *hyperopta*, and *obsessa*, all of Acharius (see synonymy given below for bibliographical references). The type of *Parmelia aleurites* var. *diffusa* Ach. is made up of three specimens, one from Sweden, one from Germany (collected by Schreber), and one from France (collected by Dufour), all essentially the same, and closely related to *aleurites* but smaller, with the lobes more irregular, and the isidia finer and more scattered. The writer has collected material of this variety in Sweden, not far from Stockholm and, therefore, in the region in which Acharius lived. It is not uncommon in New England, and appears to be a form due to less favorable conditions in the habitat. It is, however, clearly recognizable and should be retained as a valid variety. The type-specimen of *Parmelia hyperopta* Ach. from Switzerland is in poor condition but represents the species already named *Lichen diffusus* by Weber. *Parmelia obsessa* Ach. (not Montagne, which is a *Physcia*) is represented by a specimen collected by Muhlenburg in North America. It is closest to *aleurites*, being copiously isidiose, but the under side is dark. It may best be regarded as an aberrant form of *Parmeliopsis aleurites*.

It will be convenient to sum up this discussion by giving a key to the North American representatives of the genus Parmeliopsis, with the diagnoses and synonymy of the species.

A. Thallus without isidia or soredia. 1. *placorodia*

AA. Thallus with either isidia or soredia.

B. Thallus with isidia.

C. Lobes regularly radiate and isidia densely crowded. 2. *aleurites*

CC. Lobes more or less irregular and isidia fine and scattered. 2a. *aleurites* var. *diffusa*

BB. Thallus with soredia.

C. Thallus yellowish with sulphury soredia. 3. *ambigua*

CC. Thallus gray, with whitish soredia. 4. *diffusa*

Note that all the species have the same habitat, namely, old fence-rails, and the bark of conifers, especially of Pinus rigida.

1. Parmeliopsis placorodia (Ach.) Nyl.

Parmelia Ach. Syn. Lich. 196. 1814.

Parmeliopsis Nyl. Flora **52**: 445. 1869. as to nomenclature but not as to characters or plant!

Cetraria aleurites var. *placorodia* Tuck. Syn. N. A. Lich. **1**: 32. 1882.

Thallus orbicular, 1.5–3 cm. in diameter, thicker, more ascendant, and less closely adherent than in the other species; whitish to cinereous above, smooth at the circumference, rugose toward the center; never isidiose or sorediate; beneath whitish, with a few pale rhizoids; lobes 1–2 mm. wide, more or less regularly radiate, the tips sinuate-pinnatifid. Upper cortex 15–25μ thick, loosely and irregularly pseudoparenchymatous with thick-walled cells, 10–12μ in outside diameter, the lumina 3–6μ in diameter; lower cortex 15–30μ thick, well-developed, compact, and chondroid, the divisions between the cell-walls not visible, the lumina 2–4μ or rarely up to 6μ in diameter. Apothecia usually numerous, elevated, 1–8 mm., mostly 3 mm., in diameter; disk fulvous to badious,[3] flat or concave; thalline margin crenate, thin, often involute. Spores broadly ellipsoid, 5–9×3.5μ. Spermagonia frequent, occurring in the form of conspicuous, shining black tubercles.

Specimens examined from: Massachusetts (8 towns), Rhode Island, New Jersey, Maryland, District of Columbia.

Exsiccati: Tuckerman's Lich. Amer. Sept. No. 71. Decades N. A. L. No. 280. Lich. Bor. Am. No. 210. Merrill's Lich. Exs. No. 144.

Parmeliopsis placorodia differs from the other species of the genus in the absence of isidia and soredia. From all species of Parmelia it can be distinguished by the whitish, sparingly fibrillose, under side; from Cetraria by the color combined with the relatively narrow, radiate lobes.

2. Parmeliopsis aleurites (Ach.) Nyl.

Lichen Ach. Lich. Prodr. 117. 1798.

Parmeliopsis Nyl. Not. Sällsk. pro F. et Fl. Fenn. Forh. n. s. **5**: 121. 1866. as to nomenclature but not as to characters or plant!

Cetraria aleurites Th. Fr. Lich. Scand. 109. 1871. Tuck. Syn. N. A. L. **1**: 32. 1882.

Parmeliopsis placorodia Nyl. according to specimens in the Mus. d'Hist. Nat. Paris!

Platysma diffusum Nyl. Flora **55**: 247. 1872. Crombie Brit. Lich. **1**: 222, 1894, according to specimens in the British Museum! Not *Lichen diffusus* Weber.

Parmelia obsessa Ach. Syn. Lich. 213. 1814. according to type-specimen in the Botanical Museum, Helsingfors. Not *Parmelia obsessa* Mont.

Thallus orbicular, mostly 2–4 cm. in diameter, closely adherent to the substratum, whitish to cinereous or even fuscescent above, smooth at the circumference, otherwise densely covered with closely packed isidia; in old specimens the center becoming cracked, rimose-areolate and subcrustose, the isidia sometimes appearing white from abrasion, but the plant never sorediate; beneath whitish and rugose, with a few pale rhizoids. Lobes and anatomical structure as in *P. placorodia*. Apothecia rare, when present sometimes reaching 6 mm. in diameter, but usually 2–3 mm.; disk badious, concave; thalline margin crenate,

[3] According to color-chart in Saccardo's Chromotaxia.

lobulate, or tuberculate. Spores as in *P. placorodia.* Spermagonia rare, when present similar to those of *P. placorodia.*

Specimens examined from: New Hampshire, Vermont, Massachusetts (8 towns), Connecticut, Pennsylvania.[4]

The strongly isidiose thallus, with radiate lobes, and pale under side, is the distinguishing character of this species. There is no species of Cetraria that could possibly be confused with it. The whitish under side should easily separate it from all species of Parmelia, with the possible exception of *Parmelia rudecta* Ach. from which it differs in the smaller thallus, the narrower lobes, and the absence of white punctations.

2a. **Parmeliopsis aleurites** var. **diffusa** (Ach.) Riddle **comb. nov.**

Parmelia Ach. Lich. Univ. 485. 1810. not *Lichen diffusus* Web.

Agreeing with the typical form of the species in color, but the lobing irregular, and partly imbricate, and the isidia finer, fewer, and more scattered.

Habitat as in the species, but commoner on the bark of conifers.

Specimens examined from: New Brunswick, New Hampshire, Massachusetts (2 towns), New Jersey, Maryland, South Carolina, Georgia.

According to the Vienna Code of Botanical Nomenclature (Article 53), the names *aleurites* var. *diffusa* Ach. and *diffusa* Weber may both be retained in the genus Parmeliopsis since they designate groups of different rank. *P. aleurites* var. *diffusa* is always isidiose, never sorediate; while *P. diffusa* is never isidiose, always sorediate.

3. Parmeliopsis ambigua (Wulf.) Nyl.

Lichen Wulfen in Jacquin Coll. Bot. **4**: 239, *t. 4, fig. 2.* 1790.

Parmeliopsis Nyl. Not. Sällsk. pro F. et Fl. Fenn. Forh. n. s. **5**: 121. 1866.

Squamaria Hoffm. Pl. Lich. *t. 40, figs. 3–4.* 1794. good figure!

Parmelia ambigua Ach. Meth. Lich. 207. 1803. Tuck, Syn. N. A. L. **1**: 66. 1882.

Parmelia diffusa Th. Fr. Lich. Arct. 60. 1860. Lich. Scand. 131. 1871. Not *Lichen diffusus* Weber.

Thallus orbicular, usually 1–2 cm. in diameter, occasionally up to 5 cm., closely adherent to the substratum, from ochroleucous to distinctly yellow above, smooth toward the circumference, becoming rimulose and broken at the center, more or less covered with an effused mass of sulphury or yellowish, powdery soredia, or, in other cases, the soredia occurring in scattered, subpedicellate soralia, never isidiose; beneath castaneous to black, with scattered black rhizoids; lobes 1–2 mm. wide, more or less regularly radiate, and more deeply cleft and more discrete than is usual in the two preceding species. Upper cortex as in *P. placorodia;* lower cortex compact and chondroid, well-developed but

[4] It seems to the writer that this species must be more widely distributed than the stations cited would indicate. He would be glad to receive specimens of any species of Parmeliopsis from any localities not listed in this paper. Through the kindness of Prof. Bruce Fink, the writer has examined the specimens upon which was based the record of *Parmelia aleurites* in the Lichens of Minnesota (Contrib. U. S. Nat. Herb. **14**: 197. 1910). They prove to belong to *Parmelia aurulenta* Tuck., and are, therefore, not to be included in the present group.

thin, 12–15μ in thickness, with minute lumina, about 2μ in diameter. Apothecia rare, 1–3 mm. in diameter; disk badious or darker, flat becoming convex; thalline margin subentire, or crenulate, becoming thin. Spores oblong, straight or curved, 10–12×2–3μ. Spermagonia minute, immersed in the thallus, and indicated by a darkened spot on the surface.

Specimens examined from: Alaska, Northwest Territory, British Columbia, Alberta, Greenland, Newfoundland, Maine, New Hampshire, Vermont, Massachusetts, New Jersey, Virginia, South Carolina, Alabama, Michigan, Wyoming, Colorado.

Exsiccati: Decades N. A. Lich. no. 108. Macoun Canad. Lich. no. 239 in part.

The color will distinguish this from any other species of the present genus. Sorediate species of Cetraria with similar coloration have the soredia confined to the margins. The only species of Parmelia that has comparable characters grows on rocks.

4. **Parmeliopsis diffusa** (Weber) Riddle **comb. nov.**

Lichen Weber Spicil. Flor. Goett. 250. 1778.

Parmeliopsis aleurites Nyl. according to specimens in Mus. d'Hist. Nat. Paris! Not *Parmelia aleurites* Ach.

Parmelia hyperopta Ach. Syn. Lich. 208. 1814. Th. Fries Lich. Scand. 120, 1871, according to type-specimen!

Parmeliopsis hyperopta Arnold Flora **62**: 329. 1879. Wainio Medd. Soc. F. et Fl. Fenn. **6**: 127. 1883. Zahlbr. in Engler & Prantl: Natürliche Pflanzenfamilien, Teil I, Abteilung I,* p. 209. 1905.

Parmelia ambigua var. *albescens* (Wahl.) Schaer. Enum. Lich. Europ. 47. 1850. Tuck. Syn. N. A. L. **1**: 66. 1882.

Thallus suborbicular, 1.5–3 cm. in diameter, closely adherent to the substratum, whitish to cinereous or subfuscescent above, smooth and even nitid toward the circumference, rimulose and becoming broken at the center, with more or less elevated balls of soredia, which are typically white, sometimes dirty-cinereous, scattered or densely packed toward the center, rarely becoming an effused, powdery mass (this condition less common than in *P. ambigua*) never isidiose. Remaining characters as in *P. ambigua*.

