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THE BRYOLOGIST

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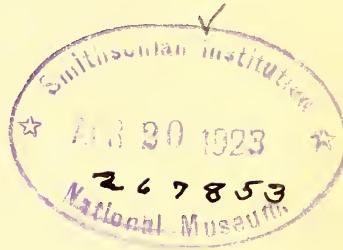
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VOLUME XXV



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ERRATA

- Page 4, line 8, for *sanguineoaira* read *sanguineoatra*.
 Page 18, line 8, for *herbaro* read *herbarum*.
 Page 18, line 11, for *prodito* read *proditia*.
 Page 18, line 21, for *determinare* read *determinari*.
 Page 18, line 22, for *tamen vera* read *determinatio videtur tamen vera*.
 Page 18, line 23, for *herbari* read *herbarum*.
 Page 18, line 24, for *coniidifera* read *conidiifera*.
 Page 18, line 25, for *herbari* read *herbarum*.
 Page 18, line 5 from bottom, for *priman* read *primam*.
 Page 18, under Fig. 1, for *Compylopus* read *Campylopus*.
 Page 30, in legend for plate, for *PTYCHOCLEUS* read *PTYCHOCOLEUS*.
 Page 32, line 3, for *Hartland* read *Hartford*.
 Page 45, line 4 from bottom, for *hampeana* read *Hampeana*.

Page 46, line 6, for *Frulliana* read *Frullania*.

Page 49, line 1, for *wahlenbergii* read *Wahlenbergii*.

Page 49, between lines 6 and 7, insert:

SWARTZIA MONTANA (Lamarck) Lindb. Moist shaded limestone edges;
local near the shore on Mackinac Island.

Page 52, line 9 from bottom, for *Pterigyandrum* read *Pterygynandrum*.

Page 56, line 2 from bottom, for *Eurynchium* read *Eurhynchium*.

Page 65, line 22 for *cupressiforme* read *cupressiformis*.

Page 65, line 24, for *curvifolium* read *curvifolius*.

Page 73, line 16 from bottom, for *Teloschistes* read *Theloschistes*.

Page 77, line 8 from bottom, " " " "

Page 79, line 2 from bottom, for *lanuginosa* read *lanuginosum*.

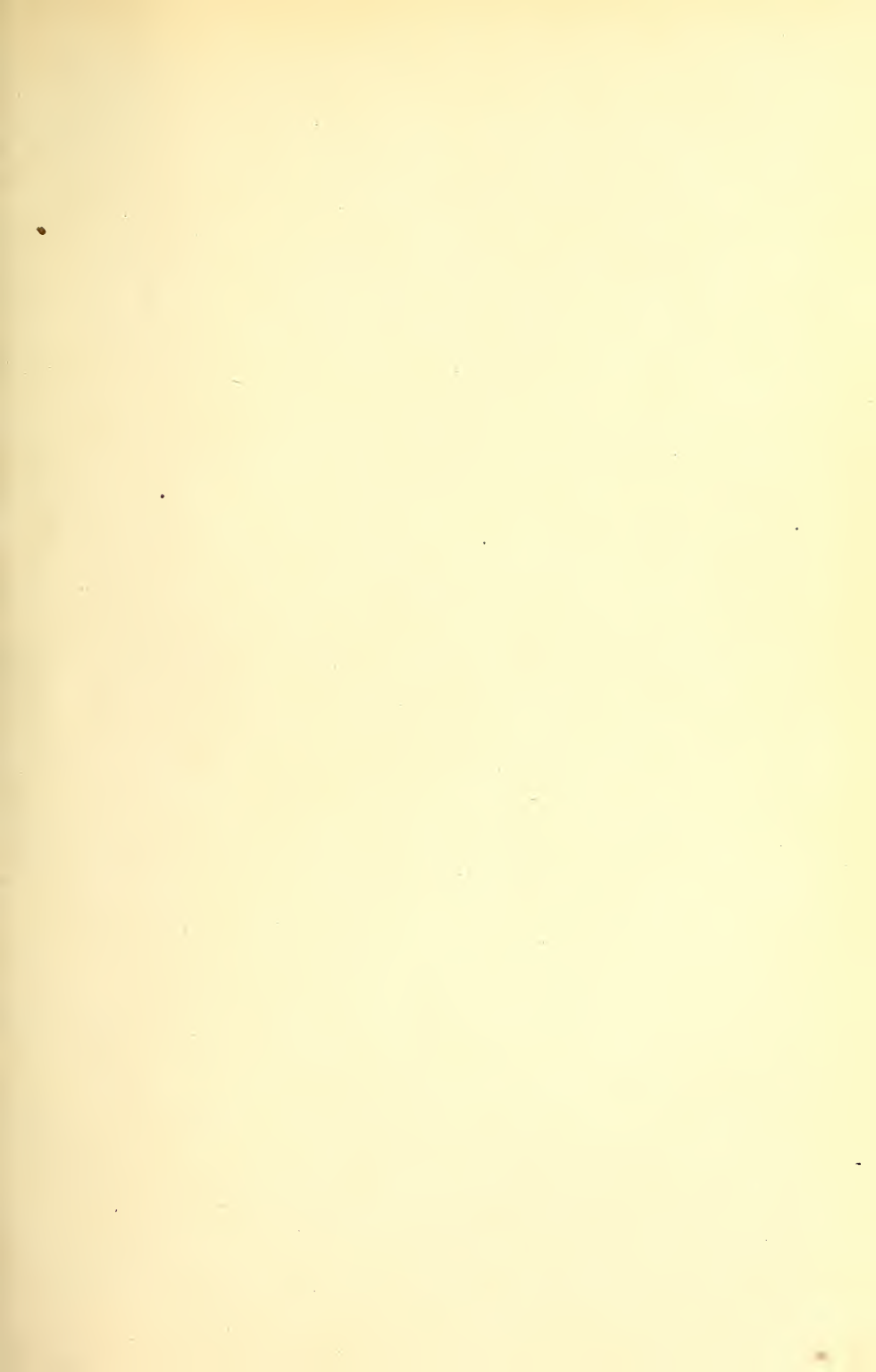
Page 80, at bottom of page add:

50. (*Lecidea intermixta* Nyl.) 121. *Patellaria Clavus* D.C.)

129. (*Synechoblastus rupestris* (Sw.) A. L. Sm.)

CORNELL UNIVERSITY, ITHACA, N. Y.

Page 106, line 5 from bottom, for *Ramalina caperata* read *Parmelia caperata*.



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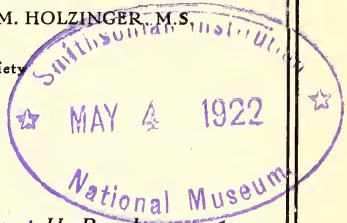
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THE BRYOLOGIST

VOL. XXV

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No. 1

LICHENS OF THE LAKE GEORGE REGION

STEWART H. BURNHAM

The region covered includes the counties of Washington, Warren, and Saratoga, New York. I collected my first lichens in 1892: these were determined by Dr. John W. Eckfeldt. Specimens collected during the last fifteen years have been determined by Dr. Bruce Fink, the late Dr. L. W. Riddle, and Mr. G. K. Merrill.

A few botanists have collected lichens in the region. Dr. E. A. Burt made the major part of his collections at East Galway, Saratoga county from 1892 to 1895; these are preserved in his herbarium. Mr. Frank Dobbin made a large collection of lichens at Shushan, Washington county, specially during the years 1906 and 1907; these are at least partly preserved in his herbarium. Dr. E. C. Howe collected lichens at Fort Edward during the years 1867 and 1868: some of these are yet to be found in the New York State Herbarium. Dr. Smith Ely Jelliffe, collected many lichens about Huletts Landing, Lake George, from 1889 to 1892; these are preserved in his herbarium in New York City. Dr. Chas. H. Peck collected lichens in the area covered, and presumably some of these were determined by Dr. Eckfeldt; these are preserved in the New York State Herbarium.

The nomenclature and sequence of names, conforms as closely as possible with that used by Dr. A. Zahlbruckner in his work on "Ascolichenes," in Engler and Prantl, "Die Natürlichen Pflanzenfamilien."

LIST OF SPECIES

1. *Verrucaria muralis* Ach. Limestone rocks and ledges; also on claystones in fields at Vaughns and east of Tripoli. Several collections have been determined by Mr. G. K. Merrill: and specimens are preserved in the State Herbarium. N. Y. State Mus. Bull. 167: 33. 1913.
2. *Verrucaria rupestris* Schrad. On small loose stones in meadows at Vaughns, Oct. 16, 1913. Determined by Mr. Merrill who says, "*Verrucaria rupestris* is where I have always placed my Knox county, Maine, specimens of this plant. Mr. Willey indentified the same thing on shell found near the sea as *Verrucaria nigrescens* Pers.: but that species has a distinct thallus and in my experience is never without such. In your specimens the thallus is inconspicuous and it would make excellent *Verrucaria muralis*, if it were not for the fact that it fits its substratum."

3. *Dermatocarpon aquaticum* (Weis.) Zahlbr. On rocks in upland creeks and upland brooks. Cold Spring, South Bay; southern W. Fort Ann. Specimens have been verified by Mr. Merrill. (*Endocarpon fluviatile* (Weber) DC.).
4. *Dermatocarpon hepaticum* (Ach.) Th. Fr. Thin limestone soil, specially about old quarries. Vaughns; determined by Mr. Merrill.
5. *Dermatocarpon miniatum* (L.) Th. Fr. Fort Edward (E. C. Howe); reported in N. Y. State Cab. Rep. 22: 68. 1869, as *Endocarpon miniatum* var. *Muhlenbergii* Nyl. Calcareous cliffs, Haynes hill, May 3, 1913; determined by Mr. Merrill.
6. *Dermatocarpon miniatum complicatum* (Sw.) Th. Fr. Exposed granitic rocks in upland regions. Dresden Station (Clemons), (C. H. Peck) in State Herbarium; Huletts Landing (S. E. Jelliffe). Southern W. Fort Ann; verified by Mr. Merrill. This is distinguished from the species by having the thallus deeply divided into smaller lobes.
7. *Pyrenula leucoplaca* (Wallr.) Koerb. On trunk of *Acer saccharum* in Vaughns schoolhouse woods, April 8, 1907.
8. *Pyrenula nitida* (Weig.) Ach. Fort Edward (Howe); East Galway on trunks of *Fagus grandifolia* (E. A. Burt); Shushan on trunks of *Fagus*, *Quercus* and *Acer* (F. Dobbin). Peaked Mt., southern W. Fort Ann, April 14, 1918, on trunks of *Quercus Prinus*; determined by Mr. Merrill.
9. *Trypethelium virens* Tuck. On trunks of *Fagus grandifolia* at E. Galway (Burt) and west of Tripoli; Shushan on trunks of *Betula lenta* (Dobbin).
10. *Mycoporium pycnocarpum* Nyl. On trunk of living maple in Rich's swamp southwest of Shushan, May 20, 1906
11. *Calicium Curtisii* Tuck. E. Galway on *Rhus glabra* (Burt).
12. *Calicium parietinum* Ach. Shushan on white birch, May 4, 1907 (Dobbin) determined by Dr. Bruce Fink.
13. *Calicium praecedens* Nyl. E. Galway on *Alnus* (Burt).
14. *Calicium sphaerocephalum* (L.) Wahl, On trunk of *Tsuga canadensis* at Vaughns; determined by Dr. John W. Eckfeldt (*Calicium trachelinum* Ach).
15. *Calicium subtile* Pers. Johnsburg on hardwood and Mechanicsville on *Acer* and *Fraxinus* (Peck).
16. *Coniocybe furfuracea* (L.) Ach. Shushan in Rich's swamp at roots of *Picea* and *Acer* (Dobbin); talus, foot of Diameter at South Bay, Aug. 21, 1906; Vaughns on *Tsuga canadensis* and *Acer*; rocks, Anaquassacook hills, Shushan, May 19, 1906.
17. *Coniocybe pallida* (Pers.) Fr. Bark of oak trees at Fort Edward, very rare (Howe), N. Y. State Cab. Rep. 22: 68. 1869.
18. *Sphinctrina turbinata* (Pers.) Fr. On *Pertusaria communis* and dry fungus at Fort Edward (Howe), N. Y. State Cab. Rep. 22: 95. 1869.
19. *Cyphelium tigillare* (Ach.) Th. Fr. On old wood, Gansevoort (Peck). (*Acolium tigillare* (Ach.) S. F. Gray).

20. *Arthonia lecideella* Nyl. On dead branches and trunks of *Salix nigra* and *Ulmus americana*, N. Beaver creek at Vaughns, March 6, and April 7, 1914; determined by Mr. Merrill.
21. *Arthonia quintaria* Nyl. Shushan on bark of *Juglans cinerea*, Aug. 9, 1906; determined by Mr. Merrill; also on bark of *Quercus*, May 14, 1906 (Dobbin); reported in N. Y. State Mus. Bull. **167**: 23, 1913.
22. *Arthonia radiata* (Pers.) Ach. On bark of *Carya ovata* and *Tilia americana*, Shushan, Aug. 9, 1806; determined by Mr. Merrill; also bark of *Fagus grandifolia*, Shushan, Apr. 3 & 9, 1906 (Dobbin). Reported in N. Y. State Mus. Bull. **167**: 23, 1913. (*Arthonia astroidea* Ach.)
23. *Arthothelium spectabile* (Flot.) Mass. On living trunks of *Acer saccharum* Apr. 16, 1914, and *Tilia americana* June 3, 1906, at Vaughns; determined by Dr. Fink and by Mr. Merrill. Bog north of Clarks Pond, west of Shushan on *Tilia*, Apr. 16, 1914. (*Arthonia spectabile* Flot.).
24. *Opegrapha varia* Pers. Trees at Fort Edward (Howe) N. Y. State Cab. Rep. **22**: 68, 1869. Bark of *Ulmus americana*, N. Beaver creek at Vaughns, Sept. 11, 1913; determined by Dr. Fink. Trunks of *Tilia americana*, Anaquassacook hills, May 19, 1906.
25. *Opegrapha varia notha* (Ach.) Fr. Warrensburg on bark of *Acer rubrum* (Peck); trunks of *Acer rubrum*, bog north of Clarks Pond, Sept. 11, 1909.
26. *Graphis scripta* (L.) Ach. Trunks of trees specially of the frondose species; common.
27. *Graphis scripta pulverulenta* (Pers.) Ach. West of Tripoli on *Juglans cinerea*, Dec. 5, 1914; determined by Mr. Merrill.
28. *Graphis scripta recta* (Humb.) Nyl. Huletts Lg. (Jelliffe).
29. *Graphis scripta stellata* (Leight.) Mudd. On bark of *Nemopanthus mucronata*, wet place in woods south of Sugar Loaf Mt., Nov. 19, 1915; determined by Mr. Merrill.
30. *Conotrema urceolatum* (Ach.) Tuck. Huletts Lg. (Jelliffe); E. Galway on birch trunks (Burt); Shushan on *Betula lutea*, May 4, 1907 (Dobbin); Anaquassacook hills on *Carya ovata*, May 19, 1906.
31. *Diploschistes scruposus* (Linn.) Norm. Shushan on slaty rocks (Dobbin); northwest Hartford; common at Vaughns on sandstone rocks, which it softens. It sometimes grows over mosses in rocky places. (*Urceolaria scruposa* (Linn.) Ach.)
32. *Microphiale diluta* (Pers.) Zahlbr. East of Tripoli, at base of tree in swampy woods, Apr. 10, 1914; determined by Mr. Merrill. Copse in wet place, near Devines woods at Vaughns, Apr. 18, 1914. (*Gyalecta Pineti* (Schrad.) Tuck.).
33. *Microphiale lutea* (Dicks.) Stein. Peaked Mt., May 26, 1917: falls in West brook on old humus and rotten logs, Sept. 11, 1918: and east of Thompsons gravel-bed on bark of *Thuja occidentalis*, Apr. 29, 1917, southern W. Fort Ann; determined by Mr. Merrill.

34. *Lecidea albocaerulescens* (Wulf.) Ach. On very hard limestone rocks, Curtis hill east of Fort Ann; southern W. Fort Ann. Vaughns, Dec. 6, 1914; determined by Mr. Merrill.
35. *Lecidea atrofusca* (Flot.) Mudd. Wiggins iron mine on mossy rocks, W. Fort Ann, Nov. 22, 1915; determined by Mr. Merrill who says, "this is a plant that I was first to differentiate in this country, but without doubt it has long been known by some other name probably *Lecidea sanguineoaira*." (*Biatora atrofusca* Flot.).
36. *Lecidea coarctata* (Sm.) Nyl. On small loose stones in meadow at Vaughns, Nov. 16, 1913; determined by Mr. Merrill who says, "a very obscure thing, but on the evidence of the spores and reaction with iodine, seems to belong to *Biatora coarctata*. It is decidedly atypical however."
37. *Lecidea contigua* (Hoffm.) Fr. On rocks. Lake George to Warrensburg; falls of West brook, W. Fort Ann; Crescent; Shushan and Anaquassacook hills. Specimens collected on rocks at southern bare of Sugar Loaf Mt., Nov. 13, 1915 were determined by Mr. Merrill who says, "Tuckerman would call the thing *L. contigua* and I have specimens from Europe similar, and so called. My own examples of *L. contigua* have a different thallus and have been verified by one of the noted lichenists of Europe. We will have to call it *L. contigua* for the present, and until such a time as *Lecidea* may be revised."
38. *Lecidea elaeochroma* (Ach.) Tayl. Vaughns on bark of *Carya ovata*, May 11, 1907; determined by Dr. Fink. (*Lecidea enteroleuca* Ach.)
39. *Lecidea granulosa* (Ehrh.) Schaer. Sugar Loaf Mt., determined by Mr. Merrill, and Peaked Mt., southern W. Fort Ann; old fence rail at Vaughns, determined by Mr. Merrill; Shushan at base of an old oak tree (Dobbin) and Anaquassacook hills near Peaked Rock on humus covered rocks.
40. *Lecidea platycarpa* Ach. Huletts Lg. (Jelliffe); Shushan (Dobbin); north-west Hartford; southern W. Fort Ann; Vaughns. A common lichen on sandstone, limestone and granitic rocks; specimens have been determined by both Dr. Fink and Mr. Merrill. Reported in N. Y. State Mus. Bull. 122: 22. 1908.
41. *Lecidea rivulosa* Ach. On rocks. Lake George to Warrensburg, Aug. 31, 1906; along Battenkill River south of Shushan, June 15, 1907; bank of Mohawk River, Crescent to Waterford, May 30, 1906.
42. *Lecidea Russellii* Tuck. Shushan on rocks with *Placynthium nigrum*, Apr. 30, 1906 (Dobbin). Limestone rocks in stonewall north of Vaughns, Apr. 11, 1915; determined by Mr. Merrill who says, "the *Biatora* is a thing that occurs here (in Maine) and while it differs from the western examples of the species to a marked degree, there is really no other place to assign it. Both your specimens and my own are without apothecia."
43. *Lecidea russula* Ach. On living trees in Rich's swamp near Shushan, May 20, 1906.

44. *Lecidea sanguineoatra* (Wulf.) Ach. On dead mosses, decaying stumps and earth mixed with humus. Shushan (Dobbin); determined by Dr. Fink. Hague; southern W. Fort Ann; several collections determined by Mr. Merrill.
45. *Lecidea uliginosa* (Schrad.) Ach. Sandy soil, Crescent, May 30, 1906; sandy fields northeast of Tripoli among *Ceratodon*, Dec. 13, 1914, "a few scattered apothecia reminding one of *Biatora uliginosa*" according to Mr. Merrill.
46. *Lecidea vernalis* (Schrad.) Ach. Rocks in woods southeast of Tripoli, Dec. 2, 1914; mossy rocks, Haynes hill, June 30, 1916; both collections determined by Mr. Merrill.
47. *Lecidea viridescens* (Linn.) Ach. Much decayed coniferous wood and stumps, southern W. Fort Ann; specimens have been determined by Mr. Merrill.
48. *Mycoblastus sanguinarius* (L.) Th. Fr. Granitic rocks, summit of Black Mt., 2,665 ft, Aug. 19, 1909; determined by Dr. L. W. Riddle. (*Heterothecium sanguinarium* (L.) Flot.).
49. *Catillaria atropurpurea* (Schaer.) Th. Fr. Shushan on *Pinus Strobus* and *Carpinus caroliniana* (Dobbin), Anaquassacook hills on *Carya ovata* and *Betula lutea*, and bog north of Clarks Pond on trunks of trees. Vaughns.
50. *Catillaria intermixta* (Nyl.) Merrill & Burnh., n. comb. E. Galway on large trunks of *Fagus grandifolia*, Aug. 15, 1893 (Burt); Shushan, Sept. 1907 (Dobbin); determined by Dr. Fink. (*Biatora Laureri* (Hepp) Tuck.).
51. *Catillaria prasina* (Fr.) Th. Fr. A greenish lichen on bark of *Acer saccharum* at Shushan, March 11 & 26, 1907 (Dobbin); determined by Dr. Fink. Reported in N. Y. State Mus. Bull. **122**: 17. 1908, and *Mycologia* **11**: 297. Nov. 1919.
52. *Bacidia atosanguinea* (Schaer.) Anzi. On trunks of *Betula lutea*, Oct. 20, 1914 & June 12, 1915, and trunks of *Quercus Prinus*, Apr. 2, 1918, near Tripoli; these collections determined by Mr. Merrill.
53. *Bacidia fuscorubella* (Hoffm.) Arn. Shushan, May 20, 1907 (Dobbin); determined by Dr. Fink. Tripoli pond, on *Fraxinus nigra*, June 20, 1914; determined by Mr. Merrill. On trunks of *Acer saccharum* at Vaughns, June 6, 1909; determined by Dr. Riddle.
54. *Bacidia lignaria* (Ach.) Zahlbr. Baker's ledge on mosses, S. Beaver creek, east of Vaughns, Apr. 15, 1917; Glenwood brook on rocks, Vaughns, Apr. 21, 1917; both collections determined by Mr. Merrill.
55. *Bacidia luteola* (Schrad.) Mudd. On bark at Fort Edward (Howe), N. Y. State Cab. Rep. **22**: 66. 1869 as *Biatora rubella* Tuck. Vaughns on trunks of *Carpinus caroliniana*, Aug. 19, 1907; trunks of *Ulmus americana*, March 29, 1914, determined by Mr. Merrill.

56. *Bacidia muscorum* (Sw.) Mudd. Limestone ledge west of Vaughns school-house on mosses, April 16, 1911 & March 23, 1915; determined by Mr. Merrill, March 12, 1912, who says, "I have never before examined it from America."
57. *Bacidia sabuletorum* (Flk.) Zahlbr. Hague on mossy trunks of *Thuja occidentalis*; determined by Dr. Riddle. Near Tripoli and at Vaughns, not uncommon on mossy limestone rocks; specimens have been determined by Mr. Merrill. (*Biatora hypnophila* (Turn.) Tuck.)
58. *Bacidia Schweinitzii* (Tuck.) Fink. On trees, Fort Edward (Howe); E. Galway on trunks of *Fagus grandifolia* (Burt); bark of *Thuja occidentalis* east of Thompsons gravel-bed, Apr. 29, 1917, determined by Mr. Merrill.
59. *Bacidia suffusa* (Fr.) Merrill & Burnh., n. comb. E. Galway on poplar bark (Burt). (*Bacidia fusciorubella suffusa* (Fr.) Fink).
60. *Bacidia trachona* (Ach.) Zahlbr. Calcareous rocks, Bacon hill, two miles east of Fort Ann, Apr. 22, 1917; determined by Mr. Merrill.
61. *Bacidia umbrina compacia* (Koerb.) Th.Fr. On decorticated branches of *Pinus Strobus* and *Tsuga canadensis*. East of Fort Ann; southern W. Fort Ann; Vaughns; determined by Mr. Merrill.
62. *Lopadium pezizoideum* (Ach.) Koerb. On bark of *Picea rubra*, summit of Black Mt., Aug. 19, 1909; determined by Dr. Riddle and reported in N. Y. State Mus. Bull. **150**: 31. 1911. (*Heterothecium pezizoideum* (Ach.) Flot.).
63. *Rhizocarpon alboatrum* (Hoffm.) Th.Fr. Peaked Rock on trunks, May 19, 1906; determined by Dr. Fink.
64. *Rhizocarpon confervoides* DC. Stone walls at Vaughns; determined by Mr. Merrill; talus at foot of Diameter precipice, South Bay; Peaked Rock. (*Buellia petraea* (Wulf.) Tuck. in part).
65. *Baeomyces roseus* Pers. Baker's gorge down S. Beaver creek, east of Vaughns on clayey soil, Aug. 12, 1899, & Nov. 15, 1914; Anaquassacook hills on earth, May 19, 1906 (young); along Battenkill River south of Shushan, Jan. 19, 1913 (young).
66. *Pilophoron cereolum* (Ach.) in Tuckerman's sense, f. *fibula* Tuck. On sandstone rocks, Vaughns, Aug. 23, 1906, sterile; determined by Dr. Fink. (*Pilophorus cereolus* (Ach.) Stizenb.).
67. *Cladonia alpestris* (L.) Rabenh. Summit of Black Mt.; foot of Diameter precipice, South Bay; Saddle Mt., Fort Ann mountains; north of New Michigan Pond, W. Fort Ann; Curtis hill, east of Fort Ann; Ballston Lake.
68. *Cladonia apolepta* (Ach.) Fink. Along West brook, W. Fort Ann on old wood in moist places, Aug. 20, 1907; determined by Dr. Fink as *C. fimbriata coniocraea* (Flk.) Wainio; but reported by Dr. Fink as *Cladonia apolepta* (Ach.) in Mycol. **11**: 299, Nov. 1919.
69. *Cladonia bacillaris* Nyl. The f. *clavata* (Ach.) Wainio, on ground at Shushan, summer 1907 (Dobbin); determined by Dr. Fink.

70. *Cladonia caespiticia* (Pers.) Flk. (E. Galway) N.Y. (Burt); reported by Dr. Fink in THE BRYOLOGIST 9: 90. Nov. 1906. Shushan on sandstone, Apr. 5, 1907 (Dobbin).
71. *Cladonia cariosa cribosa* (Wallr.) Wainio. E. Galway at base of a stump (Burt); Gansevoort (Peck); Shushan on earth and sandstone boulder (Dobbin); Vaughns on loam and clay soil (plants sometimes reddish); specimens have been determined by Mr. Merrill.
72. *Cladonia coccifera* (L.) Willd. Vaughns on rocks in woods, Aug. 15, 1911; determined by Mr. Merrill. (*Cladonia cornucopioides* (Huds.) Fr.).
73. *Cladonia crispata* (Ach.) Tuck. A composite species. On earth and decaying wood; Hulets Lg. (Jelliffe); Gansevoort and Ballston (Peck); Shushan (Dobbin); northern Washington county, determined by Dr. Eckfeldt.
74. *Cladonia cristatella* Tuck. Earth filled with humus and much decayed wood, specially coniferous; common. Easily recognized by its scarlet apothecia.
75. *Cladonia digitata ceruchoides* Wainio. Shushan on rotten stump and logs in Rich's swamp, May 4, 1907; determined by Dr. Fink and reported in N. Y. State Mus. Bull. 122: 13. 1908
76. *Cladonia fimbriata* (L.) Fr. A composite species. Shushan (Dobbin); northern Washington county; north of Glen Lake; Ballston Lake.
77. *Cladonia fimbriata Balfourii* (Cromb.) Wainio. On earth and rocks; near Tripoli, northeast of Thompsons gravel-bed; Vaughns. Determined by Mr. Merrill who said March 2, 1914, "only once before identified from America."
78. *Cladonia fimbriata fibula* (Ach.) Nyl. On earth filled with humus, east of Hadlock Pond; old logs of *Tsuga canadensis* and branches of *Juniperus communis* var. *depressa*; Fred Vaughn's woods, down S. Beaver creek; Vaughns.
79. *Cladonia fimbriata radiata* (Schreb.) Cromb. A reduced form, east base of Sugar Loaf Mt., Sept. 19. 1917; determined by Mr. Merrill.
80. *Cladonia fimbriata simplex* (Weis.) Wainio. Shushan on old logs, May 20, 1907 (Dobbin). East of Hadlock Pond, Nov. 24, 1915; determined by Mr. Merrill.
81. *Cladonia furcata* (Huds.) Schrad. Earth and about rocks; common.
82. *Cladonia furcata pinnata* (Flk.) Wainio. Southern W. Fort Ann; Vaughns; several collections determined by Mr. Merrill.
83. *Cladonia furcata pinnata* (Flk.) Wainio. The modification *truncata* Flk. in Hammond's hemlock loam pasture, north of Vaughns, May 17, Aug. 31 & Oct. 30, 1913; determined by Mr. Merrill.
84. *Cladonia furcata racemosa* (Hoffm.) Flk. Dresden Station (Peck); Hulets Lg. (Jelliffe); southern W. Fort Ann; Vaughns; Shuihan and elsewhere; several collections determined by Mr. Merrill.
85. *Cladonia furcata subulata* Flk. Old pastures at Vaughns.

86. *Cladonia gracilis* (L.) Willd. A composite species found at Vaughns.
87. *Cladonia gracilis dilacerata* Flk. Hammond's pasture north of Vaughns, Oct. 9, 1910; determined by Dr. Riddle.
88. *Cladonia gracilis dilatata* (Hoffm.) Wainio. (E. Galway) N.Y. (Burt), reported by Dr. Fink in *THE BRYOLOGIST* 8: 39. May 1905. Vaughns. This includes much formerly known as *Cladonia gracilis hybrida* Schaer. in sense of Tuckerman.
89. *Cladonia gracilis floripara* Flk. Golden's hemlocks east of Tripoli, Nov. 9, 1913; Hammond's hemlock pasture, Sept. 23, 1913, determined by Mr. Merrill who says, "almost unknown in America."
90. *Cladonia macilenta* Hoffm. E. Galway on ground with *Cladonia cristatella*, Sept. 3, 1894 (Burt).
91. *Cladonia macilenta squamigera* Wainio. Old stumps of *Pinus rigida*, northwest of Tripoli, Nov. 7, 1915; determined by Mr. Merrill.
92. *Cladonia mitrula* Tuck. Shushan, Nov. 8, 1907 (Dobbin); east of Tripoli on earth, Nov. 14, 1909.
93. *Cladonia multiformis* Merrill. East of Tripoli on earth and about old coniferous stumps; about old stumps, bog south of Mud Pond, Pattens Mills; Vaughns and vicinity; several collections determined by Mr. Merrill.
94. *Cladonia ochrochlora ceratodes* Flk. Vaughns in shaded places on earth, May, 1913, & Dec. 2, 1914; old log near marsh north of Glen Lake, Aug. 24, 1916; determined by Mr. Merrill.
95. ***Cladonia ochrochlora coniocraea*** (Flk.) Merrill & Burnh., n. comb. Huletts Lg. (Jelliffe); southern W. Fort Ann, determined by Dr. Eckfeldt in part; Ballston Lake; old stumps near Shushan. (*Cladonia fimbriata coniocraea* (Flk.) Wainio, which includes plants formerly known as *C. fimbriata tubaeformis* Fr. in sense of Tuckerman.)
96. *Cladonia papillaria* (Ehrh.) Hoffm. Sterile soil, Ballston (Peck), N.Y. State Mus. Rep. 32: 92. 1879. Peaked Rock, June 15, 1907.
97. *Cladonia parasitica* (Hoffm.) Shushan on old pine stump, Oct. 1, 1916 and rotten wood, May 20, 1907 (Dobbin). (*Cladonia delicata* (Ach.) Flk.)
98. *Cladonia pyxidata* (L.) Hoffm. A composite species. (E. Galway) N.Y. (Burt), reported by Dr. Fink in *THE BRYOLOGIST* 10: 59. July, 1907. Huletts Lg. (Jelliffe); Horicon and Dresden Station (Peck); Shushan (Dobbin); Vaughns and elsewhere.
99. *Cladonia pyxidata chlorophaea* Flk. Rich's swamp near Shushan on old stump, Aug. 9, 1906 (Dobbin); coniferous stumps, Fred Vaughn's woods, Oct. 31, 1915; both collections determined by Mr. Merrill.
100. *Cladonia pyxidata neglecta* (Flk.) Mass. The common variety of this composite species growing on old stumps and rocks. Southern W. Fort Ann; Vaughns; several collections determined by Mr. Merrill.

[To be Continued]

THE MOSSES OF WASHINGTON COUNTY, PENNSYLVANIA¹

N. M. GRIER

Some years ago the Herbarium of Washington and Jefferson College was enriched by the presentation of a collection of mosses made by Professors A. Linn and A. Simonton, then of the Faculty. Included in the gift were representative species of the mosses of Washington County, Pa. Professors Linn and Simonton published very little of their extended observations, but circulated among their friends a printed preliminary list of the mosses found in this region.

A co-author of this list, Professor J. S. Simonton, Emeritus, Washington and Jefferson College, before his death gave me permission to revise it and place it in publication.² This was especially desirable both on account of developments in nomenclature and because mistakes in identification and locality in the original list had evidently been copied in Porter's Catalogue,³ and from thence into Jennings' Manual of the Mosses of Western Pennsylvania.

Revision has been accomplished with the aid of Jennings' Manual,⁴ following in general the same taxonomic standard—that of Warnstorf, Ruhland and Broas given in Engler and Prantl's *Die Naturlichen Pflanzenfamilien*, Teil I, Abteilung III. While Professors Linn and Simonton rarely collected in the same localities of Washington County as did Dr. Jennings, the latter found many species which they did. The species starred (*) in the following list represent those published by Jennings alone as occurring in Washington County; the other species listed are substantiated by specimens in the Herbarium of the College.

ORDER BRYALES

DICRANACEAE

- Pleuridium subulatum* (Huds.) Rabenh.
- Pleuridium alternifolium* (Dicks., Kaulf.) Rabenh.
- Ditrichum pallidum* (Schreb.) Hampe.
- Ceralodon purpureus* (L.) Brid.
- Dicranella heteromalla* (Dill.) Schimp.
- Dicranella varia* (Hedw.) Schimp.
- Dicranum undulatum* Ehrh.
- Dicranum scoparium* (L.) Hedw.
- Dicranum flagellare* Hedw.
- Dicranum longifolium* Ehrh.

¹ Contribution No. 72 (E. Linton and N. M. Grier), from the Biological Laboratory, Washington and Jefferson College.

² James Snodgrass Simonton was born in Dauphin County, Pennsylvania March 20, 1829. He was educated at the Harrisburg Academy and at Princeton, graduating with the class of 1852. After teaching in the South he graduated from Princeton Theological Seminary in 1857, following which he traveled for three years in South America and Europe. In 1868 he joined the faculty of Washington and Jefferson College, becoming Professor of the French Language and Literature. He retired from the faculty in 1900, and was made Emeritus Professor by the Trustees. Professor Simonton was a teacher of unusual ability and a man of pleasant personality and high scholarship. His death occurred on December 27, 1921.

³ Catalogue of the Bryophyta and Pteridophyta found in Pennsylvania. Porter, T. C. 1904.

⁴ Manual of Mosses of Western Pennsylvania. Jennings, O. E. 1913.

LEUCOBRYACEAE

- Leucobryum glaucum* (L.) W. P. Schimp.
Leucobryum albidum (Brid.) Lindb.

FISSIDENTACEAE

- Fissidens hyalinus* Hook. & Wils.
Fissidens incurvus var. *minutulus* (Sull.) Aust.
Fissidens adiantoides (L.) Hedw.
Fissidens taxifolius (L.) Hedw.
Fissidens subbasilaris Hedw.

TORTULACEAE

- Weisia viridula* (L.) Hedw.
Tortella tortuosa (L.) Limpr.
Barbula fallax Hedw.
Barbula unguiculata (Huds.) Hedw.

GRIMMIACEAE

- Grimmia apocarpa* (L.) Hedw.
Grimmia conferta Funck.

ORTHOTRICHACEAE

- Drummondia clavellata* Hook.
Orthotrichum sordidum Sull.
Orthotrichum ohioense Sull.
Ulota crispa (L.) Brid.

FUNARIACEAE

- Physcomitrium turbinatum* (Rich.) Brid.
Funaria flavicans Rich.
Funaria hygrometrica (L.) Sibth.

SCHISTOSTEGACEAE

- Leptobryum pyriforme* (L.) Wils.
* *Pohlia nutans* (Schreb.) Lindb.

BRYACEAE

- Mniobryum albicans* (Wahl.) Limpr.
Rhodobryum roseum (Weis.) Limpr.
Bryum caespiticium (L.)
Bryum argenteum (L.)
Bryum capillare (L.)
* *Rhodobryum ontariense* (Kindb.) Paris.

MNIACEAE

- * *Mnium marginatum* (Dicks.) Beauv.
Mnium rostratum Schrad.
Mnium cuspidatum (L.) Leyss.
* *Mnium affine* var. *ciliare* (Greville) C. Muell.
* *Mnium stellare* Reich.

AULACOMNIACEAE

- Aulacomnium heterostichum* (Hedw.) Bryol. Eur.
Aulacomnium palustre (L.) Schwaegr.

BARTRAMIACEAE

- Bartramia pomiformis* (L.) Hedw.
Philonotus Muhlenbergii (Schwaegr.) Brid.

POLYTRICHACEAE⁵

- * *Catharinaea undulata* (L.) Weber and Mohr.
Catharinaea undulata var. *allegheniensis* Jennings.
Catharinaea angustata Brid.
* *Catharinaea papillosa* Jennings.
Pogonatum brevicaule (Brid.) Beauv.
Polytrichum ohioense R. & C.
Polytrichum juniperinum Willd.
* *Polytrichum strictum* Banks.
Polytrichum commune L.

HEDWIGIACEAE

- Hedwigia albicans* (Web.) Lindb.

CLIMACEAE

- Climacium americanum* Brid.

LEUCODONTACEAE

- Leucodon brachypus* Brid.
Leucodon julaceus (L.) Sull.

ENTODONTACEAE

- Entodon cladorrhizans* (Hedw.) C. Muell.
Entodon seductrix (Hedw.) C. Muell.
Platygyrium repens (Brid.) Bryol. Eur.
Pylaisia intricata (Hedw.) R. & C. (*P. velutina* B. & S.)
* *Pylaisia Schimperii* Card.

FABRONIACEAE

- Anacamptodon splachnoides* (Froel.) Brid.

LESKEACEAE

- Thelia hirtella* (Hedw.) Sull.
Thelia asprella Sull.
Anomodon minor (Beauv.) Fuern.
Anomodon attenuatus (Schreb.) Hueb.
Anomodon rostratus (Hedw.) Schimp.
Leskea obscura Hedw.
Rauia scita (Beauv.) Aust.

⁵ Later records by Professors Linn and Simonton render doubtful their collection of *Polytrichum piliferum* Schreb. in Washington County, as stated in Porter's Catalogue and Jennings' Manual.

Haplocladium virginianum (Brid.) Broth.
Thuidium minutulum (Hedw.) Bryol. Eur.
Thuidium pygmaeum (Sull.) Bryol. Eur.
Thuidium delicatulum (L.) Mitt.
Thuidium recognitum (Hedw.) Lindb.

HYPNACEAE

Amblystegium serpens (L.) Bryol. Eur.
Amblystegium orthocladon (Beauv.) Jaeg.
Amblystegium radicale (Beauv.) Mitten.
* *Amblystegium varium* (Hedw.) Lindb.
* *Amblystegium Kochii* Bryol. Eur.
* *Amblystegium irriguum* (Wils.) Bryol. Eur.
Amblystegium adnatum (Hedw.) Nichols.
Cratoneuron filicinum (L.) Roth.
Campylium hispidulum (Brid.) Mitt.
Campylium chrysophyllum (Brid.) Bryhn.
Ctenidium molluscum (Hedw.) Mitt.
Rhytidiadelphus triquetrus (L.) Warnst.
Hylocomium proliferum (L.) Lindb.
Hylocomium brevirostre (Ehrh.) Bryol. Eur.
Hypnum Schreberi Willd.
Stereodon reptilis (Rich.) Mitt.
Stereodon imponens (Hedw.) Brid.
Stereodon cupressiformis (L.) Brid.
Stereodon curvifolius (Hedw.) Brid.
* *Stereodon arcuatus* (Lindb.) Lindb.
Stereodon recurvans (Rich.) Broth.
Isopterygium deplanatum (Sull.) Mitt.
Plagiothecium denticulatum (L.) Bryol. Eur.

BRACHYTHECIACEAE

Homalotheciella subcapillata (Hedw.) Broth.
Brachythecium acuminatum (Hedw.) Kindb.
Brachythecium oxycladon (Brid.) J. & S. (*Hypnum laetum* Brid.).
Brachythecium salebrosum (Hoffm.) Bryol. Eur.
Brachythecium rutabulum (L.) Bryol. Eur.
Brachythecium Starkei (Brid.) Bryol. Eur.
Brachythecium rivulare (Bruch.) Bryol. Eur.
Cirriphyllum Boscii (Schwaegr.) Grout.
Oxyrhynchium rusciforme (Neck.) Warnst.
Eurhynchium hians J. & S.
Rhynchostegium serrulatum (Hedw.) Jaeg.

WASHINGTON AND JEFFERSON COLLEGE,
WASHINGTON, PENNSYLVANIA.

BRACHYTHECIUM NOTES

A. J. GROUT

BRACHYTHECIUM PACIFICUM (R. & C.) Grout

B. reflexum pacificum R. & C., Bot. Centralb. 1890, No. 51. Not *B. pacificum* Jennings, BRYOLOGIST 16: 95, Nov. 1913.*

Up to the year 1919 I had confused this moss with *B. glaciale* B. & S. Others here and abroad had confused it with *B. reflexum* (Starke) B. & S. and *B. Starkei* (Brid.) B. & S. The only North American plant that I have seen that seems referable to *B. glaciale* is Macoun's Canadian Musci No. 735a, from earth and rocks, Cape Breton Id., Nova Scotia, July 8, 1898.

This group, including *B. reflexum*, *B. glaciale*, *B. Starkei* and *B. pacificum*, has puzzled bryologists for a long time, not only in America but also in Europe. Part of my bewilderment is attributable to a specimen from Greenland, ex-herb. Schimper, communicated by Cardot, as *B. glaciale*, which is not that species, but a very robust form of *reflexum* approaching *pacificum*, or, possibly, it may be near the var. *micropus* (*B. micropus* B. & S.).

