

In the following summer, 1909, I had the pleasure of revisiting this station, in the company of our fellow member, Mr. Charles Schweinfurth, and in finding the trees in full bloom. Specimens were collected by each of us. I cite the one preserved in my herbarium, with corrected data: woods, one mile west of Chase Farm, Albany, Carroll County, New Hampshire, July 26, 1909, *H. St. John*, no. 170.

Chase Farm is most easily accessible from Conway, lying about two miles southeast by east from that village. This station for the *Rhododendron* is worthy of record not simply because it lies about six miles to the northeast of those recorded by Prof. Farlow, but because the trees were in such thriving condition and so thoroughly at home. It lies in the valley of the Swift River, in the township of Albany, instead of Conway, as I supposed at the time, and just within the boundaries of the new White Mountain National Forest.

CAMBRIDGE, MASSACHUSETTS.

NOTES ON NEW ENGLAND HEPATICAE,—XIII.¹

ALEXANDER W. EVANS.

(Plate 120.)

IN the recent parts of Rabenhorst's *Kryptogamen-Flora*, Müller treats the genera *Scapania*, *Radula*, and *Porella* (or *Madotheca*). He not only gives full descriptions of the various species represented in the European flora but appends interesting remarks on geographical distribution. Many of these remarks relate to North American records, and among the species which he cites from New England the following may be particularly noted: *Scapania Oakesii* Aust. (from New Hampshire), *S. paludicola* Loeske & K. Müll. (from Connecticut), and *Radula Lindbergiana* Gottsche (from Vermont). These species do not appear in the writer's Revised List of New England Hepaticae,² although *S. Oakesii* is really included under *S. dentata* Dumort. and *S. paludicola* under *S. irrigua* (Nees) Dumort. The reasons for con-

¹ Contribution from the Osborn Botanical Laboratory.

² RHODORA 15: 21-28. 1913.

sidering them distinct will be given below. Müller's record for *Radula Lindbergiana* was based on specimens accredited to Miss Lorenz. She suspects, however, that there must be some error about them, and the occurrence of this species in North America, where it is surely to be expected, must therefore await further confirmation. According to Müller *Scapania gracilis* (Lindb.) Kaalaas, which has been twice reported from New England, is restricted to Europe and the Atlantic Islands, the North American specimens which have been referred to this species representing a form of *S. nemorosa* (L.) Dumort.; *S. gracilis*, therefore, should no longer be included in our flora.

Müller's treatment of the genus *Porella* is of especial interest to students in America, where most of the European species are represented. In New England three species, *P. pinnata* L., *P. platyphylla* (L.) Lindb., and *P. rivularis* (Nees) Trevis., have been reported. The writer now feels convinced, however, from the study of recent descriptions and a representative collection of specimens, that the true *P. platyphylla* is much rarer than supposed, being largely replaced by the closely related *P. platyphylloidea* (Schwein.) Lindb.; and that *P. rivularis* does not occur in eastern North America at all. The specific characters of the New England species are discussed below. It may be noted in this connection that a strong tendency prevails in Europe to supplant the old generic name *Porella*, dating from 1753, by the more recent name *Madotheca*, dating from 1822. The name *Porella* has been in use on this side of the Atlantic for many years, and Howe¹ has given excellent and convincing reasons for not giving it up. It is possible, at some future International Botanical Congress, that *Madotheca* may be placed among the "nomina conservanda". Until such action is taken, however, the writer would recommend that the use of the name *Porella* be maintained although, to avoid confusion, *Porella* and *Madotheca* are used interchangeably in some of the following discussions.

As in previous papers of this series additions to local state floras and a census of the New England species will be given at the close.