Specimens examined from: Alberta, Ontario, Labrador, Maine, New Hampshire, Washington.

Exsiccati: Decades N. A. L. no. 109. Macoun Canad. Lich. no. 239 in part.

In spite of the undeniably close relationship of this species with the preceding, it would seem logical to consider it a valid species rather than a variety, since the difference between ochroleucous and cinereous coloration is recognized to be of constant specific value in both Cetraria and Parmelia. The whitish soredia will distinguish *Parmeliopsis diffusa* from any other species of the genus, and also from any American species of Cetraria. It is much smaller than most species of Parmelia. It might possibly be confused with depauperate and adherent specimens of *Parmelia physodes*, which grows on the same substrata and is often sorediate, but in that species the soredia are always confined to the tips of the lobes. From sterile specimens of such sorediate Physcias as *Ph. crispa*

and *integrata* var. *sorediosa*, apart from the difference in distribution, the anatomy of the thallus and the darker coloration of the under side would serve as a distinction.

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PRELIMINARY NOTES ON THE LICHENS OF WHATCOM COUNTY, WASHINGTON[1]

A. C. Herre

Whatcom County occupies the northern one of the northwest corners of the United States, as the state of Washington has what one might well call two northwest corners. This is due to the folding of the international boundary which turns southward from the 49th parallel to the strait of Juan de Fuca and then westerly to the Pacific. The county, which has a length of about 90 miles with a north and south breadth of 25 miles, has an area of 2226 square miles.

Excluding Lummi Island which lies just off the southwest corner of the county and which attains a height of about 1800 feet, the county is all on the mainland. It divides naturally into two physiographic provinces; the western fourth is largely a forest covered plain, consisting of the valleys of the Nooksack and Sumas rivers and the rolling uplands between them and southward, much of it less than 100 feet above sea level. It is bounded on the west by the Gulf of Georgia and Puget Sound; the remaining portion of the county lying to the eastward of this region of little elevation is covered by the Cascades. The plain is crossed from east to west by the Nooksack river and its tributaries but in the main the original topography has been greatly altered by glacial action and deposits which destroyed the old drainage, leaving many gravelly eskers, kames, ponds, sphagnum swamps, cranberry marshes, and peat bogs. The western fourth of the county contains all the cleared land and practically all the population.

The eastern three-fourths is a wild and little visited region of exceedingly rugged mountains which form a maze of irregular ranges. The main divide of the Cascades here has an elevation of between 6000 and 7000 feet and is clad in perpetual snow. Several peaks range from 8000 to 9000 feet in altitude while the mountains culminate in Mt. Baker, a huge volcano 10,780 feet in height. Mt. Baker and Mt. Shuksan have many large glaciers on their flanks, while a few hundred feet below the dome-like summit of Mt. Baker, at the so-called crater, is a vent from which come sulfurous gases and vapor.

Excluding the arctic realm of the higher mountains, and the alpine meadows more or less common above 5000 feet, the entire region was originally covered by the typical dense coniferous forest of the Puget Sound Valley. The principal lumber trees were and still are *Pseudotsuga mucronata* and *Thuya plicata*, though the giant trees reaching a height of from 200 to 300 feet have practically

[1] Presented at the December, 1916, meeting of the Sullivant Moss Society, New York City.

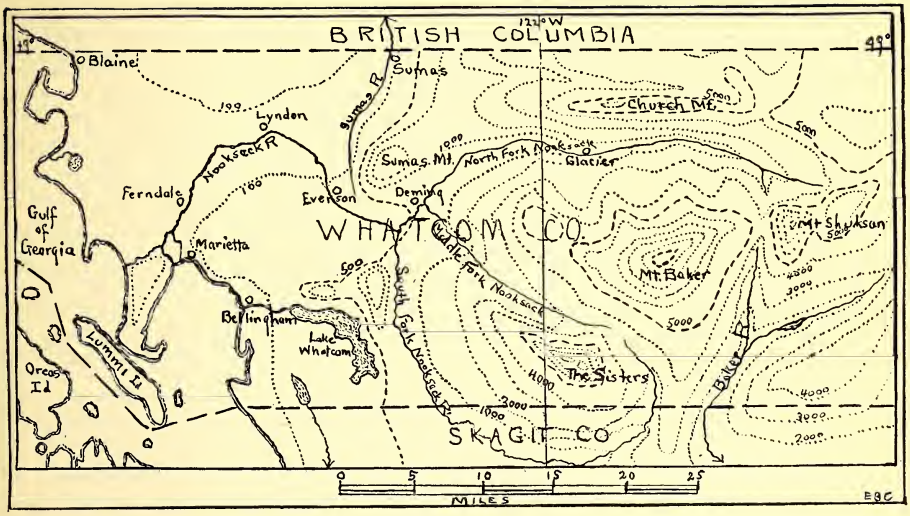

FIG. 1—Sketch-map of the western portion of Whatcom County, Washington.

disappeared from the inhabited district. The above often originally formed nearly pure stands over large areas but mixed with them occur more or less frequently *Tsuga heterophylla*, *Abies grandis*, and *Picea sitchensis*. Now and then in a bog is found a patch of *Pinus contorta*. In the higher mountains are extensive forests of *Tsuga mertensiana*, and still higher are four species of *Abies*, *Taxus brevifolia*, and *Chamaecyparis nootkatensis*. *Pinus monticola* is occasional at all altitudes.

Intermingled with the conifers are patches of greater or lesser extent, especially on low ground, of various deciduous trees. *Alnus oregana* is the most abundant of these; *Betula occidentalis*, *Acer macrophyllum*, *Acer circinatum*, *Prunus emarginata erecta*, *Populus trichocarpa*, *Pyrus diversifolia*, *Pyrus sitchensis*, *Rhamnus purshiana*, *Salix lasiandra Lyallii*, and *Salix scouleriana* are practically all the trees of any importance.

Weather records kept at Bellingham for a number of years past show a mean annual precipitation of about 31.5 inches. Back a few miles from salt water the rainfall is two or three inches less, with much greater extremes of both heat and cold. At my home twelve miles from Bellingham the thermometer has dropped to 8 degrees below zero, Fahr., and has risen to over 90 degrees above. The rainfall is mostly distributed through the winter and spring months; in the summer the precipitation is scanty or even altogether absent for several months, but throughout the year there is a good deal of foggy or cloudy weather. The western portion of Whatcom County lies in the rainshadow of the Olympics and the mountains on Vancouver Island, hence the relatively light precipitation. As one ascends the Cascades the rainfall rapidly increases, so that at a height

of a few thousand feet it rises to 80 or 90 inches, or even more. The average annual snowfall in the western portion is 10 inches, but every few winters there may be three or four feet of snow on the level, while every winter in the higher mountains it falls to a depth of 20 or 30 feet.

In this rainy mountain belt lichens grow to a greater size and are much more evident than elsewhere. From about 1000 to 3000 feet the *Lobaria pulmonaria* formation is dominant; *Cetraria glauca*, *Cetraria lacunosa stenophylla*, *Sphaerophorus globosus*, and several *Usneas* of only moderate size form the chief secondary elements of this formation.

For the next two thousand feet *Lobaria oregana* is the principal lichen, absolutely covering the basal portions of the trunks of the hemlocks which here compose most of the forest.

Just below the timber line the *Alectoria* formation becomes notably conspicuous, the chief elements in it being *Alectoria jubata implexa*, *Alectoria sarmentosa*, *Usnea plicata*, and *Nephromopsis platyphylla*.

Above the snow line earth lichens are abundant on the patches of soil exposed, and rock lichens occur on some of the rocks which for the most part are bare. Their occurrence, so far as yet known to me, will be noted in the list following.

In the lowland forested region earth lichens are comparatively rare, while rock lichens are altogether absent except on an occasional erratic glacial boulder. Several species of *Peltigera* are common on earth but hardly abundant enough or sufficiently confined to earth to be named as a separate formation, unless it might be *Peltigera aphthosa*. The original botanical features of this region are very rapidly vanishing; not only has the primeval forest practically disappeared, but the logged off lands are rapidly becoming altered through the combined influences of the annual increase in the area of cleared land, and the ravages of great fires which sweep over many square miles nearly every year. But for many years the eastern portion of the county will furnish to the adventurous and hardy, able to pick a way through the pathless wilderness and carry necessary supplies, a glimpse into the virgin wilderness.

It is quite evident that lichens have never been so prominent an ecological factor here as in some other regions, as for instance the Santa Cruz Peninsula, California. Mosses and liverworts are here so conspicuous that they make our lichens quite insignificant. There are here none of the enormous expanded Parmelias and other foliaceous forms, or dense masses of greatly elongated Usneas and Ramalinas, so characteristic of the Californian coastal woods. Lichens there are in plenty, and the *Parmelia saxatilis* formation is really quite marked on the small limbs of various trees, but the lowland lichens are not flaunted to the breeze or markedly evident. One must hunt for them. My first impressions of the lichen flora in the Puget Sound forest were painfully disappointing.

I have had very little opportunity to do any botanical work since coming to Washington, and though I have collected at every opportunity much of my material is as yet unworked. I have observed the lichens over most of the lowland, have made one trip into the mountains immediately bordering the lowland, and thrice have ascended Mt. Baker. It is to be regretted that I have

been unable to visit the ranges lying further eastward where one may confidently expect a considerable increase to the tentative list of 124 names herewith appended:

VERRUCARIA NIGRESCENS Pers. Rare; on Sumas Mt. at 2500 feet. Specimens not typical, spores 9½–10 by 16½–22μ.

VERRUCARIA PULVERULENTA Ach. Occurring with *Graphis scripta* on bark in the lowlands.

CALYCIUM HYPERELLUM Ach. Abundant on the trunks of *Pseudotsuga mucronata*, along the upper portions, 50 feet and more from the ground.

CALYCIUM POLYPORAEUM Nyl. On a *Polyporus*, Sumas Mt., at 2000 feet.

CYPHELIUM INQUINANS (Sm.) Trevis. Abundant on lower portion of trunks of large specimens of *Pseudotsuga mucronata;* throughout the lowlands; spores smaller than I find them elsewhere, 8 by 11–13.5μ. Also occurring on old cedar rails and posts.

SPHAEROPHORUS GLOBOSUS (Huds.) Herre. Abundant on tree trunks; slopes of Mt. Baker, 1000 to 4000 feet.

ARTHONIA RADIATA (Pers.) Th. Fr. Common on trees in the lowlands.

ARTHONIA RADIATA var. SWARTZIANA (Ach.) Willey. On bark of *Acer circinatum*.