Although I have not studied the calyptra and peristome of these forms from North America, forms of *B. reflexum* approaching *micropus* in gametophyte characters are not rare in North America. They run larger in size and have the leaves less abruptly acuminate, with leaf-cells longer and narrower.

B. Starkei is the most robust of the group, with leaves spreading, scarcely plicate, often almost complanate, very widely cordate-ovate. *B. glaciale* is more slender, julaceous, with leaves appressed, somewhat plicate, with the costa perhaps averaging a little longer than in *B. Starkei*, but this is not constant.

B. pacificum is much more slender than *B. glaciale*, approaching *B. reflexum* in habit, but with leaves less closely appressed when dry, costa longer and stronger than in *Starkei* or *glaciale*, but not consistently percurrent. Leaf-cells much like those of *Starkei* in outline, but smaller.

B. reflexum is typically very slender, almost filiform, with widely cordate-ovate leaves, abruptly long-acuminate, leaf-cells much as in the shorter-celled *Amblystegia*, typically about 5 : 1 in the stem-leaves.

According to Braithwaite, Bottini considers *B. reflexum micropus* a hybrid with *B. populeum*. There is much to suggest hybrids in the varying and intergrading species of this group. *B. Starkei* and *B. reflexum* are common in the mountain regions of North America, apparently less frequent westward. I have *B. pacificum* from Norway, communicated by Holzinger (See Mosses of the Soils Kelp Expedition, Holzinger and Frye. Publications of the Puget Sound Biolog-

* Dr. Jennings has very kindly sent me a part of his type of *Brachythecium pacificum* Jennings, l. c. After a careful comparison with slides of the type of *B. aspernum* Mitt., I feel sure that the two are the same species. The serration of the leaves is not materially different, in spite of the differences in descriptions. *B. aspernum* is dioicous and Jennings reports no antheridia on his fruiting plants. Had Jennings' material come to me unnamed, I should have referred it to *aspernum* without the slightest hesitation.

ical Station, Vol. 3, no 58, p.54). Vicinity of Yakutat Bay, Alaska, 1892, coll. Frederick Funston, comm. U. S. National Museum. (This specimen is a much prized souvenir of our plucky little American soldier and botanist.) Juneau, Alaska, Mehner. Cape Breton Id., No. 1432, 1915, and also No. 90 of 1909, G. E. Nichols. Traille River Divide, Idaho, alt. 7,000 ft., "On shady crevice of quartzite ledges, J. B. Leiberger, No. 260" White Bay, Newfoundland, 10-6-91. Sent by Dr. Best, probably collected by Waghorne.

Brachythecium Holzingeri Grout, COMB. NOV.

B. Holzingeri Grout (*B. collinum Holzingeri* Grout). BRYOLOGIST 4 :48. July, 1901.

At the time this variety was described the *collinum* group and its allies were not well enough known to warrant making a new species, but a specimen from A. H. Brinkman, Mt. Kamloops, British Columbia, on soil, alt. 3700 ft., Sept. 20, 1910, presents an extreme and well differentiated form that seems certainly worthy of specific rank. The leaves are very widely long-decurrent. The plants are loosely intricate and sparingly branched and the seta slightly papillose. I consider this form typical of the species rather than the plant originally described as *B. collinum Holzingeri*.

BRACHYTHECIUM OXYCLADON (Brid.) J. & S. forma **falcata** FORMA NOV.

A very interesting xerophytic form unlike anything I have seen before. The plants are bright yellow with short stems and branches which are more or less curved at the ends; leaves strongly falcate secund. Plants sterile.

Dry sandy shores of Douglas Lake, Michigan, June-August, 1920. G. E. Nichols. No. 141.

NEW DORP, RICHMOND BOROUGH, N. Y.

LITTLE JOURNEYS INTO MOSSLAND

VI. — THE MOSSES OF TREE-TRUNKS

GEORGE B. KAISER

Let us go to the woods. The student may there reap a veritable harvest of interesting mosses which grow on the trunks of living trees. In our groves and forests many trees indeed harbor a great variety of bryophytes forming a distinct moss-flora of their own and these mosses add considerably to the beauty of the scene. It would be difficult to imagine how bare an aspect the woodlands would present without them.

Those aprons of gray-green for instance. How thickly they clothe the base of the white oak and of other trees! These are likely to be composed of *Thelia asprella*, in autumn, when fertile, so thickly covered with capsules displaying conspicuous white peristomes. Under the microscope the papillae on the leaves appear delicately branched. Other mats on like substrata are yellow rather than

gray-green and the leaves have simple unbranched papillae. *Anomodon rostratus* is a bright yellow-green, the leaves are somewhat opaque, and a strand, when held to the light, exhibits under the hand lens, leaves with very slender apices. On the bases of trunks which at some seasons are submerged, one may note the more shaggy and thicker growth of *Anomodon attenuatus* and, to the North, the mat may prove by the fringed basal margin of the leaves to be *Anomodon apiculatus*.

Or, the tree-bases may be clad with *Leskeas*. *Leskea gracilescens* with slender stems, the acute leaves closely appressed when dry, is the commonest species of the genus in our region, but *Leskea obscura*, with rounded leaves, coarser in appearance, is to be found too, and, towards the North and West, the more acuminate-leaved *Leskea polycarpa*. Only rarely do we find *Leskea nervosa*, which is quite blackish in color and whose leaves have a distinctly excurrent nerve.

You will soon realize that the rather glossy olive-green or brownish *Platygyrium repens* also loves the base of trees, and you will find the species almost everywhere on such substrata, sometimes unmixed, sometimes with the glossy green *Brachythecium acuminatum* and other pleurocarpous mosses. All these bryophytes so far mentioned have straight, erect capsules, but one may find with them *Amblystegiella adnata* and other *Amblystegia* whose capsules are gracefully arcuate, presenting a quite different appearance. It is an undertaking of some magnitude to become familiar with the moss-flora of tree-bases but perseverance sees the fruits, in more ways than one, and the day comes, after careful study, when typical *Platygyrium*, *Amblystegiella*, and *Stereodon reptilis* may be differentiated by the naked eye without much trouble.

Farther up the trunk the mosses are quite different. *Pylaisia Schimperii* appears in ample mats of bright glossy green with the ends of the strands curved. The capsules, generally borne abundantly, are upright, brown in color, and the endostome of the peristome teeth is joined from tooth to tooth, forming little loops clearly seen under the microscope. If you are fortunate you may also find *Homalotheciella subcapillata*, which is paler green without curved ends, the seta of the light brown sporophyte decidedly rough, while the abruptly acuminate leaves display a costa to one-half their length.

Here appear the cushions, half-inch or more in diameter, of *Ulota crispa* and *Ulota Ludwigii*, covered with pale straw-colored capsules on short setae. The former has the leaves curled when dry, while the latter, commonly called the Puckered *Ulota*, has little tucks at the upper end of the capsule and the leaves are not crispate under any condition. With the *Ulotas* are found several common *Orthotricha*. Dr. Grout in his book tells how to determine them. *Orthotrichum strangulatum* with immersed furrowed capsules, constricted below the mouth when fully mature, chestnut-brown in color, and small, seems one of the most abundant species in our range, but several others occur: *Orthotrichum ohioense*, with pale straw-colored capsules, a little larger than the first species; *Orthotrichum speciosum*, much larger than any other species of the genus hereabouts, with more exerted capsules; and *Orthotrichum sordidum* with characteristics only evident under microscopic examination.

At five feet or more above the base of the trunk also occur the robust mats of *Leucodon brachypus*, *Leucodon sciuroides*, and *Leucodon julaceus*, according to whether the locality is north or south. The stems of these mosses are several inches in length, with hooked ends, and in alternating moisture and dryness, present very different aspects, as does the beautiful *Neckera pennata*, which grows with *Leucodon*, but is complanately flattened and paler green, shelving out from the tree-trunk in graceful curves. The capsules of these species, except *Leucodon julaceus*, are immersed. I recall a certain sunny morning after heavy rains, in a glen of the Catskill Mountains when the bolls of the venerable monarchs of the forest, resplendent in all their mossy dress of *Leucodon* and *Neckera*, have never appeared to me more beautiful.

One of the less common tree-loving mosses is *Anacamptodon splachnoides*, which was so named because the teeth of the peristome bend backward and because the species resembles that odd genus *Splachnum*. This moss is found about clefts and knotholes of living trees throughout a wide range. I have collected it in central Pennsylvania, in southern New Jersey, and in the mountains of New York, but it is never common and the search for it is generally a long but always an interesting one. In color this slender member of the *Fabronia* family is dark green, the ovate slenderly acuminate leaves have clearly marked cells and the capsules, on setae quarter-inch high, are dark brown and exhibit those characteristic backward-turning teeth. For this and for nearly all the species described, one of the best collecting grounds in my experience is a grove of old sugar maple trees at Haines' Falls, in the Catskills. There more than one summer's afternoon has been indeed well spent in carefully scrutinizing the rich old mossy trunks, and wonderful collections for future study have been brought back from this pleasant retreat, so redolent of woody scents and "far from the maddening crowd" which, too often, makes some of our resorts places to be avoided rather than sought by the lover of Nature.

6620 GERMANTOWN AVE.,

PELHAM, PHILADELPHIA, PA.

GRIMMIA BRANDEGEI AUST.

JOHN M. HOLZINGER

The authors of Lesquereux and James' Manual record, on page 138, that they have seen only a sterile plant of this species; and, since from the original description the fruit characters are exactly like those of *Grimmia plagiopodia*, they have referred this species to their variety *pilifera* of the Manual. It is not quite clear from the Manual whether Austin's species is the type of var. *pilifera*: if it is, then *Grimmia plagiopodia pilifera* L. & J. is a synonym for *Grimmia Brandegei* Aust.

Paris's Index accepts the view of the Manual. But Dr. Brotherus, in *Natürliche Pflanzenfamilien*, Musci, p. 449, cites Austin's species as distinct. This view is borne out by plants collected in 1921 in Los Angeles County, Cali-

foria, as well as by Mr. Coville's plant No. 336, collected Feb. 20, 1891, on the Death Valley Expedition, in the canyon of Mesquite Spring, in the Funeral Mountains west of the settlement of Amargoza, southern California. Coville's plant was named by the late Charles R. Barnes, and was by me reported as *Grimmia plagiopodia pilifera* L. & J.

The recent collection was made by Mr. George L. Moxley, on Big Rock Creek, San Gabriel Mountains, California, and was communicated to the writer by Dr. P. O. Schallert, of Winston-Salem, North Carolina.

The latter collection shows several fruits, all old; but one has a good peristome, which agrees well with the one figured in Limpricht's *Laubmoose*, Vol. I, p. 729. But here the similarity of this plant with *Grimmia plagiopodia* practically ends.

First, a hand-lens examination leads one to suspect that the small cushions have *two* species mixed: the sterile plants are dark green with all the leaves rounded at the apex, their costa ending well below it; scattered among these are groups of three or four leaves with long white hair-points as long as their lamina which turn out to be the perichaetial leaves of the fruiting plants or branches.

Then, the seta, strongly crooked as in the other *Gasterogrimmias* is twice to thrice as long as the capsule, carrying the latter well to the top of the hair-points of the enveloping leaves.

The spores which, according to Limpricht, *l.c.*, measure 11 to 13 microns in *Grimmia plagiopodia* here measure 14 to 16 microns.

Finally, the plant has leaf-margins rolled back and the lamina strongly keeled towards the apex and throughout unistratose, while *Grimmia plagiopodia* has the leaves described by Limpricht as *flat* ("flach-randig") agreeing with the sections in plate 236 in *Bryologia Europea*.

Austin's species, like *Grimmia plagiopodia*, is autoicous, the perigonal buds standing below the perichaetium. But the perigonal leaves are small, the inner ones reaching not over a third of the length of the stem leaves. They are closely rolled around the several antheridia and are with difficulty unrolled. These buds were too old to show whether paraphyses were present or not. The Manual says of the var. *pilifera*, p. 138; "perigonal leaves longer." Unless this is an error in observation, that variety may be a separate plant.

Austin's plant is evidently a good species, distinct from *Grimmia plagiopodia*, distinguished by the *entire absence of hair points* on all stem-leaves, which are rounded at the apex and *rolled back* at the margin, and by the *long seta*, and by the perceptibly larger spores.

In closing, I wish to correct an error. In *Minnesota Botanical Studies*, in my report on the moss-flora of the Minnesota River, p. 115, I reported *Grimmia Brandegei* Aust. This is clearly not the same as the above described California plants, but is rather referable to *Grimmia plagiopodia*, simply with somewhat longer hair-points.

WINONA, MINNESOTA

NOVITAS BRYOLOGICA.— II¹

I. GYÖRFFY

In literatura enumerant auctores sequentes fungum parasiticum in capsulis diversarum specierum habitantem:—1. Cooke et Masee,² *Cladosporium epibryum* in diversis capsulis muscorum, leg. E. G. Britton; 2. ipse publicavi³ *Cladosporium herbarum* ex capsulis *Buxbaumiae viridis* in Magas-Tatra (Hungary) lectae.

Annis 1911–1921 legi multas diversarum specierum capsulas *Cladosporio* herbaro investitas. Etquidem plantae nutrices fuerant:—1. *Gyroweisia tenuis* (Schrud.) Schimp., 2. *Dicranella subulata* (Hedw.) Schimp., 3. *Tortula crenulata* Warnst. 4. *Bryum argenteum* L. 5. *Bryum torquescens* Schimp., 6. *Bryum pallescens* Schleich. (publicatio mea in lucem prodito fuerit in Numb. Sept. Botan. Közl. 19. 1920).

Ill. ac clar. dominus bryologicus fennicus Prof. Dr. Vict. Ferd. Brotherus (Helsinki), dono donavit mihi libenter innumerabilia exemplaria muscorum, inter quos inveni unum, *Campylopus introflexus*⁴ cuius pars peristomialis conidiis cuiusdam fungi coronata erat. Fungum parasiticum determinavit resp. determinationem meam approbavit ill. dom. mycologicus Dr. G. Moesz, director sectionis botan. Musei Nat. Hungarici, Budapestini. Nam conidia haud 1–2, etiam haec immatura fuerant, fungum certe determinare difficile potuisset; tamen vera quia hypha nec in minimo caractere ab typo *Cladosporii herbari* varia sunt. Partem peristomialem capsulae *Campylopi introflexi* filamenta coniidifera *Cladosporii herbari* circumcirca coronant (vide fig. nostr.).



FIG. I.—Capsule of *Campylopus* infested with *Cladosporium herbarum*.

UNIVERSITY OF SZEGED, HUNGARY

ABSTRACT OF NOVITAS BRYOLOGICI.—II

Cooke and Masee in Grevillea, and Györfly in THE BRYOLOGIST have noted the presence of parasitic fungi in the capsules of different species of mosses. During the past ten years Dr. Györfly himself has found *Cladosporium herbarum* infesting the capsules of six other species, as listed above, and has published results. Among the material given Dr. Györfly by Dr. Brotherus there was a specimen of *Campylopus introflexus* from Tasmania whose peristome contained conidia of the same fungus. The determination of the latter was confirmed by Dr. G. Moesz, of Buda-Pesth. Immaturity would have rendered determination difficult had not the hyphae agreed absolutely with those of *C. herbarum*. The figure shows the capsules of *Campylopus* infested with the fungus. (E.B.C.)

¹ Priman partem:—BRYOLOGIST 14: 41–42. 1911.

² Grevillea 17: 76. 1889.

³ BRYOLOGIST l. c.

⁴ Schedae:—Ex herb. V. F. Brotherus. *Campylopus introflexus* (Hedw.) Mitt. Tasmania, Ringarosma. 11, 1913. leg. W. A. Weymouth.

REVIEWS

While the nations of the Western World were killing each other off by millions on Flanders fields, in the Great War, Scandinavian moss students were busily engaged in the study of the moss flora of Arctic Asia. There has come to hand, as evidence of industry, a notable report by Prof. H. Wilh. Arnell, dated 1917; in German.

DIE MOOSE DER VEGA-EXPEDITION. Von H. WILH. ARNELL, Arkiv for Botanik, Band 15, No. 5. Stockholm, 1917.

This is a report of the mosses collected in 1878 to 1880, on the occasion of the first circumnavigation of the Eurasian continent under the direction of Professor A. E. Nordenskiöld. This Swedish expedition is named after the Steamship Vega which carried the expedition.

This is a volume of 111 pages. In the first 20 pages the author discusses the physiographic and climatic conditions of the regions between Novaja-Zemlja Island and the territories surrounding Bering Sea.¹ He also reviews previous collections and discusses the principal moss associations. In Tabelle I he enumerates 85 most characteristic species and notes their relative frequency on Novaja Zemlja, in northern Siberia, and in the Bering Sea regions.

The systematic list, which treats the geographic distribution in detail, comprises 65 species of Hepaticae, 16 Sphagna (determined by C. Jensen), and 188 species and varieties of Musci.

The most notable critical systematic notes are on two varieties of *Cephalozia bicuspidata*, vars. *cavifolia* and *atrata*; on *Haplozia polaris*; on *Jungermannia alpestris*, *porphyroleuca*, and *murmanica*; on *Oligotrichum cavifolium* (*Psilopilum tschuctschicum*); on *Bryum crispulum*; on *Bryum inclinatum*; on *Swartzia Hagenui* (*Distichum Hagenii*), on *Ceratodon purpureus* and varieties; on *Amblystegium aduncum* and *latifolium*, to the latter of which species over six pages of critical notes are devoted.

The species and varieties described as new are: *Cephaloziella Hampeana sibirica* C. Jensen; *Bryum Lundstroemii* Arnell; *Bryum synoicum* Arnell; *Bryum inclinatum macrosporum* Arnell; *Bryum inclinatum alaskanum* Arnell; *Bryum inclinatum beringianum* Arnell; *Bryum Kjellmanii* Arnell; *Bryum subacutum* Arnell; *Bryum purpurascens aculeatum* Arnell; *Bryum longirostratum* Arnell; *Dicranum elongatum longifolium* C. Jensen; *Ceratodon purpureus rotundifolius* Berggr.; *Grimmia gracilis hyperborea* Arnell.

J. M. HOLZINGER

WINONA, MINN., JULY 26, 1921

¹ Note: It was Captain *Bering*, not Behring, that gave name to Bering Sea. All American geographies now spell the name *Bering*.

ANNUAL REPORTS—SULLIVANT MOSS SOCIETY—1921

Report of the President

The Editor-in-Chief has just called for the Annual Report of the President. This means that the January BRYOLOGIST is going to the printer, which is good news indeed. He also says that the July number is ready for distribution, to be quickly followed by the September and November issues. A year ago no one could have foreseen the printers' strike and all the difficulties following in its train, but the year has been lived through and the volume for 1921 will soon be in our hands, telling of the faithful work of our members and contributors.

Owing to my breaking up the homestead of seventy years, and moving from Brooklyn to Bronxville in September, I have been able to do very little active work for the Society. Also, now that I am devoting my time to geneological research, I find things botanical slipping away from me. This has made a change in the presidency necessary, as it is most important that the President of our Society be an active worker in the cryptogamic field, and it is a great pleasure to turn over the duties and honors of the office to Prof. A. LeRoy Andrews.

We shall all look forward to his putting new enthusiasm into all branches of our work. I bespeak for him the hearty cooperation of all members, as only by working together can we achieve the best results.

I thank all my many botanical friends and co-workers for their help and encouragement in all times of doubt and perplexity, and I assure all that my interest in the Sullivant Moss Society will continue just as strong as ever, even though I am occupied with work in another field of endeavor, and I hope to retain this friendship in the years to come and will be pleased to hear from these friends in my new permanent home.

110 PONDFIELD ROAD, BRONXVILLE, N. Y.

ANNIE MORRILL SMITH

Report of the Secretary-Treasurer

The result of the balloting for Officers of the Sullivant Moss Society for the year 1922 resulted in the election of the candidates nominated by the Executive Committee, viz- *President*, Dr. A. LeRoy Andrews, Ithaca, N. Y., *Vice-President*, Mr. C. C. Plitt, Baltimore, Md., *Secretary-Treasurer*, Mr. Edward B. Chamberlain, New York City. The total number of ballots cast was 70, all being for the candidates mentioned above.

Having occasion to consult the report of last year in preparing the present one, the Secretary-Treasurer was both amused and chagrined to note that the opening paragraphs contained a record of unfulfilled promises regarding the publication of THE BRYOLOGIST very similar to the one which must now be laid before the Members of the Moss Society. There have been previously vexatious accidents and delays in the publication of the magazine, but nothing equalling the conditions which obtained in 1921. Some explanation is certainly due the Members. On May 1st a strike of the compositors began, which was almost nation wide. It was just in time to catch the publication of the May issue of

THE BRYOLOGIST. It was necessary for the printers to assemble a new force, largely of green men, and to train them before any attempt could be made to continue printing the magazine. The only alternative was the payment of demands which the printers felt wholly unjustified. All the members know the resulting delay in the receipt of copies of the magazine. The delay could not be avoided nor foreseen by the Editor and Officers of the Moss Society, nor could conditions be remedied save by an expensive resort to special printing which the finances of the Society did not permit. The Secretary is deeply appreciative of the forbearance and patience shown by the individual Members in not complaining at a time when complaints and requests for "lost copies" would have been amply justified. The Editor and Secretary are not making any promises for the future, this time; they only have hopes!

The membership of the Society now totals 146; two deaths, Dr. Riddle and Mrs. McConnell, and two resignations having come to the notice of the Secretary during the year, to balance which ten new members have been added to our lists. The Secretary hopes that this increase may be continued and augmented in the future, and urges all Members to make the effort to bring the Society to the attention of others. With the year 1922, the Moss Society enters upon its twenty-fifth year, those who have so unselfishly supported it with their enthusiastic cooperation may soon be compelled to relinquish their connection.

The following additions should be made to the names on the List of Members sent out in November.

Mr. Harold V. W. Halsey957 Boulevard, Astoria, N. Y.

Mr. Wm. B. Kirkham100 Mill St., Springfield, Mass.

Dr. George E. NicholsYale University, New Haven, Conn.

There are also several corrections in addresses that should be made in the list as published; no one regrets these more than the Secretary, for the financial condition of the Society may not justify the publication of a new list the coming year. However, these errors were due to failure of members promptly to advise the Secretary of changes. *Please keep the Secretary informed*; he cannot be expected to know otherwise.

The financial condition of the Society is shown below. Especial thanks are due to certain members of the Society who have voluntarily defrayed costs of plates, as well as to the Curators of the Herbaria for their unselfish devotion of time and money.

SUMMARY OF ACCOUNTS

RECEIPTS

Balance on hand, December 1, 1920.....	\$113.34
Dues for current year.....	178.30
Subscriptions for current year.....	88.20
Arrears collected.....	4.50
Sales of back issues and sets.....	67.57
Minor receipts.....	23.47
Receipts for Dr. Grout, combinatoin offer.....	17.60
	\$492.98

EXPENDITURES

Minor printing and stationery.....	\$ 18.50
Postage and incidentals.....	14.80
Paid Dr. Grout.....	17.60
Herbarium expenses.....	16.23
Purchases for members.....	13.10
Purchase of back issues.....	10.00
Plates for the magazine.....	33.65
Printing, five issues of THE BRYOLOGIST, and Index.....	258.97
	<u>\$382.85</u>
Balance on hand, November 30, 1921.....	110.13
	<u>\$492.98</u>

EDWARD B. CHAMBERLIN, *Secretary-Treasurer*

Report of the Curator of the Moss Herbarium for 1921

In making his report for the year 1921, the Curator of the Moss Herbarium wishes to thank all those who have contributed during this period to the ever-increasing number of specimens in the collections of the Sullivant Moss Society. Among those who have been actively interested have been: P. G. M. Rhodes, P. O. Schallert, Miss Helen E. Greenwood, Mrs. Elizabeth M. Dunham, Mrs. Rachel L. Lowe, H. Dupret, F. L. Pickett, J. M. Grant, Miss Daisy Levy, and others.

One of our new members, James Murray, 2 Balfour Road, Carlisle, England, has sent the Curator a beautiful set of slides illustrating certain species of the genus *Fissidens*, which particularly interests Mr. Murray, and, should our members have noteworthy material in that group, Mr. Murray would no doubt be glad to correspond with them. Dr. Schallert is still strenuously engaged in searching the Winston-Salem neighborhood in North Carolina for mosses, and he has been the sender of several large packages, while Miss Greenwood and Mr. Grant have shown their usual care in collecting desirable unmixed material. A package from Mr. Rhodes containing a number of excellent specimens collected by Sir Benjamin Stone in Norway, southern France, Ceylon, and Japan, has afforded several species new to the Herbarium and is deserving of special thanks.

However, we still greatly need larger quantities of less common species for purposes of exchange. Our supply of the mosses ordinarily found abundantly in our region is a large one, but for these species the more advanced students have little use except in so far as they represent distributional areas. It is our hope that members may contribute during the ensuing twelve month more really worth-while things, and those in sufficient quantity to allow others to share in their collections. We again urge care in collecting unmixed fertile material and, in closing, wish, to all, renewed zest in bryological interest and research and, to all a Happy New Year!

PHILADELPHIA, PA., DECEMBER, 1921

Report of the Curator of the Hepatic Department for 1921

Six hundred and seventy-seven specimens were added to the herbarium during the year. The total number is now six thousand one hundred and seven. We are glad to report an increasing number of contributors. Specimens were sent by Mr. Severin Rapp, Miss C. C. Haynes, Miss Helen Greenwood, Mr. Geo. L. Moxley, Mrs. Anna L. Reid, Dr. P. O. Schallert, Mr. A. H. Brinkman, Mrs. H. B. Dudley, Mr. J. Evans, Prof. H. Dupret, Miss Annie Lorenz, Mr. J. Murray, Dr. Louis Dutton, Mr. C. C. Potter, Prof. I. Ichiba, Mrs. Bayard Taylor, Mr. John Bailey, Dr. A. W. Evans, Mr. Roy Latham and Mr. W. E. Brenckle. Specimens were also added from the collections of the late Dr. H. S. Jewett and Mrs. M. A. Williams. The writer contributed 105 specimens from Wisconsin and Minnesota.

Special mention must be made of the interesting collection of 168 specimens from North Carolina by Dr. P. O. Schallert; 34 specimens from Portland, Oregon, collected by Mr. C. C. Potter; 134 specimens from the A. H. Brinkman collection from B. C. and Alberta, and 39 named Japanese specimens from Prof. I. Ichiba.

Mrs. Bayard Taylor has begun an hepatic survey in the vicinity of West Jefferson, Ohio, a comparatively new field. Prof. H. Dupret continues to send his interesting Canadian species.

The rare additions to the herbarium during the year were the finding of *Lophozia obtusa* in the collections of Mr. C. C. Potter and Mr. A. H. Brinkman, which adds two new stations, Portland, Oregon, and Shushwap Lake, B. C., for this rare species. *Neesiella rupestris* was found by Mr. Geo. L. Moxley at Los Angeles, California, and *Diplophyllum gymnostomophilum* was found by Miss Anna Lorenz at Hartford, Vermont. Dr. A. W. Evans found the same species in a collection of the writer from Black River, Douglas Co., Wisconsin. This shows apparently a wide distribution of this rare species. It is hoped that Miss Greenwood, Dr. Schallert, and Mr. Potter will publish a list of the species in their localities in THE BRYOLOGIST.

Mr. Severin Rapp again responded to the appeal made in THE BRYOLOGIST, Vol. XXIV, January, 1921, page 16, by sending the herbarium the following species from Florida: *Anthoceros Ravenelii*, *Lejeunea floridana*, *Aphanolejeunea sicaefolia*, *Cephaloziella obliqua*, *Cephaloziella floridae*, *Metzgeria uncigera*, *Fossombronia lamellata*. These species, with *Neesiella rupestris* from Geo. L. Moxley, and *Pleuroclada albescens* from A. H. Brinkman, reduces the number of desired species by nine.

The Curator has packeted a lot of duplicate specimens for distribution. Sets of 25-50 and a few of 100 specimens can be now made up to members who express a desire for them to the Curator.

GEO. H. CONKLIN

SUITE 201-202, BOARD OF TRADE BLDG.,
SUPERIOR, WISCONSIN, DEC. 1921

Report of the Lichen Department for 1921

It gives me much pleasure to report that great enthusiasm has been manifested this year in the study of Lichens. Not only have specimens been received from many of our members, but there have been a number of inquiries regarding what books the Curator would recommend for the beginner.

This inquiry was taken up once before¹. It is important enough to add to these recommendations a few comments. In the report, the beginner has two books recommended, Schneider's "A Guide to the Study of Lichens" and Fink's "The Lichens of Minnesota", that are now unfortunately out of print. The Curator believes that they are of sufficient value to warrant the student to make an effort to get second-hand copies. This is especially true for students in the eastern section of our country. For students of California, Dr. Hasse's "The Lichen Flora of Southern California"², or Dr. Herres' "The Lichen Flora of the Santa Cruz Peninsula"³ are to be recommended. Then, by all means, get Mrs. Harris' articles and those of Prof. Sargent. I am sure Mr. Chamberlain will help him to get these.

As soon as the beginner feels that he is beginning to know a little about Lichens, he will want to acquire other books. He will then, by all means want "British Lichens"⁴, published by the British Museum. The author of these two fine books, has written also a small book, "A Handbook of the British Lichens", based on the larger work. It gives detailed descriptions of the families and the genera, but only distinguishing characters for the species. This little book will be found quite worth having. Of course, it enumerates some species that we do not have, and fails to mention many that we have but that are not found in the British Isles; there are, however, a great many that are common to both countries.

Our list of Contributors, this year, is headed by Mr. George L. Moxley, and Dr. P. O. Schallert. Mr. Moxley sends fine specimens collected in California; Dr. Schallert is quite an indefatigable collector of North Carolina Lichens. Other contributors are Mrs. H. F. Robertson, Mr. H. V. M. Halsey, Prof. John L. Sheldon, Prof. R. H. Denniston, Dr. O. E. Jennings, and Mrs. M. A. Noble, to all of whom, the Curator extends sincere thanks.

It is to be hoped, that the coming year will be just as enthusiastic a one in Lichen study.

Respectfully submitted,

CHARLES C. PLITT

BALTIMORE, MD., DEC. 20, 1921

¹ Report for 1919. THE BRYOLOGIST, XXIII, p. 15, 1920.

² Contrib. U. S. Nat. Herb. Vol. 17, part I. Washington, 1910.

³ Proc. Wash. Acad. Sci. May. 1910.

⁴ A Monograph of the British Lichens. By A. Lorrain Smith, F. L. S. Part I, first Edit., 1894, second edit., 1918, and Part II, 1911.

NORTH AMERICAN MUSCI PLEUROCARPI

Issues of my North American Musci Pleurocarpi, suspended during the war, will be completed by Nos. 476—500 to be issued to present subscribers. A Supplement will be issued, containing only species or varieties not in the original 500, or fruiting plants of forms originally issues as sterile. Price \$1.50 per fascicle of 10 numbers.

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A. J. GROUT, *New Dorp, Richmond Bor.*, NEW YORK

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THE BRYOLOGIST

VOL. XXV

MARCH, 1922

No. 2

NOTES ON NORTH AMERICAN HEPATICAE—IX*

ALEXANDER W. EVANS

(WITH PLATE I)

In the first paper of this series *Riccia dictyospora* M. A. Howe was reported from Missouri,¹ and in the second paper *R. californica* Aust. was reported from British Columbia.² Howe has lately shown that these reports were based on incorrect determinations. He refers the Missouri specimens to his recently described *R. McAllisteri*³ and the British Columbia specimens to *R. Beyrichiana* Hampe. Attention may be called also to *Sphenolobus groenlandicus* (Nees) Steph. and *Lophozia murmanica* Kaalaas, two species which have been recognized as members of the arctic American flora. According to Müller⁴ these species are indistinguishable from each other and represent a synonym (or perhaps a variety) of *L. Wenzelii* (Nees) Steph., a variable and widely distributed plant of arctic and alpine regions.

In the present paper four other species are reduced to synonymy, a *Diplophyllum* from North Carolina and Tennessee is proposed as a new species. the perichaetial bracts and perianths of *Ptychocoleus heterophyllus* are described for the first time, and Conklin's report of *Gymnomitrium varians* as a North American plant is confirmed; the remaining species are included to record extensions of range.

I. BLASIA PUSILLA L.

Collected in 1873-75 near Loma Parda, Rio Grande, New Mexico, by the botanists of the Wheeler Expedition. This is apparently the first record of the species for New Mexico, since it is not included in either of Standley's lists.⁵

2. GYMNOTRIUM VARIANS (Lindb.) Schiffn.; Engler & Prantl, Nat. Pflanzenfam 1³: 77. 1893. *Nardia varians* Lindb. Musc. Scand. 9. 1879. *Gymnomitrium crassifolium* Carringt. Trans. Bot. Soc. Edinburgh 13: 461. pl. 18, f. 3. 1879. *Sarcoscyphus confertus* Limpr. Jahreshb. Schles. Gesell. Vaterl. Cultur 57: 312. 1880. *Gymnomitrium confertum* Limpr. Flora 64: 73. 1881. *Marsipella conferta* Spruce, Rev. Bryol. 8: 95. 1881. *Gymnomitrium ambiguum*

* Contribution from the Osborn Botanical Laboratory.

¹ BRYOLOGIST 13: 33. 1910.

² BRYOLOGIST 14: 84.84. 1911.

³ See BRYOLOGIST 20: 35. 1917.

⁴ Rabenhorst's Kryptogamen-Fl. 6²: 762. 1916.

⁵ BRYOLOGIST 18: 81-83. 1915; 19: 64, 65. 1916.

The January number of THE BRYOLOGIST was published April 27, 1922.

Limpr.; Massalongo & Carestia, Nuovo Gior. Bot. Ital. **14**: 218. 1882. *Cesia varians* Lindb. Meddel. Soc. F. et Fl. Fenn. **13**: 238. 1886. *C. crassifolia* Lindb. *l. c.* **14**: 48. 1888. *Acolea varians* Steph. Bull. Herb. Boissier II. **1**: 149 [Sp. Hepat. **2**: 10]. 1901. *A. crassifolia* Steph. *l. c.* II. **1**: 150. 1901. *Cesia conferta* Pears. Hep. British Isles 397. *pl.* 175. 1901.

Collected in August, 1913, at and near Simpson Pass, vicinity of Banff, British Columbia, 6750-7400 feet altitude, on wet or moist earth, by A. Brinkman (Nos. 904, 937, 963, 973, 978). These specimens have already been reported, without definite localities, by Conklin.⁶ They represent an addition to the North American flora.

The long synonymy brings out the interesting fact that *G. varians* was independently described as new by Lindberg, by Carrington, and by Limpricht at about the same time. Lindberg's species was based on Norwegian material, Carrington's on Scottish, and Limpricht's on Austrian. The plant has a wide distribution in Europe and is distinctly arctic-alpine in its range, often appearing close to the snow line and sometimes forming extensive mats of a dark brown or blackish hue. The lack of a perianth around the young sporophyte shows that the species is a *Gymnomitrium*, rather than a *Marsupella*, and the dark color indicates that it should be assigned to the subgenus *Homocraspis*. So far as known the only other North American representative of this subgenus is *G. revolutum* (Nees) Philibert, which has been reported from Greenland, but other species are doubtless to be expected.

There is a little danger of confusing *G. varians* with any of our other species of *Gymnomitrium*. It bears a strong resemblance, however, to *Marsupella ustulata* (Hüb.) Spruce, which grows in somewhat similar localities. So far as the leaves are concerned the two species are strikingly alike. The lobes in both cases are acute or subacute, the sinus is acute, and the depth of the sinus is one third of less the length of the leaves. The median leaf-cells, moreover, measure 12-18 μ in width, and the cell-walls have more or less evident trigones. Of course the presence of a perianth in the *Marsupella* will at once serve to distinguish it, and the constantly parocious inflorescence is likewise a distinctive feature. In *Gymnomitrium varians* the inflorescence is sometimes parocious, but the antheridia are often borne on separate branches or even on distinct plants. In *G. crassifolium* the inflorescence is said to be constantly dioicous, and European writers still recognize its validity on the basis of this character, although they admit that its claims are exceedingly doubtful. Another species, which should probably be included among the synonyms of *G. varians*, is *G. cochleare* (Lindb.) K. Müll. of Norway. As Müller states the distinctive features of this species are very vague, and he predicts that it will be regarded in the future as nothing more than a small form of *G. varians*.⁷

3. JUNGERMANNIA PECKII Aust.; Peck, Ann. Rep. Regents Univ. State New York **19**: 68. 1866. "Decayed wood. Sand Lake [New York]."

⁶ BRYOLOGIST **17**: 14. 1914.

⁷ Rabenhorst's Kryptogamen-Fl. **6**: 431. 1909.

In a little known paper entitled, "List of mosses of the state of New York," and published in the place indicated above, Peck included the following three manuscript species of Austin: *J. Sullivantiana*, *J. Lescuriana* and *J. Peckii*. In connection with each of these species a full description by Austin is given. Since these were probably the earliest of Austin's species to be published and since the later literature of the Hepaticae makes no allusion to them, the writer appealed to Professor Peck a number of years ago for information about them and about the specimens upon which they were based. Professor Peck kindly sent a plant of *J. Peckii* for examination but stated that the other two species were not represented in the herbarium at Albany. In the writer's opinion *J. Peckii* is a simple synonym of *Harpanthus scutatus* (Web. & Mohr) Spruce, a species with which Austin himself compared it. The other two species can hardly be determined from Austin's descriptions. In all probability *J. Sullivantiana* is a species of *Cephaloziella*, and *J. Lescuriana* may perhaps belong to the same genus.

4. JUNGERMANNIA RAUANA Steph. Bull. Herb. Bossier II. 1: 511 [Sp. Hepat. 2: 73]. 1901. "Hab. America sept. Washington Terr. (Rau)."

According to the original description of this species it is characterized (among other features) by a dioicous inflorescence, by a lack of cauline underleaves, by adnate and entire perichaetial bracts, by variously cleft or lacinate perichaetial bracteoles, and by a clavate-cylindrical perianth densely setose at the mouth. Since some of these peculiarities are inconsistent with the genus *Jungermannia* as defined by most students of the Hepaticae, the writer was especially anxious to study the type material, in order to confirm or correct Stephani's observations.

Upon making inquiries of Mr. Eugene A. Rau, of Bethlehem, Pennsylvania, in whose honor the species was named, it was learned that he had never collected hepatics in the state of Washington and that he had no specimens in his herbarium bearing the name *J. Rauana*. The type locality of the species therefore became problematical. Though the kindness of Professor R. Chodat, of the University of Geneva, the writer has since obtained a portion of the type from the Stephani collection, now included in the Boissier Herbarium. This specimen shows beyond a doubt that *J. Rauana* is a synonym of *Jamesoniella autumnalis* (DC.) Steph. An adnation of the perichaetial bracts, which is ascribed to the species, is not shown; although the upper portion of the stem, to which the bracts are attached is swollen, the long-exserted perianth takes its origin above the line of attachment of the innermost bracts. Not only is this the case, but the bracts, although usually entire, occasionally show basal cilia. *Jamesoniella autumnalis* has a wide distribution in Europe, Asia and North America. In the eastern parts of Canada and the United States it is one of our commonest species. On the Pacific Coast, where it seems to be rarer, it has been reported by Macoun from several stations in British Columbia, so that its occurrence in the neighboring state of Washington would naturally be expected. It is unfortunate that there is so much uncertainty about the locality where Stephani's specimen was collected.

5. *PLAGIOCHILA SMALLII* Evans, Bull. Torrey Club 32: 180. *pl.* 5, *f.* 1-8. 1905.

Collected in February, 1918, at Las Ninfas, Cuba, by Brother Hioram (No. 2022); also in June, 1921, at Lake Cunningham, New Providence, Bahama Islands, by L. J. K. Brace. These specimens, which represent interesting extensions of range, were both received from the New York Botanical Garden. The species was based on material collected by J. K. Small and others in the southern part of Florida. It has since been found in various other localities in the same general region and has likewise been reported from Bermuda. It is the second species of *Plagiochila* to be recorded from the Bahama Islands. Its discovery in Cuba brings up again its relationship to the Cuban *P. diffusa* Steph., a species with which it was originally compared, and arouses the suspicion that the two species may be synonymous. The Cuban specimen, however, shows clearly the distinctive features of the species, and no connecting links between *P. Smallii* and *P. diffusa* have as yet been brought to light.

6. *CALYPOGEIA ACUTA* Steph. Bull. Herb. Boissier II. 8: 668 [Sp. Hepat. 3: 400]. 1908. "Hab. America septentr. Pennsylvania (Rau)."

A portion of the type material of *C. acuta*, kindly forwarded by Professor Chodat, gives the additional information that it was found at Bethehem in 1883. In his treatment of the genus *Calypogeia* Stephani arranges the species in three groups characterized, respectively, by obtuse or truncate leaves, by acute leaves, and by bidentate leaves. The only North American species which he places in the second group is *C. acuta*, and he describes the cauline leaves of this species as 1.5 mm. long, crowded, spreading at a right angle, broadly ovate-triangular, and acute at the apex. The type specimen shows that the last feature is by no means constant. Most of the leaves, especially on robust stems, are either rounded at the apex or very obtusely pointed. On some of the more slender axes acute leaves occasionally occur, but even here blunt leaves are in the majority. In the common *C. Trichomanis* (L.) Corda a similar diversity in the leaf-apices is often encountered, and acute leaves may be even more numerous than blunt leaves on plants growing in unfavorable localities. The writer would therefore include *C. acuta* among the synonyms of *C. Trichomanis*, since the difference in the leaf-apices breaks down and since no other differences are brought out either by the original description or by the type material.

7. *Diplophyllum Andrewsii* sp. nov.

Collected on July 8, 1919, on ground near Bee tree Creek, Buncombe County, North Carolina, by A. Le Roy Andrews (No. 117); also on July 31, 1919, on ground along roadside near Burbank, at foot of Roan Mountain, Tennessee, by the same collector (No. 189)⁸. No. 117 may be designated the type.