1. SCAPANIA OAKESII Aust. Bull. Torrey Club. 3: 10. 1872. *Scapania dentata*, ϵ . *Oakesii* K. Müll. Nova Acta Acad. Caes. Leop.-Carol. Akad. 83: 102. 1905. On rocks and banks, mostly at elevations above 600 m. Maine: Big Alder Gorge near Round Mountain

¹ See Bull. Torrey Club 24: 512-515. 1897; 25: 96-103. 1898; Rev. Bryol. 25: 76-78. 1898.

Lake, Franklin County (*A. Lorenz*). New Hampshire: White Mountains (*W. Oakes, C. F. Austin*, distributed in *Hep. Bor.-Amer.* 14). Vermont: Hancock and Rochester¹ (*D. L. Dutton* 633, 906). In addition to the stations given by Austin and Howe the following station outside New England may be noted: valley of the Barrasois River, Cape Breton, Nova Scotia (*G. E. Nichols* 294).

The history of *Scapania Oakesii* gives evidence that its claims for recognition as a species are not very strong. As originally proposed by Austin it was based on four specimens, the first two from the White Mountains, New Hampshire, collected by Oakes, the third from the "Lake Superior region, Canada," collected by Macoun, and the fourth from "Observation Inlet, Columbia, Oregon," collected by Scouler. These are described as varieties α , β , γ and δ , respectively. In *Hep. Bor.-Amer.* 14 (1873) Austin distributed specimens from the White Mountains collected by Oakes and by himself. He compared the species with *S. undulata*, var. *purpurea* Nees, but emphasized the large spur-like teeth on the keels of the uppermost leaves as an important distinguishing character.

Nothing further was added to our knowledge of *S. Oakesii* until Howe² described and figured it from specimens which he found at Eureka and Kneeland Prairie Road, California. According to his account the plants from California are usually smaller than those from New Hampshire but agree closely with those from Observatory Inlet. He notes their superficial resemblance to *S. nemorosa* but considers them distinct both from this species and from *S. undulata* (L.) Dumort.

In his monograph of the genus *Scapania*, Müller,³ in reducing *S. Oakesii* to a variety of *S. dentata* Dumort., stated that he had examined Austin's plant in two different sets of exsiccati. In one he found nothing but *S. nemorosa*; in the other a mixture of two plants, one being a green form of *S. undulata* and the other a reddish plant which he took to be the true *S. Oakesii*. He finds no important characters to separate this plant from *S. dentata*, and remarks that the carinal teeth, upon which both Austin and Howe laid emphasis, represent an uncertain character found now and then in many other species of *Scapania*. In the fourth series of the writer's Notes on New England

¹ The Rochester specimens were cited under *S. dentata* in *RHODORA* 12: 204. 1911.

² *Mem. Torrey Club* 7: 151. pl. 108, 109. 1899.

³ *Nova Acta Acad. Caes. Leop.-Carol.* 83: 102, 114. 1905.

Hepaticae,¹ the example of Müller is followed, and *S. Oakesii* is included among the synonyms of *S. dentata*.

A few years later Kaalaas² found an ambiguous *Scapania* in Söndmøre, Norway, at an altitude of 800 m. He considered it distinct from all the known European species and identified it as *S. Oakesii*, which he knew from description only. In distinguishing his plant from *S. dentata* and *S. undulata*, he again emphasizes the carinal teeth but states that this character is associated with a series of others, both lobes, for example, being rounded as in *S. subalpina* (Nees) Dumort., while the dorsal lobe arches far across the stem and the keel is curved. Müller³ now shares the views of Kaalaas, at least to the extent of considering *S. Oakesii* a "kleine Art," and includes it among the species of Europe, citing the Norwegian station as the only one known at the present time. For North America he cites Eureka, California, in addition to the New Hampshire localities.

