Mémoires du Jardin Botanique de Montréal, no 21.

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THE OCCURRENCE OF GRIMMIA TERETINERVIS LIMPR. IN NORTH AMERICA, WITH NOTES ON ITS DISTRIBUTION

JAMES KUCYNIAK[1]

Over a half century ago, K. G. Limpricht (1884) described *Grimmia teretinervis*. Although his description is based on the collection made by Pfarrer H. Gander (Innervillgraten, Tirol, Austria; July 27, 1882), the type-collection is antedated by one made almost a decade earlier by J. Breidler (Gaistrümer Ofen, in the Oberwölz region, Steiermark province, Austria; July 25, 1874). Having the singular misfortune of bearing a previous determination, that of *G. conferta* by Juratzka, the Breidler collection was shelved by Limpricht to favor the Gander specimen as type.

An examination of the past history of *G. teretinervis* reveals that, within a decade of its discovery, the species made its initial appearance in an exsiccati through the efforts of Breidler, who distributed material of it under *No. 397* of his "Kryptogamae exsiccatae." For a brief period following the publication of the original diagnosis, the known range of

1 Montreal Botanical Garden, Montreal, Quebec, Canada.

the plant remained limited to the type locality and the several stations in the Alpine region of central Europe listed under the description. Other localities in the general area were subsequently brought to light. Several years later, John M. Holzinger (1900), having named with certainty after several attempts a moss which he had under observation for fifteen years, was able to report a North American station for the unique *Grimmia*: Winona, Minnesota.

With his discovery, interest in the species received a marked impetus. This *Grimmia*, because of its extremely localized occurrence, soon became a veritable collector's item as its frequent re-appearance in exsiccati indicates. Thanks to the efforts of Holzinger, the species enjoyed a wide distribution in various European sets, the collections coming from a number of different stations all within a forty-mile radius of the first North American locality known for the plant. Few mosses have been re-issued as consistently in a given exsiccati. One has only to cite its four different numbers (1729a, 1729b, 1828a & 1828b) in Bauer's "Musci europ. et amer. exsiccati." Moreover, through some oversight, a fifth contribution of Holzinger's from "Minnesota, in dem S. O. Gebiete" was distributed as No. 1655 in Bauer's "Musci europ. [sic] exsiccati," which also includes a truly European collection, No. 2164, made by J. Amann, in Egraz sur Roche, Waadt Canton, Switzerland. Holzinger, furthermore, furnished the material which F. Renauld & J. Cardot incorporated as No. 367 in their "Musci Americae septentrionalis exsiccati." Without restricting his assistance to European exsiccati builders, he prepared the only New World set to offer correctly determined material of the species: No. 26, in his "Musci acrocarpi Boreali-Americani." It may be appropriate to mention here that erroneously named *G. teretinervis*, the true identity of which will be discussed below, appears in the "Canadian Mosses" collected by John Macoun and determined by N. C. Kindberg.

Holzinger's collection remains without doubt the first for North America. He (Holzinger, 1900) gives an interesting account of the search which led him to determine a striking plant which had perplexed him for over a decade. While

accepting it as a species of *Eugrimmia*, the sterile condition in which the plant appeared year after year made recognition of its identity an almost insoluble problem. No matter how familiar one became with its gametophytic features, the species could not be linked up with any of the genus then known to occur in North America. That characteristics of the gametophyte must be relied upon solely to recognize the identity of the species in a genus such as *Grimmia* where prime importance is accorded to the features of the sporophyte does not facilitate the problem of naming, on first sight, a plant such as the one under study. Quite by accident, Holzinger "happened upon Limpricht's figures of leaf sections in his *Grimmia teretinervis*," and found therein the long-sought identity of his species.