OPEGRAPHA VARIA Pers. Very abundant on the trunks of large specimens of *Populus trichocarpa* along the Nooksack river, and also on *Acer macrophyllum* in the forested lowlands.

GRAPHIS SCRIPTA (L.) Ach. Very common on various smooth barked trees.

GRAPHIS SCRIPTA PULVERULENTA Ach., and other varieties also occur.

THELOTREMA LEPADINUM Ach. On alder, Sumas Mt., at 1600 feet.

LECIDEA SANGUINEO-ATRA (Wulf.) Ach. On *Pseudotsuga mucronata*.

LECIDEA RUBIFORMIS Wahlenb. On earth and rocks; Mt. Baker, at 6000 feet. Spores small, 4 by 6 5–8μ.

LECIDEA CONTIGUA Fr. On Mt. Baker above the snow line; specimens not typical; spores sub-globose, ovoid ellipsoid, and ellipsoid, 7½–12½ by 12–20μ.

LECIDEA TESSELLATA Flk. On rocks, Mt. Baker; poorly developed.

LECIDEA ARCTICA Sommerf. On dead moss, Mt. Baker, 6000 to 7000 feet. Spores 8 by 13–16μ, with conspicuous oil drops.

LECIDEA RIVULOSA Ach. Mt. Baker above snow line; occurring on dead moss, in very tiny patches mixed with other lichens.

LECIDEA PARASEMA Ach. Common on various trees in the lowland.

LECIDEA ANTHRACOPHILA Nyl. The late Dr. Hasse and myself both placed this specimen here though the spores are short for the species. On a charred stump at 2000 feet elevation, Sumas Mt.

MEGALOSPORA SANGUINARIUS (L.) Th. Fr. Occasional on bark of Douglas spruce in the lowlands.

BACIDIA ALBESCENS (Anzi) Zwackh. On the shaded side of *Sambucus* and on Douglas spruce; spores 1.4–2.7 by 38–44μ.

BACIDIA FUSCO-RUBELLA (Hoffm.) Arn. On Sumas Mt.; spores 2.5–3 by 47–72μ.

Rhizocarpon petraeum (Wulf.) A. Zahlbr. Hardly agreeing with typical form but not belonging elsewhere. Sumas Mt., at 2500 feet.

Rhizocarpon geminatum (Elot.) Koerber. With *R. geographicum;* spores 13–22 by 21–40μ.

Rhizocarpon geographicum (L.) DC. At 5500 feet and above on Mt. Baker.

Baeomyces byssoides (L.) Schwer. Common on old stumps, logs, and on earth, in the wooded lowlands.

Stereocaulon paschale var. conglomeratum Fries. Not rare on the slopes of Mt. Baker, especially above the snow line. We may have two or more species but the material is too depauperate to place with certainty.

Thamnolia vermicularis (Sw.) Ach. Abundant on exposed patches of soil amid the snow fields of Mt. Baker at 6000 feet and above.

Cladonia rangiferina (L.) Web. Rare; on Mt. Baker, 4500 feet.

Cladonia sylvatica (L.) Hoffm. Rare; Mt. Baker, at about 5000 feet.

Cladonia bellidiflora (Ach.) Schaer. On rocks, Mt. Baker, 4500 feet.

Cladonia macilenta Hoffm. Occasional on rotten logs and stumps throughout, at least to an elevation of 4000 feet.

Cladonia bacillaris (Del.) Nyl. On rotten logs in the lowlands and foothills.

Cladonia cristatella Tuck. On Mt. Baker at 5000 feet.

Cladonia verticillata Hoffm. var. evoluta Th. Fr. On rotten logs in the foothills.

Cladonia squamosa (Scop.) Hoffm. On rotten logs in lowland and foothills.

Cladonia gracilis dilacerata Floerke. This, and several other varieties, occur on mossy logs in the forested lowlands.

Cladonia pyxidata (L.) Fr. Common in the lowlands on mossy logs and stumps.

Cladonia furcata racemosa Floerke. On Lummi Island and probably throughout the mainland of the county.

While we have a number of species of *Cladonia* they are not specially conspicuous. The above list will be readily added to when they are further collected.

Pilophoron cereolus Hallii Tuck. Common on rocks, especially among mosses on the under side of overhanging ledges; Sumas Mt., 2500 feet, and Mt. Baker at 4500 feet.

Pilophoron cereolus acicularis (Ach.) Tuck. Common on Mt. Baker at from 4000 to 5000 feet.

The *Gyrophora* group is not particularly well developed or represented here in my collections as yet. All my trips on Mt. Baker have been on the north or northwest side and I have no doubt that further investigation on the southward slopes will reveal a number of other species as well as a more abundant growth of the species here indicated. The five here listed are all from Mt. Baker at 6000 feet (the glacier line on the northwest) and above.

Gyrophora cylindrica (L.) Ach.

Gyrophora reticulata (Schaer.) Th. Fr.

Gyrophora hyperborea (Hoffm.) Ach.

Gyrophora rugifera (Nyl.) Th. Fr.

Gyrophora erosa (Web.) Ach.

A stranger would naturally anticipate a large development of the Collemaceous lichens but they are few and far between in all the localities thus far visited. But one species of *Collema* has thus far been determined with certainty and three of *Leptogium*, while at no place are they abundant.

Collema nigrescens (Leers) Wainio. Among mosses on trunks of *Acer macrophyllum*.

Collema sp. Material small, sterile; growing among mosses near the snow line on Mt. Baker.

Leptogium tenuissimum (Sm.) Koerber. On *Selaginella* sp., at 1600 feet on Sumas Mt.

Leptogium palmatum (Huds.) Mont. On earth at 2000 feet; Sumas Mt.

Leptogium pulchellum (Ach.) Nyl. Among mosses on the trunks of *Acer macrophyllum*, probably throughout the lowlands, but rare everywhere; determination somewhat doubtful, material submitted to Dr. Fink, and Dr. Hasse, was not recognized by them and it does not agree with any material seen by me or descriptions read but evidently belongs under the type of *pulchellum*.

Leptogium tremelloides (L.) Gray. A minute specimen of this was found growing with *Parmeliella microphylla*, on rocks on Sumas Mt.; spores 8–10 by 18–27μ.

Heppia virescens (Despr.) Nyl. 7000 feet and above, Mt. Baker, on dead mosses.

Massalongia carnosa (Dicks.) Koerber. Same locality as, and mixed with, *Heppia virescens*.

Parmeliella microphylla (Sw.) Müll. Arg. Among mosses on rocks; slopes of Mt. Baker and Sumas Mt., and undoubtedly common everywhere in the mountains.

Parmeliella cyanolepra (Tuck.) Herre. Sterile; Sumas Mt. at 1800 feet.

Parmeliella lepidiota (Sommerf.) Herre (?). A sterile lichen occurring on Mt. Baker and Sumas Mt. is with little doubt this species.

Lobaria pulmonaria (L.) Hoffm. On various trees but not common, throughout the lowlands; very abundant in the rainy forest belt on the slopes of Mt. Baker between 1000 and 3000 feet.

Lobaria oregana (Tuck.) Herre. Very abundant on trunks of hemlocks on Mt. Baker from 3000 to 5000 feet elevation.

Sticta anthraspis Ach. Rare; near Glacier at about 1000 feet elevation; specimens small and sterile.

Nephroma helvetica Ach. On *Acer circinatum*, Glacier, elevation 950 feet.

Solorina crocea (L.) Ach. Abundant and very finely developed on earth amid the Mt. Baker snow fields at 7000 feet and above.

PELTIGERA APHTHOSA (L.) Hoffm. On earth, stumps, and rotting logs; common at all altitudes up to 8000 feet.

PELTIGERA VENOSA (L.) Hoffm. Not rare on mossy earth at lower elevations.

PELTIGERA POLYDACTYLA (Neck.) Hoffm. On the slopes of Mt. Baker.

PELTIGERA CANINA (L.) Hoffm. Common everywhere on earth, logs, and stumps.

PELTIGERA CANINA MEMBRANACEA (Ach.) Nyl. Abundant and finely developed in the lowlands and lower slopes of the mountains.

PELTIGERA CANINA SPURIA (Ach.) Tuck. A few specimens obtained from Mt. Baker.

PERTUSARIA AMARA (Ach.) Nyl. On trunks of trees in the lowlands.

PERTUSARIA MULTIPUNCTA (Turn.) Nyl. On trunks of birch.

PERTUSARIA PERTUSA (L.) Nyl. On various barks in the lowlands.

PERTUSARIA LEIOPLACA (Ach.) Schaer. On bark of both species of maple, in the lowlands.

PERTUSARIA PUSTULATA (Ach.) Nyl. (?) The apothecia of this lichen yield me no spores, but it is nearest this species.

LECANORA GELIDA (L.) Ach. Abundant in the mountains at 2000 feet and upward wherever there are rock exposures; occasional in the lowlands on erratic glacial boulders.

LECANORA PACIFICA Tuck. Abundant on bark of various deciduous trees in the lowlands.

LECANORA SUBFUSCA (L.) Ach. Common in same localities as above; several varieties occur.

LECANORA COILOCARPA (Ach.) Nyl. On *Acer macrophyllum*, in lowlands.

LECANORA HAGENI Ach. On bark in lowlands and very finely developed on rocks, Mt. Sumas, at 2500 feet.

LECANORA VARIA (Ehrh.) Ach. On bark of various deciduous trees, in lowlands.

LECANORA POLYTROPA Nyl. What I take to be this occurs on the thallus of other lichens; locality Mt. Baker, above 6000 feet.

LECANORA FRUSTULOSA (Dicks.) Ach. Rare; Mt. Baker.

LECANORA ALPINA Sommerf. Rare; small patches among *Rhizocarpon geographicum;* Mt. Baker, above snow line.

LECANORA GIBBOSA (Ach.) Nyl. Specimens scanty and very dark, resembling sea-coast aberrant forms from the Santa Cruz Peninsula; on Sumas Mt., at 2500 feet.

ICMADOPHILA ERICETORUM (L.) A. Zahlbr. On old logs and stumps, in the lowlands.

OCHROLECHIA TARTAREA (L.) Mass. Common throughout the forested regions.

LECANIA DIMERA (Nyl.) Oliv. Occasional on smooth barks in the lowlands.

CANDELARIELLA CERINELLA (Flk.) A. Zahlbr. On rocks with other lichens; Mt. Baker, 6000 feet altitude; also on Sumas Mt. at 2500 feet.

Parmelia perlata (L.) Ach. A poorly developed, sterile lichen which I take to be this species is occasional on fences, roofs, and limbs of trees.