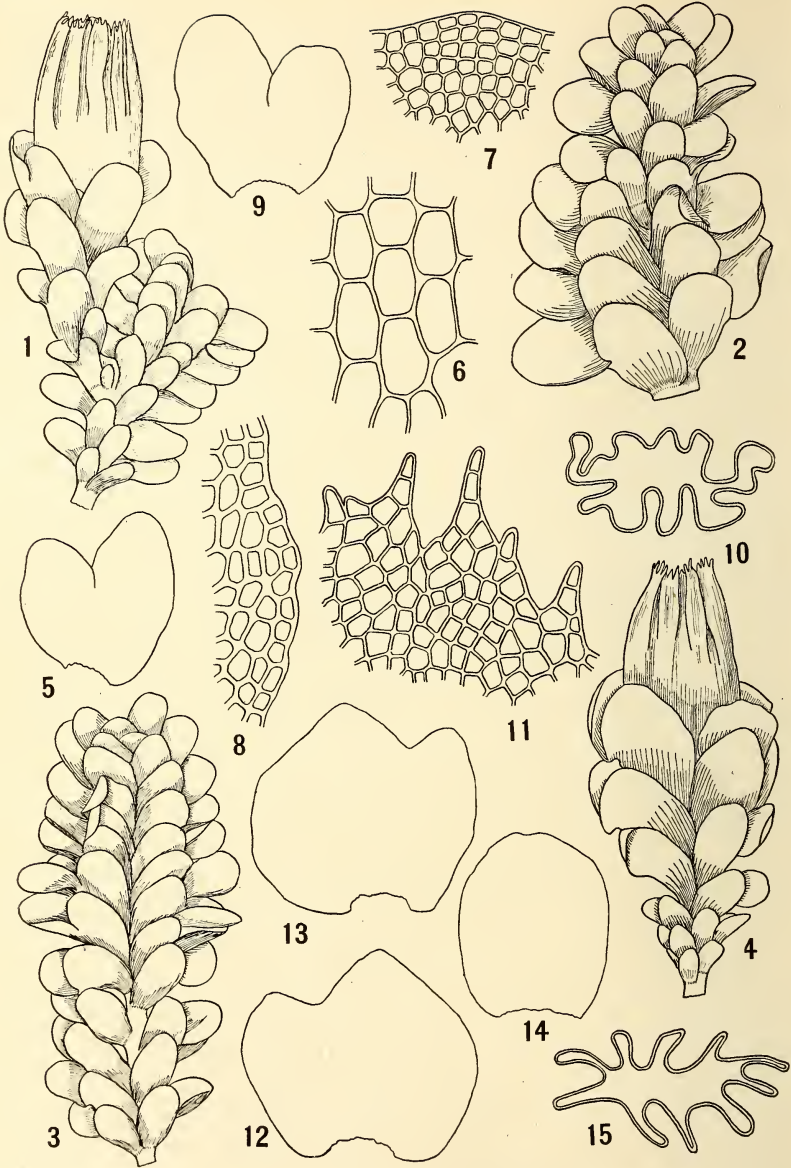
Yellowish or brownish green, sometimes becoming bleached with age, growing in tufts or in small mats and often mixed with other bryophytes: stems with ascending or suberect tips but prostrate and densely radiculose in the older parts

⁸ Andrews has already reported these specimens under the name "*Diplophyllum* Sp." See BRYOLOGIST 24: 52. 1921.

with colorless rhizoids, mostly 3-5 mm. long and 0.15-0.2 mm. in diameter, sparingly branched, the branches soon becoming separated as distinct individuals; leaves at first loosely to closely imbricated, often becoming scattered with age, unequally complicate-bilobed to about the middle; dorsal lobe suberect to obliquely spreading, ovate, when well developed 0.65-0.85 mm. long and 0.4-0.45 mm. wide, but sometimes considerably smaller, almost transversely attached and not decurrent, broad and rounded at the apex, entire; ventral lobe widely spreading, ovate to oblong, when well developed 1-1.15 mm. long and 0.5-0.6 mm. wide, attachment and apex similar to those of the dorsal lobe, margin usually entire throughout but sometimes with vague indications of minute rounded projections close to the base; keel sharp, straight or slightly incurved; leaf-cells with slightly thickened walls and (in the middle of the lobes) vaguely defined trigones having concave sides, averaging about 10μ in width along the margin of the ventral lobe, $22 \times 15\mu$ in the median portion and $30-60 \times 15\mu$ toward the base, no distinct median band of elongated cells being differentiated; cuticle smooth or with very faint verruculae: inflorescence autoicous: σ^7 inflorescence at first terminal on a more or less elongated axis, then proliferating vegetatively; bracts mostly in four to six pairs, at first imbricated, similar to the vegetative leaves but with more or less strongly arched keels; antheridia borne singly: Ω inflorescence borne on a more or less elongated branch arising just below a σ^7 inflorescence, the vegetative leaves mostly in two to four pairs, increasing in size upward; bracts mostly in one or two pairs, similar to the vegetative leaves but larger and with both lobes obliquely spreading to suberect, the dorsal lobe measuring about 1.35×0.75 mm. and the ventral about 1.5×0.85 mm.; perianth about half exerted or slightly more, oblong to obovate in outline, mostly 2-2.5 mm. long and 0.9-1 mm. wide, somewhat compressed, irregularly about ten-plicate in the upper part, the folds and grooves being rounded, but often narrow, slightly contracted at the mouth and irregularly toothed, the teeth sharp, mostly one to five cells long and one to four cells broad at the base, some of the larger teeth bearing smaller secondary teeth on the sides: mature sporophyte and gemmae not seen. [PLATE I, FIGS. I-II].

The writer takes pleasure in naming this well-marked species in honor of its discoverer, Professor A. Le Roy Andrews of Cornell University, President of the Sullivant Moss Society. The material collected is not abundant but is sufficient to bring out clearly the distinctive features of the plant.

Although in most cases the lobes of the leaves are plane or nearly so, they are sometimes more or less concave when viewed from above. This is especially likely to be the case with the ventral lobes, the margins of which may even be slightly involute. The verruculae, which are sometimes to be observed on the cuticle of the leaf-cells, are exceedingly pale and inconspicuous. In the middle of a lobe they are circular to oval in outline, perhaps half a dozen lying over each cell cavity; toward the base they become narrowly linear. Most of the leaf-cells, especially in the vicinity of the margin and apex, appear to be entirely free from verruculae of any sort.



1-11. *DIPLOPHYLLUM ANDREWSII* EVANS
 12-15. *PTYCHOCLEUS HETEROPHYLLUS* EVANS

Owing to the ease with which female branches become detached, it is sometimes difficult to bring out the fact that the inflorescence is autoicous. In several cases, however, the writer has been able to demonstrate attached female branches, and these have always arisen, either singly or in a subopposite pair, just below a male inflorescence (FIG. 1). Even in the case of detached female axes it is usually easy to see that they are branches, since the basal leaves are always small and poorly developed (FIG. 4). If the inflorescence terminated a main axis, the leaves for a considerable distance below the bracts would naturally be vegetative leaves of the ordinary type. This seems to be true in the case of the male inflorescence, in all observed instances, so that the latter may be described as being borne on a main axis, rather than on a branch. Beyond the inflorescence the axis continues its growth vegetatively (FIGS. 2 and 3), but whether it eventually forms another series of bracts and antheridia has not yet been determined.

Among the North American species of *Diplophyllum*, *D. apiculatum* (Evans) Steph. and *D. obtusifolium* (Hook.) Dumort. seem to be the closest allies of *D. Andrewsii*. *D. apiculatum* is the common lowland species of the eastern United States, its known range extending from Maine to Georgia. It grows preferably on shaded banks and agrees with the new species in color and general habit and also in its autoicous inflorescence, the female branch normally arising just below the male inflorescence. The leaf-cells, moreover, are very much alike in the two species and the differences in the cell-measurements are almost negligible. In *D. apiculatum*, however, the plants are a trifle smaller, both leaf-lobes are almost invariably apiculate and the margin is often distinctly denticulate, especially toward the base of the ventral lobe. The perianth, also, although similarly compressed, has fewer folds in the upper part and the teeth at the mouth tend to be simpler and more crowded. *D. obtusifolium* is a species of wide European distribution, being most abundant in the lower mountains of France, Germany and Switzerland, but often descending to the sea level along the Atlantic Coast. In North America it seems to be confined to the Pacific Coast, being known only from British Columbia and Washington. This species likewise agrees with *D. Andrewsii* in general appearance and in size, and its leaf-lobes are similarly broad and rounded at the apex. It differs, however, in its inflorescence, which is normally paroicous, rather than autoicous, the male bracts being situated in several pairs just below the perichaetial bracts. The species is further distinguished by its relatively smaller dorsal lobes and by the distinct denticulation of the leaf-margins, not only in the vicinity of the base of the dorsal lobe but also in the apical portions of both lobes.

8. DIPLOPHYLLUM GYMNOSTOMOPHILUM Kaalaas.

Collected in 1917, at Middle Harbor, Dingwall, Cape Breton, Nova Scotia, on gypsum ledges, by G. E. Nichols; also in October, 1910, below the falls of the Black River, Douglas County, Wisconsin, on rock ledges, by G. H. Conklin (No. 959 in part). Both of these localities represent interesting extensions of range. The species was first recognized as American by Miss Lorenz, who col-

lected it at Willoughby, Vermont in July, 1913⁹. She has since found it in the vicinity of Round Mountain Lake, Franklin County, Maine,¹⁰ and at Quechee Gulf, Hartland, Vermont. The two localities noted above represent the only known North American stations outside New England. In Europe *D. gymnostomophilum* has a fairly wide distribution but is everywhere rare. It seems to be confined to calcareous regions.

9. TAXILEJEUNEA EROSIFOLIA Steph. Species Hepat 5:487. 1914. "Hab. *America septentrionalis*. Florida. Cuba."

A specimen of this species is in the Underwood Herbarium, now in the possession of the New York Botanical Garden. It was collected by J. Donnel Smith in Florida, no more definite locality being indicated on the label. In the writer's opinion this specimen clearly represents *T. obtusangula* (Spruce) Evans, a species rediscovered in Florida by S. Rapp in 1913.¹¹ Most of the perianths present are old and battered, so that it is difficult to demonstrate their true features, but at least one of them shows the depressed and beakless mouth characteristic of Spruce's species. In all probability Stephani's description of *T. erosifolia* was drawn largely from the Underwood material, and it therefore seems safe to regard the species as a synonym of *T. obtusangula*.

10. PTYCHOCOLEUS HETEROPHYLLUS Evans, Am. Jour. Bot. 5: 144. f. 5. 1918.

Collected in January, 1920, at Sandy Bay, Nicaragua, on the bark of trees and on decaying stumps, by K. Hamilton (Nos. 224, 225); specimens received from Dr. P. O. Schallert.

The present species was based in part on specimens from Florida, collected by S. Rapp, and in part on specimens from Honduras, collected by P. Wilson. These specimens were wholly without female inflorescences, so that their reference to the genus *Ptychocoleus* rather than to *Brachiolejeunea* had to be provisional. The new material from Nicaragua bears female inflorescences without subfloral innovations and thus proves beyond a question that the species is a true *Ptychocoleus*.

The female branches are more or less elongated and the leaves show a gradual increase in size as the perianth is approached. The bracts are in two to five pairs. The innermost bracts (FIGS. 12 and 13) are complicate-bilobed about one fourth, with a rounded and wingless keel, which is straight or slightly arcuate. The lobe is broadly ovate, measuring about 1.2 x 0.9 mm., and tapers distinctly to a broad rounded or obtuse apex; the lobule is ovate-oblong, measuring about 1 x 0.5-0.6 mm. and less distinctly tapering. Both lobe and lobule are entire or nearly so. The bracteole. (FIG. 14), which is entirely free from the bracts, is oblong, measuring about 1 x 0.9 mm. and shows a broad rounded apex and entire margin, with little or no indication of basal auricles. Although the lobules of

⁹ See Evans, *Rhodora* 16: 71. 1914. A discussion of the species, with synonymy, may be found here.

¹⁰ See Evans, *Rhodora* 19: 272. 1917.

¹¹ See *BRYOLOGIST* 17: 90. 1914.

the bracts are often perfectly entire at the apex an occasional lobule shows a very shallow apical sinus with rounded lobes. So far as the lobules are concerned there is an abrupt transition between the lowest bract, the lobule of which has an entire margin, and the uppermost vegetative leaf, the lobule of which bears from five to seven teeth. The only perianths seen were imperfectly developed and did not project beyond the bracts. They show an oblong to obovate outline and are slightly compressed, but they are characterized chiefly by their ten narrow folds separated by deep grooves, the folds being rounded rather than sharp (FIG. 15).

In the original account of *P. heterophyllum* it was compared with the South America *P. torulosus* (Lehm. & Lindenb.) Trevis., a somewhat larger plant with relatively broader leaf-lobes. It was shown that the two species had many features in common and an additional resemblance is supplied by the perichaetial bracts and perianths, as a comparison of the figures in the present paper with Schiffner's figures of *P. torulosus* will clearly show¹². In both species the lobules of the bracts are nearly as long as the lobe and the perianths are ten-plicate. In *P. torulosus*, however, the lobes of the bracts are much broader at the apex, which is either rounded or truncate, the bracteole is relatively broader, and the folds of the perianth are separated by shallower grooves.

SHEFFIELD SCIENTIFIC SCHOOL,
YALE UNIVERSITY

EXPLANATION OF PLATE I

DIPLOPHYLLUM ANDREWSII EVANS

- FIG. 1. Part of a plant bearing a male inflorescence and giving rise to a female branch with a perianth, dorsal view, x 15.
FIG. 2. Male inflorescence with vegetative proliferation, dorsal view, x 25
FIG. 3. Another male inflorescence with vegetative proliferation, dorsal view, x 15.
FIG. 4. Female branch with perianth, dorsal view, x 15.
FIG. 5. A leaf, spread out, x 25.
FIG. 6. Cells from the middle of a ventral lobe, x 265.
FIG. 7. Cells from the apex of a ventral lobe, x 200.
FIG. 8. Cells from the base of a ventral lobe, x 200.
FIG. 9. Perichaetial bract, spread out, x 15.
FIG. 10. Cross-section of a perianth in upper third, x 35.
FIG. 11. Teeth from the mouth of a perianth, x 200.
FIGS. 1 and 2 were drawn from the Tennessee specimens and all the remaining figures from the type specimen.

PTYCHOCOLEUS HETEROPHYLLUM EVANS

- FIGS. 12-14. Innermost bracts and bracteole from a female inflorescence, x 25.
FIG. 15. Cross-section of a perianth in upper third, x 45.
The figures were all drawn from the Nicaragua specimens collected by K. Hamilton (No. 225).

¹² Hedwigia 33: pl. 7, f. 8-10. 1894.

LICHENS OF THE LAKE GEORGE REGION

(Continued)

STEWART H. BURNHAM

101. *Cladonia rangiferina* (L.) Weber. On earth and rocks, specially in upland regions and in shade of conifers; abundant. It rarely grows in sphagnum but has been found growing on old *Picea mariana* in the marsh north of Glen Lake, Oct. 31, 1916.
102. *Cladonia squamosa* (Scop.) Hoffm. A composite species. (E. Galway) N. Y. (Burt), reported by Dr. Fink in THE BRYOLOGIST 10: 22. March 1907. On earth, rocks and in marshes on decaying logs; Black Mt.; talus at foot of Diameter, South Bay; southern W. Fort Ann; Rich's swamp near Shushan; low woods north of Cambridge.
103. *Cladonia squamosa muricella* (Del.) Wainio. Thin rocky soil near Vaughns schoolhouse, Sept. 23, 1913; determined by Mr. Merrill. Golden's hemlocks east of Tripoli.
104. *Cladonia squamosa phyllocoma* Rabenh. East of Thompsons gravel-bed on coniferous stump, Oct. 13, 1915; determined by Mr. Merrill. East of Tripoli on coniferous stump, Apr. 4, 1915.
105. *Cladonia squamosa plumosa* Del. Rocks east of Hadlock Pond, Nov. 24, 1915; determined by Mr. Merrill.
106. *Cladonia subcariosa* Nyl. Thin rocky soil at Vaughns, Aug 19, 1914; determined by Mr. Merrill.
107. *Cladonia sylvatica* (L.) Hoffm. Usually found growing with *Cladonia rangiferina*; common. The plants are straw colored; while those of *C. rangiferina* are ash colored.
108. *Cladonia turgida* (Ehrh.) Hoffm. On earth and rocks in old woods and pastures. Southern W. Fort Ann; Vaughns, Oct. 12, 1913 & Oct. 25, 1914, determined by Mr. Merrill; Peaked Rock, May 19, 1906, determined by Dr. Fink.
109. *Cladonia uncialis* (L) Weber Bolton Landing, Warrensburg and Fort Ann (Peck), often growing with *Cladonia rangiferina* under pines; southern W. Fort Ann; Vaughns; Ballston Lake; Peaked Rock. On rocks, Curtis hill east of Fort Ann, May 17, 1913. "a form between f. *obtusata* Ach. and *Cladonia caroliniana* (Schw.) Tuck."; determined by Mr. Merrill.
110. *Cladonia verticillata* (Hoffm.) Flk. Huletts Lg. (Jelliffe); Gansevoort (Peck); (E. Galway) N.Y. (Burt), reported by Dr. Fink in THE BRYOLOGIST 7: 87. Nov. 1904. Vaughns and elsewhere on earth and thin rocky soil; common. Specimens have been determined by Mr. Merrill
111. *Cladonia verticillata evoluta* Th. Fr. Old pastures and thin rocky soil at Vaughns, April 2 & Aug 19, 1914; determined by Mr. Merrill. Peaked Mt., Oct 23, 1918.

112. *Stereocaulon paschale* (L.) Fr. Not uncommon on granitic rocks and boulders in upland regions and undisturbed fields. Specimens have been determined by Dr. Eckfeldt. A coralloid lichen growing in circular patches.
113. *Stereocaulon paschale conglomeratum* Fr. Sugar Loaf Mt., on granitic rocks, Nov. 13, 1915; determined by Mr. Merrill. Rocks in woods northeast of Thompson's gravel-bed, Nov. 10, 1918.
114. *Stereocaulon tomentosum* Fr. Hulets Lg. (Jelliffe); Thurman, on sandy ground (Peck); rocks at E. Galway (Burt), reported in Bot. Gaz. **50**: 297. Oct. 1910.
115. *Gyrophora Dillenii* (Tuck.) Müll. Arg. Granitic rocks and talus slopes, not uncommon in elevated regions about Lake George; the towns of Dresden and Fort Ann; and at Peaked Rock. (*Umbilicaria Dillenii* Tuck.)
116. *Gyrophora Muhlenbergii* Ach. Growing with the preceding species.
117. *Gyrophora vellea* (L.) Ach. On cliff west of Cold Spring, near water's edge. foot of Diameter Precipice, South Bay, Aug. 21, 1906; reported in Am. Bot. **11**: 114. Jan. 1907.
118. *Umbilicaria pennsylvanica* Hoffm. Rocks. Hulets Lg. (Jelliffe).
119. *Umbilicaria pustulata papulosa* (Ach.) Tuck. Not uncommon and usually associated with *Gyrophora Dillenii*.
120. *Maronea constans* (Nyl.) Th. Fr. Rich's swamp near Shushan on *Acer rubrum*, April 13, 1907; determined by Dr. Fink and reported in N. Y. State Mus. Bull. **122**: 13. 1908, also in Mycol. **11**: 306. Nov. 1919. (*Rinodina constans* (Nyl.) Tuck.).
121. *Acarospora Clavus* (DC.) Burnh., n. comb. On calcareous rocks, east of Tripoli, Apr. 12, 1914, and at Vaughns, Apr. 7 & 11, 1915. Determined by Mr. Merrill, who says he was the first to collect it in this country: and that his specimens and these are without apothecia. (*Lecidea eucarpa* Nyl.).
122. *Acarospora fuscata* (Schrad.) [Arn. On granitic rocks, Peaked Rock, June 15, 1907 (Dobbin); determined by Dr. Fink.
123. *Acarospora Xanthophama* (Nyl.) Fink. The form *dealbata* (Tuck.) Hasse on calcareous rocks at Vaughns, Aug. 23, 1906; determined by Dr. Fink. Northwest Hartford, Aug. 24, 1906.
124. *Thyrea pulvinata* (Schaer.) Mass. R. C. Burnham's stone wall, on calcareous rock, Aug. 25, 1912; determined by Mr. Merrill, who says "infertile but looks like an *Omphalaria*, perhaps *pulvinata* (Schaer.) Nyl." It is similar to specimens in the N. Y. State Herbarium called this species.
125. *Collema crispum* Ach. Limestone ledge west of Vaughns schoolhouse on mosses, Apr. 21, 1912; determined by Mr. Merrill and reported in N. Y. State Mus. Bull. **167**: 24. 1913. (*C. crispum* (Huds.) Hoffm.)
126. *Collema nigrescens* (Huds.) Ach. On trunks. Bolton Lg. (Peck).

127. *Collema pulposum* (Bernh.) Ach. Thin rocky soil at Shushan, growing on *Anomodon rostratus*, Nov. 20 & 26, 1910 (Dobbin), specimens are in the N. Y. State Herbarium. Southern W. Fort Ann; Vaughns on mossy limestone ledges, Oct. 16, 1913, determined by Mr. Merrill.
128. *Collema pycnocarpum* Nyl. On trunks. Mechanicsville (Peck); determined by Dr. Eckfeldt.
129. ***Collema rupestris*** (Sw.) Burnh., n. comb. Hulets Lg. (Jelliffe); Bolton Lg. (Peck); Shushan (Dobbin); Lake George to Warrensburg; southern W. Fort Ann; Vaughns. Collections have been determined by Dr. Fink and Mr. Merrill. (*Collema flaccidum* Ach.)
130. *Collema rysssoleum* Tuck. On rocks. Bolton Lg. (Peck.).
131. *Leptogium chloromelum* (Sw.) Nyl. Rocks at Crescent, May 30, 1906.
132. *Leptogium lacerum* (Sw.) S. F. Gray. Rocks among mosses at Shushan (Dobbin); northwest Hartford; Wiggins iron mine, determined by Mr. Merrill; Vaughns.
133. *Leptogium myochroum* (Ehrh.) Tuck. Peaked Rock, May 19, 1906, determined by Dr. Fink; Shushan on trees, Aug. 31, 1909 (Dobbin).
134. *Leptogium pulchellum* (Ach.) Nyl. On trunks and rocks. Hulets Lg. (Jelliffe).
135. *Leptogium tremelloides* (L.f) S. F. Gray. Trunks of trees and mossy rocks; common.
136. ***Parmeliella crossophylla*** (Tuck.) Merrill & Burnh., n. comb. Shushan on slate rocks, May 14, 1906 (Dobbin), *Pannaria crossophylla* Tuck.
137. *Parmeliella microphylla* (Sw.) Müll. Arg. Shushan on rocks (Dobbin); Peaked Mt.; Vaughns on sandstone and calcareous rocks, several collections determined by Mr. Merrill.
138. *Placynthium nigrum* (Huds.) S. F. Gray. On calcareous rocks and sandstone. Shushan (Dobbin); Vaughns and elsewhere, several collections determined by Mr. Merrill. (*Pannaria nigra* (Huds.) Nyl.)
139. *Pannaria leucosticta* Tuck. Talus, Diameter precipice, South Bay, Aug. 21, 1906; determined by Dr. Fink.
140. *Pannaria lurida* (Mont.) Nyl. On oak bark, Anaquassocook hills, May 19, 1906; Shushan on elm trunks, May 28, 1906 (Dobbin). (*Physma luridum* (Mont.) Tuck.).
141. *Hydrothyria venosa* Russell. On rocks, falls of West brook, W. Fort Ann, Sept. 19, 1917, growing with *Nephroma laevigatum*; determined by Mr. Merrill who says, "the plant is probably widely distributed but it seldom turns up. I have not collected it in Maine but have long sought for it." In stream bed, in Big notch, north of Peaked Mt., June 27, 1918, plants with apothecia; specimens verified by Mr. Merrill. *Hydrothyria* closely resembles *Leptogium* but has conspicuous radiant veins on the under surface of the thallus.
142. *Lobaria laciniata* (Huds.) Wainio. On trunks of trees and rocks. Hulets Lg. (Jelliffe); E. Galway on elm trunks (Burt); southern W. Fort Ann; Vaughns; Shushan; Crescent. (*Sticta amplissima* (Scop.) Mass.)

143. *Lobaria pulmonaria* (L.) Hoffm. On trunks of trees; common. Occasional on rocks.
144. *Sticta Weigelii* (Ach.) Wainio. On rocks. E. of Hadlock Pond, Nov. 24, 1915; Peaked Mt., Oct. 23, 1918; Vaughns, July 6, 1907; Anaquassacook hills, June 15, 1907. (*Sticta quercizans* (Mx.) Ach.).
145. *Nephroma helveticum* Ach. Huletts Lg. (Jelliffe); Shushan on rocks (Dobbin); east of Tripoli on rocks, Aug. 2, 1914, determined by Mr. Merrill; Sugar Loaf Mt., Nov. 13, 1915.
146. *Nephroma laevigatum* Ach. Mossy rocks. Falls in west brook, W. Fort Ann, Sept. 19, 1917, & Sept. 11, 1918, determined by Mr. Merrill; Peaked Mt., Apr. 14, & June 16, 1918; woods east of Tripoli schoolhouse, May 25, 1913, determined by Mr. Merrill.
147. *Nephroma laevigatum parile* (Ach.) Nyl. On rocks at the falls in West brook, W. Fort Ann, Sept. 11, 1918; determined by Mr. Merrill.

[To be Continued]

MISCELLANEOUS NOTES

Fascicle 18 of Musci Acrocarpi Boreali-Americani, issued by Dr. John M. Holzinger, was sent out February 6, 1922. It comprises the following species:

- | | |
|-------------------------------------|---|
| 426. <i>Bryum Atwateriae</i> | 438. <i>Oreoweisia serrulata</i> |
| 427. <i>B. capillare flaccidum</i> | 439. <i>Philonotis americana</i> |
| 428. <i>B. cuspidatum</i> | 440. <i>Ph. capillaris</i> |
| 429. <i>B. meesioides</i> | 441. <i>Ph. alpicola</i> |
| 430. <i>Catharinaea xanthopelma</i> | 442. <i>Physcomitrella patens</i> |
| 431. <i>Dicranella pumila</i> | 443. <i>Physcomitrium turbinatum Langloisii</i> |
| 432. <i>Dicranum Drummondii</i> | 444. <i>Pilopogon Blumii</i> |
| 433. <i>D. falcatum</i> | 445. <i>Polytrichum angustidens</i> |
| 434. <i>Epipterygium Tozeri</i> | 446. <i>Rhadoweisia denticulata</i> |
| 435. <i>Fissidens Garberi</i> | 447. <i>Rhacomitrium fasciculare</i> |
| 436. <i>Rhacomitrium Macounii</i> | 448. <i>Seligeria recurvata pumila</i> |
| 437. <i>Mniobryum albicans</i> | 449. <i>Tortula Mülleri</i> |
| | 450. <i>Webera prolifera</i> |

The eight contributors have collected in widely separate areas. Dr. John W. Bailey, Prof. J. Flett, and the late Prof. A. S. Foster have, together, collected 13 species in Washington and Oregon. Mr. Severin Rapp has contributed 3 from Florida. Mr. Edwin B. Bartram, 3 from Pennsylvania. Prof. H. Dupret and Dr. F. E. Lloyd, each 1 from Canada; Mrs. Rachel Lowe, 1 from Massachusetts; Dr. Geo. E. Nichols, 1 from Michigan; Dr. T. C. Frye, 1 from the Hawaiian Islands, and the author, 1 from Minnesota.

The list shows that the United States is as yet sparsely covered with moss-students able and ready to cooperate in this exploring work, and the assistance of others all over the United States is solicited.

In the work of verifying and correcting critical determinations, the author is under special obligations to Mr. R. S. Williams, to Mrs. Elizabeth G. Britton, Dr. A. LeRoy Andrews, Mr. Leopold Loeske, and to Dr. George N. Best.

NOTES ON CURRENT BRYOLOGICAL LITERATURE

A. LUISIER—*Fragments de bryologie iberique*. (Brotéria sér. Bot. 19: 5—11. 1921). The article deals with the enumeration of the mosses of Oña, Spain, including the results of a recent collection and a resumè of the previously known species. At the end of the article there is a more extended discussion of the distribution in the Spanish peninsula of *Triquetrella arapilensis* Luis., *Brachy-menium lusitanicum* (Luis.) Hagen, and *Claopodium Whippleanum* Sull.

A. LUISIER—*Les Mousses de Madère*. (Brotéria sér. Bot. 19: 36—48. 1921.) This portion of the series of articles, already noticed several times in the BRYOLOGIST, contains the keys to the earlier portion of the family Pottiaceae.

GONCALO SAMPAIO—*Novas contribuições para o estudo dos liquenes portugueses*. (Brotéria sér. Bot. 19: 12—35. 1921). This is a list of 74 additions to the Portuguese lichen-flora, each species being accompanied with brief descriptive notes and a careful citation of authorities. The following are, judging from the method of citation, new combinations (the authority for the binomial is Sampaio in each case): *Buellia indissimilis* (Nyl.), *Lopadium athalloides* (*L. Newtoni* Samp., *Lecidia athalloides* Nyl.), *Pachyphiale carneolutea*, *Bacidia Nitschekeana* (Stiz.), *Bacidia mesoidea* (Nyl.), *Catillaria nigroclavata* (Nyl.), *Lecania cyrtellina* (Nyl.), *Lecanora gerezina* (*L. tristis* Samp. non Merezk). *Acarospora Zahlbruckneri* and *Lecanora lisbonensis* are proposed as new. Keys are given for the separation of *Lecidia lithophiloides* Nyl., and of *L. viridans* Tw. from allied species.

MALTA, N.—*Versuche über die Widerstandsfähigkeit der Moose gegen Austrocknung*. (Acta universitatis latviensis 1: 125—129. fig. 1—5. 1921).—Many xerophilous mosses are capable of renewed growth, even after remaining a long time in the herbarium, if naturally dried. The growth is usually from dormant buds, rarely from the apical cell, and produces rhizoids with brood bodies, secondary protonema, or even vegetative shoots. Various species of Grimmiaceae and Orthotrichaceae show great resistance to drying: *Anoetangium compactum* produced new growth after being dry for 19 years, but most other species experimented with were only one to six years in the herbarium. Spores, as would be expected, show the greatest vitality, those of *Grimmia pulvinata* germinating after being dry almost seventy years. A short bibliography follows.

MALTA, N.—*Oekologische und floristische Studien über Granitblockmoose in Lettland*. (Acta universitatis latviensis 1: 108—124. 1921). Floristically, granite erratics in the lowlands are interesting from the presence of montane species; ecologically, because the restricted area and constant character of the substratum permit easy recognition of the influence of outside characters; care must be taken to distinguish between the true granitic flora and that of the layer of humus or soil above the rock. A list of 15 hepatics and 96 mosses is given as comprising true granite dwellers, a discussion of the colonization of such blocks, and the stability of the forms in open situations. Four associations of mosses are recognized: three conditioned by relative exposure to sunlight, the fourth, (hydrophytic) by abundance of moisture. There is a bibliography of ten titles.

A. LUISIER.—*Les Mousses de Madère*. (Brotéria sér. Bot. 19; 73—96. 1921.)—This portion of the series of articles, of which note has already been made above, continues the keys to the mosses of the Atlantic Islands from *Tortula* (pars) to *Webera sessilis*.

GUILLERMO GÁNDARA.—*Acción de los líquenes sobre otras plantas*. (Revista mex. de biología. 1: 215—220. 1921.)—The article is a refutation of statements appearing in two bulletins of the Estación Agrícola Central de México concerning the structure, biology, and harmfulness of lichens.

WILLIAM EDWARD NICHOLSON.—*New or rare British hepatics*. (Journal of Botany 59: 202—204. 1921.)—The author records the presence in Britain of *Riccia Huebneriana* Lindenb., *Cephalozia spiniflora* Schiffn., and *Cephalozia elachista* (Jack) Schiffn. var. *spinigera* (Lindb.) K. M., with notes on their relationships. The statement is made that the *Cephalozia macrostachya* Kaal. of Schiffner's Hep. Eur. Exs. No. 549 and the plate under that name in Macvicar's *Handbook* belong really to *C. spiniflora*.

H. N. DIXON.—*Miscellanea Bryologica*.—VII. (Journal of Botany 59: 132—139. 1921.)—This is a collection of fifteen short notes, whose conclusions are given below. *Sematophyllum pilotrichelloides* Card. & Dixon is the same as *Hypnum replicatum* Hampe and should be called *S. replicatum* (Hpe.) Dixon. *Rigodium dentatum* Dixon was originally collected in Cape Town, not Pretoria. The status of *Eurhynchium meridionale* de Not. as a British plant has recently been confirmed, while *Tortula inermis* (Brid.) Mont. and *Didymodon riparius* (Aust.) Kindb. are not British. *Discelium nudum* Brid. has recently been found in Scotland, as well as a remarkable form of *Dicranum fuscescens* with erect fruit. The correct name for *Ectropothecium australe* Jaeg. is *Isopterygium lineatum* (H. f. & W.) Broth. *Barbula apoclada* Par. is superfluous, Mueller having previously changed his *B. subrevoluta* (non Hampe) to *B. perrevoluta*. *Schwetschkea usambarica* Broth. possesses dorsal papillae, a character unique in the family. Cuming's No 2209 from the Philippines is *Myurium Foxworthyi* (Broth.) Broth. *Fontinalis antipyretica* L. from Cape Town is the first known occurrence in South Africa. Study of the Hermit Id. moss referred to *Hypnum lithophilum* Hsch. and called by Mueller *H. secundifolium* proves it to be a *Drepanocladus*. Comparison of specimens shows the identity of *Neckera glossophylla* Mitt. and *Homaliodendron microdendron* (Mont.) Fleisch.; also the identity with each other of *Pinnatella elegantissima* (Mitt.) Fleisch. and *P. Kuhliana* (Bry. Jav.). *Weissia oranica* (Rehm.) C. M. is the correct citation for *Gymnostomum oranicum* Rehm., as shown by Holzinger.

P. CULMANN.—*Muscinées spéciales à l'Auvergne*. (Revue bryologique 47: 65—69. 1920.)—A criticism of Charbonnel's statement that there are 32 bryophytes known from the Auvergne, not occurring elsewhere in France. Author maintains statement true for but 2 hepatics and 9 mosses.

I. THÉRIOT.—*Considérations sur la flore bryologique de la Nouvelle Calédonie, et diagnoses d'espèces nouvelles*. (Revue bryologique 47: 69—71. 1920.)—The

author has in mind a revision of the New Caledonian moss-flora, estimated at 500 species. The article describes *Holomitrium Francei* Thér. and, with short description, notes occurrence of *Trematodon pauciflorus* C. M.

I. THERIOT.—*Une rectification a propos du Stereodon lignicola* Mitt. (Revue bryologique 47: 71—72. 1920.)—The author concludes that Mitten accidentally described the fruit of *Stereodon lignicola* from a *Stereophyllum* mixed with the type specimen. A corrected description is given.

G. DISMIER.—*Notes sur les Fissidens serrulatus* Brid., et *Fissidens polyphyllus* Wils. (Rev. bryol. 47: 54—56. 1920.)—The author decides that these two species may easily be separated upon morphological bases, by following the principles laid down in 1889 by Bottini, whose work, of which a resumé is given, seems little known.

R. DOUIN.—*Recherches sur les Marchantiaées*. (Revue générale de botanique 1920.)—A short abstract of this work appears in the Revue bryologique 47: 58—60, quoting M. Douin's proposed classification.

ALEXANDER W. EVANS.—*Abruzzi Hepaticae*. (Revue bryol. 47: 57—58). 1920.—This is a list of 14 species from the vicinity of Lago di Scanno.

ALEXANDER W. EVANS.—*Taxilejeunea plerogonia* and certain allied species. (Bull. Torr. Bot. Club 48: 107—136. pl. 2, and figs 1—22. 1921).—This is an exhaustive discussion of *Taxilejeunea plerogonia* (L. & L.) Schiffn., *T. jamaicensis* Evans. *T. densiflora* Evans, and *T. debilis* (L. & L.) Steph., the second and third being proposed as new. All but the last species mentioned are figured.

POTIER DE LA VARDE.—*Contribution à la flore bryologique du Kikouyou*. (Rev. bryol. 47: 49—54. figs 1—6. 1920.)—The mosses here treated were collected near Nairobi, British East Africa. Twenty-eight species or varieties are included of which 5 species and 3 varieties are proposed as new.

W. H. PEARSON.—*Notes on a collection of hepatics from the Cameroons West coast of Africa*. (Mem. & Proc. Manchester Lit. & Phil. Soc. 65: 1—6. pls. 1—2. 1921). The material studied was collected from ebony logs imported to the Liverpool docks with the addition of a single collection made on the Gold Coast. Five species are listed, two others being determined only generically. Of these *Aneura Travisiana* Pears., and *Ceratolejeunea Saxbyi* Pears., are proposed as new and figured.

The last issue of the Revue of the Revue bryologique (Nos. 5—6, 47th year, 1920, though published in 1921) contains this disquieting but courageous announcement. "C'est le dernier numéro de l'année. Le nombre des abonnés était, avant la guerre, de 130 à 140, il n'est plus que 81, insuffisant pour payer les frais de la Revue, même réduite à 5 numeros. La publication VA CONTINUER."

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THE BRYOLOGIST

VOL. XXV

MAY, 1922

No. 3

THE BRYOPHYTES OF MICHIGAN WITH PARTICULAR REFERENCE TO THE DOUGLAS LAKE REGION*

GEORGE E. NICHOLS

Our knowledge of the bryophyte flora of Michigan seems to be limited to five published lists, of which three are based on collections from Isle Royale, the extreme northern outpost of the state. Of these three, the first in order, by Holt¹, records 38 mosses; the second, by Cooper², raises the number of mosses to 104; the third, by Conklin³, records 36 liverworts. Of the two remaining papers one by Kauffman⁴, based in large measure on specimens collected in southern Michigan, records a total of 131 liverworts and mosses; the other by Praeger⁵ records 10 species of *Sphagnum* from the vicinity of Douglas Lake.

The present paper, like Praeger's, is the outcome of investigations carried on at the University of Michigan Biological Station, situated on Douglas Lake, and is based primarily on collections made by the writer during the summers of 1920 and 1921. By far that larger number of records are from the immediate vicinity of Douglas and Burt Lakes, in Cheboygan County, but collections were also made in the vicinity of Pellston, Cecil Bay, and Big Stone Bay, in Emmet County, and on Mackinac Island, in Mackinac County. Cheboygan and Emmet Counties are the northernmost counties in the southern peninsula of Michigan, while Mackinac Island lies in the straits of Mackinac, between Lakes Michigan and Huron. A few scattered records are included from the southern shores of the northern peninsula of Michigan (Prentis Bay and Scotty Bay), based on collections by Dr. J. H. Ehlers, who is responsible also for a number of records from other localities.

* Contribution from the Osborn Botanical Laboratory.

¹ Holt, W. P. Notes on the vegetation of Isle Royale, Michigan. In "An ecological survey of Isle Royale, Lake Superior", prepared under the direction of C. C. Adams. Lansing. 1908 (1909).

² Cooper, W. S. A list of mosses collected upon Isle Royale, Lake Superior. *BRYOLOGIST* **16**: 1-8. 1913.

³ Conklin, G. H. A list of Hepaticae collected upon Isle Royale, Lake Superior. *BRYOLOGIST* **17**: 46-48, 52-55. 1914.

⁴ Kauffman, C. H. A preliminary list of the bryophytes of Michigan. *Mich. Acad. Sci. Rep.* **17**: 217-223. 1915.

⁵ Praeger, W. E. A collection of sphagnum from the Douglas Lake region, Cheboygan County, Michigan. *Mich. Acad. Sci. Rep.* **21**: 237, 238. 1919.

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Holt's Isle Royale list includes the following 8 mosses which are not known to have been found elsewhere in the state and which were not subsequently collected on that island by Cooper.

<i>Dicranum longifolium</i> Ehrh.	<i>Bryum pallens</i> Sw.
<i>Grimmia unicolor</i> Hook.	<i>Hygrohypnum polare</i> (Lindb.) Broth.
<i>Ulota americana</i> (Beauv.) Limpr.	<i>Neckera oligocarpa</i> Bruch
<i>Paludella squarrosa</i> (L.) Brid.	<i>Dichelyma uncinatum</i> Mitt.(?)

Cooper lists 12 additional mosses from Isle Royale which are not definitely known to occur elsewhere in the state, as follows:

<i>Polytrichum alpinum</i> L.	<i>Splachnum ampullaceum</i> L.
<i>Cynodontium polycarpum</i> (Ehrh.) Schimp.	<i>Bryum inclinatum</i> (Sw.) Bland.
<i>Grimmia ovata</i> Schwaegr.	<i>Bryum Mühlenbeckii</i> Br. & Sch.
<i>Racomitrium canescens</i> (Timm) Brid.	<i>Mnium subglobosum</i> Br. & Sch.
<i>Encalypta procera</i> Bruch	<i>Amblystegium fluviatile</i> (Sw.) Br. & Sch.
<i>Anoetangium lapponicum</i> Hedw.	<i>Calliergon Richardsonii</i> (Mitt.) Kindb.

Both Holt and Cooper list *Sphagnum subsecundum* Nees (as *S. platyphyllum* Sull.).

Conklin's list of Isle Royale liverworts includes the following 5 species not elsewhere recorded from Michigan.