The writer has examined Austin's specimens of *S. Oakesii* in two sets of his exsiccati and has found in both cases a mixture of *S. undulata* and the plant which Müller regards as Austin's type. Since the *S. undulata* has no carinal teeth while the other plant exhibits them in abundance, Müller's views are clearly correct. The plant with the carinal teeth shows further the other characteristics pointed out by Kaalaas, and the same thing is true of the specimens from Maine and Vermont which are quoted above. The carinal teeth are by no means constant, some of the leaves developing five or more while others show few or none, but leaves with teeth of this character apparently occur on every well-developed stem and form a very striking feature of the species. In reinstating *S. Oakesii* as a member of the New England flora the writer admits that its characters are less definite than might be desired; at the same time they are fully as satisfactory as the characters of such species as *S. dentata*, *S. subalpina*, and *S. undulata*, species which are universally recognized but which are nevertheless connected by transitional forms. The four varieties distinguished by Austin need further investigation.

2. *SCAPANIA PALUDICOLA* Loeske & K. Müll.; K. Müller, Rabenhorst's Kryptogamen-Flora 6²: 425, f. 125, 126. 1915. In peat bogs. Maine: near Schoodic Lake, Piscataquis County (A. W. E.); Round

¹ RHODORA 8: 41. 1906.

² Kgl. Norske Vidensk. Selsk. Skr. 1910⁷: 26. 1911.

³ Rabenhorst's Kryptogamen-Flora 6²: 460. 1915.

Mountain Lake, Franklin County (*A. Lorenz*). New Hampshire: Eagle Lake, Mt. Lafayette (*C. C. Haynes, A. Lorenz & A. W. E.*). Vermont: Bloodsucker Pond, Jamaica (*F. Dobbin*); Willoughby (*A. Lorenz & A. W. E.*); Franklin and Burke (*A. Lorenz*). Connecticut: Bethany (*A. W. E.*), cited by Müller; specimens from the same locality (*F. Bement*) but incorrectly labeled "Lebanon" were distributed in *Hep. Amer.* 190, as *S. irrigua*; Norfolk and New Fairfield (*G. E. Nichols*); Bailey's Pond, Voluntown (*A. W. E.*). The following stations outside New England may likewise be recorded: St. Ann's Mountain, Cape Breton, Nova Scotia (*G. E. Nichols 213*); Campobello, New Brunswick (*W. G. Farlow*); St. Hubert, Quebec (*Brother Victorin*); near Ottawa, Ontario (*J. Macoun 1*); Port Clarence, Alaska (*W. H. Brewer & W. R. Coe 673*), cited by Müller; Podunk Marsh, West Fort Ann, New York (*S. H. Burnham*); near Superior, Wisconsin (*G. H. Conklin 1009, 1258*).

In describing *S. paludicola* as a "kleine Art," Müller calls attention to the strong superficial resemblance which it bears to *S. paludosa* K. Müll. In his opinion, however, the two species are not as closely related as might be supposed; he considers that *S. paludosa* has been derived from *S. undulata*, while *S. paludicola* has been derived from *S. irrigua*. In *S. undulata* and *S. paludosa* he finds that the leaf-cells are either thin-walled throughout or develop uniformly thickened walls (in which trigones are usually absent altogether), while in *S. irrigua* and *S. paludicola*, trigones are invariably present and may be very conspicuous. Apparently *S. paludicola* is not uncommon in northern North America, having been confused with *S. irrigua*. In fact several of the stations cited above have already been reported under the older species. Müller brings out the fact that *S. paludicola* prefers calcareous bogs, without being confined to them, and this preference is apparent from its North American stations.

The occurrence of *S. paludicola* in bogs, its robust habit, its deeply divided leaves, its short and arched keel usually without alar outgrowths of any sort, its deeply cordate dorsal lobes directed toward the apex of the stem rather than obliquely outward, and the trigones in its leaf-cells will usually make its recognition an easy matter. The margins of the leaves may be sparingly and minutely toothed or subentire and both lobes are often distinctly apiculate. The short and strongly arched keel and the cordate dorsal lobe directed forward will distinguish the species at once from both *S. irrigua* and *S. undulata*, while the trigones will readily separate it from *S. paludosa*.