Unacquainted with the efforts of the Minnesota bryologist, the author followed almost the same procedure in his attempt to determine a collection from "Percé, comté de Gaspé; 20-28 juillet 1948; Marcel Raymond, No. 35." A number of keys, some of which quite reasonably did not list *G. teretinervis*, because of the absence of the species in the area covered by the flora, were tried. Checking the descriptions of other *Grimmiae* having some of the diagnostically important characters in common with this species, i.e., plane margins, presence of a hairpoint on some leaves, etc., followed. Only after consulting the illustrations of cross sections, reproduced in the *Moss Flora of North America*, (Jones, 1933) from the originals (Holzinger, 1900) published in THE BRYOLOGIST (particularly figures 10 and 12, as well as the case of costal bifurcation which figure 11 represents and which the author has observed), was the author convinced that the material was unquestionably *G. teretinervis*. The Quebec specimen differs but slightly from the original description and lies well within the range of variation shown in the critically determined specimens which the author has subsequently revised and enumerated below.

In spite of its occurrence in widely separated areas, and being extremely localized, the plant is adequately represented in herbaria. Examination of the ample material available has enabled the author to make an evaluation of the game-

tophytic features which in turn leads him to affirm that the species is not only one in good standing, but easy of recognition to the practiced eye. Its features, despite their variability, remain broadly speaking clear-cut. To the best of the author's knowledge, no attempt has been made to reduce *G. teretinervis* to the rank of variety or form, or even less, a synonym. An examination of its synonymy (Jones, 1933), shows only *G. tenuis* Barker listed thereunder, Barker himself having reduced his species to that status.

Grimmia teretinervis grows in abundant tiny, lime-incrusted but easily disintegrating polsters which in color range from reddish- to blackish-brown. Its fragile stems, frequently branched, are about 1 cm. in length (they occasionally reach 3 cm.) and present, in general, a slender, threadlike appearance. The leaves, linear-lanceolate in outline, when dry spread widely or remain erect-patent especially in the lower part of the stem, while toward the tip they are strongly imbricated. When moist, all leaves assume a rigidly erect-ascending to slightly recurved position. The length of the leaf normally ranges between 1 and 1.4 mm. Only once did the author find a specimen where the leaf reached 1.6 or 1.7 mm. from insertion to tip of hairpoint, that is, in the Amann collection, No. 2164 of Bauer's "Musci europ. et amer. exsiccati," though most of the leaves seldom surpassed 1.4 mm. in length.

In muticous leaves, the apex is obtuse; in the piliferous ones, in sharp contrast to the acute hyaline hairpoint, the chlorophyllose portion of the leaf terminates obtusely in the acumen.

The length of the hairpoint varies considerably from one specimen to another, and even from different parts of the same plant. It may reach a third of the leaf's length, while on leaves taken a little more than a millimeter lower, the hairpoint will be much shorter. Lower still, the muticous leaves appear most distinctively with their obtuse apices. Consequently, the hairpoint's presence, rather than its length, abundance or position, i.e., whether accumulated at the tip of the stem or gathered at the base of innovations, is of diagnostic importance.

The disposition of the leaf cells themselves, perhaps, furnishes the best "ear mark" for recognition of the species, particularly when examined in a transverse section of the lamina taken from that region of the leaf which lies between midleaf and the base of the upper third. In most instances, the cut will show a section, unistratose for several cells on either side of the costa but which soon becomes bistratose and even occasionally pluristratose. When present, the unistratose portion of the lamina appears as two paler longitudinal striae running almost the whole length of the leaf on either side of the costa. The author also observed a number of specimens in which the thickness of the leaf-sections appeared variously unistratose, bistratose or pluristratose.

Special attention should be paid to the costa as it appears in a transverse section. In the upper half of the leaf, the costa is circular and convex ventrally as well as dorsally. It almost invariably shows two subtly discernible areas: an outer zone, formed of a single row of larger cells, which encircles a central region of slightly smaller and more compact cells. The two angular cells in the outer layer which form the connecting link with those of the leaf-lamina on either side of the costa appear appreciably deformed in size and general outline. In sections of the costa from the basal portion of the leaf, the zones do not stand out as clearly nor does the distinction hold any longer since all cells there tend to be more homogeneous in structure. Meanwhile, though the costa becomes more flattened in outline, it remains nevertheless manifestly convex on both surfaces. Limpricht (1884) observes that of all European *Grimmiae*, *G. maritima* is the only other species which has a biconvex costa. However, the large median guide cells ("Deutern") in the midrib of the latter immediately set the maritime moss apart.