<i>Cephalozia bicuspidata</i> (L.) Dumort.	<i>Lophozia Lyoni</i> (Tayl.) Steph.
<i>Lophozia heterocolpa</i> (Thed.) Howe	<i>Sphenolobus minutus</i> (Crantz) Steph.
<i>Lophozia longidens</i> (Lindb.) Macoun	

Kauffman records 28 liverworts and mosses which appear on no other Michigan list (including the present one); viz.:

<i>Ricciella fluitans</i> (L.) A. Br.	<i>Bryum affine</i> (Bruch) Lindb.
<i>Ricciocarpus natans</i> (L.) Corda	<i>Aulacomnium heterostichum</i> (Hedw.) Br. & Sch.
<i>Lunularia cruciata</i> (L.) Dumort.	<i>Fontinalis antipyretica</i> L.
<i>Reboulia hemisphaerica</i> (L.) Raddi	<i>Entodon cladorrhizans</i> (Hedw.) C. Müll.
<i>Calypogeia suecica</i> (Arn. & Pers.) Warnst. & Loeske	<i>Entodon seductrix</i> (Hedw.) C. Müll.
<i>Porella pinnata</i> L.	<i>Leskea obscura</i> Hedw.
<i>Pleuroidium alternifolium</i> (Dicks.) Rabenh.	<i>Thelia asprella</i> (Schimp.) Sull.
<i>Ditrichum pallidum</i> (Schreb.) Hampe	<i>Brachythecium acuminatum</i> (Hedw.) Kindb.
<i>Ditrichum tortile</i> (Schrud.) Lindb.	<i>Brachythecium acutum</i> (Mitt.) Sull.
<i>Fissidens taxifolius</i> (L.) Hedw.	<i>Oxyrrhynchium praelongum hians</i> (Hedw.) Warnst.
<i>Barbula fallax</i> Hedw.	<i>Rhynchostegium serrulatum</i> (Hedw.) Jaeg.
<i>Barbula unguiculata</i> (Huds.) Hedw.	<i>Thamnium allegheniense</i> (C. Müll.) Br. & Sch.
<i>Tortula subulata</i> (L.) Hedw.	
<i>Orthotrichum Braunii</i> Br. & Sch.	
<i>Orthotrichum ohioense</i> Sull. & Lesq.	
<i>Physcomitrium turbinatum</i> (Michx.) C. Müll.	

The lists of both Cooper and Kauffman include two additional bryophytes which have not been collected in the region covered by the present investigation, namely *Bryum intermedium* (Ludw.) Brid. and *Stereodon curvifolius* (Hedw.) E. G. Britton; while both Conklin and Kauffman list *Jungermannia lanceolata* L. and *Porella platyphylla* (L.) Lindb¹. To these should be added, as not elsewhere recorded for Michigan, *Anacamptodon splachnoides* (Froel.) Brid. and *Elodium paludosum* (Sull.) Loeske, collected by the writer at Lakeside, Berrien County, in 1910.

Of the 261 species to be noted in the present paper as occurring in the Douglas Lake region, no less than 101 appear not to have been previously reported from the state. These species will be marked with a star (*).

For a country of moderately rolling topography with little rugged relief, a country of sands and gravels with almost no outcrops of bed rock (except at Mackinac Island), a country which has been almost completely lumbered and more or less extensively burned over, the comparative richness in species of the bryophyte flora in the Douglas Lake region, at first thought, seems almost incredible. But this diversity is at once explained by the surprising variety of habitats which this region, superficially so lacking in promise, reveals upon closer examination. The principal types of habitat, in so far as these are of bryological importance are as follows:

The Hardwoods.—The magnificent forests of beech, sugar maple and hemlock which, with white pine, formerly covered the uplands throughout this region are now represented only by occasional primeval stands and by somewhat more frequent second-growth tracts of woodland.

The Aspens.—The prevailing type of vegetation on uplands today is dry open woodland, more or less densely populated by aspen, with a sprinkling of other trees.

The Lake Bluffs.—Steep embankments, usually of gravel and from three or four to more than fifty feet high, border the shores of Douglas and Burt Lakes in several localities, affording conditions favorable to many bryophytes which are found in no other type of habitat.

Sandy Lake Shores.—Sandy lake shores in general possess little of bryological interest. Certain species, however, appear to be restricted to the beaches, growing at about the level of winter high water mark, but for the most part only in places where the ground remains quite moist, even in summer.

Rocks and Cliffs.—Through most of this region the only rock substrata are afforded by the scattered to locally abundant glacial boulders; but Mackinac Island abounds in rocks and cliffs, here as elsewhere mainly limestone.

The Gorge.—One of the most striking physiographic features of the region

¹The majority of American specimens formerly referred to *P. platyphylla*, however, are now assigned to *P. platyphylloidea* (Schwein.) Lindb., and only one apparently authentic Michigan record for the true *P. platyphylla* is known, viz., a specimen collected at Ann Arbor in 1907 by Dr. Conklin.

is this steep-flanked ravine, its floor from sixty to seventy feet lower than the surrounding upland and in which occur the "Big Springs", sources of Carp Creek. The Gorge is situated about a mile from the Biological Station.

The Streams.—There are a number of these, varying in size, in flow and swiftness, in temperature, and in character of banks, but all agree in having a sandy, gravelly or muddy floor, rocky stream beds being conspicuously lacking in this region.

Coniferous Forest Swamps.—Low wet grounds commonly are wooded mainly with white cedar and black spruce. A typical swamp of this kind is Reese's Bog, about a mile from the Station, which occupies a strip perhaps two miles long and up to half a mile wide along the northern shore of Burt Lake. The tamarack predominates locally in wooded swamps, more especially in areas that have been burned over.

Open Marshy Swamps.—These are characterized typically by the abundance of sedges and grasses and the scarcity of sphagnum. Commonly they are periodic swamps and the underlying mineral soil is but sparingly covered with organic debris.

Open Sphagnum Bogs.—These are of the familiar sort, characterized by the abundance of sphagnum mosses and ericaceous shrubs and by the presence of a deep peaty substratum.

In the detailed list which follows, generally speaking, the habitat relations of each species are indicated, together with its comparative frequency in the region under consideration. For the majority of species definite stations are cited, these stations being represented by specimens in the Herbarium of Yale University and most of them also by duplicate specimens in the Herbaria of the New York Botanical Garden and of the University of Michigan. For species recorded as "common", however, as well as for some of those recorded as "frequent", specific stations are not given: in all such cases a definite "Douglas Lake" station can be assumed. Except where otherwise noted, all records are based on the writer's collections. Of the localities mentioned, aside from those that can be found on any good map of this region or for which the name given is self-explanatory, Fontinalis Run, Reese's Bog, and Colonial Point adjoin Burt Lake; North and South Fishtail, Grapevine Point, Polypody Bluff, Bryant's, Fairy Island, and Pine Point border on Douglas Lake; while Lancaster, Munro, Vincent and Mud Lakes, together with the various "bogs", are all in this immediate vicinity.

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Ma:chantiaceae

CONOCEPHALUM CONICUM (L.) Dumort. Common along overhanging banks of streams in moist woods.

MARCHANTIA POLYMORPHA L. Common on wet ground in the open, but especially in swamps that have recently been burned over.

PREISSIA QUADRATA (Scop.) Nees. Frequent in wet open situations, on earth banks and logs. Carp Creek; Mackinac Island.

Metzgeriaceae

PALLAVICINIA FLOTOWIANA (Nees) Lindb.* Locally abundant on wet sandy lakeshore at North Fishtail.

PALLAVICINIA LYELLII (Hook.) S. F. Gray. Locally abundant on wet sandy shores at Vincent Lake.

PELLIA EPIPHYLLA (L.) Corda. Sandy roadside in swampy woods; rare in Reese's Bog.

PELLIA FABRONIANA Raddi.* Shaded, overhanging stream banks and lake shores; frequent. North Fishtail; Big Stone Bay.

PELLIA NEESIANA (Gottsche) Limpr. Locally abundant along wet muddy shores of Maple River, west of Pellston.

RICCARDIA LATIFRONS Lindb. On rotten logs; common in wet woods.

RICCARDIA MULTIFIDA (L.) S. F. Gray. Swampy woods along Carp Creek; locally abundant.

RICCARDIA PINGUIS (L.) S. F. Gray. Floating in Smith's Bog; rare.

Jungermanniaceae

BAZZANIA TRILOBATA (L.) S. F. Gray.* On ground, logs and stumps; common in moist woods.

BLEPHAROSTOMA TRICHOPHYLLUM (L.) Dumort. On logs and ground in swampy woods; Reese's Bog.

CALYPOGEIA NEESIANA (Massal. & Carest.) C. Müll.* On logs, stumps and ground in moist woods; occasional. Reese's Bog; Mackinac Island.

CALYPOGEIA PALUDOSA Warnst.* On wet ground in an open bog; Mud Lake.

CALYPOGEIA TRICHOMANIS (L.) Corda. On shaded banks and earth in woods; frequent. Carp Creek; Colonial Point.

CEPHALOZIA CATENULATA (Hübner.) Spruce.* On a rotten log in moist woods; Gorge.

CEPHALOZIA CONNIVENS (Dicks.) Lindb.* On wet ground in Bryant's Bog.

CEPHALOZIA CURVIFOLIA (Dicks.) Dumort. On logs; common in moist woods.

CEPHALOZIA FLUITANS (Nees) Spruce.* On wet ground or floating; frequent in open bogs. Mud Lake; Bryant's Bog.

CEPHALOZIA MEDIA Lindb. On logs and banks; frequent in moist woods. Reese's Bog; Vincent Lake.

CEPHALOZIA PLENICEPS (Aust.) Lindb.* On logs in wet woods; occasional. Reese's Bog; Carp Creek.

CEPHALOZIELLA HAMPEANA (Nees) Schiffn. On moist earth in wood road near North Fishtail.

CEPHALOZIELLA SULLIVANTII (Aust.) Evans.* Moist sandy bank in woods near Smith's Bog.

CHILOSCYPHUS FRAGILIS (Roth) Schiffn.* Floating in springs and cold brooks; locally abundant. Reese's Bog; Carp Creek; Scotty Bay Creek (Ehlers).

CHILOSCYPHUS PALLESCENS (Ehrh.) Dumort. On wet logs and ground in open swampy woods; frequent. Smith's Bog; Reese's Bog.

FRULLANIA ASAGRAYANA Mont. On trunk of tree in Reese's Bog.

FRULLIANA BRITTONIAE Evans.* On a tree near Douglas Lake (Mrs. E. W. Brown).

FRULLANIA EBORACENSIS Gottsche. Common on trunks of trees in open woods.

GEOCALYX GRAVEOLENS (Schrad.) Nees. On rotten logs and banks; occasional in moist woods. Reese's Bog; Mackinac Island.

HARPANTHUS SCUTATUS (Web. f. & Mohr) Spruce. On rotten logs; frequent in moist woods.

JAMESONIELLA AUTUMNALIS (D. C.) Steph. On earth and rotten logs; common on lake bluffs and in moist woods.

LEPIDOZIA REPTANS (L.) Dumort. On earth and logs; common in moist woods.

LEPIDOZIA SETACEA (Web.) Mitt.* On wet ground in Mud Lake Bog (L. Blinks).

LOPHOCOLEA HETEROPHYLLA (Schrad.) Dumort. Common on earth along lake bluffs and in moist woods.

LOPHOCOLEA MINOR Nees. Common on moist gravelly soil along lake bluffs.

LOPHOZIA BADENSIS (Gottsche) Schiffn.* On wet or moist shaded banks; common on Mackinac Island.

LOPHOZIA BARBATA (Schreb.) Dumort. Moist gravelly lake bluffs; locally abundant at Douglas Lake.

LOPHOZIA EXCISA (Dicks.) Dumort.* Gravelly lake bluff at south end of Burt Lake.

LOPHOZIA INCISA (Schrad.) Dumort. On shaded banks and rotten logs. Reese's Bog; Carp Creek; Douglas Lake.

LOPHOZIA KAURINI (Limpr.) Steph. Local on wet sandy lake shore; North Fishtail.

LOPHOZIA MARCHICA (Nees) Steph.* On wet ground in Reese's Bog.

LOPHOZIA PORPHYROLEUCA (Nees) Schiffn. On moist ground and logs in Reese's Bog.

MYLIA ANOMALA (Hook.) S. F. Gray.* Frequent in open sphagnum bogs.

ODONTOSCHISMA DENUDATUM (Mart.) Dumort.* On a wet, rotten log in the Gorge.

PLAGIOCHILA ASPLENIODES (L.) Dumort. Common on moist gravelly lake bluffs and on banks and logs in wet woods.

PORELLA PLATYPHYLLOIDEA (Schwein.) Lindb. Common on trees in moist woods.

PYLIDIDIUM CILIARE (L.) Nees. On a moist shaded bank; south end of Burt Lake.

Ptilidium pulcherrimum (Web.) Hampe. Common on logs, stumps and tree trunks in wet or moist woods.

Radula complanata (L.) Dumort. Common on bark of trees in moist woods.

Scapania curta (Mart.) Dumort. On the ground along lake bluffs; local at Douglas Lake.

Scapania glaucocephala (Tayl.) Aust.* On logs in moist woods; occasional near Douglas Lake.

Scapania irrigua (Nees) Dumort.* Wet sandy ground; rare. Reese's bog; Vincent Lake.

Scapania nemorosa (L.) Dumort.* On earth and logs in wet woods and along lake shores; rare. Vincent Lake; Douglas Lake.

Sphenobolus exsectaeformis (Bridl.) Steph.* On rotten log in Reese's Bog; rare.

Sphenobolus hellerianus (Nees) Steph.* On rotten log in Reese's Bog; rare.

Sphenobolus michauxii (Web. f. & Mohr) Steph. On rotten log in Reese's Bog; rare.

Trichocolea tomentella (Ehrh.) Dumort. Common on the ground in swampy woods.

Anthocerotaceae

Anthoceros laevis L. On moist earth along a wood road in Reese's Bog.

Sphagnaceae

Sphagnum capillaceum (Weis) Schrank. Common in open bogs.

Sphagnum capillaceum tenellum (Schimp.) Andrews. Common in open bogs.

Sphagnum compactum DC.* Locally abundant in wet sandy depressions near Douglas Lake.

Sphagnum cuspidatum Ehrh. Common in wet depressions in open bogs.

Sphagnum dusenii C. Jens. Common in wet open bogs.

Sphagnum fuscum (Schimp.) H. Klinggr. Common in bogs.

Sphagnum girgensohnii Russow. Common in wooded bogs and swamps.

Sphagnum magellanicum Brid. Common in bogs and swamps.

Sphagnum palustre L. Frequent in wooded swamps. Ingleside; Vincent Lake.

Sphagnum papillosum Lindb. Locally abundant in Mud Lake Bog.

Sphagnum recurvum Beauv. Common in bogs.

Sphagnum recurvum tenue H. Klinggr. Frequent in Gleason's and Bryant's Bogs.

Sphagnum robustum (Russow) Röhl. Locally abundant in Bryant's Bog.

Sphagnum squarrosom Crome. Frequent in swampy woods. Gorge; Reese's Bog; Big Stone Bay.

SPHAGNUM SUBBICOLOR Hampe.* Frequent in Bogs. Reese's Bog; Big Stone Bay.

SPHAGNUM TERES (Schimp.) Aongstr. Locally abundant in Mud Lake Bog.

SPHAGNUM WARNSTORFII Russow. In boggy, wooded swamp; Reese's Bog.

SPHAGNUM WULFIANUM Girg. Locally abundant in boggy wooded swamps. Reese's Bog.

Dicranaceae

CERATODON PURPUREUS (L.) Brid. On earth and other substrata; very common in open situations and the most abundant moss in the aspens.

DICRANELLA GREVILLEANA (Brid.) Schimp.* Locally abundant on a moist clayey bank; Mackinac Island.

DICRANELLA HETEROMALLA (L.) Schimp. On the ground; frequent in upland woods. Mud Lake Hardwoods; Lancaster Lake (Ehlers); Pellston; Colonial Point.

DICRANELLA RUBRA (Huds.) Kindb.* Locally abundant on a moist clayey bank; Mackinac Island.

DICRANELLA SCHREBERI (Sw.) Schimp. Locally common along a wet, sandy lake shore; North Fishtail.

DICRANUM BERGERI Bland.* On the ground; occasional in bogs and wet woods. Mud Lake Bog; Big Stone Bay.

DICRANUM BONJEANII De Not.* On ground; frequent in open sandy woods. Reese's Bog; Pine Point, Cecil Bay.

DICRANUM CONDENSATUM Hedw.* On the ground; locally abundant in open sandy blueberry barrens near Big Stone Bay.

DICRANUM DRUMMONDII C. Mull.* On the ground, probably common in wet woods. Reese's Bog.

DICRANUM FLAGELLARE Hedw. Rotten stumps and logs, and bases of trees; common in moist woods.

DICRANUM FUSCESCENS Turn. On the ground, logs, and stumps; frequent in moist woods. Reese's Bog; Big Stone Bay.

DICRANUM MONTANUM Hedw. On rotten logs and stumps; common in moist woods.

DICRANUM MÜHLENBECKII Br. & Sch.* On the ground in woods; Big Stone Bay.

DICRANUM RUGOSUM (Hoffm.) Brid. On logs, stumps, and the ground; common in moist or wet woods.

DICRANUM SCOPARIUM (L.) Hedw. Logs, stumps and ground; common in woods.

DICRANUM VIRIDE (Sull. & Lesq.) Lindb.* According to R. S. Williams *D. viride* is a synonym of *D. fulvum* Hook. On logs and trunks of trees; common in moist woods.

DITRICHUM FLEXICAULE (Schleich.) Hampe.* Locally abundant along an open gravelly roadside near the shore; Mackinac Island.

ONCOPHORUS WAHLENBERGII Brid. On shaded logs; common but seldom abundant.

SAELANIA GLAUCESCENS (Hedw.) Broth. Rare on gravelly lake bluffs along shores of Douglas Lake.

SELIGERIA CAMPYLOPODA Kindb.* On limestone boulders and stones in moist woods. Rare at Colonial Point; frequent on Mackinac Island.

Leucobryaceae

LEUCOBRYUM GLAUCUM (L.) Schimp. On the ground in moist woods; frequent. Douglas Lake vicinity (Ehlers); Reese's Bog; Colonial Point.

Fissidentaceae

FISSIDENS ADIANTOIDES (L.) Hedw.* On the ground, logs, and tree bases; common in wet woods and along moist lake-shores.

FISSIDENS CRISTATUS Wils. Frequent in the same sort of situations as the preceding species. Reese's Bog; Pellston Hardwoods.

FISSIDENS OSMUNDIOIDES (Sw.) Hedw. Occasional on tree bases in wet woods and on moist sandy lake shores. Douglas Lake; Reese's Bog.

FISSIDENS VIRIDULUS (Sw.) Wahl.* On ledges and stones in moist woods; common on Mackinac Island.

Pottiaceae

BARBULA CONVOLUTA Hedw.* On moist gravelly or sandy banks; occasional. Fairy Island; Colonial Point; Big Stone Bay.

DIDYMODON LURIDUS Hornsch.* Limestone cliffs and boulders; locally common along the lake shore at Mackinac Island.

DIDYMODON RUBELLUS (Hoffm.) Br. & Sch.* Wet logs and rocks; locally common. Carp Creek; Mackinac Island.

ENCALYPTA CILIATA (Hedw.) Hoffm. Common on a moist gravelly lake bluff; Fairy Island.

ENCALYPTA CONTORTA (Wulf.) Lindb.* Lake bluffs, sand dunes, and earth; occasional. Bryant's; Cecil Bay; Mackinac Island.

ENCALYPTA RHABDOCARPA PILIFERA (Funck) Nees & Hornsch.* Very local on a moist gravelly lake bluff; Fairy Island.

GYMNOSTOMUM RUPESTRE Schleich.* Moist shaded limestone ledges; occasional near the shore on Mackinac Island.

TORTELLA CAESPITOSA (Schwaegr.) Limpr.* Rare on gravelly lake bluff at Fairy Island.

TORTELLA FRAGILIS (Drumm.) Limpr.* Rare on sandy or gravelly banks along lake shores. Bryant's; Cecil Bay.

TORTELLA TORTUOSA (L.) Limpr. Rocks, and gravelly or sandy banks; locally common. Fairy Island; Cecil Bay; Big Stone Bay; Mackinac Island.

TORTULA MUCRONIFOLIA Schwaegr.* On moist gravelly lake bluffs; locally common. Fairy Island; Colonial Point.

TORTULA RURALIS (L.) Ehrh. Open sandy or gravelly ground; locally abundant. Cecil Bay; Big Stone Bay; Mackinac Island.

WEISIA VIRIDULA (L.) Hedw. Gravelly lake bluff; Colonial Point.

Grimmiaceae

GRIMMIA APOCARPA (L.) Hedw.* On sunny rocks; local along shore of Burt Lake; common on Mackinac Island.

Orthotrichaceae

ORTHOTRICHUM AFFINE Schrad.* Trunks of hardwood trees in the woods; frequent. Several localities near Burt Lake; Big Stone Bay.

ORTHOTRICHUM ANOMALUM Hedw. Sunny limestone boulders. Rare at Big Stone Bay; common along shore at Mackinac Island.

ORTHOTRICHUM BRACHYTRICHUM Schimp.* On hardwood tree in woods adjoining Smith's Bog.

ORTHOTRICHUM OBTUSIFOLIUM Schrad. Bark of trees in woods; frequent. Reese's Bog; Smith's Bog.

ORTHOTRICHUM SORDIDUM Sull. & Lesq.* Trunks of hardwood trees; frequent on Mackinac Island.

ORTHOTRICHUM SPECIOSUM Nees. Trunks of trees in woods; frequent. Reese's Bog; Big Stone Bay; Mackinac Island.

ULOTA CRISPULA Bruch. On trunks of broadleaf trees; frequent in open woods. Reese's Bog; Carp Creek; Big Stone Bay.

ULOTA LUDWIGII Brid.* On bark of tree in hardwood forest west of Pellston.

ULOTA ULOPHYLLA (Ehrh.) Broth. On trunk of tree; Mackinac Island.

Funariaceae

FUNARIA HYGROMETRICA (L.) Schreb. Common on earth in open situations generally, but especially abundant in burnt-over places.

Bryaceae

BRYUM ARGENTEUM L. Locally abundant on earth in a door-yard; Colonial Point.

BRYUM BIMUM Schreb.* On the ground; common in swampy or wet woods.

BRYUM CAESPITICIMUM L. Frequent on sandy or gravelly lake shores. Fairy Island; Colonial Point; Cecil Bay.

BRYUM CAPILLARE L. Sandy or gravelly ground; frequent in open woods.

BRYUM DUVALII Voit.* Locally abundant in wet open swamp; Reese's Bog.

BRYUM PALLESCENS Schleich.* Local along sandy shore of Lake Michigan near Big Stone Bay.

BRYUM PENDULUM (Hornsch.) Schimp. Frequent along sandy shore of Lake Michigan, near Big Stone Bay.

BRYUM VENTRICOSUM Dicks.* On ground in swampy woods. Reese's Bog; Cecil Bay.

LEPTOBRYUM PYRIFORME (L.) Wils. On earth; frequent in moist, open situations. Fairy Island; Smith's Bog; Gorge; Burt Lake Bluffs.

MNIOBRYUM ALBICANS (Wahl.) Limpr.* Open springy ground; locally common at northern end of Burt Lake.

POHLIA CRUDA (L.) Lindb. Common on a gravelly lake bluff; Douglas Lake.

POHLIA NUTANS (Schreb.) Lindb. On the ground and on stumps and logs in open situations; very common.

POHLIA PULCHELLA (Hedw.) Lindb.* Locally abundant on a moist clayey bank; Mackinac Island.

RHODOBRYUM ROSEUM (Weis) Limpr. On logs and the ground; occasional in moist woods. Burt Lake; Reese's Bog; Pellston Hardwoods; Big Stone Bay; Mackinac Island.

Mniaceae

MNIUM AFFINE Bland. On ground; common in wet woods.

MNIUM CILIARE (Grev.) Lindb. On ground in wet woods; probably frequent. Colonial Point.

MNIUM CUSPIDATUM (L.) Leys. On logs and earth; common in upland woods.

MNIUM DRUMMONDII Br. & Sch.* Swampy woods; rare. Reese's Bog.

MNIUM MARGINATUM (Dicks.) Beauv. On ground and logs; frequent to common in moist upland woods.

MNIUM MEDIUM Br. & Sch. On the ground in moist woods; apparently rare. Colonial Point.

MNIUM ORTHORRHYNCHUM Br. & Sch. Moist earth and bases of trees; common on lake bluffs and in wet woods.

MNIUM PUNCTATUM (L.) Schreb. Common in wet woods. Practically all material seen from this region is referable to the var. *elatum* Schimp.

MNIUM ROSTRATUM Schrad.* Wet woods near Burt Lake; probably frequent.

MNIUM RUGICUM Laur.* Springy roadside northeast of Burt Lake; also Douglas Lake vicinity. Local.

MNIUM SPINULOSUM Br. & Sch. Earth and logs in moist woods, but especially on lake bluffs; frequent. Fairy Island; Polypody Bluff; Reese's Bog; Big Stone Bay.

MNIUM STELLARE Reich.* Frequent to common on moist, shaded banks, or on tree bases in wet woods.

Aulacomniaceae

AULACOMNIUM ANDROGYNUM (L.) Schwaegr.* On moist, shaded banks; local. Vincent Lake; Carp Creek; Burt Lake Bluffs.

AULACOMNIUM PALUSTRE (L.) Schwaegr. On the ground; common and usually abundant in bogs, swamps, and wet woods.

Meesiaceae

MEESIA TRIQUETRA (L.) Aongstr.* Local in open, sedgy bog at Mud Lake.

Bartramiaceae

BARTRAMIA POMIFORMIS (L.) Hedw. Locally abundant on a steep gravelly lake bank; Polybody Bluff.

PHILONOTIS FONTANA (L.) Brid. Open springy places and along streams; frequent. Reese's Bog; Cecil Bay; Mackinac Island.

PHILONOTIS MARCHICA (Willd.) Brid.* Local on open, springy banks near shore of Burt Lake.

PLAGIOPUS OEDERI (Gunn.) Limpr.* Frequent on moist, shaded limestone ledges; Mackinac Island.

Timmiaceae

TIMMIA CUCULLATA Michx. Moist shaded banks; rare. Reese's Bog; Mackinac Island.

Hedwigiaceae

HEDWIGIA ALBICANS (Web.) Lindb. On sunny rocks; local. Colonial Point; Cecil Bay.

Fontinalaceae

FONTINALIS LESCURI Sull.* On stones and logs in streams; rare. Fontinalis Run (Ehlers and L. Blinks); Scotty Bay Creek (Ehlers).

FONTINALIS NOVAE-ANGLIAE Sull.* In streams; occasional. Carp Creek; Maple River; Levering and Scotty Bay Creek (Ehlers).

Leucodontaceae

LEUCODON SCIUROIDES (L.) Schwaegr. On trunks of trees; common, especially in hardwood forests.

Neckeraceae

NECKERA PENNATA (L.) Hedw. Trunks of trees; very common in moist woods.

Entodontaceae

PLATYGIRIUM REPENS (Brid.) Br. & Sch. Occasional on moist logs in woods, especially on bark of fallen birches. North Fishtail; Carp Creek; Colonial Point Hardwoods.

PTERIGYNANDRUM FILIFORME (Timm) Hedw. Occasional on roots of trees along a low lake bluff; Bryant's.

PYLAIASIA INTRICATA (Hedw.) Br. & Sch. On the bark of a tree; Mackinac Island.

PYLAIASIA POLYANTHA (Schreb.) Br. & Sch. On bark of trees; Reese's Bog.

PYLAIASIA SCHIMPERI Card. On trunks of aspen and other trees; frequent in open woods.

PYLAIASIA SUBDENTICULATA Schimp.* On trunks of hardwood trees; frequent in open woods. Douglas Lake; Big Stone Bay.

Leskeaceae

ANOMODON APICULATUS Br. & Sch. On trunks of broadleaf trees; frequent in hardwood forests. Vicinity of Mud Lake and Pellston; Big Stone Bay.

ANOMODON ATTENUATUS (Schreb.) Hüben. On moist earth and bases of trees; occasional. Douglas Lake; Big Stone Bay; Mackinac Island.

ANOMODON MINOR (Beauv.) Förn. On trunks of trees and logs; common in hardwood forest.

ANOMODON ROSTRATUS (Hedw.) Schimp. At the base of trees and on earth or rocks; occasional in upland woods. Fairy Island; Colonial Point; Big Stone Bay; Mackinac Island; Prentiss Bay (Ehlers).

ANOMODON VITICULOSUS (L.) Hook. & Tayl.* On limestone rocks, or occasionally on trees; common on Mackinac Island.

ELODIUM LANATUM (Stroem) Broth.* On the ground in swamps; frequent. Reese's Bog; Gorge.

HAPLOCLADIUM MICROPHYLLUM (Sw.) Broth.* On rotten logs; occasional in wet woods. Smith's Bog; Colonial Point (Ehlers).

HETEROCLADIUM SQUARROSULUM (Voit) Lindb.* On the ground and at the bases of trees; rare in upland woods. Big Stone Bay.

LESKELLA NERVOSA (Schawegr.) Loeske. Bases of trees and rocks; common in woods.

LINDBERGIA AUSTINI (Sull.) Broth.* On trunks of hardwood trees in woods northeast of Burt Lake; very rare.

MYURELLA GRACILIS (Weinm.) Lindb.* Moist crevices of limestone rocks; frequent along the shore of Mackinac Island.

MYURELLA JULACEA (Vill.) Br. & Sch.* Rare on a gravelly lake bluff at Bryant's.

RAUIA SCITA (Beauv.) Aust.* On bark at the base of trees; occasional in upland woods. Mud Lake Hardwoods; Colonial Point; Pellston Hardwoods; Big Stone Bay.

THUIDIUM ABIETINUM (L.) Br. & Sch. Dry sand, gravel, and rocks in open situations; local. Shores of Douglas Lake; Cecil Bay; Big Stone Bay; Mackinac Island.

THUIDIUM DELICATULUM (L.) Br. & Sch. On logs and ground in moist woods. Frequent.

THUIDIUM RECOGNITUM (Hedw.) Lindb.* On logs and ground in moist or wet woods. Common.

Hypnaceae

ACROCLADIUM CUSPIDATUM (L.) Lindb.* On the ground in bogs and marshes; locally abundant. Mud Lake Bog; marsh south of Burt Lake; Alanson.

AMBLYSTEGIELLA CONFERVOIDES (Brid.) Loeske.* Limestone cliffs and boulders; common on Mackinac Island.

AMBLYSTEGIELLA SUBTILIS (Hedw.) Loeske.* On bark of broadleaf trees; common in upland woods.

AMBLYSTEGIUM COMPACTUM (C. Müll.) Aust. Local along springy lake bluff at Colonial Point.

AMBLYSTEGIUM IRRIGUUM (Wils.) Br. & Sch.* On wet banks, stones, and logs; common along streams, frequently growing in the water. Common.

AMBLYSTEGIUM IRRIGUUM SPINIFOLIUM Schimp.* Scotty Bay Creek (Ehlers).

AMBLYSTEGIUM JURATZKANUM Schimp. On earth and logs; not uncommon in moist woods.

AMBLYSTEGIUM KOCHII Br. & Sch. On wet ground and in pools; occasional in swamps bordering Douglas and Burt Lakes.

AMBLYSTEGIUM ORTHOCLADON (Brid.) Card.* On base of tree along lake-shore at Polypody Bluff.

AMBLYSTEGIUM RIPARIUM (L.) Br. & Sch. Floating in the water or growing on roots, branches, logs, and ground subject to periodic inundation. Frequent to common in swamps and springs

AMBLYSTEGIUM SERPENS (L.) Br. & Sch. On the roots and at the base of trees, and on earth; frequent. Polypody Bluff; Burt Lake Hardwoods; Colonial Point.

AMBLYSTEGIUM VARIUM (Hedw.) Lindb. On earth and tree bases; frequent in moist woods.

CALLIERGON CORDIFOLIUM (Hedw.) Kindb. Locally abundant on the ground in swamps and wet woods. Several localities in vicinity of Burt Lake.

CALLIERGON GIGANTEUM Schimp.* On the ground in bogs and swamps; common and locally very abundant.

CALLIERGON STRAMINEUM (Dicks.) Kindb. On the ground in bogs; local. Bryant's, Gleason's, and Mud Lake Bogs.

CHRYSOHYPNUM CHRYSOPHYLLUM (Brid.) Loeske. Earth, rocks, roots, and stumps; frequent in wet woods. Reese's Bog; Big Stone Bay; Mackinac Island.

CHRYSOHYPNUM HISPIDULUM (Brid.) G. Roth. On earth, roots of trees, and stumps; frequent in moist woods. Douglas Lake; Mackinac Island.

CHRYSOHYPNUM POLYGAMUM (Br. & Sch.) Loeske. Locally abundant on wet sandy lake shores and in marshes. Douglas Lake; marsh south of Burt Lake.

CHRYSOHYPNUM SOMMERFELTII (Myr.) G. Roth.* Wet woods near Burt Lake.

CHRYSOHYPNUM STELLATUM (Schreb.) Loeske. Frequent in marshes and wet wooded swamps, growing on the ground. Pine Point; Carp Creek; Crooked River; Cecil Bay.

DREPANOCLADUS ADUNCUS (L.) Warnst. (*Hypnum uncinatum* Hedw.) Banks, rocks, logs, tree bases, and wet depressions; frequent in moist woods. Reese's Bog; Smith's Bog; Carp Creek; Cecil Bay; Big Stone Bay; Mackinac Island.

DREPANOCLADUS FLUITANS (L.) Warnst. Locally abundant on periodically inundated ground; Smith's Bog.

DREPANOCLADUS KNEIFFII (Schimp.) Warnst. On the ground or floating in the water; common in bogs and swampy woods, on springy banks, and in wet

situations generally. Under *D. Kneiffii* are here included a number of forms formerly referred to *Hypnum aduncum* Hedw., but more recently treated by various authors as distinct species. Some of these forms may indeed be specifically distinct, but their status in this respect seems altogether too uncertain to warrant attempting to separate them at the present time.

DREPANOCLADUS REVOLVENS (Sw.) Warnst.* Frequent in marshes and swamps, and along springy banks. Pine Point Bog; Cecil Bay; Big Stone Bay; Mackinac Island.

DREPANOCLADUS SCORPIOIDES (L.) Warnst. Locally abundant in wet marshes. Pine Point; Cecil Bay.

DREPANOCLADUS SENDTNERI (Schimp.) Warnst.* Floating in pools in open swamps; locally abundant near Burt Lake.

DREPANOCLADUS SENDTNERI WILSONI Warnst.* Smith's Bog.

DREPANOCLADUS TRIFARIUS (Web. f. & Mohr.) Broth.* Wet sandy marshes; local at Pine Point and Cecil Bay.

DREPANOCLADUS VERNICOSUS (Lindb.) Warnst. Local in wet, open bog; Mud Lake.

HETEROPHYLLON HALDANIANUM (Grev.) Kindb. On rotten logs and earth; common in moist woods.

HOMOMALLIUM ADNATUM (Hedw.) Broth.* On tree bases and gravelly banks; occasional in open woods. Fontinalis Run (Ehlers); Colonial Point.

HYGROAMBLYSTEGIUM FILICINUM (L.) Loeske.* Springy places and along streams; locally very abundant. Gorge; Mackinac Island.

HYGROHYPNUM PALUSTRE (Huds.) Loeske. On wave-washed logs and wet rocks; rare at Burt Lake Bluff and on Mackinac Island.

HYLOCOMIUM SPLENDENS (Hedw.) Br. & Sch. Common on the ground in moist woods.

HYPNUM SCHREBERI Willd. On ground, logs, and stumps; one of the commonest mosses of moist woods.

ISOPTERYGIUM ELEGANS (Hook.) Lindb.* Moist woods, usually on earth or rocks; rare. Mud Lake Hardwoods and Carp Lake Hardwoods (Ehlers); Big Stone Bay.

ISOPTERYGIUM TURFACEUM Lindb. Common in moist woods, usually on decaying logs.

PLAGIOTHECIUM DENTICULATUM (L.) Br. & Sch. Gravelly lake bluffs, and on the ground in wet woods; frequent.

PLAGIOTHECIUM ROESEANUM Br. & Sch.* Occasional on moist shaded banks. Polypody Bluff; Fairy Island; Burt Lake Hardwoods.

PLAGIOTHECIUM STRIATELLUM (Brid.) Lindb. On the ground or logs; frequent in moist woods. Reese's Bog; Burt Lake Hardwoods.

PTILIUM CRISTA-CASTRENSIS (L.) De Not. On the ground, logs, and stumps; frequent in moist woods. Reese's Bog; Cecil Bay.

RHYTIDIADELPHUS TRIQUETRUS (L.) Warnst. On the ground in moist woods; common.

STEREODON CUPRESSIFORMIS (L.) Lindb. Shaded logs and stumps; infrequent. Colonial Point (Ehlers); Mackinac Island.

STEREODON IMPONENS (Hedw.) Lindb. On logs and stumps in the woods; common.

STEREODON LINDBERGII (Mitt.) Warnst. Swamps, springy roadsides, and wet woods; common.

STEREODON PALLESCENS (Hedw.) Lindb. On logs, stones, and tree bases in woods; common.

STEREODON PRATENSIS (Koch) E. G. Britton. On the ground in swamps; frequent. Reese's Bog; Big Stone Bay.

STEREODON RECURVANS (Schwaegr.) Broth.* On logs and humus in the woods; common.

STEREODON REPTILIS (Michx.) Mitt. On logs, stones, and tree bases; common in moist woods. Douglas Lake; Cecil Bay.

Brachytheciaceae

BRACHYTHECIUM CYRTOPHYLLUM Kindb.* On a steep gravelly lake bank at Polypody Bluff.

BRACHYTHECIUM OXYCLADON (Brid.) Jaeg. & Sauerb. Earth and bases of trees; common in open woods.

BRACHYTHECIUM PLUMOSUM (Sw.) Br. & Sch. On earth; rare in open woods along lake shore at North Fishtail.

BRACHYTHECIUM RIVULARE Br. & Sch.* On wet ground; common in springy woods, especially along streams, often growing in the water.

BRACHYTHECIUM RUTABULUM (L.) Br. & Sch. Earth, stones, trees, and logs; occasional in moist upland woods. Burt Lake Bluffs; Burt Lake Hardwoods.

BRACHYTHECIUM RUTABULUM FLAVESCENS Br. & Sch.* Wet grassy roadside; Mackinac Island.

BRACHYTHECIUM SALEBROSUM (Hoffm.) Br. & Sch. On the ground and on the roots and bases of trees; frequent in upland woods. Grapevine Point; Smith's Bog; Cecil Bay.

BRACHYTHECIUM STARKEI (Brid.) Br. & Sch.* Earth and rotten logs; occasional in wet or moist woods. Reese's Bog; Colonial Point; Mackinac Island.

BRACHYTHECIUM VELUTINUM (L.) Br. & Sch. On earth in open woods; Cecil Bay.

BRYHNA GRAMINICOLOR (Brid.) Grout.* Local on a steep, gravelly lake bluff at Fairy Island.

BRYHNA NOVAE-ANGLIAE (Sull. & Lesq.) Grout.* On the ground; occasional in springy woods. Burt Lake Hardwoods.

CAMPTOTHECIUM NITENS (Schreb.) Schimp. On the ground in wooded swamps; frequently abundant. Reese's Bog.

EURYNCHIUM DIVERSIFOLIUM (Schleich.) Br. & Sch.* Locally abundant on shaded gravelly hillsides; Colonial Point.

EURYNCHIUM STRIGOSUM (Hoffm.) Br. & Sch. Earth, logs, and bases of trees; common in moist woods.

OXYRRHYNCHIUM RUSCIFORME (Neck.) Warnst.* On rocks in a stream; Scotty Bay Creek (Ehlers).

Dendroidaceae

CLIMACIUM AMERICANUM Brid. On logs and the ground; common in swampy woods.

CLIMACIUM DENDROIDES (L.) Web. f. & Mohr. On logs and the ground; frequent in wet woods. Bryant's; Smith's Bog.

Weberaceae

WEBERA SESSILIS (Schmid.) Lindb. On an earth bank in moist upland woods; Colonial Point.

Buxbaumiaceae

BUXBAUMIA APHYLLA L. On earth banks rich in humis; local in woods along Carp Creek and at Colonial Point.

Georgiaceae

GEORGIA PELLUCIDA (L.) Rabenh. On rotten logs and stumps; common in moist woods.

Polytrichaceae

CATHARINEA ANGUSTATA Brid. On earth; frequent in open upland woods. Mud Lake; Smith's Bog; Burt Lake Hardwoods; Colonial Point; Pellston.

CATHARINEA UNDULATA (L.) Web. f. & Mohr. On earth; occasional in moist open woods. Grapevine Point; Mud Lake Hardwoods; Burt Lake.

POLYTRICHUM COMMUNE L. On the ground in all sorts of situations; common and abundant.

POLYTRICHUM DECIPIENS Limpr.* Locally abundant on moist earth in hardwoods near Carp Lake (Ehlers).

POLYTRICHUM FORMOSUM Hedw.* Frequent on moist earth in hardwoods west of Pellston.

POLYTRICHUM JUNIPERINUM Willd. On the ground in open situations; very common and abundant.

POLYTRICHUM OHIOENSE Ren. & Card. Occasional on earth banks in Colonial Point Hardwoods.

POLYTRICHUM PILIFERUM Schreb. Dry, open ground; common and abundant.

POLYTRICHUM STRICTUM Banks. On the ground in bogs; probably frequent. Reese's Bog.

By way of summary it may be stated that, so far as published records show (and as tabulated in the present paper), the bryophyte flora of Michigan com-

prises a total of 321 species, distributed as follows: Marchantiaceae 4, Ricciaceae 2, Metzgeriaceae 9, Jungermanniaceae 56, Anthocerotaceae 1, Sphagnaceae 17, Bryaceae 232.