3. PORELLA PINNATA L. Sp. Plant. 1106. 1753. *Jungermannia Porella* Dicks. Trans. Linn. Soc. 3: 239. pl. 20, f. 1. 1797. *Jungermannia distans* Schwein. Spec. Fl. Am. Sept. Crypt. 9. 1821. *Madotheca Porella* Nees (in part), Naturg. der europ. Leberm. 3: 201. 1838. *Madotheca involuta* Hampe; Lehmann & Lindenberg, Pug. Plant. 7: 10. 1838. *Cavendishia Porella* Carruth. Seemann's Jour. Bot. 3: 301. 1865. *Madotheca Sullivantii* Aust. Bull. Torrey Club 3: 15. 1872. *Porella Sullivantii* Underw.; A. Gray, Man., ed. 6, 709. 1890. *Madotheca microrhyncha* Tayl.; Stephani, Species Hepat. 4: 251. 1910. [Text figs. 1–13.]

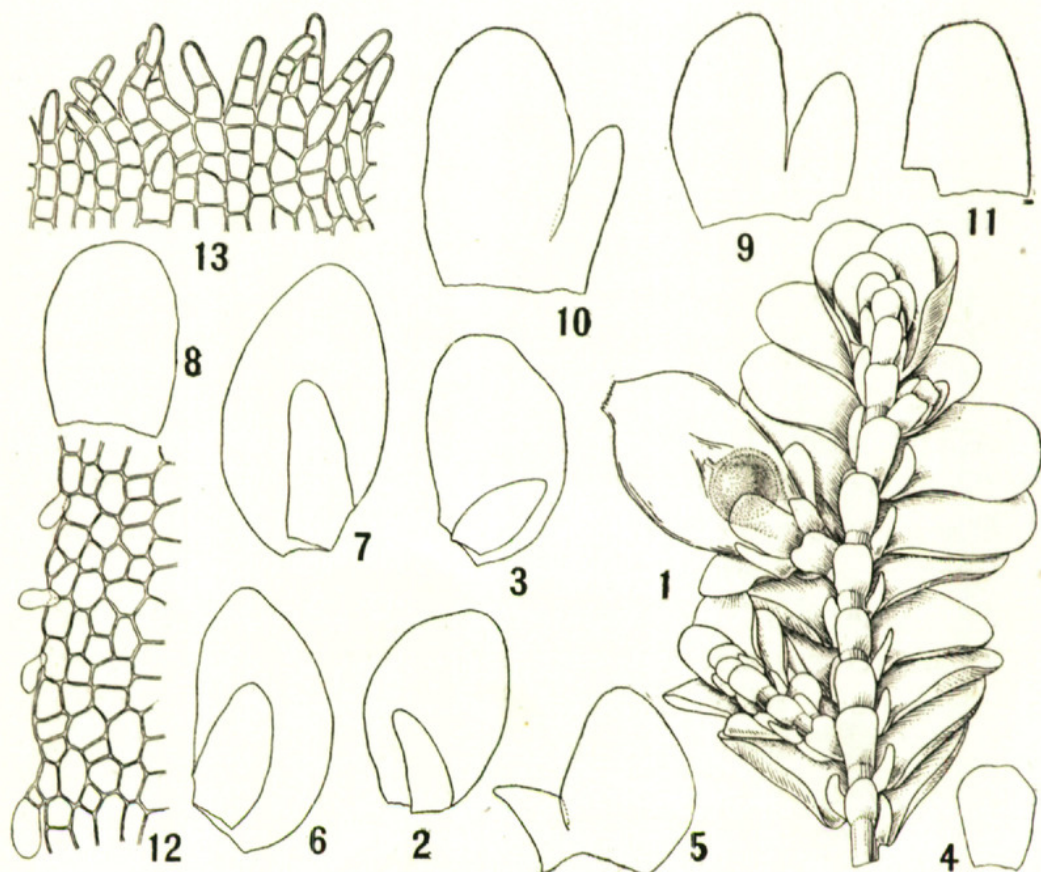
The geographical distribution of *P. pinnata* extends, in North America, from Nova Scotia westward to Ontario and Minnesota and southward to Cuba, Florida, and Louisiana, numerous stations being known from New England. In Europe its range is restricted to the British Isles and the western coast of France, with a possible extension into Portugal. In North America the species is abundant; in Europe, exceedingly rare. It grows on stones and logs in streams as well as on the banks, and is completely submerged during a part of the year. Apparently the sporophytes reach maturity only when the plants are exposed to the air.