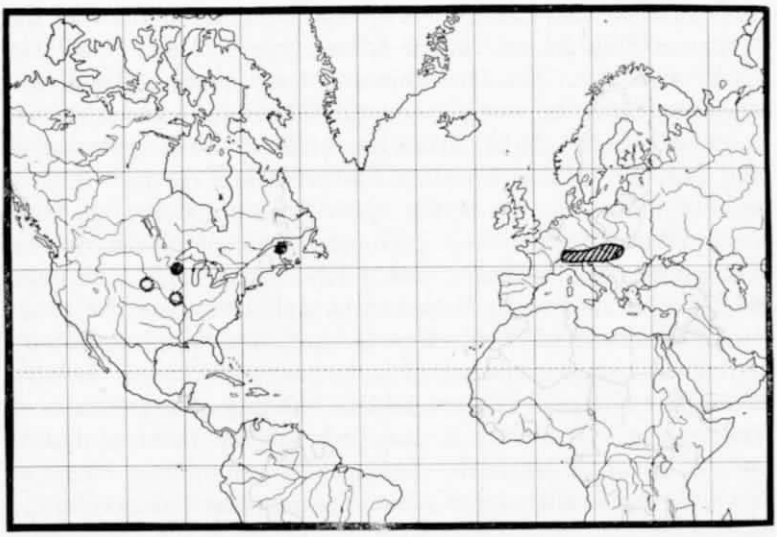
The leaf-margins of *G. teretinervis* are generally plane throughout, though occasionally sections from the lower part of the leaf will show the margins having an almost imperceptible tendency to recurve to one side.

The habitat-preferences of *G. teretinervis*, as gathered from data furnished by Limpricht (1884, 1890) and Loeske

(1913), seem linked to petrographical structures combining limestone and sandstone. In its Gaspé peninsula station, the plant finds the satisfactory substratum-requisites in the conglomerate of the Bonaventure Formation. Alcock (1935) describes the formation as one of the four divisions of the Carboniferous rocks of the region. Its conglomerate contains pebbles and boulders of all the varieties of rocks occurring in the surrounding area, those of sedimentary origin including limestone and sandstone. The matrix is usually a coarse, deep-red sandstone. Its rougher texture permits the plant to gain a foothold on the sheer walls of La Grotte, Percé, which the species inhabits almost exclusively. It may prove worthwhile to look for this interesting moss in stations where terrains of a similar composition occur. During the foray of the Northeast Section of the American Botanical Society held in Michigan in August, 1949, the author observed along the bluffs of the Keweenaw peninsula habitats which closely resemble that on which Raymond found the species in Quebec. This species may well be added someday to the highly interesting bryophyte flora of Michigan made known by W. C. Steere (1937, 1938).

Altitude does not apparently exert an influence on the distribution of *G. teretinervis* as one may conclude from the data which Limpricht furnishes for the European collections he cites. Elevation of the stations listed varies from: "... am Humberg bei Tüffer (ca. 350 m.) ... bei Nicolaiberg bei Gilli (300-400 m.) ... am Jauerberg bei Weitenstein (600-700 m.) ... am Gaistrümer Ofen bei Oberwölz (1000 m.) ..." to 1800 m. "... bei Innervillgraten ...," the type locality. Loeske (1913) cites a station at an altitude as low as 200 m. "... in den Karnischen Alpen ... bei Gemona und Maniaglia...." As will be noted in the revised list of the material given below, *G. teretinervis* appears so far to be a species confined to the Alpine mountain area in Europe, and in North America, to Minnesota, neighboring Wisconsin, and Quebec, and probably, pending further elucidation, Kansas and Missouri. This range does not seem to follow closely any of the general patterns of distribution outlined in some of the more pertinent phytogeographical papers