YALE UNIVERSITY

LICHENS OF THE LAKE GEORGE REGION

STEWART H. BURNHAM

(Continued)

148. *Peltigera aphthosa* (L.) Willd. On earth and mossy rocks; common. Specimens collected Oct. 18, 1905, near Tripoli are reported in the N. Y. State Mus. Bull. **105**: 24. 1906; having the thallus variegated with whitish patches, which is due apparently to the epidermis having been eaten by some small creature.
149. *Peltigera canina* (L.) Willd. Growing in locations similar to those of preceding species; abundant.
150. *Peltigera canina soorediata* (Schaer.) Fink. Wooded bank west of Tripoli cemetery, May 30, 1918; determined by Mr. Merrill.
151. *Peltigera canina spongiosa* Tuck. "This variety occurs . . . near Warrensburg." (Peck) in N. Y. State Mus. Rep. **53**: 854. 1900. Ravine southern base of Sugar Loaf Mt., Sept. 19, 1917; east of Thompson's gravel-bed, July 8, 1917. East of Tripoli in low woods, Nov. 12, 1913; determined by Mr. Merrill, who says "with portions of the thallus developing a mat of rhizoids below as in *v. spongiosa* Tuck."
152. *Peltigera canina undulata* Del. Peaked Mt., Oct. 23, 1918; determined by Mr. Merrill.
153. *Peltigera horizontalis* (L.) Hoffm. Rotten wood at Shushan, July 7, 1907 (Dobbin); falls in West brook, W. Fort Ann, Aug. 20, 1907; rocks near Wiggins iron mine, June 8, 1917, determined by Mr. Merrill.
154. *Peltigera polydactyla* (Neck.) Hoffm. Huletts Lg. (Jelliffe); Shushan, June 9, 1907 and Cambridge waterworks swamp, Sept. 2, 1913 (Dobbin); Black Mt., Barber trail, Aug. 19, 1909.
155. *Peltigera rufescens* (Neck.) Hoffm. Huletts Lg. (Jelliffe).
156. *Peltigera rufescens praetextata* (Flk.) Nyl. Peaked Mt., May 26, 1918, on thin rocky soil; stones in woods southeast of Vaughns schoolhouse, Aug. 19, 1914. Both collections determined by Mr. Merrill, who says, "unrecognized by others in America but I have identified it from many localities."
157. *Pertusaria amara* (Ach.) Nyl. West of Tripoli schoolhouse on trunks of *Juglans cinerea*, Dec. 5, 1914; determined by Mr. Merrill.
158. *Pertusaria globularis* Ach. Peaked Rock on *Hedwigia albicans*, May 19, 1906.
159. *Pertusaria leioplaca* (Ach.) Schaer. E. Galway on *Castanea dentata* (Burt);

- New Michigan Pond, "Talman marsh" on *Acer rubrum*, June 2, 1917; west of Tripoli schoolhouse on trunks of *Acer saccharum*, Apr. 7, 1918. The latter two collections determined by Mr. Merrill.
160. *Pertusaria multipuncta* (Turn.) Nyl. On trees. Fort Edward (Howe); Shushan (Dobbin); Black Mt. on *Abies balsamea*, Aug. 19, 1909; Vaughns on *Betula lutea*, June 6, 1909.
161. *Pertusaria pertusa* (L.) Dalla Torre & Sarnth. Fort Edward; the host plant of *Sphinctrina turbinata* (Howe); E. Galway on *Fagus grandifolia* (Burt); Shushan on oak trunks (Dobbin); northwest Hartford on calcareous rocks, Aug. 24, 1906; west of Tripoli schoolhouse on *Juglans cinerea*, Dec. 5, 1914; Vaughns on *Tilia americana*. The last two collections determined by Mr. Merrill. (*Pertusaria communis* DC.).
162. *Pertusaria pustulata* (Ach.) Nyl. Shusan on maple trunks, May 25, 1907; determined by Dr. Fink.
163. *Pertusaria velata* (Turn.) Nyl. E. Galway on maple trunks (Burt); near Tripoli; Vaughns on trunks of *Carya ovata*, *Betula lenta*, *Acer saccharum*, and *Fraxinus nigra*; Anaquassacook hills on oak trunks. Collections have been determined by Mr. Merrill.
164. *Pertusaria Wulfenii* DC., in sense of Tuckerman. Vaughns on trees, Aug. 18, 1909; determined by Mr. Merrill.
- [To be Concluded]

BOOK REVIEW

LÖFMOSSORNAS UTBREDNING I SVERIGE. [Distribution of Mosses in Sweden.] HJALMAR MÖLLER. Arkiv för Botanik, utgifvet of K. Svenska Vetenskapsakademien i Stockholm. Uppsala & Stockholm. Almqvist & Wiksells Boktryckeri, A-B.

- Band 10, No. 12, I Splachnaceae, 1911.
" 12, No. 4, II Cryphaeaceae och Neckeraceae, 1912.
" 12, No. 13, III Thuidiaceae, 1913.
" 15, No. 2, IV Leskeaceae och Pterogoniaceae, 1917.
" 17, No. 4, VI Polytrichaceae 2, Polytrichum Dill. 1921.
" 17, No. 14, VII Hookeriaceae och Fontinalaceae, 1922.

In the BRYOLOGIST for May, 1920, the writer reviewed No. 5 of this series, dealing with the first part of *Polytrichaceae*, and expressed the hope of seeing the rest of the series. They are all on hand now, up to date, owing to the kindness of Mr. Möller, and form a valuable addition to the literature of the perennially interesting Scandinavian moss-flora. This is always useful to the student of the mosses of northern New England, particularly of those of Vermont.

I. Deals with *Splachnaceae*, genera *Splachnum*, *Haplodon*, *Tetraplodon*, and *Tayloria*. They are evidently much more frequent than with us, except perhaps in the subalpine regions of Maine. In this installment, as in all the rest, a very comprehensive list of Swedish stations is given, and most excellent critical notes.

II. *Cryphaeaceae* and *Neckeraceae*, contains the genera *Antitrichia*, *Leucodon*, *Hedwigia*, (1) with several varieties, *Homalia*, and *Neckera*, with six species and many varieties. The assigning of *Hedwigia* to *Cryphaeaceae* is new to the writer

III. *Thuidiaceae*, genera *Thuidium*, 7 species, our *T. Blandowii* W. & M. as *T. lanatum*, (Strom.) Hagen, *Heterocladium*, 3 species and varieties.

IV. *Leskeaceae* and *Pterogoniaceae*, genera *Leskeella*, 3 species. *Leskea polycarpa* Ehrh. and 2 varieties; *Anomodon*, 4; *Pseudoleskeella catenulata* (Brid.) Kindb.; *Myurella*, 2 species; *Pterogoniaceae*, genera *Pterogonium*, *P. ornithopodioides* (Huds.) Lindb.; *Pterygynandrum filiforme* (Timm.) Hedw., and 3 vars.; *Helicodontium pulvinatum* (Wahlenb.) Lindb.

V. See BRYOLOGIST for May, 1920, Vol. 23, p. 46.

VI. *Polytrichaceae* 2, *Polytrichum* Dill., 12 species are discussed, including some formerly under *Pogonatum*, as *P. alpinum* L., with numerous varieties.

VII. *Hookeriaceae* and *Fontinalaceae*. I. *Pterygobhyllum lucens* (L.) Brid. 2. *Dichelyma*, 2 species. *Fontinalis*, 11 species and plenty of varieties, with many excellent figures of the leaf-cells, which should be most useful in the study of this interesting but critical genus.

The text of this series is in Swedish, but that ought not to deter the earnest student from consulting it. The writer presumes that the series is to be continued.

ANNIE LORENZ

HARTFORD, CONNECTICUT,
APRIL, 1922.

MISCELLANEOUS NOTES

Mr. H. Pittier, lately of the Bureau of Plant Industry, U. S. Department of Agriculture, and now a resident of Caracas, Venezuela, has undertaken extensive plant collecting in that country. Lately, he has paid closer attention to the Moss flora, which seems to be very rich, since, though no less than seventy-nine genera and two hundred and ninety species had been listed previously, the small collection already sent Mrs. Britton and Mr. Williams for determination contained several interesting additions to said list.

Four sets of Mr. Pittier's plants have already been placed, but he would like to obtain a few more subscribers, either for the complete series or for the mosses only, which would help him in continuing his exploration work in Venezuela. It may be added that Mr. Pittier is not without experience as a collector. He was the initiator and principal agent in the formation of the rich collection of more than 20,000 numbers known as the "Instituto-fisico-geográfico de Costa Rica" series (1887-1905), the mosses of which were worked up by Mr. J. Cardot, and his own series (1903-), a complete set of which is in the U. S. Nat. Herbarium, amounts to-day to more than 10,000 specimens, proceeding from Mexico, Central America, Panama, Colombia and Venezuela. Fuller information may be obtained from Mr. Edward B. Chamberlain or Mrs. Britton.

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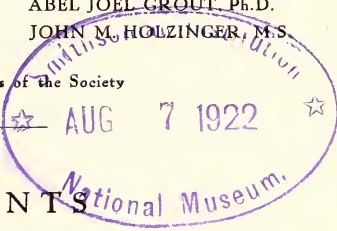
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HEPATICS, AND LICHENS

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THE BRYOLOGIST

VOL. XXV

JULY, 1922

No. 4

MOSESSES OF THE ROCKY MOUNTAINS PARK, BANFF, ALBERTA, CANADA*

W. H. EMIG

The Rocky Mountains Park of Canada offers bryologists an exceptionally rich field for the study and collection of mosses. The mosses listed below were collected by Mr. N. B. Sanson, Curator of the Government Museum, within short distances from Banff, where the Museum is located.

The Town of Banff nestles in a small valley west of Tunnel Mountain. To the north side of the valley ascend the Cascade and Stony Squaw Mountains. The Bow River passes near the town and after tumbling over a pretty cascade is joined by the Spray River from the south. The river flows on to the east and cuts through Tunnel Mountain and Rundle Mountain. To the south, hot sulphur springs issue from the east slope of Sulphur Mountain. Leaving the Banff station, the Canadian Pacific Railroad climbs along the broad swampy valley of the Bow River to the west. In this general direction, some ten miles distant, appear the snow capped peaks of the Bourgeau Range.

In this region of limestone, quartzite, and shale formations, we would expect to find a very large number of species of mosses if the collections were carefully and systematically made. The species listed below for one of Mr. Sanson's collections is an indication of what can be obtained in this region.

I am indebted to Prof. A. Leroy Andrews for the determination of the species of Sphagnum; to Mr. George B. Kaiser for the determination of *Hypnum turgescens* Schimper; and to Dr. O. E. Jennings for many suggestions while working on the separate determinations of the mosses listed below.

The specimens enumerated below are to be found in the Government Museum at Banff, Alberta, while duplicates of many of the numbers have been deposited in the Carnegie Museum Herbarium, Pittsburgh, Pennsylvania.

Aulacomnium palustre Schwaegr. No. 6, Mound, off Aspen Ave., Banff, 10-7-10.¹ Nos. 37, 43, and 62, Simpson Pass Summit, 8-25-13. Nos. 116 and 119, Swamp back of station, 10-15-10. Nos. 200, and 202, no locality given, 7-18-03. No. 203, along fireguard below Hot Springs, 6-20-04. Nos. 204, and 205, marsh nearly opposite C. P. R. Hotel, 6-27-04. No. 206, off from marsh in woods of lower park, 8-25-13.

Barbula convoluta Hedw. No. 179, ditches at side of Hot Springs Road, 6-24-04.

* Contribution No. 4 from the Department of Botany; University of Pittsburgh.

¹ October 7, 1910. For purposes of brevity the dates are indicated thus by figures.

The May number of THE BRYOLOGIST was published June 20, 1922.

Brachythecium digastrum C. M. & Kindb. No. 260, Spray Ave. woods, 10-22-10.

Brachythecium salebrosum (Hoffm.) Br. & Sch. No. 13, Buffalo Ave., near Bow Falls, Tunnel Mt., 10-13-13. No. 17, Sulphur Mt., 10-20-13. Nos. 184 and 185, Rundle Mt., 7-8-04.

Brachythecium plumosum (Sw.) B. & S. No. 248, Sulphur Mt., 9-9-13.

Bryum argenteum L., No. 136a, no data.

Bryum bimum Schreb. No. 68a, Simpson Pass Summit, 8-25-13.

Bryum caespiticium L. No. 213, off Hot Springs Road, 6-24-04.

Bryum calophyllum R. Br. No. 56, S. D. Canyon, 8-21-11.

Bryum pallens Sw. No. 133, no data. No. 238, Simpson trail and Cave Ave. August, 1915. No. 268, Loop, 5-29-11.

Bryum pseudotriquetrum (Hedw.) Schwaegr. No. 111, in pools of Bow River, 10-4-10.

Calliergon cuspidatum (L.) Kindb. No. 267, no data.

Calliergon giganteum (Schimp.) Kindb. Nos. 107, 108, 115, and 118, marsh back of station, 10-15-10.

Camptothecium Amesia R. & C. No. 265, Tunnel Mt., 11-8-13.

Camptothecium nitens (Schreb.) Sch. Nos. 113, and 224, marsh back of R. R. station, Banff, 10-15-10, and 8-6-02. No. 222, Marsh off Lower Park, 8-22-03.

Campylium stellatum (Schreb.) Bryhn. No. 78 Squaw Mt., 7-25-10. No. 99, off Hot Springs road, 6-24-04. No. 129, Aylmer Pass Flats on way to Ghost Creek, 9-20-16.

Ceratodon purpureus (L.) Brid. No. 117, Swamp back of station, 10-15-10. No. 144, off Hot Springs road, 6-24-04. No. 193a, Bourgeau Range, 77-12-04.

Climacium dendroides (L.) Web. & Mohr. No. 219, woods off Echo Creek, 4-10-06. No. 220, near Boswell's house, 4-10-06.

Cratoneuron commutatum (Hedw.) Roth. No. 22, Glen Ave., Banff, 9-27-13. No. 25, and 28, Sulphur Mt., 10-20-13. Nos. 40, 61, and 70, Simpson Pass Summit, 8-25-13. No. 78a, Summit Trail, Squaw Mt., 7-25-10. No. 98, off Hot Springs Road, 6-24-04. No. 103, Swamp back of R. R. station, Banff, 10-15-10. No. 109, Sulphur Mt., 8-30-09. No. 114, North side of Squaw Mt., 7-25-10. No. 257, no data. No. 275, Spray Ave., Banff, 11-6-13.

Cratoneuron filicinum (L.) Roth. Nos. 24, 26, and 27, Sulphur Mt., 10-20-13. No. 33, Glen Ave., Banff, 9-27-13. No. 65, Simpson Pass Summit, 8-25-13. No. 85, Rundle Mt., 7-8-04. No. 100, off Hot Springs road, 6-24-04. No. 183, off Hot Springs road, 6-24-04.

Dicranoweisia crispula Lindb. Nos. 35, and 60, Simpson Pass Summit, 8-25-13.

Dicranum Bonjeani De Not. No. 156, Sulphur Mt., 7-28-05.

Dicranum congestum Brid. No. 9, Glen Ave., Banff, 9-27-13. No. 166, Sickle Mt., 7-20-04.

Dicranum enerve Thed. No. 36, Simpson Pass Summit, 8-10-13.

Dicranum flagellare Hedw. No. 74, Spray bridge, 10-4-13.

Dicranum fuscensens Turn. No. 104, Sulphur Mt., 9-9-13. No. 167, west slopes of Bourgeau Mt., 7-12-04. Nos. 247 and 242, Sulphur Mt., 9-9-13.

Dicranum Mühlenbeckii B. & S. Nos. 158, 159, 178 and 175, Sulphur Mt., 6-27-04, 7-28-05, 6-27-04, 6-30-03, respectively.

Dicranum scoparium (L.) Hedw. No. 8, Glen Ave., Banff, 9-27-13. Nos. 58 & 69, Simpson Pass Summit, 8-25-13. Nos. 157, & 164, Sulphur Mts., 6-27-04. No. 161, Sulphur Mt., 9-14-03. No. 175, Sulphur Mt., 6-30-03. No. 201, without locality, 7-18-03. Nos. 243, 244 & 145, Sulphur Mt., 9-9-13.

Dicranum Starkei W. & M. No. 163, Sulphur Mt., 6-27-04.

Dicranum subpalustre C. M. & Kindb. No. 165, Sulphur Mt., 7-28-05.

Didymodon luridus Hornsch. No. 264b, Tunnel Mt., 11-8-13.

Didymodon rubellus (Hoff.) B. & S. No. 77, Sulphur Mt., 10-6-13. No. 123, Castle Mt., Mt. Aylmers Pass Camp, 9-22-16. No. 147, Sulphur Mt., 6-27-04.

Distichium capillaceum B. & S. No. 5, no locality, 8-25-13. No. 112, back of C. P. R. Hotel, 9-3-10. No. 169, west slope of Bourgeau Mt., 7-12-04. Nos. 170, 171 & 172, Hot Springs Road, 6-24-04. No. 173, no data. No. 174, Sickle Mt., 7-20-04. No. 256, Sulphur Mt., 9-9-13.

Ditrichum flexicaule (Hampe.) Schleich. No. 31 Glenn Ave., Banff, 9-27-13.

Ditrichum flexicaule (Hampe.) Schleich. No. 31 Glenn Ave., Banff, 9-27-13. No. 146 & 149, Trail to Rundle Mt., 9-5-06. No. 148, Sulphur Mt., 6-27-04. Nos. 150, & 151, Hot Springs Road, 6-24-04. No. 152, Sulphur Mt., 6-27-04.

Ditrichum tortile (Schr.) Hampe. No. 50, trail off Hot Springs, 10-20-13.

Drepanocladus aduncus (Hedw.) Warnst. No. 34, Sulphur Mt., 9-9-13.

Drepanocladus aduncus (Hedw.) Warnst., var? Nos. 269 & 271, Spray Ave., Banff, 10-22-10.

Drepanocladus aduncus (Hedw.) Warnst. var. *Kneiffi* Schimp. No. 96, The Lake in small hay field, 9-20-03.

Drepanocladus exannulatus (Guemb.) Warnst. No. 110, Pool of Bow River, 10-4-10.

Drepanocladus revolvens (Sw.) Warnst. var. *intermedius* Lindb. No. 63, Sulphur Mt., 7-29-17. No. 78, Squaw Mt., 7-25-10.

Drepanocladus scorpioides (L.) Warnst. No. 230, Spray Bridge, 10-6-13.

Drepanocladus uncinatus (Hedw.) Warnst. Nos. 15, 19, & 21, Sulphur Mt., 10-20-13. Nos. 39 & 68, Simpson Pass Summit, 8-25-13. No. 52, below Hot Springs, 11-12-06. Nos. 87, 88 & 162, Sulphur Mt., 6-27-04. No. 89, Hot Springs Road, 7-24-06. No. 90, Spray Ave., Banff, 7-5-06. No. 94, woods off Loop, 8-22-03. No. 105, Squaw Mt., 7-25-10. No. 137 woods off Spray Ave., Banff, 11-6-13. No. 181, Sulphur Mt., 6-24-04. No. 272, Tunnel Mt. Stop, 11-8-13.

Entodon brevisetus (Hook. & Wils.) J. & S. No. 145, Spray Ave. woods, 10-22-10.

Fissidens adiantoides (L.) Hedw. No. 177, off Hot Springs Road, 6-20-06.

- Fissidens grandifrons* Brid. No. 176, off Hot Springs Road, 7-24-06.
Funaria hygrometrica (L.) Sibth. No. 124, below Kananaskis Falls, Secbe, Alberta, 5-8-14. No. 178, no data.
Grimmia ambigua Sull. No. 232, Sulphur Mt., 9-9-13.
Grimmia apocarpa (L.) Hedw. No. 196, above Hot Springs, 11-12-06. Nos. 198 & 266, no data. No. 199, Bourgeau Range, 7-12-04. No. 270, Spray Ave., Banff, 10-22-10. No. 273, Tunnel Mt. Stop, 11-8-13. No. 274, Spray Ave., Banff, 11-6-13.
Grimmia conferta Funck. No. 136, Rundle Mt., 9-16-16.
Grimmia heterophylla Kindb. No. 195, above lake opposite Gibraltar Point, 7-1-04.
Grimmia pennsylvanica Schwaegr. No. 121, Rundle Mt., 9-16-16. No. 249, Sulphur Mt., 9-9-13.
Hedwigia albicans (Web.) Lindb. No. 142, Spray Ave., Banff, 10-28-16.
Homalothecium sericeum B. & S. No. 221, Tunnel Mt., midway to Falls, 6-11-03.
Hylocomium proliferum (L.) Lindb. Nos. 139, & 243, no data. No. 225, Sulphur Mt., 6-27-04. No. 227, Sulphur Mt., 7-14-03. No. 230, Spray Bridge, 10-6-13.
Hymenostylium curvirostre (Ehrh.) Lindb. No. 1, Tote Road, 10-10-11. No. 153, Hot Springs Road, 9-20-04. No. 154, North side Lake Minnewanka, 7-11-06. No. 155, Rundle Mt., 7-8-04.
Hypnum Schreberi (Willd.) Kindb. No. 4, no locality 10-10-10. No. 93, Bourgeau Mt. slope, 8-18-03. No. 102, Bourgeau Mt., 7-12-04. No. 233, no data. Nos. 235 & 258, no locality, 8-x-15. Nos. 236 & 237, Simpson Trail & Cave Ave., 9-6-13.
Hypnum turgescens Schimp. Nos. 84, & 86, marsh off C. P. R. Hotel, 7-27-04.
Leptobryum pyriforme (L.) Wils. Nos. 120 & 241, Sulphur Mt., 9-9-13. No. 193b, Bourgeau Mt., 7-12-04. No. 207, off Hot Springs Road, 6-24-04. Nos. 208 & 209, Bourgeau Mt., 7-12-04. No. 210, Sulphur Mt., 7-28-05.
Leucobryum glaucum (L.) Schimp. No. 2, no data.
Mnium rostratum Schrad. No. 135, no data. No. 212, below Hot Springs, 6-20-04.
Orthothecium chryseum Schwaegr. (Bry. Eu.) Nos. 148, 217 & 218, Sulphur Mt., 6-27-04. No. 216, Trail to Moraine Lake, 9-20-03.
Orthotrichum rupestre Schleich. No. 138, Spray River, 10-28-16.
Paludella squarrosa (L.) Brid. Nos. 38 & 44, Simpson Pass Summit, 8-25-13.
Philonotis fontana (L.) Brid. Nos. 64, 57 & 130, Simpson Pass Summit, 8-25-13. No. 214, Simpson Pass Summit, 7-27-04.
Pohlia cruda (L.) Lindb. No. 50, Hot Springs, 10-20-13. No. 126, Sulphur Mt., 10-10-10. No. 254, (in part) Sulphur Mt., 9-9-13.
Pohlia nutans (Schreb.) Lindb. Nos. 160 & 194, Lake Minnewanka, 7-11-06. Nos. 192, & 193, Sulphur Mt., 6-27-04. No. 239, Sulphur Mt., 9-9-13.
Polytrichum commune L. No. 42, Simpson Pass Summit, 8-25-13.

Polytrichum commune L. var. *uliginosum* Hueb. No. 186, Cascade Trail, 10-15-03.

Polytrichum juniperinum Willd. No. 198, Stony Squaw Mt., 6-22-99. No. 193, Sickle Mt., 7-20-04. No. 191, Hot Springs Road, 5-5-00. No. 252, Sulphur Mt., 9-9-13.

Polytrichum piliferum Schreb. No. 141, Simpson Pass Summit, 8-28-13.

Polytrichum strictum Banks, Nos. 45, 46 & 47, Simpson Pass Summit. No. 187 Sickle Mt., near Cascade Creek, 7-20-04. No. 188, Sulphur Mt., 7-28-05.

Ptilium crista-castrensis (L.) De Not, No. 10, Sulphur Mt., 10-20-13. No. 32, Glen Ave., Banff, 9-27-13. No. 91, left side of Lake Louise, 9-29-03. No. 95, Back of Museum, Banff, 9-9-10. No. 143, Healey's Creek, Simpson Pass Summit, 9-6-13. No. 237, Simpson Trail & Cave Ave., 9-6-13. No. 259, Spray Ave woods, 10-22-10.

Rhacomitrium canescens (Timm.) Brid. No. 14a Cascade Mt., 8-24-06. No. 14b, Cascade Mt., 9-1-16. Nos. 58, 59 & 71, Simpson Pass Summit, 8-25-13.

Rhytidiadelphus triquetrus (L.) Warnst. No. 23, Sulphur Mt., 10-20-13. No. 73, above Large Hot Spring, 10-6-13. No. 92, below Hot Springs, 6-20-04. No. 228, above Hot Springs, 4-25-04.

Rhytidium rugosum (L.) Lindb. Nos. 11 & 16, Sulphur Mt., 10-20-13. No. 122, Spray River, 10-28-16.

Stereodon cupressiforme (L.) Brid. No. 134, Cascade Mt., 9-2-16. No. 240, Sulphur Mt., 9-9-13.

Stereodon curvifolium (Hedw.) Roth. Nos. 72, 76, & 231, Sulphur Mt., 10-6-13. No. 230, Spray Bridge, 10-6-13. No. 263, Tunnel Mt., 11-8-13.

Stereodon Patientiae Lindb. No. 75, Spray Bridge, 10-4-13.

Stereodon revolutus Mitt. No. 97, near C. P. R. Station, 10-29-06. No. 101, Sulphur Mt., 12-3-06. No. 253, Sulphur Mt., 6-27-04. No. 276, Spray Ave., Banff, 11-6-13.

Sphagnum capillaceum (Weiss.) Schrank, var. *tenellum* Andrews, No. 29, Banff, 10-15-10. No. 48, Simpson Pass Summit, 8-25-13. No. 54, S. D. Canyon, 8-21-11. No. 81, Spray River, 7-5-06. No. 82, between Sulphur and Bourgeau Mt., 8-18-03. No. 254, (in part) Sulphur Mt., 9-9-13.

Sphagnum fuscum (Schimp.) H. Klinggr. Nos. 53 & 55, S. D. Canyon, 8-21-11. Nos. 83 & 79, Spray River, 7-5-06. No. 229, Squaw Mt., 7-25-10.

Sphagnum Warnstorfi Russow, No. 49, Simpson Pass Summit, 8-25-13. No. 80, Spray River, 7-5-06. No. 106, Squaw Mt., 7-25-10.

Tetraplodon angustatus (L.) B. & S. No. 211, Sulphur Mt., 7-27-06.

Thuidium abietinum (L.) B. & S. Nos. 18 & 20, Sulphur Mt., 10-20-13. No. 215, Boswell's woods, 10-4-06. No. 223, Rundle Mt., 8-9-02.

Timmia austriaca Hedw. No. 51, Sulphur Mt., 10-20-13.

Tortella tortuosa (L.) Limpr. Nos. 66, & Simpson Pass Summit, 8-25-13. No. 127, Sulphur Mt., 10-10-10. No. 255, Sulphur Mt., 9-9-13.

Tortula aciphylla (B. & S.) Hartm. No. 264c, Tunnel Mt., 11-8-13.

Tortula ruraliformis (Besch.) Dixon, No. 12a, Buffalo Ave., Tunnel Mt., 10-13-13. No. 128, Aylmer Pass Flats, 9-20-16. No. 144a Simpson Pass Summit, 9-6-13. No. 262, Spray Ave. woods, 10-22-10.

Tortula ruralis (L.) Ehrh. No. 3, Buffalo Ave., 10-10-16. No. 7, no locality, 1910. No. 125, Sulphur Mt., 10-10-10. No. 180, Hot Springs, 6-20-04. No. 182, Sulphur Mt., 7-14-03. No. 197, across from C. P. R. Hotel, 6-27-0. No. 261, Spray Ave. woods, 10-22-10. No. 264a, Tunnel Mt., 11-8-13.

Ulota americana (Beauv.) Lindb. No. 12, Buffalo Ave., Tunnel Mt., 10-13-13. No. 250, Sulphur Mt., 9-9-13.

UNIVERSITY OF PITTSBURGH,
PITTSBURGH, PA.

HYMENOSTOMUM IN NORTH AMERICA

II. THE CASE OF ASTOMUM SULLIVANTII

A. LEROY ANDREWS

The first question that arises under the subgenus *Astomum* is manifestly whether or not *A. crispum* (Hedwig) Hampe of Europe occurs in America. It has generally been treated as a species of the three northern continents: Europe, Asia and North America. Attempts have at the same time been made to separate forms in all three continents, which however like many proposed new moss-species have served to obscure rather than clarify. The American species which have been subject to confusion with *A. crispum* are *A. Sullivantii* Bruch & Schimper and *A. nitidulum* Bruch & Schimper. The tendency has been growing of late to refer all North American specimens of this type to *A. Sullivantii*¹. With this I find my own results entirely in agreement. The only supposedly North American specimen that I have seen that must apparently be referred to *A. crispum* is one now in the herbarium of the New York Botanical Garden, which, according to the label, came from the Mitten herbarium, where it was included in the cover of *Weisia convolutacea*². It is further labeled as No. 46 of the Musci Bor. Amer. Exsicc. of Sullivant and Lesquereux (2nd ed.). This number is however, in the other sets which I have seen, not the same thing, but apparently *A. Sullivantii* as named. I assume then that there has at some stage been a mixing of labels and that the Mitten specimen is a European, probably an English one, it closely resembling other English specimens. Under the circumstances it is doubtless justifiable to exclude *A. crispum* as a

¹ Even Georg Roth (Aussereuropäische Laubmoose, 1, 185. 1911), who did not aspire to be primarily a critic of species, suggested this relation, though figuring both *A. Sullivantii* and *A. nitidulum* separately.

² One of Mitten's species referable to *A. multicausulare* according to Braithwaite.

North American species.³ That the two continents should not exactly agree in this genus is not greatly to be wondered at. The *Dicranaceae*, in the broad sense of Brotherus, are largely boreal mosses with close circumpolar agreement of species. The *Pottiaceae* of Brotherus, in which he includes *Astomum*, are on the other hand very generally types of warmer latitudes and adapted to habitats with a hot, dry season. Agreement of species between Europe and North America is in this group not nearly so close. As to *Astomum* in particular, it does not in America extend north of the limits of the United States except in a single locality in the Saskatchewan region, where it has not been found since Drummond's day. It is a plant of open fields, not of forests or mountains. Furthermore according to the theory generally held at present with reference to cleistocarpous mosses they are for the most part, if not altogether, relatively young phylogenetic types, not relicts of early stages in bryologic evolution. This is obviously true of *Astomum* and explains in part why its species are in such a plastic state, so hard to grasp in their range of variation and to separate clearly from one another.

Hymenostomum Muhlenbergianum (Swartz) new combination. The earliest name for our common species is *Phascum Muhlenbergianum* Swartz. The name was published after Swartz' death (1818) in the "Adnotationes botanicae" edited by J. E. Wikström and published at Stockholm in 1829 (pp. 74f.). According to the preface (p. VI) Swartz received plants from Muhlenberg in 1810 and 1811. Muhlenberg in fact included the new name in his "Catalog" of 1813, but without accompanying description, though according to Swartz' preface the description had also been sent him. As to the type-specimen, I have on two different occasions gone through the Muhlenberg moss-herbarium at the Academy of Natural Sciences in Philadelphia. Thanks particularly to Mrs. Britton's work of revision the collection is in good shape for study. It contains a number of cleistocarpous mosses labeled *Phascum*, some of which are clearly referable to *Astomum*, but none is labeled *Phascum Muhlenbergianum* and it is perhaps a question whether Muhlenberg retained duplicates in the strict sense of specimens sent away for examination. His specimens are very meagre and accompanied by little or no data. Drummond, who saw his collection while on his second American collecting trip, calls them "miserable".⁴ During the war years it was difficult for me to get information, to say nothing of specimens,

³ Grout (Mosses with Handlens and Microscope, 139. 1904) speaks also of a single specimen of *A. crispum* which he had seen from the northern States, with several from the southern ones. Apart from the improbability that our endemic species would be of more northerly distribution than the one common to Europe, I have been unable to identify any of our southern specimens with *A. crispum*, but have felt justified in referring them all to either *A. Sullivantii* or *A. ludovicianum*. It is possibly puzzling forms of the latter with abbreviated seta and general poor development that have suggested *A. crispum*, though such forms are not common. I would emphasize that apart from this minor point, I find myself in entire agreement with Grout and believe he had correctly grasped the essential facts with reference to our northeastern *Astomum*.

⁴ Hooker, Journal of Botany, I, 54. 1834 (letter of Apr. 28, 1831).

from the Naturhistoriska Riksmuseum of Stockholm, where Swartz' herbarium now is. In the summer of 1919, however, Dr. Hjalmar Möller after a first unsuccessful search finally succeeded in finding the type-specimen of Swartz and kindly sent it to me. It is plainly marked *Phascum Muhlenbergianum* and corresponds otherwise closely with the description.

Astomum Sullivantii Bruch & Schimper and *Astomum nitidulum* Bruch & Schimper were published in the *Astomum* monograph of *Bryologia Europaea* (XLIII, 2 and 3 respectively), whose date of publication according to the careful researches of Dr. Barnhart was 1850. Their descriptions are very brief and relegated in fine print to the foot-notes and no exact locality is given, but *A. nitidulum* is characterized as growing with *A. Sullivantii*. Under the circumstances it is but natural that bryologists have had difficulties in interpreting the types. C. Müller, for example, in 1851⁵ supposed that both were to be found in No. 211 of Sullivant's Musc. Allegh., which was collected in Virginia in 1843 and distributed (as *Phascum crispum*) in 1845. Mrs. Britton has however in her (unpublished) studies on *Astomum* identified as the type of *A. Sullivantii* a specimen collected by Sullivant in Ohio in 1842 labeled *Phascum crispum* and numbered 116. A drawing in the herbarium of the New York Botanical Garden executed by C. H. Wright, Oct. 21, 1890, from the Schimper herbarium at Kew represents this in fact as the type. Sullivant in his Musci and Hepaticae of the United States (1856, p. 16) mentions *Phascum nitidulum* as occurring only in central Ohio, which would tend to confirm the idea that the type of both specimens was from Ohio. Wright's drawing of *A. nitidulum* from the Schimper herbarium is on the other hand taken from a specimen collected by James at Easton, Pennsylvania, in 1868, which is of course not the type, and it would appear from the original statement in *Bryologia Europaea* that this species was really based upon some aberrant plant growing with the type-specimen of *A. Sullivantii*. The specimen in Sullivant & Lesquereux, Musc. Bor. Amer. Exsicc., No. 36 (also 2nd ed., No. 47) as *A. nitidulum* (locality not given) might have some value as representing Sullivant's idea of what the species was, and it has been the working basis for the separation of this species by North American bryologists. It does not however show two characters ascribed to the original, both in the *Bryologia Europaea* and by Sullivant, viz., the rather long seta and the differentiated line of operculation, but is a small form with more deeply pigmented capsule, which appears to fall entirely within the limits of variation of *A. Sullivantii*, as do nearly all specimens since called *A. nitidulum*.

The late Prof. L. W. Riddle shortly before his death looked very carefully through the Sullivant herbarium with reference to the type of this species, as well as of *A. Sullivantii*, and found that a small specimen of *A. nitidulum* had been sent to Sullivant by Schimper, but had fallen from the bit of paper in which it was enclosed and is irretrievably lost. Sullivant's note reads: "Schimper in letter dated April 1850 says in specimens I sent him marked 'No. 116, Ohio,

⁵ Synopsis, II, 519.

1842, *Phascum crispum*' there are two new species which he names *Astomum Sullivantii* and *Astomum nitidulum*—he gives no characters—but sent small specimens of each—one of them I lost in opening the paper." An empty packet in the Sullivant herbarium labeled "*Astomum nitidulum* W. P. Schimp. (*Ast. Sullivantii* immixtum Sulliv. misit) W. S. S. Ohio 1842" commemorates the loss. Mr. H. N. Dixon has also been so kind as to go through the Schimper herbarium at Kew with reference to this matter and finds no type-specimen of *A. nitidulum* preserved as such and no other species mixed with the type-specimen of *A. Sullivantii*. He sends me however copies of drawings found in the packet of the type of *A. Sullivantii*, which, though not labeled, apparently represent the lost *A. nitidulum*. Later specimens labeled *A. nitidulum* he thinks are not specifically separate from *A. Sullivantii*. The type of *A. nitidulum* was then apparently the bit sent to Sullivant, which is lost. It is possible from the brief original description that it contained a somewhat variant capsule of *A. Sullivantii*, but I think much more likely it was a hybrid capsule of *Weisia viridula* upon *A. Sullivantii*. There is in the Sullivant herbarium a small specimen of later collection labeled "*Verum Phascum nitidulum* Sch. Columbus Ohio 1855." I have seen a single plant of this through the kindness of Prof. Thaxter and have no doubt that it does agree with the original type, as it does in fact with the original description. My conclusion then is that *A. nitidulum* of the S. & L. exsiccati and generally subsequently is synonymous with *A. Sullivantii*, that is with *Hymenostomum Muhlenbergianum*, but that Schimper was probably justified in his original distinction and that his *A. nitidulum* was presumably of hybrid origin. The whole question of hybrids in this genus I hope to discuss at greater length subsequently.

The differences between the European and the American species are quantitative in their nature, as is likely to be the case with closely related cleistocarpous mosses, the American one tending to be smaller in its parts except the spores, which are consistently larger and furnish perhaps the clearest and most tangible diagnostic character. The relation of diameters is as I find it at least 6 to 5, in *A. Sullivantii* about 20μ (running up to 25μ or more), in *A. crispum* about 17μ . Doubtless abnormal specimens may be found somewhat bridging over the gap, but the tendency of the American form to produce larger spores is beyond dispute. The larger size of spores marks under the circumstances a species farther down in the scale of organization, a more cleistocarpous moss. With this the other characters are in accord. The generally smaller size of the American species is also shared by the capsule, which furthermore has thinner walls, more easily dented out of shape or for that matter broken open, letting the light through more readily,⁶ showing rather larger exothecial

⁶ The remarkable difference in this respect shows itself clearly in cross-section of the capsules, the European species showing a wall $8-10\mu$ or even more in thickness, with several layers of fairly strong cells between it and the spore-sac, and a stronger columella, while the American species is only sectioned with difficulty owing to its extremely thin wall (hardly more than $1-2\mu$) and the

cells,⁷ more pigmented orange to purplish, as contrasted with the normal brown of *A. crispum*. The operculum of *A. Sullivantii* is never separated off, while that of *A. crispum*, though varying somewhat in this respect, tends to be well marked off, or even in extreme cases separable. These differential characters are perhaps not wholly convincing, but as they seem to fairly consistently separate the plants of two rather remote areas they may, I think, be safely regarded as justifying the treatment of the American plant as a distinct species, though I have no especial quarrel with anyone preferring to call them marked geographical varieties of a single species. Characters of the gametophyte in these plants are elusive, not to say illusive, and appear to add nothing in this case, except the generally somewhat coarser manner of growth of the European species. The American species is by no means without variation and in fact runs through a series of forms that are often parallel to those European ones which have been treated as independent species. Mrs. Britton had for example in her earlier study of the genus segregated a number of specimens from our northeastern states, which she called *Astomum multcapsulare* (Sm.) Br. & Sch.⁸ This form is distinguished by an elongated stem, even up to an inch or more in height and

collapse of the weak cells between it and the spore-sac, a single layer of thin cells usually appearing in section. This character however like others is not an absolute one, as occasional American specimens show a somewhat thicker wall, but is not without significance in the aggregate of features. It is perhaps of passing interest to note that the type of *A. Levieri* Limpricht of southern Europe, a bit of which I owe to the kindness of the late Georg Roth, shows a very thin capsule-wall, as in fact noted by Limpricht in his original description (Rabenhorst, Kryptogamenflora, IV, iii. 638. 1901), though the plant shows otherwise no close relation to our species.

⁷ The individual cells vary so much in size and shape that it is not easy to establish a basis of comparison, but it is certainly true that with a decidedly smaller capsule the North American species has slightly larger, or at least broader, exothecial cells than the European. The striking impression is that of the small number of exothecial cells to the capsule in the American species. The European shows a greater tendency to have the exothecial cells longer than wide, that is, lengthened in the longitudinal direction of the capsule, another mark of the less cleistocarpous, more advanced species.

⁸ It is not my intention to express any opinion on European species, except as is rendered necessary by the interpretation of our own forms, but I would call attention to the fact that the name of *A. multcapsulare* is not wholly satisfactorily founded. It has been noted that it does not especially apply, as it generally bears but a single capsule (Dixon, Student's Handbook of British Mosses, 206. 1896; Bruch & Schimper, Bryologia Europaea, Monograph *Astomum*, 4. 1850). Smith's *Phascum multcapsulare* (Flora Britannica, 1152. 1804) is based on specimens collected by Chas. Abbot and cites the latter's *P. sphaerocarpon* (Flora Bedfordiensis, 230. 1798) as a synonym, also the *P. crispum* of Swartz' Musc. Suec., 17 and the plate No. 618 in English Botany. This plate (Smith, English Botany, IX. 1799) is from Bedfordshire specimens discovered in March, 1799 by Abbot. The plate is labeled *P. crispum* and appears to me to represent that species, though I may be in error. Anyhow, if *P. multcapsulare* is not *P. crispum* or a mixture, it is only a later synonym of *P. sphaerocarpon*, which should as the prior name be restored. According to Smith, Abbot collected *P. crispum* as well as *P. multcapsulare* near Bedford.

I note also an *Astomum intermedium* Péterfi, which appears to have found no place in European bibliography. It is referred to by its author in a reprint from the Mathematische und naturwissenschaftliche Berichte aus Ungarn, XIX, 356, which appears to be a German translation from the Potfüzetek a Természettudományi Közlönyhöz, LXI, 143, Budapest, 1901, the original publication of the species being in LII, 108 of this latter series.

grows, according to observations of Austin, in wet places. In a series of specimens it seems to connect through all degrees with the normal *H. Muhlenbergianum* and to be unworthy of taxonomic distinction, except as one wishes to admit to taxonomic distinction forms due directly to difference of habitat. In fact Muhlenberg's original specimen, probably collected about Lancaster, Pennsylvania, tended somewhat toward this type, it being described as up to half an inch in height, but really falling somewhat short of that. Another variation also represented by the original specimen and noted in its description is a slight lengthening of the seta. This is, however, very slight, so that the combined seta and vaginule do not surpass in length the capsule itself, being just about equal to it in the Muhlenberg specimen. I cannot see that this character is more than a casual variation and it is correlated with nothing else, unless it be that it is more likely to occur in specimens showing a somewhat, but not extremely lengthened stem.

H. Muhlenbergianum is a fairly widely distributed species, its northwestern outpost being the Saskatchewan where it was collected by Drummond in 1827, its southwestern, southern Arizona, where it was found by Leiberg in 1906, its northeastern, Massachusetts⁹, and its southeastern North Carolina, though it extends further south in Louisiana and Texas. Within this area it may be looked for almost anywhere in fields, though the finding of it is not an everyday affair. It may yet be found to pass these limits in places, but they probably pretty well indicate its total range. It evidently does not reach west of the Rocky Mountains.

Specimens of *Astomum* from China and Japan I have not had opportunity to study in adequate detail or sufficient number to reach any positive results. It seems to me worthy of careful investigation whether *A. crispum* occurs in Asia at all and whether the (or a) species which does occur may not be more closely related to our own *Hymenostomum Muhlenbergianum*. In the Cornell University Herbarium is a specimen of hepatic labeled "*Grimaldia fragrans* Corda. Tokyo, 1897", without further data as to collector, etc., which has many plants of *Astomum* growing with it. These show a small deeply pigmented capsule with the thin wall characteristic of *H. Muhlenbergianum*, while the spores when ripened average also fully 20 μ . The gametophyte is even smaller than is generally the case with our species. A specimen from the Jaeger herbarium labeled "*Phascum crispum*, Japonia" is quite similar.