The species has been repeatedly described so that little need be said about its general features and great variability. There are certain details, however, which the descriptions do not bring out very clearly, and a few words about these may be in place. Attention will likewise be called to certain synonyms of the species.

The complete, or almost complete, absence of marginal teeth on the leaves, underleaves and bracts, in a genus where teeth are so frequently present, is one of the most important characteristics of *P. pinnata*. Close to the dorsal base of the lobe, to be sure, close to the inner base of the lobule and along the margins of the perichaetial bracts and bracteoles a few slime papillae (or their vestiges) can be demonstrated (Fig. 12) and these are sometimes borne on short stalks, but even here anything approaching an actual tooth in size is exceedingly rare.

The lobes of the leaves (see Fig. 1) which are ovate to oblong in form and rounded at the apex, are attached by an arched line and are commonly plane except close to the lobule, where the margin is slightly inflexed. In plants exposed to the air this portion of the margin is often more or less involute. At the dorsal base the lobe is somewhat dilated but scarcely enough to be called cordate; at the ventral base

(where it meets the lobule) it is usually not dilated at all and may even be slightly decurrent, the keel being often obsolete. The small and narrow lobules, rounded or very bluntly pointed at the apex, are attached by a line which is straight or only slightly arched, and the inner edge is usually shorter than the outer, an unusual condition in the genus *Porella*. The leaf-cells average about $20\ \mu$ in the middle of



Figs. 1-13. *PORELLA PINNATA* L.

1. Branch (of first order) bearing a female branch with a perianth, and also a sterile branch, ventral view, $\times 15$. 2-4. Bracts and bracteole from a single involucre, $\times 35$. 5. A bract from another involucre, $\times 35$. 6-8. Bracts and bracteole from a third involucre, $\times 35$. 9-11. Bracts and bracteole from a fourth involucre, $\times 35$. 12. Cells from the base of a bract (lobe), showing papillae, $\times 200$. 13. Teeth from the mouth of an immature perianth, $\times 200$. Figs. 1-5 were drawn from a specimen collected at Columbus, Kentucky, by N. L. T. Nelson 1497; Figs. 6-8, 12, 13 from a specimen collected at Granby, Connecticut, by G. E. Nichols; Figs. 9-11, from the type specimen of *Madotheca microrhyncha* in the Taylor herbarium.

the lobe and show small but distinct trigones. In the inflexed portion the marginal cells extend at right angles to the edge and form a distinct border. The underleaves (Fig. 1) are slightly if at all decurrent, the line of attachment (as in the case of the lobules) being straight or only slightly arched.

The perichaetial bracts (Figs. 2, 3, 5-7, 9, 10) are not very fully treated in most descriptions, although Gottsche¹ has given a good account of them. They are commonly reduced to a single pair and the difference in size between the inner and outer bracts is not marked. The bracts are unequally bilobed, both lobe and lobule being ovate to oblong and usually rounded at the apex; in the case of the lobule, however, the apical portion is sometimes distinctly narrowed and the apex itself may be subacute. The bracteoles (Figs. 4, 8, 11) are oblong to obovate and usually rounded or truncate at the apex. According to Stephani² the lobule is lanceolate and long-attenuate, while the bracteole is suborbicular and highly coalescent on one side with a lobule. So far as the writer has been able to observe, however, the bracteole is usually quite free from the lobules, coalescence being either absent altogether or very slightly marked.