(Fernald, 1925; Steere, 1937, 1938). From what is presently known of the occurrence of the species, *G. teretinervis* may be considered an alpine, non-arctic species. Its appearance at lower altitudes occurs in such areas where alpine conditions prevail. For example, the windswept cliffs of



MAP. 1. KNOWN RANGE OF GRIMMIA TERETINERVIS LIMPR. The open rings indicate the questionable North American stations. (Goode's Series of Base Maps No. 101M. Copyright 1939 by the University of Chicago.)

Percé, Quebec, which, though slightly above sea level, harbour an alpine vascular flora. The alpine non-arctic group is an exceedingly difficult one to define in Quebec because of the tendency of a number of arctic species to assume an alpine comportment when encountered in regions far south of their arctic area. Among the elements of the vascular plants, *Polystichum Lonchitis* (L.) Roth may be cited as a good example of an alpine plant for northeastern North America.

The task of defining the taxonomic position of *Grimmia teretinervis* accurately hinges on the discovery of fruiting material. Seta, columella and calyptra, essential to sub-

generic or sectional recognition in *Grimmia*, remain unknown.

With only female plants in a relatively poor condition at his disposal, Limpricht was unable to indicate with any certainty to which subgenus the moss belonged. Voicing the opinion that its systematic position was near *G. commutata* or *G. ovata*, he placed it, with some apprehension, in the subgenus *Eugrimmia*. Some fifteen years later, (1899) in his treatment of the Grimmiaceae for Rabenhorst's *Kryptogamen-Flora*, he dubiously transferred it to *Schistidium*. Leopold Loeske (1913) likewise stressed the disputed generic position of the species. Rather than restrict it to a definite subgenus, he wrote "Schistidium oder Grimmia? Verwandtschaft unsicher." The most recent North American monograph of the genus (G.N. Jones, 1933), though placing the species in *Eugrimmia*, acknowledges the problematical status of *G. teretinervis* and accordingly offers an analytical key so constructed as to permit reaching the species under either of the subgeneric headings, *Schistidium* or *Eugrimmia*. However, in the body of the treatment, one finds it grouped with the "Alpestres" (subgenus *Eugrimmia*), the general traits of which are summarized as follows: "Leaves keeled, costa prominently convex on the dorsal side of the leaf; margins usually revolute; basal cells smooth-walled; . . ." Jones adds that its "dioicous inflorescence and the plane-margined leaves indicate an affinity to the subsection Litoneuron," which, likewise belonging to the *Eugrimmia*, immediately precedes the "Alpestres" in his monograph. One however cannot ignore that the dioicous condition is a character which does not exclusively apply to the subsections "Litoneuron" and "Alpestres" but is common to species of the subgenus *Schistidium*. The reddish-brown color of the tufts is moreover one of the striking features of plants belonging to the latter subgenus, and, as pointed out above, *G. teretinervis* shares with *G. maritima*, also of the subgenus *Schistidium*, the distinction of being the only species with costa convex on both surfaces.

Though *G. teretinervis* has been reported from a number of localities in North America, revision of the specimens