Parmelia saxatilis (L.) Ach. Commonest of all our foliaceous lichens, on all sorts of trees and often absolutely covering branches and twigs of deciduous native and cultivated trees. The individual thalli are small and sterile as a rule, but not rare in fruit on Lummi Island.

Parmelia fuliginosa (E. Fr.) Nyl. Common on various barks but small and poorly developed.

Parmelia pubescens (L.) Wainio. Common and fertile on rocks at the snow line and above on Mt. Baker.

Parmelia physodes (L.) Ach. Common on bark and old fences.

Parmelia enteromorpha Ach. On dead and living trees of all sorts throughout the forested regions and on old fences. Some of our material has a very close resemblance to *Parmelia lugubris*.

Cetraria glauca (L.) Ach. On mossy logs and trees throughout.

Cetraria lacunosa stenophylla Tuck. Common in the forests of Mt. Baker.

Cetraria Tuckermani Herre. Abundant on trees in the Mt. Baker forest.

Cetraria chlorophylla (Humb.) Wainio. On twigs and old fences in the lowlands.

Cetraria islandica (L) Ach. On Mt. Baker from a little below the snow line upward.

Nephromopsis ciliaris (Ach.) Hue. On various conifers in the mountains and on birch bark in the lowlands.

Nephromopsis platyphylla (Tuck.) Herre. Abundant on bark of *Abies* sp., on Mt. Baker at 6000 feet.

Evernia prunastri (L.) Ach. Common on trees and fences in the lowlands.

Letharia vulpina (L.) Wainio. Common enough on bark of Douglas spruce, but small, poorly developed, and sterile. Thus far I have seen nothing corresponding to the luxuriant growth so conspicuous in the high Sierras of California.

Alectoria jubata implexa (Hoffm.) Ach. On various trees, living and dead, at 6000 feet on Mt. Baker; well developed but sterile. Also at all levels below down to less than 100 feet, but very small.

Alectoria sarmentosa Ach. On various trees on Mt. Baker, intertangled with the preceding species.

Alectoria oregana Nyl. A sterile lichen occurs on Mt. Baker on the bark of *Abies* which I place here; it does not quite accord with the luxuriant specimens collected by me in California.

Ramalina inflata Hook. & Tayl. Not common; on trunks of trees in the lowlands and lower mountain slopes.

Ramalina reticulata (Noehd.) Krempelh. Abundant on Lummi Island.

Usnea florida (L.) Weber. Common throughout but poorly developed; on twigs, tree trunks, and fences.

USNEA HIRTA (L.) Hoffm. Likewise common but rather poorly developed.

USNEA PLICATA (L.) Weber. On trees throughout but not specially notable.

USNEA DASYPOGA (Ach.) Nyl. Neither abundant nor well developed, but found throughout on trees and fences.

BLASTENIA ATROSANGUINEA (Merrill) Herre. Not rare on *Acer circinatum* and occasional on other trees in the lowlands. Spores simple to bi- and polarilocular, 5–7 by 10–16μ.

CALOPLACA ELEGANS (Link) Th. Fr. Mt. Baker, on rocks at 5000 feet and upward.

CALOPLACA JUNGERMANNIAE (Vahl) Th. Fr. Found in tiny patches on mosses; Mt. Baker, 6000 feet.

XANTHORIA POLYCARPA (Ehrh.) Th. Fr. Abundant throughout the lower levels on fruit trees, fences, and twigs of various forest trees.

BUELLIA PARASEMA (Ach.) Th. Fr. Common on smooth barks in the lowlands.

BUELLIA ALIENA (Nyl.) Herre, var. PENICHRA (Tuck.) Herre. On bark of *Pseudotsuga mucronata*, Sumas Mt., at 1700 feet; spores 12.3–16 by 21–27μ.

BUELLIA ALBO-ATRA (Hoffm.) Th. Fr. Common on trunks of trees, especially Douglas spruce.

BUELLIA PAPILLATA (Sommerf.) Tuck. Overrunning dead mosses; Mt. Baker, 7000 feet.

I also have one or two additional species of rock Buellias which I have not yet satisfactorily determined.

RINODINA HALLII Tuck. On smooth barks in the lowlands.

RINODINA EXIGUA (Ach.) Th. Fr. Occasional with *Lecidea parasema*.

RINODINA TURFACEA (Wahl.) Nyl. In very tiny patches on mosses; Mt. Baker, 6000 feet, mixed with *Caloplaca jungermanniae*.

PHYSCIA AIPOLIA (Ach.) Nyl. On *Acer macrophyllum*, in the lowlands.

PHYSCIA TENELLA (Scop.) Nyl. Common on apple trees in the lowlands.

PHYSCIA PULVERULENTA (Schreb.) Nyl. Growing on moss on Mt. Baker at 6000 to 7000 feet; material sterile and small.

STATE NORMAL SCHOOL,
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NOTES ON NORTH AMERICAN SPHAGNUM:—VII.

A. LEROY ANDREWS

The Group Cuspidata Lindberg (Continued)

16. *Sphagnum recurvum* Beauvois, 1805. An earlier name, *S. intermedium* Hoffmann, 1795[1] has been used by some authors for this species, but its status is so uncertain[2] that it has been rather generally and probably justly abandoned.

[1] Dr. Barnhart has called my attention to the fact that while the second volume of Deutschlands Flora was not published until 1796, a portion containing *Sphagnum* came out shortly before the close of 1795; cf. Hoppe, Botanisches Taschenbuch, 1796, 243ff.

[2] The whole question is discussed in considerable detail by Dusén in Sphagnaceernas utbredning, 42ff. 1887.

Even the name *recurvum* has been discarded by some recent authors, though hardly with equal justice. Beauvois' name is distinctive, the description emphasizing the distinctive feature, and his type-locality was South Carolina, which excludes other species with recurved leaf-apices and the several valid segregates, whose range does not in any case extend further south than New Jersey.

Some of its characters have been indicated in my last paper: the cortical cells of its stem are not strongly differentiated from those within, the stem-leaves are relatively small, the branch-leaves show when dry not only recurved tips, but also several undulations further down (a condition of things not evident when they are moist), their chlorophyll cells are exposed broadly on the dorsal surface, triangular in section with the apex ordinarily just about reaching the ventral surface, their pores are few, on the outer surface small end-pores usually at both ends of the cell with sometimes an additional pore or two in the lateral corners, on the inner surface a few rather large round pores in cell-corners, the latter rarely exceeding four to the cell, sometimes almost or entirely suppressed.[3] The plants are nearly always bright green, but may show a brownish pigmentation; the leaves of the antheridial catkins are strongly pigmented brown. Though dioicous the species fruits by no means rarely, fruiting tufts often showing male plants intermingled with those bearing the capsules.

Though the structure of this species is so relatively simple that one might be tempted (wrongly) to consider it the ancestral type of the order, it is in its formal variation the most difficult and critical species after *S. subsecundum*. Apart from the forms which can with a degree of justification be separated as varieties or species there remain several synonyms to be explained. *S. pulchricoma* Carl Müller, 1848 is now accredited by Warnstorf to North America.[4] It was based originally upon South American forms. I have not seen the type-specimen of *S. pulchricoma*, but have seen Brazilian specimens so named by Carl Müller together with various others from South America. These I should not feel entirely justified in separating specifically from *S. recurvum*. Warnstorf has included under *S. pulchricoma* not only specimens from our Gulf states, but also some from as far north as Massachusetts which are entirely normal *S. recurvum*. The characters that he gives for *S. pulchricoma*, lacerate stem-leaves and chlorophyll cells of the branch-leaves not reaching their ventral surface, do not apply to all the specimens named *S. pulchricoma* by Warnstorf himself, and in fact so far as they indicate a tendency at all indicate one within the normal lines of variation of the usual European and North American *S. recurvum*, except that the leaf-section of our most southern form is noteworthy. The character is however somewhat variable. Upon a specimen from Alabama Warnstorf based in 1908 a new *S. riparioides*, which he still (1911) retains. The type-material is in every way identical with other specimens included by Warnstorf

[3] The relative lack of porosity of this and related species, in fact of the whole group *Cuspidata*, makes them of little value in the present important use for surgical dressings.

[4] Pflanzenreich, **51**: 188ff. 1911.

in *S. pulchricoma*, in fact a quite similar specimen collected in the same locality by one of the same collectors was named *S. pulchricoma* by Warnstorf himself in 1906.

The question of *S. amblyphyllum* (Russow) H. Lindberg, 1903[5] is a more vexatious one and brings us at once into the whole problem of the close and still critical segregates of *S. recurvum*. The basis for the separation was furnished substantially by Russow, who proposed a division into four subspecies[6] which are by many European bryologists now treated as separate species. I am able to recognize *S. pulchrum* and *S. balticum* as distinct, though I have no quarrel with those who prefer to call them varieties, and will discuss them later; to the variety *tenue* I can not accord specific rank, and I will discuss it also later. With this the four-fold division of Russow would seem to be accounted for, but Warnstorf and others following him have made out of this a five-fold one. Russow gave a name to each separate form, leaving nothing under the species without subspecific name, his subspecies being *mucronatum*, *amblyphyllum*, *balticum* and *angustifolium*. The difference between the subspecies *mucronatum* and *amblyphyllum* (as interpreted by Warnstorf and others) lay almost exclusively in the triangular stem-leaves of *mucronatum* and the more lingulate ones with rounded or truncate apex of *amblyphyllum*. The variety *pulchrum* of Lindberg (1880) was included within the subspecies *mucronatum* by Russow, but was separated from it by Warnstorf as a fifth variety the same year.[7] In 1903 H. Lindberg definitively recognized all five forms as species, even discarding the old name *S. recurvum* as of uncertain application, discarding *mucronatum* because already used for a different species, and creating the new specific name *S. apiculatum* for this form.[8] Röll has on the other hand consistently refused to recognize *S. amblyphyllum* as a species distinct from *S. recurvum*, and Warnstorf had himself noted in 1891[9] that both kinds of stem-leaves can be found on the same stem, but now[10] attempts to meet the difficulty by suggesting examining the stem-leaves on slide without cover-glass. My observations on this point force me to agree with Röll. I have had no difficulty in finding *amblyphyllum* leaves on plants determined by Warnstorf as *mucronatum*, can find no other character whatever to correlate with this one and am obliged to conclude that the distinction is without taxonomic significance.

The close relationship between *S. recurvum* and *S. cuspidatum* will call for further comment when we reach the latter species. For the present *S. fallax* Klinggräff, 1880 demands attention, as Warnstorf in his last work[11] has accre-

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[5] In 1913 (North American Flora, XV, 16) I have erroneously accredited *S. amblyphyllum* as a specific name to Warnstorf (1911).