The mouth of the perianth is described as slightly crenulate, or minutely crenulate, or dentate. These expressions, however, do not depict the condition of the mouth accurately and were probably based on old and disintegrated specimens. In uninjured perianths (see Fig. 1) the mouth is shortly and closely ciliolate, the cilia varying from one to four cells in length (Fig. 13). The spores and elaters are well described by Howe.³

Of the synonyms cited above *Madotheca Sullivantii* and *M. microrhyncha* require a few words of explanation. *M. Sullivantii* was based on specimens collected by W. S. Sullivant in the "Alleghany Mountains" and distributed by Austin in his Hep. Bor.-Amer. 94. It was first included among the synonyms of *P. pinnata* by Howe, but neither Stephani nor Müller follows his example. Stephani gives it among the synonyms of *M. Thuja*, while Müller⁴ considers it a valid species. The specimens in Austin's distribution show, in the writer's opinion, that Howe was undoubtedly correct in considering the species synonymous with *P. pinnata*. They represent a small and slender form with perianths, and evidently grew in a more or less exposed position. The habit of the plants, which Müller emphasizes in maintaining the validity of the species, is not a constant feature and is not supported by characters drawn from the leaves and floral organs.

The habitat of *M. microrhyncha* is given by Stephani as "Ohio."

¹ Gottsche & Rabenhorst, Hep. Eur. 639 (accompanying text).

² Species Hepat. 4: 252. 1910.

³ Bull. Torrey Club 24: 517. 1897.

⁴ Rabenhorst's Kryptogamen Flora 6²: 571. 1915.

Through the kindness of Professor Farlow it has been possible to examine a portion of the type material from the Taylor herbarium. On the original packet the following words are written: "*Jungermannia microrhyncha* Tayl. Mss. (*Madotheca*). Ohio: Sir W. J. Hooker. 1843." Apparently Taylor had little faith in his species, for he never published it formally, but it is cited (as a manuscript species) among the synonyms of *Madotheca Porella* in the Synopsis Hepaticarum. Stephani was the first to give it adequate publication. Among the characters which he emphasizes are the following: the small, slightly projecting and minutely crenulate mouth of the perianth; the ovate-oblong lobes of the perichaetial bracts, rounded at the apex; and the small triangular lobules, discrete almost to the base. In *M. Porella* he gives, as more or less contrasting characters: the small, shortly rostrate, and minutely crenulate mouth of the perianth; the oblong and obtuse lobes of the perichaetial bracts; and the lanceolate lobules, discrete to about the middle. These differences, even if they were constant and accurately described, are so slight that they would have but doubtful specific value. As a matter of fact the type specimens, when compared with *P. pinnata*, do not show the differences which Stephani brings out. The two plants are essentially alike in all important respects, and there seems to be no reason for considering *M. microrhyncha* a distinct species. The same conclusion was reached by Underwood, who examined Taylor's type many years ago and placed it under *P. pinnata*.

Müller objects to the use of the specific name "*pinnata*" for the present species and gives two reasons. First, because he considers it disadvantageous to use so old a name for a plant which has been so much confused even in recent times; and, second, because Linnaeus could hardly have understood this plant under his *Porella pinnata* on account of its great rarity in Europe. These reasons are not very convincing. In the first place, writers who have used the specific name "*pinnata*" (such as Lindberg, Howe, Underwood, and Pearson) have used it in a very definite sense and have based their use of the name on the specimen in the Dillenian herbarium, which represents the type of the *Porella pinnata* of Linnaeus; and, in the second place, Linnaeus cites the species from Pennsylvania only, the date of its discovery in Europe being much later.