responsible for the reports has shown several unhappy examples of inaccurate determination. In his monograph, G. N. Jones (1933) lists the following areas: Minnesota, Ontario, Tennessee and Idaho. The author has not been able to retrace the material responsible for the Idaho listing nor has he been able to locate the original published report. The Tennessee specimen, of which the author has only seen the duplicate in the herbarium of the New York Botanical Garden, is not *G. teretinervis*, but may well belong to the species which Dr. Geneva Sayre has annotated the specimen to be. The Ontario citation in all likelihood refers to No. 85a of Macoun's "Canadian Mosses." Under that number, one finds two collections labelled *G. teretinervis*, both from widely separated localities in Canada: Mt. Benson, Vancouver Island, British Columbia, and Algonquin Park, in the northeastern part of the province of Ontario. The author has examined several packets of the exsiccati number from different herbaria in addition to the collection, now housed in the Herbarium Bryologicum Hjalmar Möllar of the Riksmuseum, upon which N. C. Kindberg apparently based his determination. Collections from neither of the stations belong to *G. teretinervis*. The error in naming the West Coast material stems from a *lapsus calami* for *G. tenerrima* rather than from an erroneous determination. Such herbaria as have prudently kept the original newsprint envelopes in which the specimens were distributed, will find "*G. nivalis*" written on the upper flap. With *G. tenerrima*, *G. nivalis* belongs to the synonymy of *G. alpestris* Nees, a species easily recognized by its short-lanceolate to ovate stem leaves with basal leaf cells quadrate to short-rectangular, and the cross walls thicker than the long walls, the latter trait especially noticeable in the basal marginal cells. The Mt. Benson material unquestionably belongs to this species. As for the Algonquin Park collection, the herbarium specimens examined consist either entirely of *Grimmia unicolor* Hook. or a few patches of *G. apocarpa* mixed with the predominant *G. unicolor*. In contrast to *G. teretinervis*, the leaves of *G. unicolor* have no hairpoint. Its obtuse apex is, moreover, cucullate. The margins are plane throughout.

Sections from the upper part of the leaf are uniformly pluristratose across the whole width, and the cells of the costa are hardly distinguishable from those in the leaf-lamina. The semiterete costa, convex on the dorsal side only, flattens out in the lower part of the leaf.

Whether Kindberg was fully acquainted with *G. teretinervis* as a species is a matter for conjecture. He has correctly named as such his collections from Monte San Salvatore, near Lugano, Switzerland. On the other hand, Prof. Holzinger sent him one of his Minnesota specimens bearing the determination of *G. teretinervis* for comparison with European material of the species. The specimen, in the Naturhistoriska Riksmuseum in Stockholm, bears the following annotation in Kindberg's handwriting: *"Grimmia heterophylla?"*

Among the collections obtained on loan from the New York Botanical Garden, two specimens labelled *G. teretinervis* seem to present extensions to the North American range. Should label data be exact in reference to the stations given —Clayton, Missouri: on limestone; July 4, 1903; *P. K. Lawrence*—and—Wolf's Creek, near Lukas, Russell County, Kansas: on rocks; June 7, 1931; *C. H. Demetrio*—the area of the species should be extended to include the states of Missouri and Kansas. In literature available to him, the author has not been able to trace any published report on the aforementioned collections. Following revision, the author finds no grounds for differing with the determinations. However, an unusual indication given on the label of the Demetrio collection, wherein the collector observes "Found only one small cushion," invites caution. The information contradicts the profusion with which the species is known to occur. In Minnesota, Holzinger reported it as "a plant which occurs abundantly. . . ." and his word need not be queried when one considers the tremendous quantities necessitated to supply as many exsiccati numbers as he succeeded in doing. His remark applies with no modification whatever to the new Gaspé station for the species. For the present, the author accepts the two stations but with some reserve pend-

ing further enlightenment on the geological structure and the bryophytic flora of those stations.

In the Naturhistoriska Riksmuseum, there is a fairly representative number of collections labelled *G. teretinervis* from Missouri made by N.L.T. Nelson. No. 679, from Bismark and dated October 30, 1904, appears rather to be *Grimmia apocarpa* Hedw. var. *alpicola* (Hedw.) Hartm., while No. 1647, growing on limestone, Creve Coeur Lake, April 13, 1907, and No. 1874, growing on top of limestone bluffs, Sherman, July 18, 1907, belong to a species which the author is unable to name with certainty, but which has the leaf-lamina variously bistratose and the leaf-margins plane and bistratose.

Specimens of the American collections, on the whole, macroscopically appear slightly more turgid rather than assume the thread-like appearance of typical *G. teretinervis* observed, i.e., in the Breidler collections from Steiermark province. The hairpoints appear shorter, are less evident, and, in the material studied, do not (as in some of the European collections examined) form brushlike points at the stem's tip. However, the differences noted are not important enough to warrant separating the American material from the European, either as a variety or a mere form.