[6] Sphagnologische Studien, 99ff. 1890; this paper is generally cited as of 1889, but seems not to have been actually published before 1890 (in Sitz.-ber. Nat. Ges. Dorpat, IX) as Dr. Barnhart informs me; Jensen (De danske Sphagnum-Arter, 116) says he received his copy of the separate reprint on February 14, 1890.

[7] Bot. Gaz. XV, 218f. 1890.

[8] Lotos, LI, 127.

[9] Verh. d. bot. Ver. d. Prov. Brandenburg, XXXII, 217.

[10] Pflanzenreich, **51**: 243. 1911.

[11] Ibid., 252ff.

dited it to North America. It is an aquatic form of *S. recurvum*[12]; the differences are those one becomes familiar with in aquatic forms. The cortical cells however remain those of *S. recurvum*, tending to confirm one's impression that *S. cuspidatum* can not likewise be regarded as a mere aquatic form of *S. recurvum*.

As to distribution, *S. recurvum* is widely spread over the three northern continents, and either itself or closely related species occur also in South America and Africa. In North America it is not to be found everywhere, but may be looked for generally north of the limits of glaciation, extending further southward in the eastern states to Florida and through the tier of Gulf states to Louisiana. In the Pacific coast region Washington seems to constitute the southern limit; in the Rocky Mountains, Colorado.

Var. *tenue* Klinggräff, 1872. This is the small leaved form of the species and probably deserves taxonomic recognition as differing so markedly in aspect from the more normal forms that it is likely to be confused with other species. The intergrading of forms is however such that I doubt if any two persons could agree just where to draw a dividing line in case of a large number of specimens, in fact I am not convinced that one person would draw it twice in exactly the same place. Russow recognized in the work already referred to that the subspecies contained two distinguishable series of forms, those with leaves clearly undulate (*undulata*), and those without this character (*imbricata*). Warnstorf in his revision of the group *Cuspidata*,[13] which it should be said owed a great deal to Russow, characterized them more in detail as the forms *Warnstorfii* Jensen and *tenue* (Klinggräff). I have in North American Flora (1913) tried to secure a definite line of separation and at the same time recognize what seems the most natural taxonomic grouping by restoring the undulate leaved forms to the species and keeping under the variety only those with imbricate leaves, retaining then the varietal name which both has priority and was originally used in this sense.

The unfortunate attempt to make a species out of this variety or of these various forms has led to considerable disagreement as to specific name. Röll insists that his *brevifolium* has priority. The publication of it upon which he bases his claim[14] suggests a *nomen nudum*, as Warnstorf asserts;[15] it does, however, refer back to a series of forms characterized in Flora LXIX, 184ff. 1886, some of which at any rate probably belong within our variety, though the *S. cuspidatum* var. *brevifolium* Lindberg, 1880 included in it and apparently giving it its name belongs according to Warnstorf to *S. balticum*. Warnstorf himself used a specific name *parvifolium* (1900) applied varietally by Sendtner, while Russow as we have seen published in 1890 Jensen's *angustifolium* as a subspecific name and Scandinavian bryologists still use this name as specific. In his last work Warnstorf has given up *S. parvifolium* as a species, and including it as a variety under *S. amblyphyllum* has felt obliged to put its specimens with tri-

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[12] Cf. H. Lindberg, Lotos, LI, 123. 1903; Loeske, Zur Morphologie und Systematik der Laubmoose, 50. 1910.

[13] Verh. d. bot. Ver. d. Provinz Brandenburg, XXXII, 220. 1891.

[14] Bot. Centralbl., XXXIX, 340. 1889.

[15] Pflanzenreich, **51**: 214f. 1911.

angular stem-leaves as a new analogous variety *parvulum* under *S. recurvum*. This procedure is, I think, indicative enough not only of the specific worthlessness of *S. parvifolium*, but also of that of *S. amblyphyllum* as distinct from *S. recurvum*.

This form with non-undulate leaves is more characteristic of the southern and inland range of the species, while the small-leaved form with undulate leaves is frequent in the far north. It is possible that the Greenland specimens all belong to the latter and that I should not have included Greenland in the range of the variety *tenue*. Neither form appears south of the limits of glaciation, the var. *tenue*, as I have defined it, finding its southern limits in the states Pennsylvania, Michigan, Minnesota, Nebraska, Montana, Idaho, Washington, so far as known at present.

17. *Sphagnum pulchrum* (Lindberg) Warnstorf, 1900. The variety *pulchrum* of *S. recurvum* (*S. intermedium*) was accredited by Braithwaite[16] to Lindberg, and as a form stands out so clearly that it has not been subject to much misunderstanding, though one may in some cases be in doubt as to whether a certain specimen should be placed with it or with the parent species. It is usually a robust plant, tends to a fairly pronounced brown pigmentation, the branch-leaves are decidedly broader in proportion to their length with rather less conspicuous undulations, they may be arranged quite clearly in five ranks, the separate leaves appear shortly apiculate from the fact that they are so strongly involute at the immediate apex. In section they show chlorophyll cells whose apex does not reach the ventral surface of the leaf. The stem-leaves are regularly of stout structure with the same tendency to a short involute apiculus. The stem in section shows cortical cells much more clearly set off than in *S. recurvum*, though they are not over large and have fairly substantial walls; the stems are accordingly generally brown and brittle as compared with those of the parent species. Fruit is extremely rare. The species shows considerable variation as it grows in or out of the water or under other different conditions, but is fairly clearly recognizable through its varied forms. Its occurrence falls entirely within the limits of *S. recurvum*, but is much more restricted. With us it is known only in the coastal region from Labrador to New Jersey. In the latter state I should say from my observations in Ocean County that it is in that portion of the state the commonest species of *Sphagnum*. In Nova Scotia it seems to be also well represented. Its European range is northwestern, from Finland to the British Isles, and confined to regions essentially coastal. In Asia it has not been found and very likely does not occur, as it is also lacking in interior and western North America.

18. *Sphagnum balticum* Russow, 1890. This form had been distinguished by Russow with a varietal name *mollissimum* as early as 1865.[17] Though called by Russow in 1890 a subspecies, it was in the same year published by Jensen as a full-fledged species[18] ascribed to Russow as author. It is a soft compact-grow-

[16] Sphagnaceae, 81. 1880.
[17] Beiträge zur Kenntniss der Torfmoose, 61.
[18] De danske Sphagnum-Arter, 100.

ing form tending to take on a snuff-colored pigmentation, and the branch-leaves are not so markedly undulate as is commonly the case with *S. recurvum*. The branch-leaves tend to be considerably more porose on the outer surface than in the parent species, the stem-leaves are relatively large, and broad in proportion to their length (lingulate), and the stem-cortex is differentiated off as in *S. pulchrum*, or even more distinctly so. The species is one of the far north, being known in North America from Greenland and Alaska.[19] The Alaskan collection was made by Trelease at Port Wells in 1899.[20] I have a bit of the material from the herbarium of the New York Botanical Garden, and would agree with Warnstorf in its identification. I have also seen a specimen from Greenland in the herbarium of the Copenhagen Botanical Museum which seems to represent the species. It was collected by Kruuse (not Krause, as Warnstorf has it) in 1902 in the Scoresby Sound region. In Europe it belongs primarily to the north, though Warnstorf reports it from as far south as the Alps. It has also been collected in Siberia.

Apparently next related to this species is *S. annulatum* H. Lindberg, 1898, described from Finland. It is of similar appearance, rather coarser and more robust and distinguished particularly by the astonishing development of pores in the branch-leaves, approximating in this respect *S. subsecundum* or *S. mendocinum*. H. Lindberg was led by minor variations to make two other species, *S. Jensenii* 1899 and *S. propinquum* 1903 out of his material. They have been reunited, I have no doubt correctly, by Warnstorf in 1911,[21] though under the name *S. Jensenii* which lacks priority. I refer to this species because there is every reason to expect that it will be found in extreme northern North America. In Europe it is confined to the far north; it is also known from Siberia.[22]

If I may revert for a moment to the group *Squarrosa*, it will be recalled that I was previously not able to include Pennsylvania in the list of states representing the southern limit of distribution of *S. teres*. At about the same time Dr. Jennings published its occurrence in that state[23] near Linesville in Crawford County, and has kindly sent me a specimen from this collection. The locality falls within the limits of glaciation. It would be of decided interest if data sufficient could be secured to show just where various species of *Sphagnum* reach their southern limit of distribution in Pennsylvania and in just what relation this limit stands to the limit of glaciation. The same is of course true of other states across the country.

Ithaca, N. Y.

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[19] Reports of Warnstorf (Pflanzenreich, **51**: 227. 1911) from Labrador and New Hampshire I cannot verify.

[20] Cf. Harriman Alaska Expedition, V, 332. 1904; Warnstorf mentions other collections from Alaska.

[21] Pflanzenreich, **51**: 199ff.

[22] Warnstorf's locality for Japan should be confirmed.

[23] Mosses of Western Pennsylvania, 33. 1913.

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

Mr. Edward B. Chamberlain, 18 West 89th Street, New York City.—*Pohlia pulchella* Lindb. c. fr., collected in Connecticut by Dr. Nichols.

Mrs. Frank E. Lowe, 24 Brattle Street, Worcester, Mass.—*Amblystegium irriguum* var. *spinifolium* Schimp., and *Thelia Lescurii*, both collected in Oklahoma.

Mr. Roy Latham, Orient, N. Y.—*Pyrenula nitida* (Schrad.) Ach., and *Sagedia cestrensis* Tuck., both collected in New York.

Mr. C. C. Plitt, 3933 Lowndes Ave., Baltimore, Md.—*Gyrophora Dillenii* (Tuck.) Müll. Arg., collected in Maryland.

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THE RHACOMITRIUMS OF WESTERN NORTH AMERICA

T. C. FRYE*

The genus *Rhacomitrium* has given more or less trouble in regard to the identification of the western species because a number have been described insufficiently, sometimes no drawings were made to show what the description was based on; and because a number of species usually recognized as such are quite close in their approach to each other. It is hoped that this may prove to be of value to those who find difficulty with western material:

RHACOMITRIUM

Plants mostly branched. Stem without central strand, with rhizoids only at base. Leaves with or without hyaline point, lanceolate; vein extending to tip except in *R. palmeri,* margin mostly entire except the hyaline point; surface often sunken over the cell-cavities or over the walls. Cells strongly sinuose, the lower usually elongated, the upper isodiametric to elongated. Dioicous. Calyptra mitrate, rather long-beaked. Seta straight or curved, twisted to the right or left. Capsule oval to cylindric, smooth, with stomates. Lid conic, with long beak; beak ⅓ to once the length of the capsule-body. Annulus present. Peristome single; teeth divided to below the middle into 2–3 divisions, with swollen joints. (Gk. *rhakos*=frayed, *mitrion*=a cap; referring to the fringed calyptra.)