4. PORELLA PLATYPHYLLA (L.) Lindb. Acta Soc. Sci. Fenn. 9: 339. 1869. *Jungermannia platyphylla* L. Sp. Plant. 1134. 1753. *Antoiria vulgaris* Raddi, Mem. Soc. Sci. Modena 18: 19. pl. 2, f. 1. 1818.

Cavendishia platyphylla S. F. Gray, Nat. Arr. British Pl. 1: 690. 1821. *Madotheca platyphylla* Dumort. Comm. Bot. 111. 1822. *Porella Notarisii* Trevis. Rend. Ist. Lomb. II. 7: 785. 1874. *Bellincinia platyphylla* O. Kuntze, Rev. Gen. Plant. 833. 1891. [Plate 120.]

On rocks and trees. Maine: Dover (*J. F. Collins 1685*); Vassalboro (*E. B. Chamberlain 966*). Vermont: Stowe (*E. G. Britton*); Willoughby (*E. Faxon*; *A. Lorenz & A. W. E.*); Jamaica (*F. Dobbin*). Connecticut: New Haven (*D. C. Eaton*); Brookfield, Sherman, and New Milford (*A. W. E.*); West Hartford (*A. Lorenz*). The following specimens from stations outside New England may likewise be recorded: Bic, Quebec (*A. W. E.*); Syracuse, New York (*L. M. Underwood & O. F. Cook*, distributed in *Hep. Amer.* 29); Dresden Station, Adirondack Mountains, New York (*C. H. Peck 60*); Narrowsville, Pennsylvania (*T. P. James*); near Yellow Springs, Ohio (*W. S. Sullivan*, distributed in *Hep. Bor.-Amer.* 91*b*, as *Madotheca rivularis*); near Big Bay, Lake Superior region, Wisconsin (*L. S. Cheney 5705*); Vermilion Lake, Minnesota (*Arthur, Bailey & Holway 114a*); Vasa, Minnesota (*N. L. T. Nelson 5, 945 1/2*); Fall Lake, Minnesota (*J. M. Holzinger*), male plants, doubtful; Iowa City, Iowa (*B. Shimek*). In Europe the species is exceedingly abundant.

Although *Porella* (or *Madotheca*) *platyphylla* has long been recognized as one of the commonest and most widely distributed of the Hepaticae, questions have arisen from time to time regarding the limitations of the species. By many writers it has been understood in a broad sense, with characters varying within wide limits, the variations, however, being thoroughly unstable and due to environmental conditions. By other writers it has been understood in a narrower sense, and one or more closely related species, forming with *P. platyphylla* a well-defined aggregate, have been distinguished. The difficulties involved were well stated by Nees von Esenbeck.¹ In discussing certain Mexican specimens of *Madotheca platyphylloidea*, the species most frequently segregated from *M. platyphylla*, he remarked that they were really intermediate between his earlier conceptions of these two species. And he stated further that two conclusions were possible: either, that *M. platyphylloidea* and *M. platyphylla* formed a single series of forms (that is, a single species), the extremes being connected by the Mexican specimens; or, that *M. platyphylloidea* should be made to include the forms which he had

¹ *Naturg. der europ. Leberm.* 4: 497. 1838.

previously referred to *M. platyphylla* β *major*, thus ascribing to the two species ranges of variability different from those at first assigned. As to which conclusion was correct he made no attempt to decide. In spite of this uncertainty both species were recognized as valid in the Synopsis Hepaticarum, published a few years later by Nees von Esenbeck, in collaboration with Gottsche and Lindenberg.