Listed below are collections which the author has been privileged to have on loan for examination from the following institutions: Helsingin Yliopiston Kasvieteellinen Museum, Helsinki (H); New York Botanical Garden, New York (N); National Museum of Canada, Ottawa (O); Herbier cryptogamique du Muséum de Paris (P); Naturhistoriska Riksmuseum, Stockholm (S); Botanisches Institut und Botanischer Garten der Universität Wien, Vienna (V); United States National Museum, Washington (W).

Also revised were specimens of *Grimmia teretinervis* in the British Museum of Natural History, South Kensington, London (L).

EUROPE

AUSTRIA. Steiermark province: Gaistrümer Ofen, prope Oberwölz: ad saxa calcarea arida, 1000-1100 m.; 16.VII.1894; *J. Breidler;* No. *397* in Breidler, "Kryptogamae exsiccatae" (H, N, V, W).—Kalk-

felsen am Gaistrümer Ofen bei Oberwölz; Aug. 10, 1888; *J. Breidler* (S, V).—Mts Gaistrümer Ofen prope urb. Oberwölz: in rupibus calcareis, 1000 m.; 19.VIII.1888; *J. Breidler* (H).—Kalkfelsen an der Südseite des "Gaistrümer Ofen" bei Oberwölz, 1000-1100 m.; Juli, 1894; *J. Breidler* (N). Tirol province: Innervillgraten: ad rupes calc., 5400′; 22.VII.1882; *H. Gander* (H, N, S, V).—Innervillgraten prope Kalchstein: in rupibus calcareis, ca. 5100′; Apr. 27, 1882; *H. Gander* (N).—Innervillgraten (n. von Sillian): ad rupes praecipites calc., 5400′; 22.VII.1884; *H. Gander* (H, V).—Innervillgraten: ad rupes calcareos in Kalchstein (5800′); 22.VII.1888; *H. Gander* (N).—Innervillgraten, 5600′; 22.V.1890; *H. Gander* (S).

JUGOSLAVIA. Styria province: Humberg prope Tüffer, ca. 400 m.; in rupibus calcareis; 25.IV.1884; *J. Breidler* (H, S).

HUNGARY. Magas Tatra: In monte Stierberg (=Bŭjaczy Wierch): substr. calc.; alt. 1800 m. s. m.; 28.VII.1905; *Györffy* (S).

SWITZERLAND. Bern (Berne) Canton: Rocks across the river opposite the Hotel Gemmi, Kandersteg; Sept. 1890; *J. Barker* (L).—Bei Kandersteg dem Hotel Gemmi gegenüber mit *Grimmia anodon* auf Kalkfelsen, 1200 m.; 12.III.1904; *P. Culmann;* No. *291* in Bauer, "Musci europaei exsiccati" as *Grimmia tenuis* Barker (V).—Zwischenflühtal, Bern: parois calcaires verticales; 28 août 1905; *P. Culmann* (P).—Rochers calcaires au—dessus de Beatenberg, "Bire", 1470 m.; 28 août 1911; *P. Culmann* (P). Grisons (Graubünden) Canton: Sulfur auf das Albula, 7800′; July 3, 1885; *Dr. Hugo Graef* (S). Neuchatel (Neuenburg) Canton: Roche aux Crots, près Chaux de Fonds, 1250 m.; août 1907; *Ch. Meylan* (P). Ticino (Tessin). Canton: Monte San Salvatore, Lugano; June 14, 1892; *N.C. Kindberg* (S).—Monte San Salvatore, Lugano; July, 1894; *L. Mari* (S).—Monte San Salvatore, Lugano; July 12, 1895; *N. C. Kindberg* (S). Vaud (Waadt) Canton: Aiguille de Beaulmes, 1450 m.; janvier 1898, *Ch. Meylan* (P).—Aiguille de Beaulmes, 1500 m.; août 1898; *Ch. Meylan* (P).—Aiguille de Beaulmes: sur rochers calcaires, ca. 1500 m.; août 1899; *Ch. Meylan* (H, P).—Aiguille de Beaulmes; août 1901; *Ch. Meylan* (S).—Grand Savagnier, Massif du Chasseron, 1400 m.; août 1903; *Ch. Meylan* (P).—La Tourne: rocher au soleil, alt. 1260 m.; juin 1906; *Ch. Meylan* (P).—Auf Kalkfelsen des Wasserfalles bei der Brücke von Egraz sur Roche, 820 m.s.m.; 29 Nov. 1930; *J. Amann;* No. 2164 in Bauer, "Musci europ. & amer. exsiccati" (L, N, S).—Rocher Blanc, Massif du Chasseron, 1450 m.; février, 1920; *Ch. Meylan* (L).