KEY TO THE SPECIES

A. Upper green leaf-cells isodiametric or nearly so.
  B. Hyaline points lacking on all leaves, even on those of the branch-tips.
    C. Leaves with 2–4 ridges several cells high on the under side of the vein. 1. *R. patens*
    CC. Leaves without ridges on the vein.
      D. Leaves distinctly papillose on both sides; seta twisted to the left. 10. *R. canescens*
      DD. Leaves not papillose; seta twisted to the right.
        E. Isodiametric leaf-cells restricted to the marginal row above, and to a few cells in the tip; capsule-body 3.3–3.8 mm. long. 9. *R. varium*
        EE. Isodiametric leaf cells predominating above except in the vein; capsule-body 2.6 mm. or less long.

* The writer is indebted to Mrs. E. G. Britton, R. S. Williams, J. W. Bailey, and J. M. Macoun for assistance.

The September number of the BRYOLOGIST was published October 13, 1917.

F. Plants reddish; leaves less than 1.5 mm. long; cells greatly bulging on the upper leaf-surface. 4. *R. cyclodictyon*

FF. Plants green to blackish; leaves 2 mm. or more long; cells not or hardly bulging on the leaf-surface.

G. Leaf-tip rounded, often toothed, but sometimes entire. 2. *R. aciculare*

GG. Leaf-tip bluntly pointed, entire.

H. Leaf-margin 1 cell thick throughout; short tuft-like lateral branches 0 to few. 3. *R. depressum*

HH. Leaf-margin more than 1 cell thick above; short tuft-like lateral branches many. 1. *R. affine*

BB. Hyaline points present on some leaves, at least on some of those of the branch tips.

I. Leaves plainly papillose on both sides; seta twisted to the left. 10. *R. canescens*

II. Leaves not or hardly papillose.

J. Leaves with 2–4 ridges several cells high on the under side of the vein; seta twisted to the left. 8. *R. patens*

JJ. Leaves without longitudinal ridges on the vein; seta twisted to the right.

K. Isodiametric cells restricted to the marginal row above, and to a few cells in the tip; capsule body 3.3–3.8 mm. long. 9. *R. varium*

KK. Isodiametric cells predominating above except in the vein; capsule-body 2.4 mm. or less long.

L. Leaf-margin only 1 cell thick throughout. 5. *R. heterostichum*

LL. Leaf-margin more than 1 cell thick near the tip.

M. Hyaline leaf-points acute, always present on some leaves of the branch-tips; short tuft-like lateral branches 0 to few. 6. *R. sudeticum*

MM. Hyaline leaf-points blunt, always present on some leaves of the branch-tips; short tuft-like lateral branches 0 to few. 7. *R. macounii*

MMM. Hyaline leaf-points none at all or blunt or few; short tuft-like lateral branches many. 8. *R. affine*

AA. Upper green leaf-cells 2 or more times as long as wide.

N. Leaves with papillose hyaline points, or if all leaves without hyaline points the green cells papillose; seta twisted to the left.

O. Green cells papillose on both leaf-surfaces; upper green leaf-cells 1–2 times as long as wide exclusive of vein. 10. *R. canescens*

OO. Green cells not papillose except within a few cells of the hyaline point; upper green leaf-cells 2–8 times as long as wide exclusive of vein. 11. *R. lanuginosum*

NN. Leaves wholly without papillae; seta twisted to the right.

P. Vein extending to the leaf-tip or very nearly there.

Q. Most of the leaves with hyaline points; seta 4–5 mm. long; capsule-body 1.8–2.1 mm. long; peristome-teeth about .6 mm. long; leaf-surface depressed over the cell-wall. 12. *R. microcarpum*

QQ. Usually at least some of the leaves of the branch-tips with hyaline points, but sometimes all muticous; seta 10–14 mm. long; capsule-body 3.3–3.8 mm. long; peristome-teeth 1.5–1.7 mm. long; leaf-surface depressed over the cell-cavities. 9. *R. varium*

QQQ. None of the leaves with hyaline points; seta 4–12 mm. long; capsule-body 2–2.5 mm. long; peristome-teeth about .6 mm. long; leaf-surface depressed over the cell cavities. 14. *R. fasciculare*

PP. Vein extending only to about the middle of the leaf. 13. *R. palmeri*

Analytic Statements

Only *R. palmeri* has the vein ending much below the tip.

Only *R. varium* has the capsule-body reaching 3 mm. long.

Only *R. cyclodictyon* is red or reddish-brown.

Only *R. aciculare* has teeth on the margin other than on the hyaline point, and it does not always have them.

Only *R. lanuginosum* has the seta rough.

Only *R. patens*, *R. sudeticum*, *R. affine* and *R. macounii* have the margin more than 1 cell thick toward the apex.

Only *R. canescens* and *R. varium* have the peristome-teeth 1 mm. or more long.

Only *R. sudeticum occidentale* has teeth on the surface of the hyaline point.

Only *R. canescens* has distinct papillae on both surfaces of the leaves; but *R. lanuginosum* has a few near the hyaline point.

Only *R. canescens* and *R. lanuginosum* have papillae on the hyaline point.

Only *R. patens*, *R. canescens* and *R. lanuginosum* have the seta twisted to the left.*

1. Rhacomitrium patens (Dicks.) Hueb. Muscol. Germ. p. 198, 1833. [*Dryptodon patens* Brid.; *Grimmia patens* B. S. G.]

Plants in loose mats, green to brownish or blackish; stems up to 12 cm. long, with few elongated branches and none to few short tuft-like lateral branches; central strand none. Leaves about 3 mm. long, lanceolate, gradually narrowed, keeled above; when dry appressed, slightly crispate; when wet strongly squarrose; tip usually muticous, often with a few teeth; margins 2 cells thick toward tip, revolute at base; vein about .12 mm. wide near base, with 2–4 longitudinal lamellae on under side; lamellae 1–2 cells thick, 2–5 cells high. Cells strongly convex on surface of leaf, round-quadratic from tip of leaf to below middle and 8–9μ in diameter, greatly elongated from near middle to base; basal cells linear; alar cells rectangular to quadrate. Dioicous. Calyptra mitrate, sometimes almost cucullate. Seta 3–5 mm. long, twisted to the left, curved, yellowish. Capsule horizontal, eventually almost erect, oval, smooth, becoming somewhat grooved in old age, its body 1.6–1.8 mm. long. Lid about $\frac{1}{3}$ the length of the capsule

* Conceive a clock with face turned up. Conceive a moss-plant upright on the face of the clock. If the capsule is twisted in the direction in which the hands of the clock move, the seta is said to be twisted to the right; if in the opposite direction, to the left.

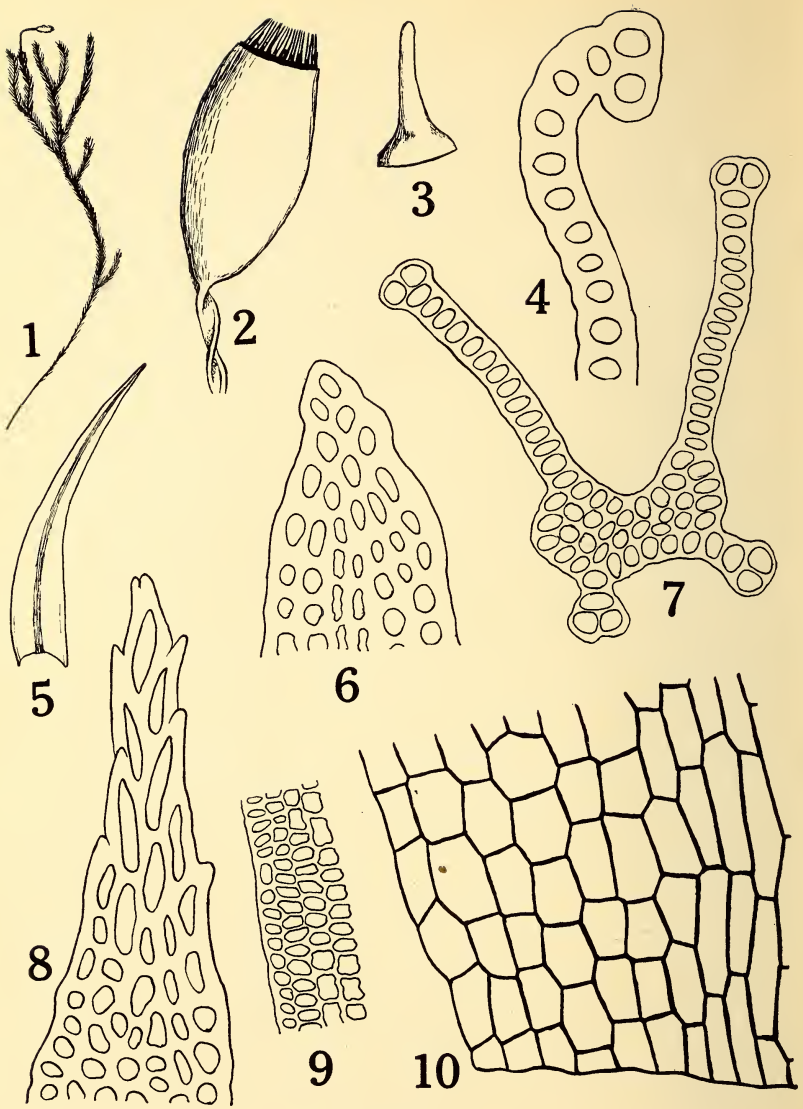

PLATE XX.

Rhacomitrium patens. (1) Plant, ×1. (2) Capsule, ×17. (3) Lid, ×17. (4) Part of cross section of upper portion of leaf, ×550. (5) Leaf, ×07. (6) Tip of rather blunt leaf, ×400. (7) Cross section of upper part of leaf, ×330. (8) Tip of rather pointed leaf, ×400. (9) Cells of leaf-middle, ×400. (10) Cells of leaf-base, including the alar cells, ×400.

body, usually diagonally beaked. Annulus of 3 rows of large cells. Peristome teeth united at base, divided into 2–3 forks to well below the middle, purple, densely papillose, .25–.3 mm. long. Spores 12–16μ.—Alaska to Oregon, Idaho and Montana.

The separation of a poorly defined group under the generic name *Dryptodon* seems to be more confusing than clarifying, and adds nothing to our knowledge of relationships. It does not then seem to have sufficient reason for support.