Lindberg, in his revision of the Scandinavian species of *Porella*, published in 1869,¹ expressed the opinion that Nees von Esenbeck's "*M. platyphylloidea*" was a mixed species. He considered that part of it belonged to the var. *major* of *P. platyphylla*, and that the other part (which he thought might be synonymous with the original *Jungermannia platyphylloidea*) was a synonym of *P. Thuja* (Dicks.) Lindb. A few years later² he added the interesting observation that he had examined many North American specimens labeled *P. platyphylla* but that they were all referable to *P. Thuja*, and he commented on the rarity and restricted range of this latter species in Europe. Soon afterwards he published the combination *Porella platyphylloides* (Schwein.) Lindb.³ and the same name reappears in his last general synopsis of the Scandinavian bryophytes.⁴ Apparently he used this name as a substitute for *P. Thuja*, although this conclusion could hardly be deduced with certainty from his published writings. If he did make this substitution, it is difficult to understand why he preferred Schweinitz's specific name to the older name of Dickson, and it is to be regretted that he did not explain his use of the name *P. platyphylloides* more fully. In any case, however, it is clear that he considered Schweinitz's species distinct from *P. platyphylla*.

Among American writers the tendency has been to define *P. platyphylla* in a broad sense. This is the course pursued by Howe⁵ in his treatment of the North American species of *Porella*, published in 1897. He admits that the species is very variable and that the common form in America corresponds with the *Jungermannia platyphylloidea* of Schweinitz better than with the common European form. He maintains, however, that the European form does occur in America and that there are so many transitional conditions that any attempt at segregation would be ill-advised.

A few years later an important paper on certain European species

¹ Acta Soc. Sci. Feun. 9: 329-345. 1869.

² Ibid. 10: 493. 1875.

³ Hepat. Utveckl. 20. 1877.

⁴ Musc. Scand. 3. 1879.

⁵ Bull. Torrey Club 24: 521. 1897.

of *Madotheca* was published by Schiffner.¹ He not only recognized *M. platyphylloidea* as valid but segregated two other species from *M. platyphylla*, describing them as new under the names *M. Baueri* and *M. Jackii*. He pointed out further that Lindberg was in error when he confused *M. platyphylloidea* with *M. Thuja*, and he emphasized the fact that the true *M. Thuja* was a species of western and southern Europe, allied to *M. laevigata* (Schrad.) Dumort. rather than to *M. platyphylla*. Basing his opinion on the material at his disposal he stated that the true *M. platyphylla* was totally lacking in America, being everywhere replaced by *M. platyphylloidea*. The latter species he did not report from Europe at all, although he pointed out that *M. Jackii* was an exceedingly close ally. In his descriptions he laid especial stress on specific characters drawn from the sporophyte and particularly from the elaters. Some of these characters had been noted by previous writers but had not been employed to any great extent in separating species, and Schiffner deserves credit for recognizing their value.

In his monograph of the genus *Madotheca*, published in 1910,² Stephani accepts *M. Baueri* and *M. Jackii* as valid but does not follow Schiffner in his treatment of *M. platyphylloidea*. This species he includes among the synonyms of *M. Thuja*, as Lindberg had done forty-one years before. Both *M. Thuja* and *M. platyphylla* are quoted from Europe and North America. Although the sporophytes are described in the case of *M. Baueri* and *M. Jackii*, nothing is said about them in the descriptions of *M. Thuja* and *M. platyphylla*, so that Stephani apparently regards their features as of secondary importance.

Müller,³ in his treatment of *M. platyphylla* and its allies, follows Schiffner in most respects but reduces *M. Jackii* to synonymy under *M. platyphylloidea* and thus gives the latter species a much wider geographical distribution than Schiffner had assigned to it. He quotes the true *M. platyphylla* from North America, Africa, and Asia, as well as from Europe, but restricts the range of *M. Baueri* to Europe. In his opinion *M. Baueri* is a "kleine Art," because he finds transitional conditions between the gametophyte of this species and that of *M. platyphylla*, but he apparently finds little difficulty in separating *M. platyphylloidea* from *M. platyphylla*.

(To be continued.)

¹ Lotos 48: 346-350. 1900.

² Species Hepaticarum 4: 241-315. 1910.

³ Rabenhorst's Kryptogamen-Flora 6^o: 573-584. f. 161, 164-166. 1915.



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