NORTH AMERICA

UNITED STATES OF AMERICA. Minnesota: Bluffs near Winona; April, 1894; *J. M. Holzinger* (S).—Catholic cemetery, Winona; April 6, 1894; *J. M. H.* (N, S).—Winona bluffs; June, 1894; *J. M. H.* (N) & Sept. 24, 1899 (W).—Lanesboro; Aug., 1894 (P, S).—Trempealeau Ridge; Aug. 9, 1899 (H, L, N, P, W).—Devil's Cave, near Winona, Lat. 44°, America borealis; Oct. 16, 1900 (P, S).—Winona; 1900; *J. M. H.;* No. *364* in F. Renauld & J. Cardot's "Musci americae septentrionalis exsiccati" (L, N, P).—Exposed north-facing sand ledges towards the tops of the bluffs, near Winona, 43° Lat. N; March to Sept., 1903; *J. M. Holzinger,* "Musci Acrocarpi Boreali-Americani" No. *26* (H, L, N, S, W).—Lairds Spring bei Winona, auf besonnten Sandsteinfelsen; 16 Aug. 1903; *J. M. Holzinger;* No. *1729b* in Bauer's "Musci Europ. & Amer. exsiccati" (L, N).—Tops of bluffs, on exposed sand rocks, Winona, Lat. 43°, America borealis; Apr. 1, 1905; *J. M. H.* (S).—Vasa; July & Aug. 1905; *N. L. T. Nelson,* No. *937* (S).—Auf ausge-

setzen Sandsteinfelsen an den steilen Flussutern bei Winona; Mai 1905; No. *1729a* in Bauer's "Musci Europ. & Amer. exsiccati" (L, N).—Jewel Korsery Bluff nächst Red Wing, auf Kalk- und Sandsteinfelsen; 11 Sept. 1919; *J. M. H.;* No. *1728a* in Bauer's "Musci Europ. & Amer. exsiccati" (N).—Albert Steffenhagens Farm nächst Red Wing, auf Sandstein und Kalkfelsen; 12 Sept. 1919; *J. M. H.;* No. *1728b* in Bauer's "Musci Europaei et Americ. exsiccati" (L, N).—In dem S. O. Gebiete gemein auf der Sonne ausgesetzen Sandstein in ausgedehnten schwarzen Polstern (Xerophyt); *J. M. H.;* No. *1655* in Bauer's "Musci Europaei (*sic*) exsiccati (L, S). Wisconsin: Trempealeau Mt., Wisconsin side; Aug. 9, 1899; *J. M. H.* (L, N).—Trempealeau, Lat. 44°, America borealis; Nov. 2, 1901; *J. M. H.* (S). Missouri: Clayton: on limestone; July 4, 1903; P. K. *Lawrence, 10* (N). Kansas: Wolf Creek, near Lukas, Russell County: on rocks; June 7, 1913; *C. H. Demetrio, 211* (N).

CANADA. Quebec: Percé, comté de Gaspé; 20-28 juillet 1948; *Marcel Raymond, 35.* (Jardin botanique de Montréal).

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