2. Rhacomitrium aciculare (L.) Brid. Mant. p. 80. 1819.

Plants rather coarse and stiff, green to blackish-green; stems up to 10 cm. long; elongated branches few; short tuft-like lateral branches none. Leaves broadly lanceolate or lingulate; apex rounded, wide; margin usually somewhat toothed at tip, only 1 cell thick throughout; vein ending a few cells from the tip. Cells of the leaf-tip isodiametric or oval, of the leaf-middle rectangular, of the leaf-base linear. Dioicous. Calyptra mitrate, smooth. Seta 3–14 mm. long, twisted to the right. Capsule oval or almost cylindric, 2–2.4 mm. long; stomates in 3–4 rows; lid beaked, ½–⅔ the length of the capsule-body; annulus of 3–4 rows of cells. Peristome about .7 mm. long, papillose; teeth divided to below the middle into 2–3 unequal divisions. On wet rocks in or at the margins of streams.

The species varies chiefly as follows: (1) the margin of the leaves from entire to distinctly toothed for ¾ the distance to the base; (2) the cell arrangement near the tip from fairly distinct diagonal rows to utter lack of diagonal rows; (3) the length of seta from 3 to 14 mm.; (4) the vein in the inner perichaetial leaves from ⅔ the distance from the base to wholly wanting; (5) the length of the body of the capsule from 2 to 2.4 mm. The nearly ecostate perichaetial leaves are usually but not always concurrent with the shorter setae and smaller capsules; this constitutes *R. nevii*. But short and long setae sometimes occur on the same plant.

Typical.

1. Seta 5–14 mm. long; capsule about 2.2–2.4 mm. long; inner perichaetial leaves with vein indistinct to distinct.—Alaska and Yukon to California and Montana.

2a. **Rhacomitrium aciculare nevii** (Muell.) n. comb. [*Grimmia nevii* Muell.; *Rhacomitrium nevii* Wats.]

1. Seta 3–7 mm. long; capsule about 2–2.2 mm. long; inner perichaetial leaves from ecostate to indistinctly costate.—Alaska to Oregon and Idaho.

3. Rhacomitrium depressum Lesq. Mem. Calif. Acad. Sci. 1: 14. 1868.

Plants yellowish-brown to blackish-green. Stems up to 13 cm. long; elongated branches none to few per plant; short tuft-like lateral branches none. Leaves obtuse, smooth; margin entire or with suggestions of distant teeth at apex, only 1 cell thick throughout; vein ending a few cells from the tip. Cells of the leaf-tip isodiametric or nearly so, those of the leaf-middle 2–4 times as long as wide and sinuous, those of the leaf-base linear except for the lower few rows. Dioicous. Calyptra (?). Seta 6–8 mm. long, twisted to the right. Capsule sub-

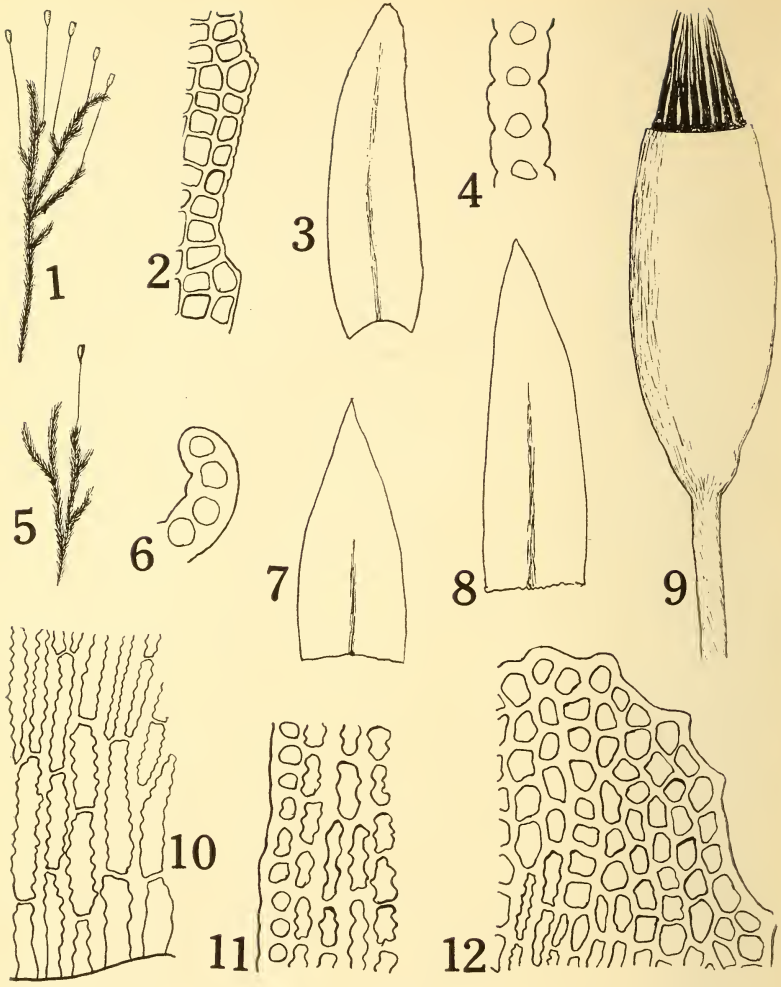

PLATE XXI.

Rhacomitrium aciculare. (1) Plant, ×1. (2) Leaf-margin near tip, ×400. (3) Leaf, ×17. (4) Portion of cross section through lower part of leaf, ×550. (5) Plant, ×1. (6) Cross section through leaf-margin near tip, ×550. (7), (8) Inner perichaetial leaves, ×17. (9) Capsule, ×17. (10) Cells of leaf-base, ×400. (11) Cells of leaf-middle, ×400. (12) Cells of leaf-tip, ×400.

cylindric, not narrowed at the mouth, its body 2.2–2.6 mm. long. Peristome teeth usually divided into 3 or rarely 2 divisions; divisions unequal, smooth.—British Columbia to California.

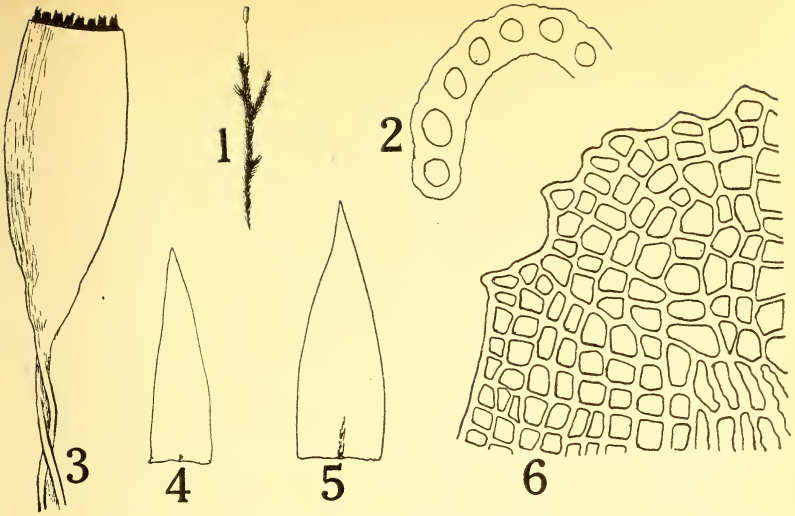

PLATE XXII.

Rhacomitrium aciculare nevii. (1) Plant, ×1. (2) Cross section through leaf margin, ×550. (3) Capsule, ×17. (4), (5) Perichaetial leaves, ×17. (6) Cells of leaf-tip, ×400.

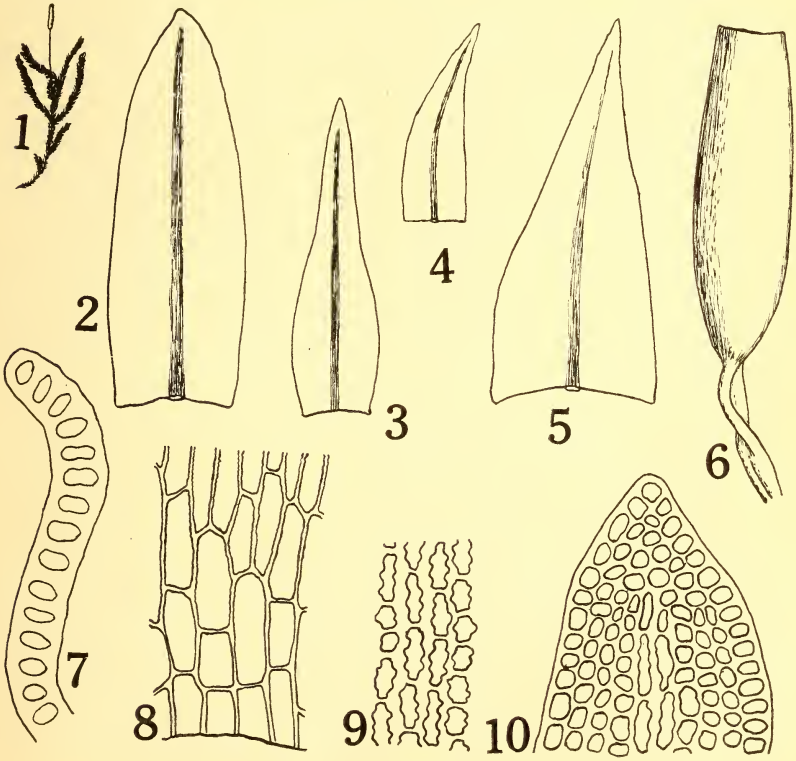

PLATE XXIII.

Rhacomitrium depressum. (1) Plant, ×1. (2), (3), (4), (5) Leaves, ×17. (6) Capsule, ×17. (7) Part of cross section of leaf, ×550. (8) Cells of leaf-base, ×400. (9) Cells of leaf-middle, ×400. (10) Leaf-tip, ×400.

The material at hand lacked calyptra and peristome. An examination of Macoun's No. 620 from Victoria, B. C., shows it to be *R. depressum* instead of *R. protensum*. Since the only report of the occurrence of *R. protensum* in the western part of North America seems to be from Macoun's collection near Victoria, its reported presence seems to be due to error. The two species seem to differ in the following:

(*a*) *R. depressum*—Capsule-body about 2.5 mm. long; leaves smooth.

(*aa*) *R. protensum*—Capsule-body about 1.8 mm. long; leaves with paired papillae over the cell-walls.

(*To be concluded in January number*)

UNUSUAL HABITATS

Elizabeth M. Dunham

A student of mosses so soon becomes accustomed to finding certain species in their accustomed habitats that a moss growing out of the usual place at once attracts attention. The following are cases that have interested the writer:

Sphagnum was found on rock on top of a hill at Holderness, N. H., June, 1915. Unfortunately the specimen collected was lost so that the species cannot be given.

Dicranum viride (Sull. & Lesq.) Lindb. grew on trees high above one's head at Upper Dam, Rangeley Lakes, Me., Sept., 1916.