ITHACA, N. Y.

NOTE—DATA WANTED

Will the member who sent me by mail a box of fresh *Asterella* some two months ago, kindly write me? No letter or other data came with the specimen, which has proved to be of interest.

GEO. H. CONKLIN,
201-202, Board of Trade
Superior, Wisc.

⁹ It has been found in New York state as far north as Fort Edward.

LICHENS OF THE LAKE GEORGE REGION

(Concluded)

STEWART H. BURNHAM

165. *Lecanora atrynea* (Ach.) Nyl. R. C. Burnham's pasture on sandstone, west of Vaughns schoolhouse, Aug. 6, 1918; determined by Mr. Merrill who says, "I feel sure that we must call this *Lecanora atrynea*. It has the thallus of *Lecanora coilocarpa* (Ach.) Nyl., while the apothecia are nearer those of *L. atrynea*. The latter was unknown in American lists until my differentiation of the species some years ago."
166. *Lecanora cinerea* (L.) Sommf. Shushan on slate rocks, May 14, 1906; Peaked Rock, May 19, 1906; both collections determined by Dr. Fink. Haynes hill on calcareous rocks, Oct. 14, 1914; Sugar Loaf Mt. on granitic rocks, Nov. 13, 1915; both collections determined by Mr. Merrill. Crescent on rocks, May 30, 1906.
167. *Lecanora frustulosa* (Dicks.) Ach. Sugar Loaf Mt. on granitic rocks, Nov. 13, 1915; determined by Mr. Merrill who says, "I collected this in Maine and have numerous specimens from the west, but yours is the first to be sent me from the east."
168. *Lecanora laevata* (Ach.) Nyl. Shushan on rocks, Apr. 5, 1907 (Dobbin); determined by Dr. Fink. (*Lecanora cinerea laevata* (Ach.) Tuck.).
169. *Lecanora pallida* (Schreb.) Schaer. Shushan on old birch trunks (Dobbin), Rich's swamp on maple, and bog north of Clarks Pond. Black Mt. on trunks of *Abies balsamea* and *Pyrus americana*, Aug. 19, 1909; determined by Dr. Riddle. Kingsbury to Fort Ann on *Acer rubrum*, Aug. 19, 1911; west of Tripoli schoolhouse on trunks of *Juglans cinerea*, Dec. 5, 1914; the last two collections determined by Mr. Merrill.
170. *Lecanora polytropa* (Ehrh.) Schaer. Shushan on rocks, Apr. 3, 1907 (Dobbin) determined by Dr. Fink. (*Lecanora varia polytropa* (Ehrh.) Nyl.).
171. *Lecanora rubina* (Vill.) Ach. Calcareous rocks at Vaughns, Aug. 23, 1906; determined by Dr. Fink, a specimen in N. Y. State Herbarium. Northwest Hartford and rocks south of Copeland hill.
172. *Lecanora rubina heteromorpha* Ach. Peaked Rock on granitic rocks, June 15, 1907; determined by Dr. Fink.
173. *Lecanora saxicola* (Poll.) Ach. Granitic rocks. Talus, Diameter precipice, South Bay, Aug. 21, 1906; Peaked Rock, May 19, 1906. (*Lecanora muralis saxicola* (Poll.) Tuck.).
174. *Lecanora subfusca* (L.) Ach. On living trunks of trees; abundant. Collections have been determined by Dr. Fink, Mr. Merrill, and the late Dr. Riddle.
175. *Lecanora subfusca argentata* Ach. E. Galway on trunks of *Fagus grandifolia* (Burt).

176. *Lecanora subfusca allophana* Ach. Shushan on bark of ash trees, May 20, 1907; determined by Dr. Fink. West of Tripoli schoolhouse on trunks of *Juglans cinerea* and *Betula lutea*, Dec. 5, 1914; determined by Mr. Merrill.
177. *Lecanora varia* (Ehrh.) Ach. Hague on *Tsuga canadensis*; southern W. Fort Ann on *Juniperus communis* v. *depressa*, *Pinus Strobus*, *Thuja occidentalis* (determined by Mr. Merrill), and *Betula lenta*. Rich's swamp near Shushan on *Pinus Strobus*.
178. *Ochrolechia pallescens* (L.) Mass. Fort Edward (Howe); near Tripoli on trunks of *Pinus Strobus*, *Juglans cinerea*, and *Betula lutea*; Vaughns on trunks of *Acer saccharum*; bog north of Clarks Pond on trees. Several collections have been determined by Mr. Merrill. (*Lecanora pallescens* (L.) Schaer.).
179. *Ochrolechia tartarea* (L.) Mass. Dresden (Peck); Peaked Rock (Dobbin), determined by Dr. Fink; talus, Diameter precipice, South Bay; on mossy rocks, northwest Hartford; Vaughns on trunks of trees and stonewalls, determined by Mr. Merrill.
180. **Haematomma elatinum ochrophaeum** (Tuck.) Merrill & Burnh., n. comb. Shushan on bark, April 1908; determined by Dr. Fink. (*Lecanora elatina ochrophaea* Tuck.).
181. *Candelariella vitellina* (Ehrh.) Müll. Arg. Shushan on rocks, May 14, 1906 (Dobbin); Vaughns on boulders and flinty pieces of rock in limestone, Dec. 1, 1914, March 25 & Apr. 7, 1915. Specimens have been determined by Mr. Merrill. (*Placodium vitellinum* (Ehrh.) Hepp).
182. *Candelaria concolor* (Dicks.) Wainio. E. Galway (Burt); Shushan on rocks and trees (Dobbin); northwest Hartford on bark of *Carya ovata*; southern W. Fort Ann on fallen trunks of *Juglans cinerea* (determined by Mr. Merrill) and trunk of *Populus*; Vaughns on trunks of *Ulmus americana* (determined by Mr. Merrill) and woodbine (*Psedera*). (*Teloschistes concolor* (Dicks.) Tuck.).
183. **Candelaria concolor effusa** (Tuck.) Merrill & Burnh., n. comb. Stumps of *Ulmus americana*, west of W. Fort Ann P. O., May 21, 1916; determined by Mr. Merrill. (*Teloschistes concolor effusus* Tuck.).
184. *Parmeliopsis ambigua* (Wulf.) Nyl. Marsh north of Glen Lake on *Kalmia angustifolia*, Aug. 22, 1906; determined by Dr. Fink who says, "sterile and distribution unusual."
185. *Parmeliopsis diffusa* (Weber) Riddle. Marsh north of Glen Lake on *Picea mariana* and *Chamaedaphne calyculata* with *Cetraria Pinastri*, Sept. 20 & Oct. 31, 1915; determined by Mr. Merrill. Small gray plants. (*Parmelia hyperopta* Ach.).
186. *Parmeliopsis placorodia* (Ach.) Nyl. West of Tripoli schoolhouse on *Ostrya virginiana*, Apr. 16, 1916; determined by Mr. Merrill. (*Parmelia placorodia* Ach.).

187. *Parmelia caperata* (L.) Ach. Abundant on trees and rocks.
188. *Parmelia cetrata* Ach. Rich's swamp near Shushan on elm and maple trunks, June 5, 1907 (Dobbin); determined by Dr. Fink.
189. *Parmelia conspersa* (Ehrh.) Ach. Very abundant on rocks. It is rarely found on trees. Sometimes the center is quite isidiophorus: and loosely attached plants on boulders are met with, such plants rarely if ever in fruit.
190. *Parmelia crinita pilosella* (Hue) Merrill. Shushan on *Juglans cinerea*, June 23, 1907 (Dobbin); bog north of Clarks Pond, on trees, Sept. 11, 1909.
191. *Parmelia dubia* (Wulf.) Schaer. Fort Edward (Howe), in N. Y. State Cab. Rep. 22: 62. 1869; Shushan on trunks of maple (Dobbin), verified by Dr. Fink. Hague; southern W. Fort Ann on rocks and trees; Vaughns on frondose trees. (*Parmelia Borreri* Turn.).
192. *Parmelia exasperata* (Ach.) Nyl. E. Galway on trunks of *Pyrus Malus* and *Acer* (Burt), specimens are in the N. Y. State Herbarium; Barber trail, Black Mt., on birch, Aug. 19, 1909; Rich's swamp near Shushan, June 16, 1907. (*Parmelia olivacea aspidota* Ach.).
193. *Parmelia furfuracea* (L.) Ach. Marsh north of Glen Lake on *Picea mariana*, Sept. 20, 1916, verified by Mr. Merrill; Mud Pond marsh south of Glen Lake, Aug. 23, 1907 on *Picea mariana*; Rich's swamp near Shushan, May 20, 1906. This has not been found on *Larix laricina* in these marshes. (*Evernia furfuracea* (L.) Mann.).
194. *Parmelia furfuracea Cladonia* (Tuck.) Howe. Podunk Pond marsh on *Picea mariana*, Oct. 17, 1900; determined by Dr. Eckfeldt.
195. *Parmelia olivacea* (L.) Ach. On trees, especially smooth-barked trunks, and rocks; common.
196. *Parmelia perlata* (L.) Ach. On rocks in upland and undisturbed regions; common. It is also found in trunks of trees.
197. *Parmelia pertusa* (Schränk.) Schaer. On bark of *Juglans cinerea* at Shushan, April. 9, 1906, (Dobbin); talus, Diameter Precipice, South Bay, Aug. 21, 1906.
198. *Parmelia physodes* (L.) Ach. On trees, especially coniferous, but sometimes occurs on rocks. It is a common lichen on trunks of *Picea mariana* and *Larix laricina* in sphagnum marshes.
199. *Parmelia physodes vittata* Ach. Shushan in Rich's swamp, Nov. 1913 (Dobbin); determined by Dr. H. D. House.
200. *Parmelia prolixa panniformis* Nyl. Talus, Diameter Precipice, South Bay, Aug. 21, 1906; determined by Dr. Fink. (*Parmelia olivacea panniformis* Nyl.).
201. *Parmelia rudecta* Ach. Abundant on rocks and trees. (*Parmelia Borreri rudecta* Tuck.).
202. *Parmelia saxatilis* (L.) Ach. On trees and rocks; abundant. Specimens have also been found on *Gyrophora Dillenii*.
203. *Parmelia saxatilis furfuracea* Schaer. E. Lake George marsh on *Picea mar-*

- iana*, Oct. 3, 1916, determined by Mr. Merrill. New Michigan Pond, "Talman marsh", June 2, 1917.
204. *Parmelia subaurifera* Nyl. Dead trunks of *Salix nigra*, N. Beaver creek, Vaughns, March 6, 1914; determined by Mr. Merrill as *Parmelia verruculifera* Nyl., which he says "is a good species, but they say in Europe that it is *P. subaurifera* in such examples as I send them."
205. *Parmelia sulcata* Tayl. Shushan on mosses, Apr. 27, 1907 (Dobbin); determined by Dr. Fink. West of Tripoli schoolhouse on *Pinus Strobus*; east of Thompson's gravel-bed; Shushan in Rich's swamp on maple, and fence-row at Clarks Pond on old pine stumps. (*Parmelia saxatilis sulcata* (Tayl.) Nyl.).
206. *Parmelia tiliacea* (Hoffm.) Ach. E. Galway (Burt); E. Lake George marsh on *Picea mariana*; Vaughns on willows, *Juglans cinerea*, *Ulmus americana*, and *Acer*; Rich's swamp near Shushan on maple.
207. ***Parmelia tiliacea subquercifolia*** (Hue) Merrill & Burnh., n. comb. Rich's swamp southwest of Shushan on *Acer*, March 1907 (Dobbin). (*Parmelia tiliacea sublaevigata* Nyl.). (*Parmelia subquercifolia* Hue).
208. *Parmelia tiliacea vicinior* (Hue) Merrill. On bark of *Pinus Strobus*, west of Tripoli schoolhouse, Jan. 29, 1915; determined by Mr. Merrill.
209. *Anzia colpodes* (Mx.) Stizenb. On trunks. Fort Ann (Peck). (*Parmelia colpodes* Mx.).
210. *Cetraria aurescens* Tuck. Shushan on coniferous wood, Apr. 22, 1907 (Dobbin).
211. *Cetraria islandica* (L.) Ach. R. C. Burnham's pasture on hummocks, west of Vaughns schoolhouse, Oct. 1913, & Sept., 1920—specimens are in the N. Y. State Herbarium. A few plants persisting at a low altitude.
212. *Cetraria lacunosa* Ach. On old coniferous trunks and branches and fences; not uncommon.
213. *Cetraria Oakesiana* Tuck. On coniferous trunks, specially *Tsuga canadensis*: it also is found on trunks of frondose trees and mossy rocks. It is somewhat widely distributed from Black Mt. to Peaked Rock near Shushan, but nowhere common.
214. *Cetraria Pinastris* (Scop.) S. F. Gray. In sphagnum marshes on *Picea mariana*, *Chamaedaphne calyculata*, and *Kalmia angustifolia*. Podunk Pond marsh, Oct. 17, 1899; determined by Dr. Eckfeldt as *Cetraria juniperina Pinastris* (Scop.) Ach. New Michigan Pond, "Talman marsh;" E. Lake George marsh; marshes north and south of Glen Lake; bog north of Clarks Pond.
215. *Nephromopsis ciliaris* (Ach.) Hue. On old coniferous trunks and branches and fences; not uncommon, and often found associated with *Cetraria lacunosa* in sphagnum marshes. It occurs rarely on wood of frondose species. (*Cetraria ciliaris* Ach.)

216. *Evernia prunastri* (L.) Ach. E. Galway on dead twigs of *Abies balsamea* and dead spruces (Burt); marshes at Glen Lake on *Picea mariana*; old hemlock board fence at Vaughns; Rich's swamp near Shushan on *Picea mariana*.
217. *Letharia thamnodes* (Flot.) Arn. Southern W. Fort Ann on dead *Pinus Strobus*; E. Lake George marsh; marshes at Glen Lake on *Larix laricina*, but little found on *Picea mariana*; Vaughns on *Juniperus communis* v. *depressa* and *Rhus typhina*. Several collections determined by Mr. Merrill. (*Evernia thamnodes* Flot.).
218. *Alectoria chalybeiformis* (L.) S. F. Gray. Old board and rail fences of coniferous wood; vicinity of Tripoli and at Vaughns. Marshes at Glen Lake on *Larix laricina* and *Picea mariana*; determined by Mr. Merrill. Peaked Rock on *Gyrophora Dillenii*.
219. *Alectoria jubata* (L.) Ach. Growing on coniferous wood and often associated with the preceding species at Glen Lake and near Tripoli. E. Lake George marsh on *Picea mariana*; determined by Mr. Merrill.
220. *Ramalina calicaris* (L.) Fr. E. Galway on maple bark (Burt), reported in THE BRYOLOGIST 17: 19. March, 1914. Ballston (Peck); southern W. Fort Ann on *Populus tremuloides* and *Ulmus americana*, determined by Mr. Merrill; Vaughns on *Salix nigra*. (Includes *Ramalina calicaris canaliculata* Fr.).
221. *Ramalina calicaris subampliata* Nyl. On trunks of *Juglans cinerea*, Pond Brook west of W. Fort Ann P. O., Dec. 13, 1914; N. Beaver Creek at Vaughns, on *Salix nigra* and *Ulmus americana*, March 6 & Apr. 7, 1914; determined by Mr. Merrill.
222. *Ramalina calicaris subfastigiata* Nyl. West of Tripoli in *Ostrya virginiana*, Apr. 12, 1916, and *Sassafras variifolium*, Nov. 7, 1915; Vaughns on *Rhus typhina*, Nov. 15, 1914; determined by Mr. Merrill.
223. *Ramalina farinacea* (L.) Ach. Dresden (Peck); Shushan on *Juglans cinerea*, Apr. 30, 1906 (Dobbin); rocks at old dam site west of W. Fort Ann P. O., May 31, 1914; cliff near summit of Peaked Mt., May 26, 1918; Vaughns on *Ulmus americana*, Dec. 6, 1914, determined by Mr. Merrill; Crescent on rocks, May 30, 1906; Peaked Rock, May 19, 1906. This species is usually found on rocks.
224. *Ramalina fastigiata* (Pers.) Ach. E. Galway (Burt), reported in THE BRYOLOGIST 17: 6. Jan. 1914; Shushan on *Juglans cinerea*, Apr. 30, 1906 (Dobbin); west of Tripoli on *Carya ovata*, Apr. 3, 1910
225. *Usnea florida* (L.) Weber. Swamp north of Glen Lake on *Picea mariana*, Aug. 22, 1906; Rich's swamp near Shushan (Dobbin), Apr. 5, 1917. (Includes *Usnea barbata* (L.) Weber, in sense of Tuckerman).
226. *Usnea florida rubiginea* Mx. Associated with the species.
227. *Usnea hirta* (L.) Hoffm. Dead trees at E. Galway (Burt); old board fences at Shushan, May 7, 1906 (Dobbin); old hemlock board fence at Vaughns, July 6, 1907.

228. *Usnea plicata* (L.) Weber. Hills north of E. Galway (Burt); Podunk Pond marsh on *Picea mariana*, Oct. 17, 1899, determined by Dr. Eckfeldt.
229. *Usnea trichodea* Ach. Dead branches of *Picea mariana*, Mud Pond marsh south of Glen Lake, Aug. 23, 1907.
230. *Blastenia ferruginea* (Huds.) Arn. On trunks and rocks. Shushan, May 20, 1907 (Dobbin); determined by Dr. Fink. (*Placodium ferrugineum* (Huds.) Hepp).
231. *Caloplaca aurantiaca* (Lightf.) Th. Fr. Gansevoort (Peck); E. Galway (Burt); Shushan (Dobbin); Fort Ann on fences, Apr. 12, 1908; east of Tripoli on *Ulmus americana*, Apr. 10, 1914, determined by Mr. Merrill.
232. ***Caloplaca aurantiaca flavovirescens*** (Wulf.) Burnh., n. comb. Calcareous rocks, Bacon hill west of Fort Ann, Apr. 22, 1917; Haynes hill on calcareous rocks, Oct. 14, 1914; east of Tripoli schoolhouse on calcareous rocks, Nov. 12, 1914; these collections determined by Mr. Merrill. This is a common lichen on rocks and stone walls at Vaughns. (*Placodium aurantiacum erythrellum* (Ach.) Th. Fr.; *P. aurantiacum flavovirescens* (Wulf.) Hepp).
233. *Caloplaca cerina* (Hedw.) Zahlbr. On bark of *Fraxinus nigra* at Fort Edward (Howe); Shushan on trunks of living trees (Dobbin), determined by Dr. Fink. West of Tripoli schoolhouse on *Juglans cinerea*, Dec. 5, 1914; determined by Mr. Merrill. On trunks of *Carya ovata*, south of Vaughns schoolhouse, May 11, 1907.
234. ***Caloplaca cerina sideritis*** (Tuck.) Merrill & Burnh., n. comb. Shushan on slate rocks, May 14, 1906 (Dobbin); determined by Dr. Fink. (*Placodium cerinum sideritis* Tuck.).
235. *Caloplaca murora* (Hoffm.) Th. Fr. High Rock, Huletts Lg. (Jelliffe); Lake George, Sept. 1890 (Geo. L. Hawes, Esq.) in Jelliffe's herbarium.
236. *Caloplaca pyracea* (Ach.) Th. Fr. Down S. Beaver creek, east of Vaughns, on calcareous rocks, Nov. 15, 1914; calcareous rocks west of Vaughns schoolhouse, March 23, 1915; both collections determined by Mr. Merrill.
237. *Xanthoria lychnea* (Ach.) Th. Fr. Patten's Mills cemetery on *Ulmus americana*, Oct. 5, 1910; determined by Dr. Riddle. Specimen in N. Y. State Herbarium. (*Teloschistes lychnes* (Ach.) Tuck.).
238. *Xanthoria parietina* (L.) Th. Fr. On mossy stonewall, north of Vaughns, March 13, 1914; old marble tombstone in Welch Hollow cemetery Sept. 7, 1916; both collections determined by Mr. Merrill.
239. *Xanthoria polycarpa* (Ehrh.) Oliv. Shushan on *Betula lenta* (Dobbin); northwest Hartford on *Juglans cinerea*; near Tripoli and at Vaughns, *Populus candicans*, *Populus tremuloides*, and *Acer*; near Wiggins iron mine on *Populus tremuloides*, Nov. 22, 1915, determined by Mr. Merrill.

240. *Buellia colludens* (Nyl.) Tuck. Rocks in woods southeast of Tripoli, Dec. 2, 1914; determined by Mr. Merrill.
241. *Buellia disciformis* (Fr.) Mudd. Hulets Lg. (Jelliffe); E. Galway on *Fagus grandifolia* (Burt); Shushan on *Betula lenta*, Apr. 30, 1906 (Dobbin); Hague on *Tsuga canadensis*, Sept. 5, 1909; Black Mt. on *Abies balsamea*, Aug. 19, 1909, determined by Dr. Riddle; Kingsbury to Fort Ann on *Acer rubrum*, Aug. 19, 1911; west of Tripoli schoolhouse on *Pinus Strobus*, Dec. 2, 1916; the last two collections determined by Mr. Merrill. (Probably includes much formerly called *Buellia parasema* (Ach.) Koerb. which was a composite species.).
242. *Buellia spuria* (Schaer.) Koerb. Hulets Lg. (Jelliffe); calcareous rocks west of Vaughns schoolhouse, Dec. 1, 1914, determined by Mr. Merrill; Peaked Rock, on granitic rocks, May 19, 1906, determined by Dr. Fink.
243. *Rinodina oreina* (Ach.) Mass. Peaked Rock on granitic rocks, May 19, 1906 & June 15, 1907; determined by Dr. Fink and reported in N. Y. State Mus. Bull. 122: 24. 1908.
244. *Pyxine soreliata* (Ach.) Fr. Shushan on oak (Dobbin) and *Betula lenta*, Anaquassacook hills; northwest Hartford on calcareous rocks and *Betula lutea*; near Tripoli on *Juglans cinerea*, determined by Mr. Merrill; Vaughns on trunks of *Betula lutea*, *Crataegus* sp., and *Acer saccharum*.
245. *Physcia elaeina* (Sm.) A. L. Smith. Bark of *Acer saccharum*, Vaughns schoolhouse woods, May 11, 1907; determined by Dr. Fink. Easily overlooked. (*Physcia adglutinata* (Flk.) Nyl.).
246. ***Physcia fusca detonsa*** (Fr.) Burnh., n. comb. Shushan on rocks (Dobbin), determined by Dr. Fink; northwest Hartford on calcareous rocks; southern W. Fort Ann on rocks; Vaughns and vicinity in mossy rocks and trunks of *Acer saccharum*, determined by Mr. Merrill. (*Physcia aquila detonsa* (Fr.) Tuck.).
247. *Physcia grisea* (Lam.) Zahlbr. Old trunk of *Pyrus Malus* at Vaughns, March 5, 1914; determined by Mr. Merrill. (*Physcia pityrea* (Ach.) Nyl.).
248. *Physcia lithotea* Nyl. Mossy rocks, usually limestone; southern W. Fort Ann and at Vaughns. Specimens have been determined by Mr. Merrill.
249. *Physcia orbicularis* (Neck.) Dalla Torre & Sarnth. This is not uncommon on mossy rocks and trunks of trees. Specimens have been determined by Dr. Fink. (*Physcia obscura* (Ehrh.) Nyl.).
250. ***Physcia orbicularis endococcina*** (Koerb.) Burnh., n. comb. This is often associated with the species on trunks of trees: and distinguished by being saffron colored within. (*Physcia obscura endococcina* (Koerb.) Th. Fr.).

251. *Physcia pulverulenta* (Schreb.) Nyl. E. Galway on ash trunks (Burt); Black Creek, north part of town of Salem (Dobbin); Vaughns on trunks of *Juglans cinerea*, *Betula lenta*, *Ulmus americana*, and *Acer saccharum*; Crescent on rocks.
252. *Physcia pulverulenta leucoleiptes* Tuck. Shushan on elm, May 28, 1906 (Dobbin) and on trees, bog north of Clarks Pond, Sept. 11, 1909, determined by Dr. Riddle. On rocks and *Juglans cinerea* at Vaughns; determined by Mr. Merrill.
253. *Physcia pulverulenta leucoleiptes* Tuck. The forma *argyphaeoides* Harm., on calcareous rocks at Vaughns, not uncommon; determined by Mr. Merrill.
254. *Physcia pulverulenta muscigena* (Ach.) Nyl. Vaughns on mossy rock, Aug. 20, 1908 (Mrs. R. C. Burnham), determined by Mr. Merrill.
255. *Physcia setosa* (Ach.) Nyl. E. Galway on maple trunks (Burt); Shushan on mossy trunks, May 14, 1906 (Dobbin); Crescent on rocks, May 30, 1906.
256. *Physcia stellaris* (L.) Nyl. On trunks of frondose trees and rocks; abundant. Collected at Huletts Lg. on *Juniperus communis* v. *depressa*, May 29, 1907.
257. *Physcia stellaris aipolia* (Ach.) Nyl. Dresden (Peck); E. Galway on maple trunks and rocks (Burt); woods east of Tripoli schoolhouse on quartz outcrops in limestone rock, May 25, 1913. Vaughns on bark of *Carya ovata*, Sept. 25, 1913, determined by Mr. Merrill who says "the variety *aipolia* is with difficulty separable from the species, and your specimens are intermediate."
258. *Physcia stellaris cercidia* (Ach.) Th. Fr. Trunk of *Populus tremuloides*, west of Wiggins iron mine, Nov. 22, 1915; determined by Mr. Merrill.
259. *Physcia tribacia* (Ach.) Nyl. On rocks and trunks, specially of frondose trees; not uncommon. Specimens have been determined by Dr. Eckfeldt, Mr. Merrill and Dr. Riddle.
260. *Anaptychia hypoleuca* (Ach.) Wainio. On trunks of frondose trees. Shushan (Dobbin), reported in N. Y. State Mus. Bull. 122: 24. 1908, Vaughns and vicinity. (*Physcia hypoleuca* (Ach.) Tuck.).
261. *Anaptychia speciosa* (Wulf.) Wainio. On mossy rocks and stone walls and trunks of frondose trees; rather frequent. Northwest Hartford; southern W. Fort Ann; about Tripoli; Vaughns; Shushan; Crescent. Specimens have been determined by Dr. Eckfeldt, Dr. Fink, Mr. Merrill, and the late Dr. Riddle.

ABNORMAL LICHEN STRATUM

262. *Amphiloma lanuginosa* (Ach.) Nyl. Usually on calcareous rocks; not uncommon. Occasionally occurring on trunks of trees. Specimens

have been determined by Dr. Eckfeldt and Mr. Merrill. (*Pannaria lanuginosa* (Ach.) Koerb.).

SPECIES IMPERFECTLY KNOWN OR EXCLUDED

263. *Arthopyrenia punctiformis* (Pers.) Arn. E. Galway on trunk of *Acer rubrum* (Burt). This was marked doubtful in Dr. Burt's herbarium. (*Pyrenula punctiformis* (Pers.) Hepp).
264. *Caliciopsis pinea* Pk. Charlton on bark of *Pinus Strobus* (Peck) N. Y. State Mus. Rep. 33: 32. pl. 2 + f. 11-15. 1880. According to Dr. Peck this was a fungus: but it is distributed among the lichens at the New York Botanical Garden. On bark of *Pinus Strobus*, west of Tripoli schoolhouse, old plants, Feb. 2, 1916; determined by Prof John Dearness.
265. *Cladonia decorticata* (Flk.) Spreng. Gansevoort (Peck). This is undoubtedly an error as this species is known from the White Mountains, N. H. It has been collected on Mt. Marcy in the Adirondacks, N. Y. State Mus. Bull. 25: 647. 1899. The Gansevoort plants may be referable to some form of *Cladonia pyxidata* (L.) Hoffm.
266. *Cladonia sobolescens* Nyl. Thin soil covering rocks at Dresden Station (Peck), N. Y. State Mus. Rep. 25: 647. 1898.
267. *Cladonia symphycarpa* Fr. Including the var. *epiphylla* (Ach.) Nyl. Thin rocky soil, northern Washington county, determined by Dr. Eckfeldt; also Gansevoort (Peck). These plants should undoubtedly be referred to *Cladonia subcariosa* Nyl. and *C. cariosa cribosa* (Wallr.) Wainio.
268. **Placynthium Petersii** (Tuck.) Burnh., n. comb. "Rocks" and on stones, river bank below the falls, Glens Falls (H. Willey), N. Y. State Mus. Rep. 26: 49. 1874. Mr. Willey in N. Y. State Mus. Rep. 28: 85. 1878 says, "the specimen reported under this name is not in good condition and therefore uncertain." (*Pannaria Petersii* Tuck.).
269. *Blastema rupestris* (Scop.) Zahlbr. Specimens from calcareous rocks at Shushan (Dobbin) and at Vaughns, should probably be referred to *Caloplaca aurantiaca flavovirescens* (Wulf.) Burnh.
270. *Caloplaca cinnabarina* (Ach.) Zahlbr. Fort Edward (Howe), N. Y. State Cab. Rep. 22: 64. 1869. Specimens in Howe's herbarium collected in 1866 was labelled, "rare in swales near Troy." (*Placodium cinnabarium* (Ach.) Anzi).
271. *Caloplaca cirrochroa* (Ach.) Th. Fr. Huletts Lg. (Jelliffe). This species, which occurs on rocks, was not found in Jelliffe's herbarium: but given in a list of plants collected at Huletts Landing.

ADDENDA

In connection with the nomenclatorial changes published in this paper the following synonyms should be added to the entries under the numbers indicated:

Errata Slip

Insert the following matter at bottom of page 80:

50. (*Lecidea intermixta* Nyl.)

121. *Patellaria Clavus* D.C.)

129. (*Synechoblastus rupestris* (Sw.) A. L. Sm.)

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THE BRYOLOGIST

VOL. XXV

SEPTEMBER, 1922

No. 5

RECENT STUDIES ON CERTAIN SPECIES OF RICCIA*

ALEXANDER W. EVANS

The genus *Riccia*, as ordinarily understood, includes the two subgenera *Euriccia* and *Ricciella*. In typical *Euriccia* the air chambers are very narrow and clearly extend in a single layer from the compact ventral tissue of the thallus to the upper surface; in typical *Ricciella* the chambers are much broader and seem to be arranged in two or more layers when cross sections of the thallus are examined. Largely on the basis of these differences *Ricciella* has sometimes been considered a distinct genus. In all probability, however, its broad chambers are really in a single layer, and the superimposed arrangement which they seem to show is due to the obliquity of their course. This being the case the distinction in the chambers become reduced to a difference in width, and even this distinction has been proved inconstant as a differential character. Juel (5) has shown, for example, that *R. Bischoffii* Hüb., a widely distributed species of the Old World has narrow chambers in the median portion of the thallus and broad chambers toward the margin; and Von Gaisberg (4, p. 264) has made similar observations in the case of *R. Gougetiana* var. *armatissima* Lev., a Mediterranean form. The latter author cites in addition certain species of *Ricciella* in which some of the air spaces are almost as narrow as those of typical *Euriccia*. In view of these transitional forms connecting *Euriccia* and *Ricciella*, it seems wisest to follow the usual custom and consider the groups subdivisions of a single genus.

Until a few years ago *Riccia fluitans* L. was universally regarded as a clearly defined species of *Ricciella* with a wide geographical distribution. It was said to occur in two distinct states or forms: an aquatic form without rhizoids, which never produced sexual organs and sporophytes; and a terrestrial form with rhizoids, which produced sporophytes with some degree of frequency. The fertile terrestrial form was said to develop when the aquatic form was deposited on the mud, upon the evaporation of the surrounding water, while the aquatic form was said to develop when the terrestrial form was flooded. Most writers considered that the aquatic form, in spite of its sterility, represented the typical condition of the species, and the terrestrial form was often separated as the variety *canaliculata* (Hoffm.) Lindenb., in spite of the apparent ease with which one form could be converted into the other. *R. fluitans*, moreover, was regarded as the only member of the subgenus *Ricciella* that was able to live indefinitely

*Contribution from the Osborn Botanical Laboratory.

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as an aquatic, unattached plant. At the same time several closely related species that grow on soft mud along the borders of ponds or streams, but not in the water itself, have been described. Two such species, *R. Huebeneriana* Lindenb. and *R. pseudo-Frostii* Schiffn., appear in recent European manuals; in North America *R. Huebeneriana* has likewise been reported, but *R. pseudo-Frostii* is replaced by *R. Sullivantii* Aust. Another more distantly related species, *R. Frostii* Aust., may be mentioned in this connection; this grows in similar localities and has a wide distribution on both sides of the Atlantic.

Recently, especially in Europe, the opinion is becoming more and more widely held that some of these other species of *Ricciella* may live as aquatic plants too, giving rise to states or forms which resemble the aquatic form of "*R. fluitans*" in a marked degree. The advocates of this opinion hold that these various aquatic forms have been included in the old conception of "*R. fluitans*" and that the latter is, in consequence, not the aquatic form of a definite species but merely an aggregation of the aquatic forms of various distinct species.

One of the earliest papers bearing on these points was published by Torka (7) in 1906 and dealt with *R. Huebeneriana*, which he discovered near Schwiebus in eastern Germany, growing as a terrestrial plant on mud. He placed some of this mud, which bore rosettes of the *Riccia*, in a glass receptacle and flooded it with water. After a while the tips of the thalli began to elongate and fork, but instead of clinging to the mud these new growths failed to develop rhizoids and often became detached, floating freely on the surface of the water. Here they remained green for some time but eventually perished unless the water was drawn off. If this was done the floating fragments would be left on the mud and would renew their growth, giving rise to attached plants of a fairly normal appearance. The part that had previously floated, however, failed to develop rhizoids and assumed a brownish color, apparently indicating a disintegration of the tissues.

On the basis of these results Torka concluded that *R. Huebeneriana* would be able to maintain itself as an aquatic plant in the open, if the places where it grew were flooded. In his opinion floating plants of this character would be the only ones to survive the winter, attaching themselves to the substratum and developing normally after the water had sunk to its usual level in the spring. He thus ascribed to *R. Huebeneriana* an amphibious habit, comparable with that of *R. fluitans*.

Five years later (8, p. 205) he announced the discovery of aquatic plants of *R. Huebeneriana* near Nakel and Zablocie in Poland and described them as a new variety under the name *Ricciella Huebeneriana* var. *natans*. In his description he notes the lack of rhizoids and the tendency of large mats of thalli to break up into small mats as the older parts die. As a result of this process the surface of the water becomes closely covered with innumerable plants in the late summer and early autumn. At the edge of the water some of these floating fragments attach themselves to decaying plants or to the moist earth, where they develop rhizoids as they continue their growth, showing a tendency to develop into a more robust terrestrial form, just as the floating fragments did in his culture experi-

ments. Torka does not state whether these plants produced sporophytes or not. In 1914 he distributed excellent specimens of his var. *natans* (9, No. 51) from the Zablocie locality. These present the appearance of a slender aquatic *R. fluitans*, as this species is usually understood.

It is unfortunate that Torka's evidence is not more conclusive. Although, in his cultures, the tips of the thalli often detached themselves and floated on the water, nothing is said about their growing while in this condition. It is implied, in fact, that the floating fragments carried on a very precarious existence unless they came in contact with some firm substratum. The mere fact that they remained green for a while would hardly show that they represented a true aquatic form of *R. Huebeneriana*. In order to prove that such a form had been produced it should have been shown that the plants in question were capable of continuing their growth and development in their new environment. With regard to the Polish specimens of his var. *natans* the evidence is lacking that these actually represent *R. Huebeneriana*. The only way in which this could be proved would be by means of morphological characters either in the thallus or in the spores. No such characters are given, and, although the attached plants are said to resemble the attached fragments of *R. Huebeneriana* in the water cultures, these fragments (as represented by Torka's figure) are hardly representative of *R. Huebeneriana* as it normally appears. The case is further weakened by the fact that he does not report the normal terrestrial *R. Huebeneriana* in the vicinity of the var. *natans*, although he cites a single station for it at a somewhat distant Polish locality.

In 1916 Donaghy (1) published a series of interesting field observations on *R. fluitans*, as it occurs in Indiana. He reports that the so-called terrestrial form is uncommon in his region but notes its occasional appearance "on mud flats and wet fields during the autumn." This form produces sporophytes in abundance. The aquatic form is abundant around Angola, Fort Wayne, and Terre Haute, where "during the summer and autumn mats . . . can be found floating in ponds and sluggish streams," sinking to the bottom in the winter and remaining there until spring. Although plants beneath the ice remain uninjured, those "frozen in the ice are much winter-killed, the apical ends alone remaining green." During "spring these plants make rapid growth, and by summer patches of thalli again dot the ponds and streams." When, owing to evaporation, the water becomes low, "mats of plants are" often "washed upon the wet edges of the ponds," and "in favored places the thalli coming in contact with the wet soil develop rhizoids . . . and open air-chambers." Whether such plants ever develop sexual organs and sporophytes remained uncertain, Donaghy's evidence on this point being wholly negative. He reports a case where plants "remained alive in wet shaded places . . . in contact with the earth sufficiently long to fruit," and yet "no sporophytes were formed."

In Donaghy's opinion these sterile terrestrial plants, derived from the aquatic plants, were distinct from the so-called terrestrial form of *R. fluitans*, and he failed to find the latter on the mud of ponds where the aquatic form was growing. He concludes from his observations that "it seems very doubtful

if the aquatic form ever changes into the terrestrial form or fruits" or "if the so-called terrestrial *R. fluitans* and the aquatic *R. fluitans* belong to the same species." Here again, it would be interesting to know just how the two terrestrial plants differed from each other, but no distinguishing morphological characters are given. It is stated, however, that the reticulate spores of the so-called terrestrial *R. fluitans* measure 75-90 μ in diameter, and this would seem to show that the material had been correctly determined and had not been confused with the closely related *R. Huebeneriana* or *R. Sullivantii*, the spores of which are smaller.

Although Donaghy's observations throw doubt on the present delimitation of *R. fluitans*, he evidently considers that the so-called aquatic form of the species is something definite. The contrary opinion is clearly expressed by Familler (3, p. 12), and he presents certain morphological distinctions to support his views. According to his statements it has now been definitely established that *Riccia fluitans* consists of at least two or three aquatic forms of various *Ricciae*. He therefore does not accept "*R. fluitans*" as a species but ascribes specific rank instead to what most writers regard as the fertile terrestrial form of *R. fluitans*. For this he takes up the old name *R. canaliculata* Hoffm. (as some of his predecessors have done) and calls the aquatic form of this species forma *fluitans* (L.) Fam. Under *R. Huebeneriana* he includes Torka's var. *natans*, as *Riccia Huebeneriana* forma *natans* (Torka) Fam., and he recognizes further an aquatic form of *R. pseudo-Frostii*. Since, however, he regards this species as a variety of *R. Huebeneriana* its aquatic form receives the name *Riccia Huebeneriana* var. *pseudo-Frostii* forma *natans* Fam. He implies that other species of *Riccia* may likewise have aquatic forms and suggests that a Mexican specimen, collected by W. Schaffner many years ago and determined by A. Braun as *Ricciella fluitans*, may be the aquatic state of *R. Frostii*, but he does not give this plant a formal name.

In separating the aquatic form of *R. canaliculata* from those of *R. Huebeneriana*, he assigns to the first very long air-spaces and to the second shorter and more crowded air spaces; in separating the aquatic form of the var. *pseudo-Frostii* from that of the ordinary *R. Huebeneriana*, he assigns to the first marginal air spaces about as long as wide and a clearly defined median band and to the second marginal air spaces about twice as long as wide and an indistinct median band. These differences are shown on *pl. 1* and *2*; the figures give the impression that the morphological distinctions between the various aquatic forms are based on variable characters and that careful culture studies would be necessary before the taxonomic value of these characters could be accurately estimated. Of course, if it could be proved that an aquatic form with long air spaces gave rise to typical *R. canaliculata* and that a form with short spaces gave rise to *R. Huebeneriana*, the differences in the air-spaces would at once assume a greater importance. Unfortunately proof of this character is lacking, and some of Von Gaisberg's culture experiments, to be mentioned below, have yielded contradictory results.

Von Gaisberg's studies on *Riccia* (4), carried on in Goebel's laboratory at Munich, throw an interesting light on some of the questions here discussed.

Evidence is first presented to show that an aquatic form of *Riccia* is not necessarily sterile, even in Europe. In old specimens collected by A. Braun at Tempelhof near Berlin and labeled by him *R. "fluitans fructifera"* archegonia are present in abundance. These specimens lack rhizoids and present every appearance of having been aquatic in habit. Wherever archegonia are situated the thallus is distinctly broader, and where the archegonia are separated from one another by sterile tracts the thallus shows a series of marginal lobes on each side, indicating the position of the archegonia. Von Gaisberg compares the Tempelhof *Riccia* with the African *R. Dinteri* Steph. (apparently a manuscript species), which was found on stones in a spring. Here too the position of the archegonia is marked by marginal lobes. Unfortunately he gives us no data regarding the spores in either case. It should be mentioned in this connection that Familler (2, p. 166) had already noted the occurrence of fruit in the aquatic form of "*R. fluitans*", before he had developed his later ideas regarding the species. His specimens came from Bavaria, but he tells us nothing about their structural features.

In his experimental work Von Gaisberg first utilized an aquatic form of "*R. fluitans*" growing in the university greenhouse at Munich. When this was transferred to soil it gave rise to what he called a "broad form," but even in this condition remained perfectly sterile, so that it was impossible to assign it to any known species on the basis of characters derived from the spores. He then turned his attention to an aquatic *Riccia* which he found in the vicinity of Starnberg in Bavaria. This plant was determined by Familler, presumably on the basis of its morphological features, as *R. Huebeneriana*; but when it was cultivated on soil it gave rise to a "broad form" essentially like that derived from the greenhouse material. Von Gaisberg expresses the opinion that this "broad form" is distinct from "*R. fluitans* f. *canaliculata*" and also from *R. Huebeneriana*. Although he thus differs from Familler, so far as the latter's determination of the Starnberg material is concerned, he agrees with him in considering "*R. fluitans*" a composite species and cites, in further defense of this view, the wide variation in width exhibited by herbarium specimens bearing this name.

In the brief description of the "broad form" it is noted that the air chambers are more or less polygonal; in cross section the thallus is bounded on each side by a single large chamber but elsewhere the chambers appear to be in two layers or sometimes, in the median portion, in three. Although these features might serve to distinguish the plant from *R. Huebeneriana*, as this species is usually described, they would hardly distinguish it from the "forma *canaliculata*"; and it is unfortunate that no other differential characters are indicated.

The work here reviewed shows that our knowledge concerning "*R. fluitans*" and certain terrestrial forms or species of the subgenus *Ricciella* is still far from complete. It shows further that additional culture experiments and accurate morphological comparisons will be necessary before satisfactory conclusions can be reached. The species of this subgenus are exceedingly variable and react to slight environmental differences. *R. Huebeneriana*, for example, although seemingly very distinct from *R. pseudo-Frostii* in size, in color and in the shape

of the cross section of the thallus, is not so in reality. Familler (3, p. 14) has shown that typical *R. pseudo-Frostii*, in some of his cultures, became directly transformed into *R. Huebeneriana*, and Nicholson (6, p. 202) has confirmed these results by careful observations in the field. There is every reason to suppose that *R. fluitans* is fully as variable as *R. Huebeneriana*. The so-called "broad form" of Von Gaisberg and the terrestrial form obtained by Donaghy in his study of the aquatic *R. fluitans* should therefore be subjected to a more rigid scrutiny than they have yet received, in order to determine whether their distinctive features are constant or inconstant in character. Until this is done their status must remain uncertain. Renewed search should likewise be made for the aquatic form of *R. fluitans* in fruiting condition, in order to determine whether or not the marginal lobing of the Tempelhof specimens represents a constant feature and also to compare the spores with those of the terrestrial form.

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THE MOSSES OF THE OXFORD UNIVERSITY EXPEDITION TO SPITZBERGEN, 1921¹

H. N. DIXON, M. A., F. L. S.

The mosses sent to me for determination were collected by three of the botanists who took part in the expedition, in June—August, 1921. Part of them were collected and sent to me by Mr. John Walton, and were collected about Klaas Billen Bay, mostly in the neighborhood of Bruce City. The remainder were sent by Mr. V. S. Summerhayes and were mostly collected by himself in various localities (Bear Id., Prince Charles Foreland, &c.); but a certain number of them were gathered by Mr. C. S. Elton in the neighborhood of Klaas Billen Bay.

The number of species found among these collections was about 82, out

¹ Constituting Number 17 of the Results of the Oxford University Expedition to Spitzbergen, 1921.

of a total number recorded for Spitzbergen, as far as I am aware, of just under 200. The mosses of Spitzbergen have been so carefully studied and enumerated by Berggren in the *Musci et Hepaticae Spetsbergenenses* (K. Vet.-Akad. Handl. XIII. 1875) that not much room has been left for further additions. In this work he enumerates 189 species of mosses. The only literature that I know which has added further to the list of mosses is a paper of Hagen's on the Mosses and Hepatics of Prince Charles Foreland, Spitzbergen, (Trans. Bot. Soc. Edin. XXIII. 1908), in which 3 species are added, and one by Bryhn, "Bryophyta pro flora Spitzbergensi nova," (Nyt Mag. for Naturvidensk. Bd. XLVII. 1909), adding 4 more. These bring the number up to 196. It is possible that I have overlooked some papers on the subject, but I believe that the above pretty well exhaust the list.

The 82 species in the present collections comprise 5 distinct species new to the group, in addition to one or two which are in the nature of segregates, and may be included by Berggren in the "aggregate" species recorded by him. The 5 additional species are as follows:—

Sphagnum subsecundum var. *contortum*
Grimmia commutata
Orthotrichum rupestre
Cinclidium stygium
Amblystegium serpens

In addition to these, *Sphagnum subnitens* and *Philonotis tomentella* have not been distinguished from *S. acutifolium* and *P. fontana* respectively. I give further particulars as to these and a few other plants of interest.

Sphagnum subsecundum var. *contortum* Schimp.—Advent Bay; 25 June, V. S. Summerhayes (28a).

Sphagnum subnitens Russ. & Warnst.—Advent Bay; 18 July, V. S. Summerhayes (123b). Probably included by Berggren in the aggregate *Sphagnum acutifolium*.

Sphagnum fimbriatum var. *concinnum* Warnst. (Syn. *S. teres* var. *concinnum* Bergg.; *S. fimbriatum* var. *arcticum* Jens.); det. J. A. Wheldon. An interesting and difficult form which has been placed under two or three different names; it has rather the habit of *S. Girgensohnii*, but the stem leaves are rather those of *S. fimbriatum*. It was collected by V. S. Summerhayes, Cape Boheman; 12–16 July, (95b).

Dicranum Starkii Web. & Mohr.—Bear Id.; 17–20 June, V. S. Summerhayes (9ad). A very puzzling, sterile plant, which appears to belong here, with the habit of *Blindia acuta*, and a very fine leaf subula, which is denticulate for some distance down. The alar cells are too strongly marked for *D. fulvellum*.

Dicranum Bonjeani De Not.—Bear Id.; 13–20 July, V. S. Summerhayes (9p). Advent Bay; June 25, (28d). The type form: Berggren found only var. *juniperifolium*.

Grimmia commutata Huebn.—Klass Billen Bay; 14 Aug., C. S. Elton (L25). A very remarkable form; robust, brown, with the leaves decidedly crisped when dry, the upper cells larger and clearer than in the usual form, and the cells and

nerve somewhat markedly papillose. The leaf form, however, and the distinctive basal areolation, are quite characteristic of *G. commutata*, and I think that it must be referred here. Mr. W. E. Nicholson concurs. The species has not been found in Spitzbergen before.

Rhacomitrium canescens (Hedw.) Brid.—Prince Charles Foreland; 8 July, V. S. Summerhayes (67b). A striking form, with the stems almost simple, or once or twice divided, the short lateral branchlets being undeveloped. The var. *ericoides*—the exact antithesis of this—was collected, also on Prince Charles Foreland, by Mr. C. S. Elton (Z4).

Orthotrichum rupestre Schleich.—Rock in Eriophorum Moss, Bruce City; J. Walton (L). Not hitherto on record for Spitzbergen.

Bryum globosum Lindb.—Bear Id.; 13–23 June, V. S. Summerhayes (6b), with one or two old capsules: Bruce City; 19–20 July, V. S. Summerhayes (124b), with abundant capsules, both the somewhat immature, operculate capsules of the present year and the old capsules of the preceding season, in, however, fairly good condition, with the peristome nearly intact. The globose, inflated capsules, of thin texture, agree exactly with Lindberg's specimens in our National collections, and in the fresh state, and in their dense profusion, made an object of great beauty; which, alas! disappeared to a great extent in drying.

Var. **ruberrimum** Dixon, *var. nov.*—Tundra, Klaas Billen Bay; 5 Aug., C. S. Elton (K23). *Theca pulcherrime rosea*. Lindberg describes the capsules of *B. globosum* as "pallide vinosa," but the reddish color must be very faint; in his specimens at Kew and the British Museum I do not find any trace of red; as in Nos. 6d and 124b, above, they are a pale brown. This applies both to the somewhat immature capsules of Mr. Summerhayes, gathering and to the mature deoperculate ones. In the present plant the capsules are of equal abundance, and of precisely the same form and character, but are of a very bright rosy red, and even in the dry state make an extremely striking object. Arnell speaks of the type of *B. globosum* as being the greatest ornament of the Arctic zone, but it is certainly far surpassed by this very beautiful variety:—"matris pulchrae filia pulchrior."

Cinclidium stygium Sw.—Gips Valleys; 26 June, V. S. Summerhayes (30e), sterile. Berggren records only *C. arcticum* B. & S., but the present plant cannot be that, as the cells are distinctly in divergent rows.

Meesia triquetra (L.) Aongstr.—In several localities. Limpricht (Laubm. p. 515) describes the leaves as "ganzrandig; nur bei den Varietäten rings gesägt." This seems to be a rather remarkable statement. I do not remember to have seen a form with entire leaves. The leaves are described as toothed by all the authors I know, and are so figured in the *Bryologia europaea*.

Philonotis tomentella Mol.—Sassen Valley; 17 July, V. S. Summerhayes (118a). Not hitherto recorded from Spitzbergen, but doubtless included in the forms recorded by Berggren as *P. fontana* Brid.

Polytrichum alpinum L.—A form from Prince Charles Foreland, V. S. Summerhayes (57 o) has the stems divided at the apex into numerous short, crowded branches, so as to be quite dendroid. This form occurs from time to

time, not only in *P. alpinum*, but in other species of the genus, and has led in one case at least, in South Africa, to the erroneous record of *Dendrologotrichum* as occurring there.

Climacium dendroides (L.) Web. & Mohr.—Bear Id.; 17 June, V. S. Summerhayes (4b). Berggren records a single stem only, from King's Bay.

Thuidium abietinum (L.) B. & S.—One or two gatherings were made of this. Berggren records it only from Green Harbour and Advent Bay.

Amblystegium serpens (L.) B. & S.—Bear Id.; 17 June, V. S. Summerhayes (79). Sterile: not previously recorded from Spitzbergen.

Calliergon sarmentosum var. *fontinaloides* Berggren.—Cape Boheman; 15 July, V. S. Summerhayes (110a). The exact habitat of this remarkable form is not given, but I have no doubt it was a submerged form. It appears to conform very fairly with Berggren's description of his var. *fontinaloides* (of which I have seen no specimens)² from the Dovre, Norway, but is, I should judge, a still more extreme form. The stems are 15 cm. long, very closely and regularly pinnate with short, subequal, widely divergent, elongate, much attenuated leaves. The plant has, in fact, in almost every particular (except that the leaves are straight, not falcate) the appearance of a *Drepanocladus* such as *D. Rotae*, and it is hard to convince oneself, even when examining it with the lens, that it is not that, but a *Calliergon*. The lower part of the stem and the lower branches are much denuded, which appears to indicate a station in flowing water.

The variety has only been recorded from the high alps of Styria in addition to the original locality. I have a somewhat similar form from New Zealand, collected by Dr. L. Cockayne "on bottom of shallow natural pond in Craigieburn Mts., Canterbury, at 1200 m. alt."

NORTHAMPTON, ENGLAND

ON SOME MOSSES FROM THE BLUE MOUNTAIN OF CUBA

ELIZABETH G. BRITTON

On April 10th, 1922 Mr. George Conrad Bucher spent the day on the summit of the highest peak of Cuba, Pico Turquino, 7600 feet and collected six mosses which are interesting because of their rarity and identity with those from the Blue Mountains of Jamaica, occurring on Sir John Peak and Blue Mountain Peak, at altitudes ranging from 5000 to 7400 feet, and including three new records for Cuba.

Holomitrium calycinum (Sw.) Mitt.

Type locality: Jamaica, widely distributed at elevation of 5000–7420 feet, usually on tree trunks. Recently collected by Fre. Clement in the Sierra Maestra. No. 28, Bucher.

Campylopus Brittonae R. S. W. Second West Indian record!

Type locality: Summit of Sir John Peak, Jamaica.

² Since the above was in print Mr. Chamberlain has kindly sent me a specimen of the Norwegian plant, leg. Bryhn et Hogen, which quite confirms the original determination. The Spitzbergen plant is a somewhat more extreme form.

Distribution: Summit of Pico Turquino, Cuba—First record. No. 27, Bucher.

Pilotrichella flexilis (Sw.) Jaeg.

Type locality: Mountains in Jamaica. Collected by S. H. Hamilton in 1902 on Pico Turquino, and by Brother Clement and Brother Leon on the Sierra Maestra, Loma del Gato, 1920. Also at higher elevations in Porto Rico, Monte Torrecilla, near Adjuntas and Sierra Luquillo. No. 25, Bucher.

Meteoriopsis patula (Sw.) Broth.

Type locality: Summits of Blue Mountains, Jamaica. Distribution not uncommon at lower elevations in Province of Oriente, Cuba, on the Sierra Maestra, Banao Mountains and Santa Clara. Also in Porto Rico, Monte Torrecilla, near Adjuntas and Sierra Luquillo. No. 26a, Bucher.

Trachypus viridulus (Mitt.) Broth.

Type locality: Andes of Quito. Distributed on rocks near summit of John Crow Peak, Jamaica, and Sir John Peak, altitude, 5500–5800 feet. Not recorded from Cuba or Jamaica by Brotherus! Altho this species was described by Mitten as having entire leaves, the drawings accompanying his type specimens show that the leaves are serrulate and agree with the West Indian specimens above recorded. No. 26, Bucher—First record.

Clastobryum americanum Cardot

Type locality: Mexico

Distribution: Jamaica, John Crow and Sir John Peak. This species has not been recorded heretofore from Cuba, but agrees with 1144 collected by me on Sir John Peak, Jamaica, in 1908, and is a slender form of this species. No. 24, Bucher—First record.

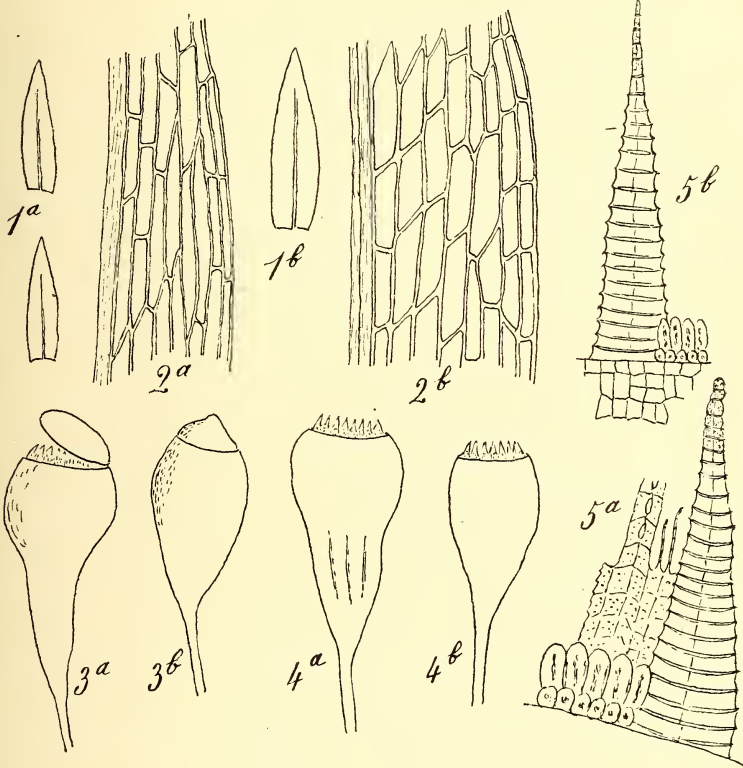
NEW YORK BOTANICAL GARDEN, N. Y.

LEPTOBRYUM ESCOMELI THER. SP. NOV.

I. THÉRIOT

Dioicum. Caespites densi, pu'chre luteo-virides, nitidi, intus tomento radiculoso ferrugineo valde intertexi. Caulis erectus, 3 cm. altus, superne fasciculato-ramosus, ramis elongatis, gracilibus, laxe foliosis. Folia oblongo-elliptica, acuta vel subobtusa, integra, haud limbata, marginibus planis, 0.7–0.8 mm. longa, 0.2 mm. lata; costa ultra $\frac{3}{4}$ evanida, basi 30–60 μ crassa; rete pellucido, cellulis longe et anguste rectangularibus vel linearibus, 60–120 μ longis, 10–12 μ latis, inferioribus parum dissimilis. Flos masculus terminalis, discoideus, folia perigonalia patulo-squarrosa, longissime linearia. Folia perichaetalia erecta, externa cauliculis parum majora, interna anguste linearia, 3–5-longiora, basi dilatata, costa latissima; pedicellus gracilis, erectus, flexuosus, pallidus, aetate

fuscus, 2 cm. longus; capsula erecta, pyriformis, leptodermis, nitida, abrupte collo longiore contracta; operculum plano-convexum, umbonatum; annulus latus, duplex; exostomii dentes lati, obtusi, apice papilloso, 0.35 mm. alti, endostomi, processus aequilongi, lanceolati, perforati, membrana ad mediam partem dentium producta, ciliis (1-2) brevissimis, haud appendiculatis; sporae minute papillosoe, diam. 18 μ ; calyptra non visa.



LEGENDE

a. *Leptobryum Escomeli*.

b. *Leptobryum Wilsoni*.

1. feuilles caulinaires X22; 2. cellules moyennes X170; 3. capsules humides X15;
4. capsules sèches X15; 5. fragments d'anneau et de péristome X120.

HAB:—Perou, Jura près d'Arequipa (leg. doct. Edm. Escomel, 1921).
Trouvé dans la même localité dès 1901, par Mr. R. S. Williams (No. 2806).

Cette belle et élégante mousse m'a été donnée par M. le doct. C. Porter, de Santiago. Je l'avais, avant d'avoir vu un échantillon original de *Leptobryum Wilsoni* (Mitt.) Broth., rapportée à cette dernière espèce. Mais Mrs. E. G.

Britton ayant eu l'obligeance de me communiquer le No. 253 de l'exs. R. Spruce et un calque des dessins de Mitten pris sur le type (Quito, leg. Jameson), j'ai pu me rendre compte que ma plante n'était pas identique à l'espèce de Mitten. Elle en est évidemment fort voisine, mais les différences que j'ai constatées sont, à mon avis, assez importantes pour l'en séparer spécifiquement.

Elle s'en distingue, en effet, par ses feuilles caulinaires plus petites (0.7-0.8 mm. sur 0.2 mm. au lieu de 1 mm. sur 0.3 mm.); par le tissu plus serré (les cellules moyennes ont 10-12 μ de large, celles du *L. Wilsoni* atteignent 15-18 μ); par la capsule brusquement contractée en un col subcylindrique plus long que le sporange, tandis que celle du *L. Wilsoni* est insensiblement atténuée en un col conique d'égale longueur; par l'opercule plan-convexe, non apiculé, alors qu'il est conique chez l'autre espèce; enfin par l'anneau plus élevé, les dents du péristome externe plus larges et par la présence de cils au péristome interne.

Je n'ai pas pu constater moi-même si le péristome du *L. Wilsoni* est dépourvu de cils, mais je pense cependant qu'il en est ainsi parce que Mitten n'en parle pas dans sa description, et surtout parce que ses dessins représentent un péristome interne avec la membrane et les lanières sans trace de cils.

FONTAINE LA MALLET, FRANCE.

NOTE ON A FORM OF POTTIA HEIMII FROM GREENLAND

H. N. DIXON

In 1921 Prof. A. C. Seward, of Cambridge University, was visiting Greenland, and collected a number of mosses, which he sent to me for identification. The bulk of them consisted of interesting but well known arctic and sub-arctic forms; but a *Pottia* from Ata, West Greenland, about 70 degrees north latitude, deserves special mention. The habit, the long, glossy, pale reddish setae, etc., were characteristic of *P. Heimii* Fuernr., but the leaves were nearly entire, obtuse, with the margin frequently recurved, the capsules very short and wide, the lid remarkably short, only very slightly rostellate, and frequently simply apiculate, and the capsules being then only just mature there was no indication of systyly. (After lying in the herbarium, however, for some months, the capsules have contracted in width and become more elongated, while the lid had become detached at the rim and shows constant systyly). It became clear that the moss was a form of *P. Heimii*, and the question arose to which of the numerous varieties of that species it should be referred. I consulted Mr. E. B. Chamberlain on the matter, and he very kindly went into the question with great care; but the ultimate conclusion at which he and I arrived was that it could not be placed under any known variety. Not that it did not possess the characters of any, but rather that it assumed the characters of all! Or, more accurately, that being apparently of an eclectic turn of mind, it had selected a salient character from one, another from another, while rejecting correlated characters in each; and with a true catholicity refused to be bound down to any single denomination! Moreover, it

quite declined to submit to any cut and dried rules of morphology even for its own characters; the leaf margins were sometimes erect, sometimes recurved; usually entire or nearly so, but here and there subdenticulate, and generally showing some signs pointing that way, as if, as Mr. Chamberlain suggests, they were "cutting their teeth." The apex was mostly very obtuse, but here and there tapering, the cell structure equally variable, often showing distinct traces of a border, but very frequently (on the same stem) without any; in fact the plant showed in all directions a callous disregard for the convenience of taxonomists.

Pottia Heimii var. *behringiana* Card. & Thér. has the same short capsule, bluntish leaves, and tendency to a border, but the leaves are normally toothed and less obtuse. *P. heimioides* Kindb. has the leaves short and obtuse, but the capsule longer and cylindric, &c. *P. Heimii* var. *obtusifolia* (R. Br.) Hag. (Syn. *P. Ryani* Philib.) is perhaps the nearest form, but that very marked plant has broader and shorter leaves, with plane margins, with more abbreviated characters generally of both gametophyte and sporophyte. On the whole it appears better to consider the Ata plant as a remarkable form of *P. Heimii* with a considerable approach to var. *obtusifolia* (R. Br.) Hag.

NORTHAMPTON, ENGLAND

NOTES

A recent issue of the *Revue bryologique* reports the death, in January, 1921, of Sign. Egidio Corti, who was a member of the Sullivant Moss Society from 1909 to 1916. Sign. Corti was a critical student of the Italian mosses, and had also investigated those of Ecuador. We understand his herbarium is for sale.

The same issue of the *Revue* mentions the death of L'abbe Faurie, well known for his explorations in Japan and Corea. No details are given.

We are informed that the Zoologisch-botanische Gesellschaft of Vienna is prepared to sell a collection containing some 12,000 specimens of mosses, more than 1,000 species of European material, all well prepared specimens collected by such bryologists, among others, as Schimper, Wilson, Lindberg, Juratzka, Molendo, etc. There are also many numbers from old and rare Exisccati, e.g. *Bryotheca Europaea*. Offers should be sent directly to Dr. Hans Neumeyer, Secretary, at Mechelgasse 3. Wein, III/3, Austria.

Fascicle Nineteen of Mr. John M. Holzinger's *Musci Acrocarpi Boreali-Americani*, sent out May 19th 1922, appears hard on the heels of the eighteenth fascicle, which was noticed in the March, 1922, issue of THE BRYOLOGIST. As will be seen from the subjoined list, the specimens come mainly from the West and South; three numbers represent European collections, which we trust may in time be supplemented with American material. Number 452, *Amphidium Mougeotii*, is from the type locality; number 473 is a portion of Ravenel's original collection. If we might suggest, the completion of this important series of North American mosses can be very greatly aided and hastened if collectors and students will send to Mr. Holzinger for lists of species already issued. Such a course will

enable them to determine whether species from their own localities are desiderata. We happen to know that such correspondence will be welcomed by Mr. Holzinger, who has recently written us that he wishes to acknowledge his great obligation, both for material and for assistance in critical determinations, to Mrs. E. G. Britton and Mr. R. S. Williams of the New York Botanical Garden, as well as to the many collectors and students who have aided him in assembling material. Fascicle Nineteen contains the following species:—

- | | |
|--|---|
| 451. <i>Amphidium lapponicum</i> , Washington. | 463. <i>Encalypta leiomitra</i> , Washington. |
| 452. <i>A. Mougeotii</i> , Puy-de-Dome, France. | 464. <i>E. vulgaris obtusa</i> , Alberta. |
| 453. <i>Archidium alternifolium</i> , Florida. | 465. <i>Fissidens Donnellii</i> , Florida. |
| 454. <i>A. longifolium</i> , Florida. | 466. <i>F. subbasilaris</i> , Florida. |
| 455. <i>Bryum californicum</i> , Washington. | 467. <i>F. taxifolius</i> , New York. |
| 456. <i>Conostomum boreale</i> , New Hampshire. | 468. <i>Hyophila riparia</i> , Pennsylvania. |
| 457. <i>Desmatodon Porteri</i> , Pennsylvania. | 469. <i>Orthotrichum Braunii</i> , Vermont. |
| 458. <i>Dicranella Grevilleana</i> , Washington. | 470. <i>O. Jamesianum</i> , Colorado. |
| 459. <i>D. heteromalla orthocarpa</i> , Florida. | 471. <i>Philonotis gracillima</i> , Kansas. |
| 460. <i>Dicranum fragilifolium</i> , Norway. | 472. <i>Physcomitrium megalocarpum</i> , Florida. |
| 461. <i>Didymodon rigidulus</i> , California. | 473. <i>Pleuroidium Ravenelii</i> , S. Carolina. |
| 462. <i>Ditrichum vaginans</i> , Connecticut. | 474. <i>Syrhropodon ligulatus</i> , Florida. |
| | 475. <i>Tortula obtusifolia</i> , France and Switzerland. |

NOTES ON CURRENT BOTANICAL LITERATURE

H. N. DIXON.—*On a collection of mosses from the Kanara District.* (Journ. Indian Bot. 2: 174-188, plate. 1921.) The district mentioned, from which 50 species or varieties are listed, is on the western coast of British India, a little south of Goa. The following new species are described and details figured: *Archidium birmannicum* Mitt. Mss., *Leucoloma strictifolium* Dix., *Fissidens subfirmus* Dix., *F. karwarensis* Dix., *F. immutatus* Dix., *F. macrosporus* Dix., *Barbula dharwarensis* Dix., *Pinnatella elimbata* Dix., *Ctenidium stereodontoides* Dix., *Vesicularia Levieri* Card. Mss. In addition two new varieties are described (*in Campylopus* and *Brachymenium*), *Fissidens elimbatus* Broth., is reduced to a variety of *F. Walkeri* Broth., and *Hyophila involuta* (Hook.) Jaeg. is stated to include both *H. cylindrica* Jaeg. and *H. stenocarpa* R. & C.

HOLZINGER, J. M., & T. C. Frye.—*Mosses of the Bureau of Soils Kelp Expedition to Alaska.* (Publ. Puget Sound Biol. Sta. 3: 23-64. pls. 4-8 (containing figs. 1-35). 1921).—A report on about 1000 packets of mosses collected at odd times by members of the Kelp Expedition mostly near the coast of south-eastern or southwestern Alaska, with addition of material from various parts of Alaska and the Yukon accumulated at the University of Washington. The report lists 15 Sphagna, 2 Andreaeae, and 206 species and varieties of true mosses. One new combination, *Brachythecium pacificum* (R. & C.) Grout occurs; *Camptothecium paulianum* Grout, *Hypnum tananae* Grout, and *Aulacomnium androgynum pygmaeum* Holz. & Frye are proposed as new, (none figured). Besides many extensions of range on the peninsula itself, forty-four species and eleven varieties are here first recorded for Alaska, two being new to America. A bib-

liography of fifty-one titles follows. The plates illustrate various details of *Dicranella squarrosa*, *Bryobrittonia pellucida*, and *Trachycystis flagellaris*. Each species has detailed citation of the collections there referred, and a general outline of the Alaskan distributions. More extended notes on various topics are given for many species; especially *Geehebia gigantea* (Funk) Boul., *Zygodon Reinwardtii* (Hsch.) A. Br. (both new to America), *Trachycystis flagellaris* (S. & L.) Lindb., *Bartramia breviseta* Lindb., *Philonotis Arnelli* Husn., and *Brachythecium pacificum* (R. & C.) Grout.

R. POTIER DE LA VARDE.—*Bartramia stricta* Brid. sur le littoral de la Manche. (Revue bryologique 47: 73. 1920.)—A record of collection at St-Jean-le-Thomas.

ARNELL.—*Necrologie: Scandinavian Bryologist that have died in last years.* [sic.] (Revue bryologique 47: 74—75. 1920.)—Records the deaths of Berggren, Bryhn, Hagen, and Kaalaas, with a bibliography of their more important works.

G. DISMIER.—*Note sur quatre numéros d'exsiccata.* (Revue bryologique 48: 28—29. 1921.)—Number 62 of the Musci Galliae is *Pottia minutula* not *Anacalypta Starkeana*; Nr. 88 of the same set is *Harpalejeunea ovata* (Hook.) Schiffn. as far as specimen B is concerned, specimen A is correctly named *Lejeunea minutissima* Dum.; Nr. 780 of the Musc. Gall. issued as *Plagiothecium denticulatum* Sch. var. *myurum* Schp. is *Isopterygium elegans*. Nr. 402 of Bauer, Musci europ. exsic. issued as *Bryum arvernense* Douin is *Anomobryum sericeum*.

J. AMANN.—*L'indice cellulaire chez les Muscinées.* (Revue bryologique 48: 33—38. 1921.)—The dimensions of the foliar cells in mosses frequently enable one to distinguish closely related species, even though the foliar cells vary considerably on different specimens. The author proposes to supplement the present method of stating length and width of cells by an "*Index cellulaire*" based upon the average of measurements of the number of cells per square millimeter in the median leaf surface. These measurements also produce more exact values for the length and width measurements. The author gives careful directions as to methods, errors to be avoided, and cites a large number of examples illustrative of the method and its utility.

W. E. NICHOLSON.—*Bryological notes from Sicily.* (Revue bryologique 48: 38—43. 1921.)—An annotated list of 47 mosses and 16 hepatics from northern Sicily with some account of the general character of the vegetation. Author considers *Bryum siculum* Roth inseparable even as a variety from *B. splachnoides* (Harv.) C. M. There are notes on characters of *Reboulia Charrieri* Douin and *Scapania compacta* var. *Biotiana* Mass.

W. INGHAM.—*Georgian Mosses.* (Revue bryologique 48: 43. 1921.)—A list of 14 mosses, without notes or data, collected by Mr Brinkman in British Columbia.

I. THÉRIOT.—*Considérations sur la flora bryologique de la Nouvelle-Calédonie et Diagnoses d'espèces nouvelles (Continuation.)* (Revue bryologique 48: 11—16; 22--28; 54--59. 1921.)—The author describes over thirty species as new, gives notes upon a number of other species new to the New Caledonian flora, and corrects certain errors in previous determinations. The new genus *Bryobrothera* is proposed for the species known as *Mesochaete crenulata* Broth. & Par.

There are many notes upon species mentioned by Beschereille in the *Florule bryologique de la Nouvelle-Calédonie*.

P. CULMANN.—*Sur quelques mousses d'Auvergne à peristome imparfait*. (*Revue bryologique* 48: 17--22. 1921.)—The article deals principally with *Tortula obtusifolia* Schleich., *Desmatodon arenaceus* Sull. and *Grimmia plagiopoda* var. *avernica* (Phil.) Boul. The author finds that there are three forms of *T. obtusifolia* in the Auvergne, one agreeing with Schwaegrichen's figure, another (proposed as var. *pilifera*) with piliferous leaves and rudimentary peristome, the third with piliferous leaves and a well developed peristome. The author concludes that *T. obtusifolia* is a subspecies of *T. muralis* and not related to the *atrovirens*-group. Comparisons of *Desmatodon arenaceus* made in course of the preceding study lead the author to consider Hagen in error in referring this plant to *T. obtusifolia*, American material differing greatly in the peristomè. The author considers *D. arenaceus* a good species and proposes the name *Tortula arenacea*. Author states that Loeske is in error on considering *Grimmia plagiopoda* *avernica* merely a piliferous form: material from the Auvergne differs constantly in possessing a rudimentary peristome.

G. DISMIER.—*Localities nouvelles de Muscinées rares ou peu connues en France*. (*Revue bryologique* 48: 49--52. 1921.)—A list with localities of 11 hepatics and 38 mosses.

G. DISMIER.—*Observations sur le Didymodon cordatus Jur.* (*Revue bryologique* 48:52--53. 1921.)—In noting new stations for *Didymodon cordatus* in southwest France, M. Dismier takes occasion to compare this species with *D. luridus* and *D. rigidulus*, concluding that it should be regarded as a subspecies of the latter.

J. AMANN.—*Bryum turgescens Hagen et le Nr. 397 des Musci Europaei de Bauer*. (*Revue bryologique* 48: 59--60. 1921.)—An examination of the material distributed by Bauer as well as material of the same collection in the *Bryotheca helvetica* indicates that the specimens do not represent the plant described by Hagen as *Bryum turgescens*, but rather slender states of *B. neodamense* Itzig.

R. HENRY.—*Le Lophozia Kunzeana (Hüb.) E ans dans les Vosges et liste des muscinées recueilliés au Honeck*. (*Revue bryologique* 48: 60--62. 1921.)—A list of 26 species, mosses and hepatics, with special note on the occurrence of the *Lophozia* mentioned in the title.

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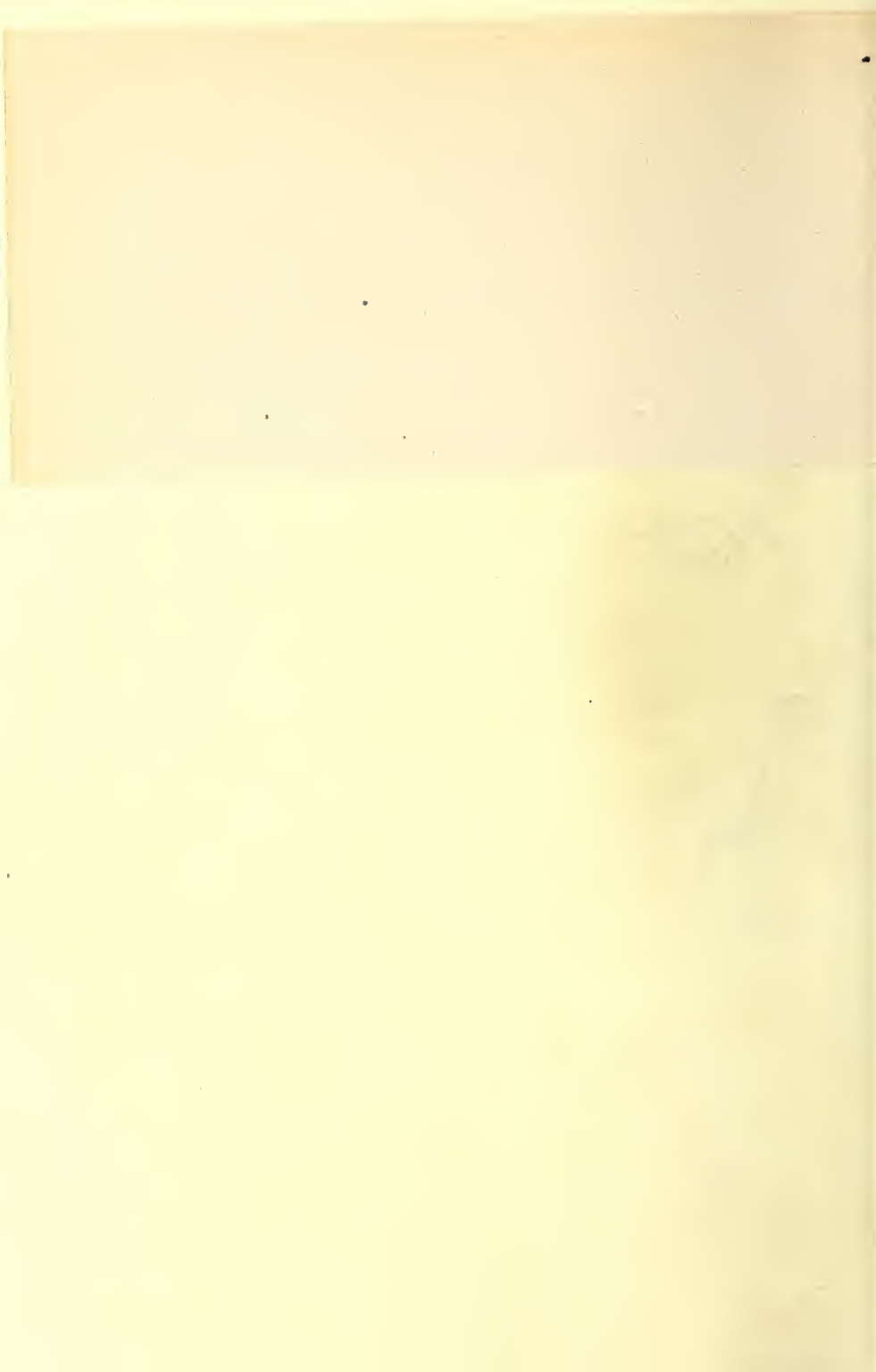
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INSERT

The following entry should be inserted in *THE BRYOLOGIST* 25: 49. May 1922, between lines six and seven:

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NOVEMBER, 1922

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THE BRYOLOGIST

VOL. XXV

NOVEMBER, 1922

No. 6

THE STATUS OF GYROWEISIA IN NORTH AMERICA

A. LEROY ANDREWS

Gyroweisia has in fact no valid status anywhere. Limpricht¹ complained of the several names that Schimper had at different times applied to this genus, but did not perhaps take the trouble to verify his references. Thus I have been unable to find *Weisiopsis* published by Schimper as a genus, with priority, if Limpricht were right. Limpricht's source was presumably Schimper's own statement,² but this speaks only of a subgenus *Weisiopsis*. In the *Bryologia Europaea* I find no such name either as genus or subgenus under plate 28 or in the text referring to it, but only as a subgenus in the index of Vol. I, page VII, which is apparently from the later date of 1851. The case is different with *Weisiodon*, which was entirely adequately published as a genus³ and by all the rules of priority should supplant the later *Gyroweisia*. Its type-species was the *Weisia reflexa* of Bridel occurring in southern Europe and northern Africa. Schimper's reason for changing the name to *Gyroweisia* was the inclusion of the European *Gymnostomum tenue* of Schrader, which he rightly recognized to be closely related to the other, but which has no peristome teeth. Both have a prominent persistent annulus—hence the name *Gyroweisia*, *Weisiodon* being no longer appropriate. But it should be obvious that a generic name need not be a generic description, cannot in fact remain one with the growth of knowledge of forms and their natural relationships.⁴ Priority demands the retention of *Weisiodon*, if the genus itself is worthy of retention. As a matter of fact, like many others, it is not particularly well understood. Engler & Prantl's *Natürliche Pflanzenfamilien* includes in it for the first time a number of exotic species, and their figure taken from a portion of the plate of *Weisia reflexa* in *Bryologia Europaea* has inspired still further additions.

As to North America, the inclusion of this genus in its moss-flora rests in the first place upon number 21 of Drummond's *Musci Americani* named *Gymno-*

¹ Laubmoose I, 235. 1886.

² Corollarium, 9. 1855. In the light of the facts here developed the genus *Weisiopsis* recently proposed by Brotherus (Finsk. Vetensk. Soc. Förhandl. 62: A: Nr. 9, 1921, according to reference; I have not seen the paper) would be valid so far as the name is concerned, but it seems questionable whether a name which has been the subject of controversy should be used again for a still different group.

³ Corollarium, 9. 1855.

⁴ Cf. THE BRYOLOGIST, XXIII, 30f. 1920.

stomum tenue by Drummond.⁵ Wilson in his critical notes on Drummond's first set⁶ suggested that this specimen might be *Gymnostomum calcareum*, and such in fact it appears to be. The two species have been much associated with one another, because their stems and leaves are so reduced by xerophytic conditions of growth that they closely resemble each other. Their capsules are however distinct, those of *Gyroweisia tenuis* being distinguished by a large persistent annulus. So persistent is this that it will usually be found even on old deperculate capsules. I have not been able to find a trace of it on any of Drummond's capsules and have no doubt that they are those of *G. calcareum*, as Wilson took them to be. To confirm the identity I have also sought gametophyte characters. These are very hard to make out, so great is the reduction of the vegetative parts in both mosses. The stem of *G. tenuis* I find in section without central strand, as noted by Limpricht,⁷ while that of *G. calcareum* has a central strand with a layer of rather large cells surrounding it, as in *G. rupestre*. Drummond's specimens are not very favorable for this kind of investigation, but I think there is no question but that they have the stem-section of *G. calcareum*. The section of the leaf-costa has so little character in these reduced plants that I cannot regard it as conclusive, but I see nothing in Drummond's plant in this respect to separate it from *G. calcareum*. There is no satisfactory doubt that Drummond's Canadian specimen is *G. calcareum*, and the same is still more clearly true of other Canadian specimens referred by Macoun and Kindberg to *Gymnostomum tenue*, also of those referred to *Gymnostomum pusillum* Kindb. (*Gyroweisia pusilla* Broth.). I have also seen specimens from the Ottawa Herbarium labeled *Gyroweisia reflexa*, but they are also *G. calcareum*, except one which is a *Seligeria*. Confusion of the two species by European bryologists is apparently not infrequent; in fact the European specimen in the Ottawa Herbarium labeled *Gyroweisia tenuis*, collected by Artaria in northern Italy, is also *Gymnostomum calcareum*. Kindberg's *Gyroweisia linealifolia*⁸ from Switzerland is also according to Paris⁹ *Gymnostomum calcareum*. The *Gyroweisia tenuis* distributed by Holzinger in his *exsiccati* (No. 331) from Enfield Gorge, N. Y. proved to be a sterile specimen of the moss variously known as *Diphyscium foliosum* or *Webera sessilis*, the correction having already been made by Holzinger in his privately printed notes.

Only the most thorough-going monographical work with consideration of all related mosses of the world can justify and, having justified, properly delimit a genus *Weisiodon* Schimper. That the exotic species included by Brotherus (in *Natürliche Pflanzenfamilien*) are not those of most immediate relationship

⁵ Careful study of the literature concerning Drummond's collections (Cf., for example, Hooker, *Botanical Miscellany*, 1, 93. 1828; Hooker, *Journal of Botany*, 111, 433f. 1841) shows that he was himself responsible for the naming of his first set of American mosses, except in so far as certain new species are definitely accredited to Hooker.

⁶ Hooker, *Journal of Botany*, 111, 434. 1841.

⁷ *Laubmoose*, 1, 235. 1886.

⁸ *Rev. Bryol.*, XIX, 104. 1892.

⁹ *Index Bryol.*, ed. 2, 11, 293. 1904

I am convinced. *Gyroweisia Barbula* (Schwaegr.) Par. of the West Indies, Florida, Bermuda, etc., originally described as a *Gymnostomum*, has been passed hopelessly from genus to genus and its exact affinities are still unknown, further than that it is a tropical or subtropical representative of the *Pottiaceae* in the broad sense of Brotherus. *G. brevicaulis* (Hpe.) Broth. of the East Indies is a somewhat parallel phenomenon with peristome-teeth. Fleischer, whose sense for moss-relationships is good, has included it in *Didymodon*,¹⁰ but the latter as it appears in recent bryological works has long ceased to be a natural genus, if it indeed ever was one. *G. obtusifolia* (Hpe.) Broth. from Mexico is a plant in many ways suggesting relationship with the Mexican species of the genus *Globulina* C. M. But this genus has at present no acceptable status in the moss-system, as the Mexican and South American species comprising it are evidently not too closely related, nor are either clearly set off from the mass of pottiaceous forms. *G. barbulea* (C. M.) Broth. from Mexico I have been permitted to see through the kindness of the director of the Botanical Garden at Berlin-Dahlem. The specimen was a single plant inserted in a split piece of mica and while affording a good idea of the peristome and capsule did not permit so clear a demonstration of the leaf-characters without the possibility of injury to the specimen. I was unable to identify the species with anything else known to me, but do not regard it as at all closely related with any of the other plants included under *Gyroweisia*.