Dicranum montanum Hedw. was collected at Upper Dam, Me., Sept., 1916, on rock and on the ground, as well as on trees and decaying logs.

Drummondia clavellata Hook. was collected on rock at Hot Springs, Arkansas, by Mrs. Frank E. Lowe, Jan., 1915.

Ulota ulophylla (Ehrh.) Broth. was found by Heyward Scudder growing on rock at Grand Manan, N. B., June, 1914. It at first seemed probable that the specimen had fallen from a tree and lodged on the rock but, when the locality was again examined, several specimens of the same moss were found on rock and in every case away from trees.

Funaria hygrometrica (L.) Sibth. has been found several times on the mortar between the rocks of stone walls, growing mixed with *Bryum argenteum*.

Mnium cuspidatum (L.) Leyss. was found in the crotch of an old willow by Heyward Scudder in New Brunswick, August, 1914.

Mnium hornum L. was collected in water in Milton, Mass., May, 1916. The growth was so very lax that the species was entirely unrecognizable until placed under the microscope.

Platygyrium repens (Brid.) Bryol. Eur. grows on rocks at North Worcester, Mass. Collected by Mrs. Frank E. Lowe.

Thelia asprella Sull. was also collected on rock by Mrs. Lowe at the limestone quarries at Bolton, Mass. The specimen was determined by Dr. Grout who said he had never heard of this species growing on rock before.

From the foregoing notes it would seem that rock is the new habitat to which mosses most easily adapt themselves, as the species given are generally found on the ground, on decaying logs, or at the base of trees.

A few other cases that have been noticed are such mosses as *Hylocomium proliferum* (L.) Lindb., *Rhytidiadelphus triquetrus* (L.) Warnst., *Hypnum Schreberi* Willd., and *Ptilium crista-castrensis* (L.) De Not., growing from two to three feet up the base of trees, whereas these species are usually found on the ground or on rotten logs.

WABAN, MASS.

LICHENS OF THE MT. MONADNOCK REGION, N. H.—NO. 9*

THOMAS DURFEE

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

Genus: PYRENULA Ach.

161. *Pyrenula glabrata* (Ach.) Mass. One specimen.
162. *P. nitida* (Weig.) Ach. One specimen.

Genus: CALICIUM Pers.

163. *Calicium lenticulare* Ach. Four specimens.
164. *C. parietinum* Ach. Two specimens.
165. *C. quercinum* Pers. One specimen.

Genus: SPHINCTRINA Fr.

166. *Sphinctrina turbinata* (Pers.) Fr. Three specimens.

Genus: ACOLIUM De Not.

167. *Acolium tigillare* (Pers.) De Not. One specimen.

Genus: ARTHOTHELIUM Mass.

168. *Arthothelium spectabile* (Flot.) Mass. Three specimens.

Genus: OPEGRAPHA Humb.

169. *Opegrapha macularis* Fr. One specimen.

Genus: GRAPHIS Adans.

170. *Graphis dendritica* Ach. Nine specimens.
171. *G. dendritica* f. *medusula* (Pers.) Nyl. Four specimens.
172. *G. elegans* (Borrer) Ach. One specimen.
173. *G. inusta* Ach. Two specimens.
174. *G. inustula* Nyl. Two specimens.
175. *G. scripta* (L.) Ach. Four specimens.
176. *G. scripta* f. *recta* (Humb.) Nyl. Six specimens.

MIDDLESEX SCHOOL,
CONCORD, MASS.

* No. 8 of this series was published in the BRYOLOGIST **20**: 47–48. 1917.

PTERYGOPHYLLUM ACUMINATUM AT OHIO PYLE, PENNSYLVANIA

O. E. Jennings

On the 12th and 13th of May, of this year, Mrs. Jennings and I, together with Dr. and Mrs. W. H. Emig, were at Ohio Pyle, Fayette County, Pennsylvania. Ohio Pyle lies in a deep rocky valley where the Youghiogheny River cuts through the Laurel Hill Mountains. The locality is noted not only for its beautiful scenery, but also for the occurrence of many rare or unusual plants that range mainly through the southern Alleghanies. Here occur *Pyrularia pubera*, *Marshallia obovata*, *Azalea arborescens*, *Aconitum uncinatum*, and others; doubtless similar peculiarities of range occur no less prominently among the mosses.

On the trip mentioned we discovered a patch of *Pterygophyllum acuminatum* (C. M.) Paris, which was growing on a large block of sandstone, frequently dashed with spray, in a deep ravine a few yards below Cucumber Falls. The plants were sterile, but were named for me by Dr. G. N. Best, who notes that the species "differs but little if indeed at all, from *Pt. acutifolium* (Hook.) Besch. and by several bryologists is regarded as simply a passing form of *Pt. lucens* (L.) Brid. . . . . *Hookeria* (?) *Sullivantii* C. M. Mss., of the Lesquereux and James Manual, is referred by its author to *Pt. lucens* Bridel, and in his description of *Pt. lucens* he says of its leaves, 'saepe rhizophora,' a condition which may be observed in your moss. I congratulate you upon this interesting and rare moss, and suggest that you keep an eye to its sexual organs. It appears to me to be dioicous, but I am not sure of it. *Pt. acutifolium* is said to differ from *Pt. lucens*, among other things, in being monoicous."

Carnegie Museum, Pittsburgh, Pa.

REVIEWS

The various delays in mails incident to the war, and further hindrances on our own account, render the notices below a little tardy. We trust that they may be none the less welcome. In the last volume of the *Nyt Magazin* to arrive Dr. Lynge continues his Index of lichen exsiccati[1] already noticed[2]. The pagination in this portion follows consecutively with that of the earlier part in volume 53 of the *Nyt Magazin*, and cause a repetition of pages 113 to 187 inclusive of the present volume. This arrangement, while perhaps presenting certain drawbacks, will greatly facilitate the ultimate publication of Dr. Lynge's work as a separate book. The present portion continues the systematic index of the various exsiccati alphabetically by authors, with critical notes as to contents, titles, etc., covering from specimen 607 of Britzelmayr: Lichens Exsiccati, to number 447 of the Kryptogamae Exsiccatae of the Museum Palatinum Vindobonense.

[1] Index specierum et varietatum lichenum quae collectionibus "Lichenes Exsiccati" distributae sunt. Bernt Lynge. Nyt Magazin for Naturvidenskabérne. **54**: 113–304. (1916).

[2] Bryologist **19**: 78. (1916.)

In *Broteria* Senhor Sampaio contributes a second series of lichen notes[1] on fifty different species, with additional localities for certain species of his earlier list, already noted in the Bryologist **19:** 95 (1916). New species or varieties are described, but not figured, in *Calicium*, *Lecanora* (2), *Pertusaria*, and *Lecidea*. A list of thirty species is also given whose occurrence is reported but of which specimens are not forthcoming.

In the same issue of *Broteria* there is a list[2] of 29 Bryophytes that are reported as new for the Portuguese flora. *Hyophila crenulata* is described as new, and also a new variety, var. *elongata*, of *Grimmia leucophaea*.

There are also among the bibliographical notices in this same number of *Broteria* two notes by Father Luisier upon recent published catalogues of Portuguese hepatics and lichens.

In the July number of *Torreya* Mr. Burnham and Mr. Latham[3] issue the first supplement to their list of the plants growing in the town of Southold and the adjacent Gardiner's Island. The list includes all forms of plant growth, from insect galls to the composites. Six species and three varieties of lichens, twelve species of hepatics, and nine of mosses are given as additions. The article in the September number includes a correction of one hepatic record in the July list. The original list was published in 1914, in *Torreya*.

MISCELLANEOUS NOTES

Unusual Habitat for Catharinea crispa.—Mr. A. T. Beals writes that last September (1916) he collected some fine specimens of *Catharinea crispa* James on Mt. Greylock, Massachusetts, within two hundred feet of the top. The moss was not in fruit but it was abundant in the little grassy waterway where it grew. Mt. Greylock is stated to be over 3500 feet in height, so that such a habitat is probably quite unusual for *C. crispa*, which has been collected mostly in swamps and along streams fairly near sea-level.

Fontinalis gigantea twenty-eight inches long.—Speaking of the specimens of *Fontinalis gigantea* which he offered for exchange in the Bryologist for March, 1917, Mr. A. T. Beals wrote: "The specimens are quite robust and one stem measured twenty-eight inches in length. Many were more than twenty inches long. They were collected at Hoboken, N. J., in early December, 1916."

Mosses as travertine builders.—Dr. W. H. Emig has returned to the University of Pittsburgh, after another summer of botanizing in the Arbuckle Mountains, Oklahoma, and has brought back with him some fine specimens of travertine formed on different species of aquatic mosses. We hope eventually to publish a paper from him.

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[1] Liquenes novos para a flora portuguesa. Gonçalo Sampaio. Broteria. **15:** 12–29. (1917.)

[2] Notas de briologia portuguesa: plantas novas para Portugal. Antonio Machado. Broteria. **15:** 8–01. (1917.)

[3] S. H. Burnham and Roy A. Latham. The Flora of the Town of Southold, Long Island, and Gardiner's Island. Torreya. **17:** 111–122. July, 1917; *and* Corrections to the Flora of the Town of Southold. Torreya. **17:** 164. Sept., 1917.

SULLIVANT MOSS SOCIETY ELECTION

Members of the Sullivant Moss Society are requested to send their ballots *promptly* to the Judge of Elections, Mr. Geo. B. Kaiser, 508 Locust Ave., Germantown, Pa. Ballots must be received before December 15th, 1916.

The following persons have been nominated by the Executive Committee, but members are reminded that they are free to vote for any others.

For President—Mrs. Elizabeth G. Britton, New York City.

For Vice-President—Mrs. Annie Morrill Smith, Brooklyn, N. Y.

For Secretary-Treasurer—Mr. Edward B. Chamberlain, New York City.

EXCHANGE DEPARTMENT

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

Dr. Wm. H. Wiegmann, 436 East 5th St., New York City.—*Catharinea crispa* James, c. fr., and *Baeomyces roseus* Pers., both collected by Dr. Wiegmann, in New York.

Dr. John W. Bailey, 4541 Fourteenth Ave., N. E., Seattle, Wash.—*Hypnum subimponens* Lesq., c. fr., collected in Washington.

Mr. A. T. Beals, 71 West 23d St., New York City.—*Aphanorhegma serratum* (Hook. & Wils.) Sul ., Pelham Manor, N. Y., Sept. 27, 1917, and *Fissidens grandifrons* Brid , Niagara Falls, Oct. 26, 1917, both collected by Mr Beals.

Mr. Severin Rapp, Sanford, Florida.—*Biatora hypomela* Nyl., and *Metzgeria myriopoda* Lindb., both collected by Mr. Rapp in Florida.