On the other hand, mosses placed by Mrs. Britton and Mr. Williams in *Gyroweisia* seem to me to show a far better sense of natural relationship, if the genus can be extended beyond the two older species or should exist at all. Mrs. Britton's better judgment has, in literature, unfortunately been obscured by a new generic name of Cardot, so that her species appears as *Dactylhymenium Pringlei* (E. G. Britton) Cardot.¹¹ The species is Mexican; besides the original station at Chihuahua there is in the herbarium of the New York Botanical Garden an earlier specimen collected in 1875 by Dr. J. G. Schaffner in the Valley of Mexico, the specimen according to label having come as *No. 17* from the herbarium of A. Vignier. It may also be claimed for the United States flora on the basis of a specimen collected by Rusby in southwestern New Mexico (Grant County). Quite similar is the case of Mr. Williams' *Gyroweisia boliviana* from the South American Andes. In describing this species Mr. Williams compared it¹² with *Hyophila Lindigii* Hpe. (*Gyroweisia Lindigii* Broth.) from the Andes of Colombia, which is quite distinct, as Mr. Williams noted, in fact hardly congeneric. The relation of the South American and Mexican species to each other and of both to the moss generally known as *Didymodon tophaceus* (Brid.) Jur. should be studied further on the basis of the greatest possible amount of material. I am persuaded that it is at any rate a close one. The last mentioned species is widely distributed in western North America. It is quite out of its element in *Didymodon*, which even without it is all too heterogeneous, and it

¹⁰ Flore de Buitenzorg, V. 1, 333. 1902.

¹¹ Rev. Bryol., XXXVI, 72. 1909.

¹² Bull. N. Y. Bot. Gard., 111, 117f. 1903.

was still less at home in *Trichostomum*. It has with us sometimes been confused with *Gymnostomum* or *Hymenostylium*. Holzinger's *b* under No. 29 of his *exsiccati* is, for example, this species and not *Gymnostomum curvirostrum scabrum* as labeled. Kindberg's *Gymnostomum platyphyllum* (*Hymenostylium platyphyllum* Broth.) is a synonym of *Didymodon tophaceus*. I am strongly disposed to believe that *Didymodon tophaceus*, which is also of European distribution, is the highest link in a chain of naturally related forms starting with the two (or three?) European species of *Weisiodon* (*Gyroweisia*) and including as intermediate forms of whatever rank the Mexican *Haplohymenium* (*Gyroweisia*) and the Bolivian *Gyroweisia*, whereby it may be remarked that the others can as well or better be understood as secondary phylogenetic developments, by reduction, from the higher type of the more widely distributed *Didymodon tophaceus*.

As my conclusions are essentially negative, I shall not discuss in further detail the characters of the various species referred to, but leave my results as a suggestion to the future monographer, who among this as among many other groups of mosses is at present more needed than the species or genus-maker. To recapitulate briefly, my conclusions are:

1. *Gyroweisia* Schimper, 1876, is antedated by *Weisiodon* Schimper, 1855, and should be relegated to synonymy.
2. *Gyroweisia tenuis* does not occur in North America, reports of it being due to errors of identification.
3. *Gyroweisia Barbula*, *G. barbulacea*, and *G. obtusifolia* from tropical or subtropical North America do not belong in this genus (*Weisiodon*).
4. I have expressed the subjective opinion, backed by no detailed statement of facts, that if *Weisiodon* is to be extended beyond the original European (and North African) application, it should most naturally include the moss known as *Didymodon tophaceus* and related forms.

ITHACA, N. Y.

A PRELIMINARY REPORT ON THE LICHENS OF WESTERN PENNSYLVANIA

GIOVANNI I. GIARDINI

In connection with my candidacy for the degree of Master of Science in the University of Pittsburgh, my thesis was written on the Lichens of Western Pennsylvania. The following annotated list presents briefly the main results of this study.¹

¹ An examination of Mr. Giardini's list emphasizes that the lichen flora of the region embraced is very imperfectly known. Many of the species are represented by but a single collection and one can but wonder how many more species are here but have so far been overlooked. It is not at all improbable that, with the wanton denudation and waste of much of our area that was once densely forested, the lichen flora is radically changed and probably is actually increasing in number of species. A large number of the Lichens are preeminently pioneers in denuded or bare habitats, such as bare soil and rock, and it is certain that the extent of this kind of habitat at least has been much enlarged. Our *Cladonia* flora, at least, has a much more extended area suitable for it

The specimens reported in the following list are all in the Herbarium of the Carnegie Museum, where most of the work on my thesis was done. Many of the specimens were named a few years ago by Mr. G. K. Merrill, the Usneas having been named by Dr. R. Heber Howe, Jr. Of the other specimens reported on in this list, about half of the total number, the identifications were accomplished during the course of my studies, and, of these latter specimens, about half were examined and checked-over by Prof. C. C. Plitt, to whom many thanks are due. A few specimens which did not appear in my thesis are included in the following list:

1. *Endocarpon aquaticum* A. Zahlbr., Krypt. Exsicc. 1901. On more or less submerged rocks or on earth. Cheat Haven, Fayette Co., Sept. 3, 1910, O. E. and G. K. Jennings.
2. *Endocarpon aquaticum euplocum* (Ach.) A. L. Sm. On blocks of Homewood Sandstone at the bottom of the Conoquenessing Gorge below Ellwood City, Beaver Co., Oct. 3, 1914, O. E. Jennings.
3. *Dermatocarpon miniatum* (L.) Th. Fr., Lich. Art. 1860. On a limestone out-crop near Van Emmon, Washington Co., April, 1922, O. E. Jennings.
4. *Amphiloma lanuginosum* (Hoffn.) Nyl., Soc. Linn. Bord. 1856. On rocks, trees and more rarely on soil. This is probably the most prominent lichen in the Pittsburgh district. It has been collected also in the following counties: Erie, Crawford, Fayette, and Butler, various collectors. No doubt it occurs in the other counties as well.
5. *Graphis scripta* (L.) Ach., Lich. Univ. 1816. On black oak, Pymatuning Swamp, Linesville, Crawford Co., June 11, 1907, O. E. Jennings.
6. *Coenogonium interpositum* Nyl. On limestone in the spring at Bedford Springs, Bedford Co. (not submerged), O. E. Jennings. This particular locality is well sheltered, so that changes of temperature thruout the year are, comparatively, within a small range. Otherwise, most species of this genus are tropical or semitropical according to most reports. It has been reported from West Virginia from about the same latitude.²
7. *Biatorella simplex* (Dav.) Br. & Rostr., Tidssk. 3: 241. 1869. On sandstone with *Lecidea albocoerulescens*, Falls Run, Glenshaw, Allegheny Co., O. E. Jennings, Sept. 17, 1921.
8. *Lecidea contigua* Fr., Sched. Crit. Lich. Exsicc. Suec. 13: 14. 1827. On sandstone boulder in ravine across river from Johnetta, Armstrong Co., O. E. Jennings, Oct. 3, 1921; Fern Hollow, Pittsburgh, Allegheny Co., G. I. Giardini, Nov. 25, 1921.
9. *Lecidea contigua hydrophila* Fr., Lich. Fur. p. 300. 1831. On sandstone Ohio Pyle, Fayette Co., O. E. & G. K. Jennings, Sept. 1-3, 1906.

than was the case before deforestation, and it seems to have occupied the cleared idle lands much as has *Crataegus* among the flowering plants. Here is a good problem for some one to work out—Is our lichen flora increasing, and if so, how?—O. E. JENNINGS

²"Growing with thallus of a *Cladonia*. Fayette: near Quinimont (Pollard & Maxon, 141, sterile."—C. F. Millspaugh, The Living Flora of West Virginia. W. Va. Geol. Surv. 5 : A: Pl. I: 159. 1913.

10. *Lecidea albocoerulescens* (Wulf.) Schaer., Lich. Helv. Spic. 3: 142. 1828. On sandstone in bed of creek, Falls Run, Glenshaw, Allegheny Co., O. E. Jennings, Sept. 17, 1921.
11. *Lecidea confluens* (Ach.) Schaer., Spicil. p. 144; Lich. Helv. n. 187. On sandstone in stream bed, near Clarion, Clarion Co., O. E. Jennings & W. H. Emig, Sept. 4, 1921; on sandstone block in bed of Falls Run, Glenshaw, Allegheny Co., O. E. Jennings, Sept. 17, 1921. This species is a native of alpine and arctic regions and for this reason, Prof. Plitt, who has seen at least one of the specimens, is somewhat doubtful about the determination.
12. *Baeomyces roseus* Pers., Ust. Ann. Bot. 1794. Mostly on clay soil under various conditions; common along roadside banks and slopes. It has been reported from several counties, namely: Westmoreland, Cambria, Fayette, Armstrong and Clarion, various collectors.
13. *Cladonia rangiferina* (L.) Web. Wig. Prim. Fl. Hols. 90, 1780, pro parte. Mostly on humus. In Bedford Co., near Bedford Springs, it occurs on a limestone field with pines, Kalmia, and Polytrichum, Sept. 13, 1919, O. E. Jennings; and there are three different collections by O. E. Jennings from sand-plain, Presque Isle, Erie County.
14. *Cladonia sylvatica laxiuscula* (Del.) Wain., Mon. Clad. Univ. 1: 29. 1887. On soil from Morris Farm, Ohio Pyle, Fayette Co., May 30-31, 1908, O. E. Jennings; and from near Carnot, Allegheny Co., J. A. Shafer, 1888-9.
15. *Cladonia bacillaris clavata* (Ach.) Wain., Mon. Clad. Univ. 1: 1887. On dead wood with *Cladonia ochrochlora ceratodes*. Ohio Pyle, Fayette County, O. E. & Grace K. Jennings, Sept. 1-3, 1906.
16. *Cladonia macilenta* Hoffm., Deutsch. Fl. 2: 126. 1795. On humus, Slippery Rock Creek, Lawrence Co., Miss Susan Gageby, 1906.
17. *Cladonia coccifera* (L.) Willd. Fl. Berol. Prodr. 361. 1787. On soil, Kittanning, Armstrong Co. This is a rather doubtful specimen.
18. *Cladonia cristatella* Tuck., Amer. Jour. Sci. 25: 428. 1858. Common on dead wood, often found on humus or soil. This is a very common form, having been reported from different counties. In Erie County it is found on the sand plains of Presque Isle. It has been found also in Allegheny, Lawrence, Jefferson, Fayette, Elk, Crawford, Blair, Center, Somerset, Washington, Armstrong, and Butler counties. It is probably one of our most common species. Often it occurs with other forms, such as *C. ochrochlora ceratodes*, *C. pyxidata neglecta*, and *C. caespiticia*.
19. *Cladonia cristatella vestita* Tuck., Syn. N. A. Lich. 1: 255. 1882. Commonly on soil. Nixon Sta., Butler Co., Feb. 3, 1917, and Wildwood, Allegheny Co., Aug. 18, 1919, both Wm. Millward; Rachelwood (Mellon Estate), Laurel Hill Mt., New Florence, Westmoreland Co., Sept. 8-11, 1907, O. E. Jennings; and VanEmman, Washington Co., April, 1922, O. E. Jennings.

20. *Cladonia didyma* (Fee) Wain. Mon. Clad. Univ. 1: 137. 1887. One specimen on old wood on moss, Ohio Pyle, Fayette Co., O. E. & G. K. Jennings.
21. *Cladonia pulchella* Schwein. One specimen only in the collections: On old wood together with mosses, Morris farm, Ohio Pyle, Fayette Co., O. E. & Grace K. Jennings, Sept. 1-3, 1907. Determined by Mr. G. K. Merrill who indicated on the label his belief that this species belongs, as a variety, to *C. didyma*.
22. *Cladonia furcata* (Hud.) Schrad., Spic. Fl. Germ. 107. 1794. Commonly occurring on rich soil and with mosses, more rarely on clay and sandy soil. The specimens are from several counties, namely: Washington, Armstrong, Butler, Allegheny, Center, Clinton, and Lawrence.
23. *Cladonia furcata racemosa* (Hoffm.) Flk., Clad. Comm. 152. 1826. Commonly on humus and with mosses, sometimes with *C. furcata*, as in the specimen from Tussey Mt., near Shingletown, Center Co., July 15, 1909, O. E. Jennings; also specimens from Carnot, Allegheny Co., J. A. Shafer 1888-89, and Pymatuning Swamp, Linesville. Crawford Co., May 18, 1905, O. E. Jennings.
24. *Cladonia furcata pinnata* (Flk.) Wain., Act. Soc. Faun. Fl. Fenn. 4: 332. 1887. Stoops Ferry, Allegheny Co., Oct. 7, 1905, O. E. Jennings and G. E. Kinzer; Idlewild, Westmoreland Co., Sept. 24, 1907, O. E. Jennings; and five different collections from Fayette County.
25. *Cladonia squamosa denticollis* (Hoffm.) Flk.; (Scop.) Hoffm. Deutsch. Fl. 2: 125. 1796. Old wood with *C. cristatella*, Somerset Co., D. R. Sumstine. Aug. 8, 1906.
26. *Cladonia squamosa squamosissima* Flk. Common on dead wood and humus. Our specimens come from Somerset, Westmoreland and Fayette Counties. Sometimes it is difficult to distinguish between this and *C. cristatella vestita*, especially if the specimens are infertile. Determined by Mr. G. K. Merrill.
27. *Cladonia caespiticia* (Pers.) Flk., Clad. Comm. 8. 1828. Occurring with a moss on soil, Ohio Pyle, Fayette Co., Sept. 1-6, 1906, O. E. & G. K. Jennings; and with *C. cristatella*, Pymatuning Swamp, Linesville, Crawford Co., June 11-12, 1907, O. E. Jennings.
28. *Cladonia delicata* (Ach.) Flk., Clad. Comm. 7. 1828. One specimen found on Birch tree, Keystone, Somerset Co., Oct. 9, 1904, O. E. Jennings.
29. *Cladonia turgida* Hoffm., Deutsch. Fl. 2: 127. 1795. One infertile specimen on clay soil, from Morris Farm, Ohio Pyle, Fayette Co., O. E. & G. K. Jennings, Sept. 1-3, 1906.
30. *Cladonia mitrula* Tuck., Darl. Fl. Cestr. ed. 3: 444. 1853. One specimen from the sand plain of Presque Isle, Erie Co., June 9-11, 1905, O. E. Jennings.
31. *Cladonia cariosa* (Ach.) Spreng., Syst. Veg. 4: 272. 1827. On soil. Reported from Nixon Station, Butler Co., and Wildwood, Allegheny Co., Aug. 19, 1919, Wm. Millward.

32. *Cladonia subcariosa* (Nyl.) Wain., Mon. Clad. Univ. 2: 38. 1904. A single specimen occurring on soil from Coraopolis, Allegheny Co., Sept. 9, 1905, O. E. Jennings and Grace E. Kinzer.
33. *Cladonia ochrochlora ceratodes* Flk., Clad. Comm. 77. 1828. On soil, bark or dead wood. This is probably the most common *Cladonia* so far reported. In Allegheny County it is commonly found on thin soil on rocks. One specimen from Crawford County was found on *Larix*. In Erie County it occurs on the sand-plains of Presque Isle. One specimen from Fayette County occurred on base of *Quercus velutina*. It was also found growing with *C. bacillaris clavata* and in another case with *C. ochrochlora truncata*. It has been collected also at various places in Butler, Beaver, Jefferson, Westmoreland, Washington, Center, Crawford, Somerset, and Armstrong counties.
34. *Cladonia ochrochlora truncata* Flk., Clad. Comm. pp. 77, 78. 1828. On soil and dead wood. It grows under conditions much similar to those of the preceding. Stoops Ferry, Allegheny County, O. E. Jennings & Grace E. Kinzer, Oct. 7, 1905, and Presque Isle, Erie County, June 9-11, 1905, O. E. Jennings.
35. *Cladonia verticillata* Hoffm., Deutsch. Fl. 2: 122. 1795. On soils of various types: humus, clay, and sand. The specimens are from Bedford, Butler, Crawford, Allegheny, Fayette, Erie and Armstrong Counties.
36. *Cladonia pyxidata* (L.) Hoffm., Deutsch. Fl. 2: 121. 1795. On dead wood and humus. It is less common than the varieties which follow and thus far has been collected only in the following places: Brookville, Jefferson Co., A. R. Hillard, March, 1917; and by Wm. Millward at Nixon Station, Butler Co., Feb. 3, 1917, and Wildwood, Allegheny Co., Aug. 18, 1919.
37. *Cladonia pyxidata neglecta* (Flk.) Mass. Usually on earth rich in humus. Occurred with *C. ochrochlora ceratodes* in Bedford County and with *C. cristatella* in Allegheny County. Specimens were examined from the following counties: Allegheny, Beaver, Bedford, Butler, Cambria, Crawford, Center, Erie, Fayette, Somerset, Washington, and Westmoreland.
38. *Cladonia pyxidata chlorophea* (Spreng.) Flk., Cl. Comm. 70. 1828. On rich soil usually. In Allegheny Co., it has been found growing with *Parmelia* and in Bedford Co. with *C. verticillata*. Specimens have been collected also in Washington, Butler, Huntingdon and Armstrong Counties.
39. *Cladonia pyxidata staphylea* Mudd., Britt. Clad. p. 7, pro parte. On dead wood, Erie Co., Gustave Guttenberg, 1878-79. The determination is doubtful.
40. *Cladonia fimbriata apolepta* (Ach.) Wain., Act. Soc. Faun. Fl. Fenn. 10: 307. 1894. On humus; a single specimen from Wildwood, Allegheny Co., Wm. Millward, July 14, 1919.
41. *Cladonia fimbriata fibula* Nyl., ex. Norrl. in Med. Saellk. Faun. & Fl. Fenn. 1: 12. 1876. A single specimen on dead wood, from near Somerset, Somerset Co., D. R. Sumstine, Aug. 8, 1906.

42. *Gyrophora Muhlenbergii* Ach. Lich. Univ. 227. 1810. Single specimen occurring on rock from Somerset, Somerset Co., D. R. Sumstine, Aug. 8, 1906. Mr. G. K. Merrill in 1914 determined this specimen as an unnamed variety.
43. *Gyrophora Dillenii* (Tuck.) Arn., Oesterr. Bot. Zeitschr. 1896: 16. 1896. On rocks. Specimens have been collected in four counties: Crawford, Westmoreland, Fayette (numerous specimens), and Franklin.
44. *Umbilicaria pustulata* (L.) Hoffm., Descr. Pl. Crypt. 2: 13. 1794. A single specimen on rocks from the top of Stony Mt., Mt. Alto, Franklin Co., April 23, 1919, O. E. Jennings.
45. *Umbilicaria pustulata papulosa* (Ach.) Tuck., Syn. Lich. N. E. 70. 1848. On sandstone rocks, Wills Mt., near Hyndman, Bedford Co., Oct. 9, 1904, O. E. Jennings, growing together with *Gyrophora Dillenii*; exposed sandstone rocks on brow of Chestnut Ridge, east of Hillside, Westmoreland Co., O. E. Jennings and others, May 25, 1907, and Oct. 11, 1917.
46. *Pannaria rubiginosa* (Thunb.) Del., in Bory. Dict. Class. Nat. Hist. 13: 20, 1828. Only one specimen in the collections: Bark of *Fraxinus nigra*, along shore of Conneauttee Lake, Edinboro, Erie Co., June 22, 1919, O. E. Jennings and J. C. Fetterman.
47. *Sticta amplissima* (Scop.) Mass., Mem. Lich. 28. 1853. On tree trunks and twigs, rarely on humus. In Center County it was found on Chestnut; in Crawford County on *Fraxinus nigra*; in Fayette County on Red oak; in Allegheny County on humus with *Parmelia rudecta*; and on tree bark, Westmoreland County.
48. *Sticta pulmonaria* (L.) Schaer., Enum. Lich. Eur. 30. 1850. On bark near Carnot, Allegheny Co., J. A. Shafer, 1888-9. (Pr. parte f. *hypomela*.—G. K. Merrill).
49. *Nephroma resupinata* (L.) Ach., Lich. Univ. 522. 1810. No data of habitat; probably on rock. This single specimen was collected by Kate Stoy in Nov. 1889, Chestnut Ridge, near Latrobe, Westmoreland County.
50. *Peltigera aphthosa* (L.) Willd., Fl. Berol. Prodr. 347. 1787. Commonly on moss and humus. In Washington County it has been found growing together with *P. canina*. Other counties represented by specimens are: Allegheny, Fayette, Westmoreland, Clearfield, Mercer and Greene.
51. *Peltigera horizontalis* (L.) Hoffm., Deutsch Fl. 2: 107. 1795. On moss and humus, Ohio Pyle, Fayette Co., Sept. 10, 1905, O. E. Jennings and G. E. Kinzer, and Sept. 1-3, 1906, O. E. & G. K. Jennings.
52. *Peltigera polydactyla* (Neck.) Hoffm., Deutsch. Fl. 2: 106. 1795. A single specimen from the Pymatuning Swamp, Linesville, Crawford Co., occurring on dead wood and mosses, May 18-19, 1905, O. E. Jennings.
53. *Peltigera canina* (L.) Hoffm., Deutsch. Fl. 2: 106. 1795. Commonly occurring with mosses on dead wood or humus, in more or less shaded habitats. About 30 different collections from Allegheny, Fayette, Huntingdon, Washington, Clearfield, Mercer, Greene, Crawford, Westmoreland, Cambria, Armstrong, and Clinton counties.

54. *Peltigera canina membranacea* Ach., Syn. Lich. Univ. 518. 1810. There are two counties represented: At the base of a stump in Pymatuning Swamp, Linesville, Crawford Co., May 10-11, 1906, and June 11-12, 1907, O. E. Jennings; and on earth, with mosses, Ohio Pyle, Fayette Co., O. E. Jennings, May 12, 1905.
55. *Peltigera spuria* DC., Fl. Franc. 2: 406. 1805. A single specimen on soil from the Pymatuning Swamp, Hartstown, Crawford Co., July 19, 1906, D. R. Sumstine.
56. *Lecanora pallida* (Schreb.) Schaer., Enum. Lich. Em. 78. 1850. On trees. Our one specimen comes from Somerset, Somerset Co., collected by D. R. Sumstine, Aug. 8, 1906.
57. *Lecanora subfusca* (L.) Ach., Lich. Univ. 393. 1810. A single specimen from Ohio Pyle, Fayette Co., June 18, 1905, O. E. Jennings and G. E. Kinzer. It was found on *Hicoria alba* together with *Lecidea disciformis* Nyl.
58. *Lecanora varia* (Hoffm.) Ach., Lichen. Univ. 377. 1810. On trunk of *Pinus Strobus*, Presque Isle, Erie Co., May 8-9, 1906, O. E. Jennings.
59. *Lecanora gibbosa* (Ach.) Nyl., Not. Saellsk. Faun. & Fl. Fenn. Foehr. 137. 1866. On sandstone, on hillside, Fern Hollow, Pittsburgh, Allegheny Co., Nov. 25, 1921, G. I. Giardini.
60. *Parmelia perlata* (L.) Ach., Meth. Lich. 216. 1803. On humus, Nixon Station, Butler Co., Wm. Millward, Feb. 3, 1917; Ohio Pyle, Fayette Co. O. E. and G. K. Jennings, Sept. 1-3, 1906; Pymatuning Swamp, Crawford Co., May 18, 1905, O. E. Jennings.
61. *Parmelia perforata hypotropa* Nyl., Syn. Meth. Lich. 1: 378. 1859. A single specimen from Nixon Station, Butler Co., on rocks, Wm. Millward, Feb. 3, 1917.
62. *Parmelia dubia* (Wulf.) Schaer., Enum. Lich. 45. 1850. Commonly on trees. It was found on *Quercus velutina* on Presque Isle, Erie Co., June 9-11, 1905, O. E. Jennings, and on different trees in Allegheny County.
63. *Parmelia rudecta* Ach., Syn. Meth. Lich. 197. 1814. Usually on trees, rarely on dead wood and mosses. On *Quercus velutina*, Presque Isle, Erie County, Aug. 26, 1905, O. E. Jennings; on *Betula lenta*, in Pymatuning Swamp, Linesville, Crawford Co., May 18, 1905, O. E. Jennings; on *Robinia*, Ohio Pyle, Fayette Co., Sept. 1-3, 1906, O. E. & G. K. Jennings; also represented by various specimens from Allegheny, Butler, and Westmoreland counties.
64. *Parmelia saxatilis* (L.) Ach., Meth. 204. 1803. On *Betula lenta*, Pymatuning Swamp, Linesville, Crawford Co., May 18, 1905, O. E. Jennings; growing mixed with *Ramalina caperata*, Ohio Pyle, Fayette Co., Sept. 1-3, 1906, O. E. & Grace K. Jennings.
65. *Parmelia sulcata* Tayl., Mack. Fl. Hiber. 2: 145. 1865. Commonly on bark, rarely on earth. Somerset, Somerset Co., Aug. 8, 1906, D. R. Sumstine; and Wolf Creek, near Slippery Rock, Butler Co., S. H. Williams,

- March 21, 1921; growing mixed with *Parmelia caperata*, Conneaut Lake Park, Crawford Co., July 17, 1906, D. R. Sumstine.
66. *Parmelia physodes* (L.) Ach., Meth. Lich. 250. 1803. On bark and twigs. A specimen from Pymatuning Swamp, Linesville, Crawford Co., May 18, 1905, O. E. Jennings, consisted of a mixture growing together of *P. physodes*, *P. caperata*, and *Cetraria lacunosa*. Collected again from the same locality June 12, 1905, O. E. Jennings; another found on *Larix*, May 10-11, 1906, consisted of *P. physodes*, *Cetraria lacunosa* and *Evernia furfuracea*. Another specimen was found in Somerset Co.
67. *Parmelia caperata* (L.) Ach., Meth. Lich. 216. 1803. Commonly on bark rarely on humus. In Fayette County it was collected on *Juglans cinerea*; in Somerset County, on *Betula lenta*; in Erie County, on *Quercus velutina* and *Populus deltoides*; in Crawford County it occurred with *P. sulcata*, while in Allegheny it has been found on humus with *P. saxatilis*. It has been collected also from Westmoreland, Huntingdon and Butler counties.
68. *Parmelia conspersa* (Ehrh.) Ach., Meth. Lich. 205. 1803. On sandstone, Montrose, Allegheny Co., Sept. 21, 1905, O. E. Jennings; Bellwood, Blair Co., May 18, 1904, O. E. Jennings; and Somerset, Somerset Co., Aug. 8, 1906, D. R. Sumstine.
69. *Parmelia Nilghertensis* Nyl. No data of habitat, but probably on rock, Pymatuning Swamp, Linesville, Crawford Co., May 18-19, 1905, O. E. Jennings. Determined by Mr. G. K. Merrill.
70. *Cetraria ciliaris* Ach., Lich. Univ. 508, 1810. On bark, Pymatuning Swamp, Crawford Co., June 12, 1905, O. E. Jennings, and Stormstown, Center Co., Apr. 2, 1902, Miss H. E. Wilson.
71. *Cetraria lacunosa* Ach., Meth. Lich. 295. 1803. A single specimen found on *Larix* in Pymatuning Swamp, Linesville, Crawford Co., May 18, 1905, O. E. Jennings.
72. *Evernia furfuracea* (L.) Mann., Livh. Bohem. 105. 1826. On *Larix* with *Parmelia physodes* and *Cetraria lacunosa*, Pymatuning Swamp, Linesville, Crawford Co., May 10-11, 1906, O. E. Jennings.
73. *Evernia furfuracea olivetorina* Lopfh. On *Larix*, Pymatuning Swamp, Crawford Co., May 18, 1905, O. E. Jennings. Determined by Mr. Merrill.
74. *Ramalina calicaris subampliata* Nyl., Bull. Soc. Linn. Norm. ser. 2, 4: 132. 1870. On twigs, Presque Isle, Erie Co., Aug. 26, 1905, O. E. Jennings. Merrill named this *Ramalina subampliata*.
75. *Usnea florida* (L.) Web., Wigg. Prim. Fl. Hols. 91. 1780. On trees and twigs. In Pymatuning Swamp, Linesville, Crawford Co., in mixture with *Parmelia* (*Evernia*) *furfuracea* var. *Cladonia* and *Parmelia physodes*, May 18, 1905, O. E. Jennings; same location on *Larix*, May 10-11, 1906, O. E. Jennings; on oak tree on top of Bald Eagle Ridge, Center Co., near Matternville, Sept. 20, 1909, O. E. Jennings; Jefferson Co., Kate Stoy.
76. *Physcia speciosa* (Wulf.) Nyl., Act. Soc. Linn. Bord. 21: 307. 1856. On bark, Nixon Station, Butler Co., Wm. Millward, Feb. 3, 1917.

77. *Physcia pulverulenta* (Schaer.) Nyl., Act. Soc. Linn. Bord. **21**: 308. 1856. A single specimen occurring on moss, on humus, near Coraopolis, Allegheny Co., Sept. 9, 1905, O. E. Jennings and G. E. Kinzer.
78. *Physcia pulverulenta leucoleiptes* Tuck., Syn. Lich. N. E., 32. 1848. On humus Montrose, Allegheny Co., Sept. 21, 1905, O. E. Jennings.
79. *Physcia stellaris* (L.) Nyl., Syn. Meth. Lich. **1**: 424. 1858. On trees, Nixon Station, Butler Co., Wm. Millward, Feb. 3, 1917, and on *Populus deltoides*, Presque Isle, Erie Co., four different collections, O. E. Jennings.
80. *Physcia tribacia* (Ach.) Nyl., Fl. **64**: 537. 1881. On trees. Presque Isle Erie Co., on *Populus deltoides* with *Ph. stellaris*, Sept. 20–22, 1906, O. E. Jennings, and Linesville, Crawford Co., Aug. 3, 1909, O. E. Jennings.
81. *Physcia obscura endochrysea* (Hampe) Nyl., Act. Soc. Sci. Fenn. **7**: 440. 1863. A single specimen on bark with *Cladonia ochrochlora ceratodes*, from Idlewild, Westmoreland Co., Aug. 10, 1906, D. R. Sumstine.
82. *Physcia obscura virella* (Ach.) Cromb., Grv. **20**: 78. 1887. On bark with *Amphiloma*, Conneaut Lake Park, Crawford Co., July 18, 1906, D. R. Sumstine.

PITTSBURGH, PA.

REVIEWS

István Gyorfy.—*A Molendoák fajai tagolódása és rokonsága összehasonlító anatómiai és fejlődéstani vizsgálatok alapján.* (A. M. T. Akadémia III osztályának 1921 január 17.—én tartott üléséből).

The above reprint, bearing the pagination 345–351, I have through the kindness of Mr. Chamberlain been able to examine, the work dealing with a genus of mosses, *Molendoa*, which I have, also, been studying. It is a Hungarian announcement of the author's "*Versuch einer Monographie der Gattung Molendoa*," upon the preparation of which he has been engaged some seventeen or eighteen years and which is now pretty well finished. Some of the essential results are here outlined in advance in the author's admirably objective and thoroughly scientific manner. Ten previously described species are apparently to be recognized, in addition to seven new ones mostly credited to Brotherus. The latter, which are here *nomina nuda*, include *M. obtusifolia* Broth. twice, in the one case doubtless a slip for some other name. The author discusses the nature of a species, but without dogmatism. He is inclined to conceive of it as a series or rather group of forms clustered about a typical center. Uncommon forms lying toward the periphery of the enclosing circle may be transition-forms to the next species; that is, the two species-circles may slightly overlap. In this way he notes three transition-varieties connecting the three European species of *Molendoa* with one another and includes a diagram illustrating the relationship of all European forms recognized. He also speaks of forms which seem to lie somewhat between *Molendoa* and *Hymenostylium*, but rejects the idea that they

might be hybrids or that the two genera belong together, though he is convinced that *Molendoa* lies closer to *Hymenostylium* than to *Anoetangium*, in which its species have frequently been placed. No one is at present likely to dispute this last contention, but the species have not yet been distributed clearly and finally among the three genera and all too many species of both *Hymenostylium* and *Anoetangium* have been and are still being described. It is to be hoped and expected that Györffy's monograph will cast a beam of light into this very dark region of the moss-system.

A. LEROY ANDREWS

NOTES ON CURRENT BRYOLOGICAL LITERATURE

W. E. NICHOLSON.—*Southbya nigrella* (DeNot.) Spr. in Britain. (Journ. Bot. 60: 67-69. 1922.)—This Mediterranean species was found by the author in a disused quarry at Portland, Dorsetsh. A detailed description and comparative remarks are appended.

ISTVAN GYÖRFFY.—*Miscellanea bryologica Hungarica*. I-V. (Botanikai Közlemények. 1920. xix. pp. 7-16. Pl.)—The article, which is in Hungarian, reports the occurrence of *Cladosporium herbarum* on several species of mosses from Hungary; describes and figures the role played by the waxy secretion in *Saelania caesia* Lind.; reports new localities for *Aulaacomnium turgidum* Schwaegr. *Conostomum tetragonum* Lindb., and *Bucegia romanica* Rad. in the Tatra.

CH. MEYLAN.—*Nouvelles contributions à la flore bryologique du Jura*. (Revue bryologique 48: 1-5. 1921.)—A record dealing with some 30 species for which new localities are announced in the Jura. A new form (*f. stricta*) is proposed for *Neckera crispa*, and *Thuidium abietinum* var. *paludosum* proposed as new.

CH. MEYLAN.—*Une variété nouvelle de Scorpidium scorpioides*. (Revue bryologique 48: 5. 1921.)—*Scorpidium scorpioides* var. *cuspidatum* Mey. from Switzerland is proposed as new.

R. POTIER DE LA VARDE.—*Observations sur quelques espèces du genre Fissidens*. VI. *A propos du Fissidens Mildeanus Schp.* (Revue bryologique 48: 5-9. fig. 1-3. 1921.)—The author collected *Fissidens Mildeanus* in La Manche, and found specimens bearing the bulb-like hairs among the paraphyses and the rhizoids which Limpricht describes. These bodies the author considers propagula.

R. POTIER DE LA VARDE.—*Hildebrandtiella Soulii Broth. et P. de la V.* (Revue bryologique 48: 9-11 fig. 1-7. 1921.)—A description and figure of a new species from the Tanganika region, Africa, with a list of six other forms from the same region. Also the author notes that the name *Weissia viridula* var. *longifolia* Thér. et P. de la V. should be changed to var. *macrophylla* on account of earlier homonym.

H. N. DIXON.—*The Mosses of the Wollaston Expedition to Dutch New Guinea, 1912-13; with some additional Mosses from British New Guinea*. (Journ. Linn.

Soc. Bot. 45: 477-510. pls. 28, 29. 1922.)—A brief introduction discusses the opportunity for the study of “discontinuous distribution” afforded by the New Guinea flora, and its decidedly endemic character. The Wollaston Mosses comprise some 35 different forms, the following being proposed as new: *Bryum papuanum* Dix., *Hymenodontopsis rhizogonioides* Dix., *Breutelia longicapsularis* Dix., *Pogonatum Klossii* Dix., *Dawsonia crispifolia* Dix., *D. limbata* Dix., *Chaetomitrium laevisetum* Dix., *C. perlaeve* Dix., *Thuidium scabribracteatum* Dix., *Ectropothecium dentigerum* Dix., *E. aureum* Dix., *E. laxirete* Dix., *Trichostelium capillarisetum* Dix., *Hypnodendron parvum* Dix.; and the following new combinations: *Thysanomitrium Blumii* (D. & M.) Dix., *Plagiotheciopsis oblonga* (Broth.) Broth., *Sematophyllum leptocarpon cylindricum* (R. & H.) Dix.; the new subgenus *Leiocarpos* is also proposed in *Hypnodendron*. Further, a key and discussion is given for all New Guinea species of *Dawsonia*, with an abundance of critical notes on other species. The circumstances attending the publication of Herzog’s *Hymenodontopsis* are also mentioned.—The second part of the article lists 48 species of mosses from the Port Moresby District, Brit. New Guinea, with many notes and synonyms. *Campylopus subcomosus* Dix., *Leucobryum cyathifolium* Dix., *Syrrophodon durigolensis* Dix., ?*Rhizogonium orbiculare* Dix., *Pterobryella papuensis* Dix., *Acanthocladium Clarkii* Dix., *Trichosteleum grosso-mamillosum* (C. Mull.) Par. ined., *T. sematophylloides* Dix., *Sematophyllum flagelliferum* Dix., *S. roseum* Dix., are proposed as new, and *Leucobryum candidum speirostichum* (C. Mull.) Dix., as a new combination.

H. N. DIXON.—*Rhacopilopsis trinitensis* Britt. & Dixon. (Journ. Bot. 60: 86-88. 1922.)—A careful study of original material shows that *Hypnum trinitense* C. M. is the same as *Ectropothecium trinitense* Mitt., *Hypnum chlorizans* Welw. & Duby, and *Hypnum Pechuelii* C. M. The original descriptions of Mueller and Mitten, as far as fruiting plants went, seem to have been based on mixed material; no constant differences were to be found between the African plants described by Mueller under *Hypnum* sect. *Dimorphella*, and the Trinidad-Guiana material.

H. N. DIXON.—*Some new Genera of Mosses*. (Journ. Bot. 60: 101-110. Pl. 564. 1922.)—The article describes and figures seven species, each representative of an undescribed genus; there is also a key to the genera of Funariaceae, bringing up to date that given by Brotherus in Engler & Prantl. The new genera and species are, family names being in parentheses: *Nanobryum Dummeri* Dix. (Dicranaceae) from Uganda and Cape Province, *Chionoloma induratum* (Mitt.) Dix. (Pottiaceae-Trichostomeae) from Burmah, *Beddomiella funarioides* Dixon (Pottiaceae-Pottiace) from Nilgheri Mts., *Ædipodiella australis* (Wager & Dix.) Dixon (Ædipodiaceae) from Natal, *Chamaebryum pottioides* Thér. & Dix. (Funariaceae) from Cape Town, *Physcomitrellopsis africana* Broth. & Wager (Funariaceae) from Natal, *Dimorphocladon bornense* Dixon (Hookeriaceae) from Sarawak.

N. MALTA.—*Zur Verbreitung von Zygodon conoideus* (Dicks.) Hook. et Tayl. (Acta universitatis latviensis 2: 97-102. Fig. 1-2, and tab. col. unnumbered. 1922.)

—Limpricht erred in referring to *Zygodon Fosteri* (Dicks.) Mitt. Prahl's material from Schleswig. This, and Warstorff's *Z. viridissimus* var. *brevifolius*, and C. Jensen's material from Jutland, are all *Z. conoideus*, which is an "Atlantic species" occurring from Norway to Spain. The ripe brood-bodies of the various species furnish a reliable means of differentiation, as they differ both in shape and color. *Z. viridissimus* has a Mediterranean form simulating *conoideus*. *Z. Fosteri* is not closely related to the others. A colored plate illustrates the various brood-bodies.

MISCELLANEOUS NOTES

We are informed that the herbarium of the late Peter Jansen of Eisenach is for sale. This herbarium consists of two parts:—first, a working herbarium of the Mosses of central Europe, all forms save the rarest being represented by a selected specimen, no duplicates, with many specimens from noted students. Mica mounts accompany nearly all specimens, and in addition there is a very full set of drawings made from the specimens, representing the material published by Jansen in *Hedwigia*, Loeske's *Grimmiaceae* and *Iconographie*, and the *Lebermoose* of Rabenhorst's *Flora*. This portion of the herbarium fills 42 quarto cases. The second part contains most of the species mentioned in Limpricht, with many examples of each, all arranged in folio, and occupying about 18 x 2 feet. This herbarium was used for exchange and study.—E. B. C.

We have also learned that the collection of ten to twelve thousand copies of Stephani's original drawings of *Hepaticae*, made by his daughter is for sale. The originals belong to the Boissier Herbarium. The copies are pencil tracings with appropriate data. For further information regarding either collection address Dr. Johannes Buder, University Botanical Institute, Leipzig, Germany, or Dr. A. W. Evans, Yale University, New Haven, Conn.—E. B. C.

For those who are looking for a convenient holder for safety-razor blades for sectioning purposes we would recommend communication with the Gits Company, 5512 Potomac Ave., Chicago, Ill. The contrivance makes of the razor-blade a convenient pocket knife easy and safe to manipulate and inexpensive, \$1.20 per dozen.—O. E. J.

WORLD METRIC STANDARDIZATION.—A conference on World Metric Standardization was held at the Carnegie Institute of Technology, Pittsburgh, Pa., September 6, 1922, in connection with the meetings of the American Chemical Society. At this meeting twenty-seven national scientific societies were represented by delegates. The Secretary has already published a report of the proceedings.¹ Physicists, chemists, and pharmacists reported that in their fields the metric system is already in general use. Medical men, however, "reported a surprising inertia on the part of physicians to make use of gram and milligram

¹ W. V. Bingham. *Science*, N. S. **56**: 362. Sept. 29, 1922.

units instead of apothecaries' weight in writing prescriptions, although metric units are used in recent editions of the Pharmacopeia." Civil engineers and architects are content to use inches, feet, and miles until the public demands a change.

After discussions and readings of papers the convention adopted the following resolutions:²

It is the sense of this meeting that we favor the gradual adoption of the metric system wherever practicable.

It was voted that this body take up with the United States Bureau of Education and other agencies, a plan for the better teaching of the metric system in the schools.

Voted, that the United States Secretary of Commerce be asked to secure information as to the extent to which the metric system is actually used at present in those countries which have made its use compulsory by law; and also in those countries where its use is not obligatory.

Voted, that the system of double-marking (in both metric and old system) all goods be encouraged. (This vote was adopted by only a small majority.)

O. E. JENNINGS, Delegate from S. M. S.

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² *Loc. cit.*

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