Notes on the Bryophytes of Indiana: I. Additions to the Flora

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Introduction

Since the publication of *Mosses of Indiana* by Welch in 1957 (9), it has been generally assumed that the bryophytes of Indiana were thoroughly surveyed. Field and literature studies during the past three years, however, have resulted in the discovery of 24 bryophyte species (5 liverworts and 19 mosses) new to Indiana and scores of new county records. Several of the new records were listed in a publication by McKnight & Sargent (5), but without collection data.

The new reports are presented below in an annotated checklist. The collection numbers, unless otherwise indicated, are mine. Vouchers are housed in my personal collection (MCKN) at the Illinois Natural History Survey and/or elsewhere as indicated. Nomenclature follows Crum & Anderson (2) for the mosses and Stotler & Crandall-Stotler (8) for the liverworts.

List of Species

Hepaticae—

Bazzania denudata (Torr.) Trev.—Perry Co.: occasional, on moist shaded sandstone wall in association with *Bryoxiphium norvegicum*. Saalman (Rich Cave) Hollow, T4S R2W S12 NE; 21 Apr 1985; *4495*. This population is a western range extension of a primarily Appalachian distribution.

Cladopodiella fluitans (Nees) Joerg.—La Porte Co.: common, intermixed with other bryophytes, Pinhook Bog, T37N R4W S35; 1 Oct 1981; *Moran 1859*. This small, stringy liverwort is invariably confined to peat bogs where it is usually found submerged in open areas or at the base of hummocks. This relic population occurs at the southern edge of a circumboreal range.

Kurzia sylvatica (Evans) Grolle—Crawford Co.: occasional, on north-facing sandstone walls, Yellow Birch Ravine Nature Preserve, T2S R1W S20 SE of SW; 20 Oct 1984; *4266*. Growing in association with *Lycopodium porophilum* and *Syrrhopodon texanus*. *Kurzia sylvatica* is a tiny, dull green species with cupped leaves that have 3-4 filiform lobes. The individual plants remind me of small bushy tails. It is an Appalachian-Coastal Plain species of shaded mesic areas and is a decided calciphobe.

Lophozia bicrenata (Schmid. *ex* Hoffm.) Dum.—Putman Co.: occasional, on clayey soil in clearing above abandoned sandstone quarry, Fern Cliff, T14N R5W S33; 13 Oct 1984; *4160*. This weedy plant may be fairly common in Indiana as a pioneer on acidic, leached, sterile soil, especially in the southern half of the state.

Mylia anomala (Hook.) S. Gray—La Porte Co.: occasional, at base of shrubs, Pinhook Bog, T37N R4W S35; 1 Oct 1981; *Moran 1885*. A robust, boreal liverwort which produces clusters of light green gemmae at the tip of terminal leaves and an abundance of intertwining rhizoids which make separating the plants from the substrate and each other a challenge. The species is characteristic of acid bogs where it is almost constantly found in association with *Cladopodiella* and *Sphagnum*. This relic population represents one of the southernmost stations for *Mylia* in the Midwest.

Musci—

Anomodon rugellii (C.M.) Keissl.—Fountain Co.: rare, on soil-covered sandstone along Bear Creek, Portland Arch Nature Preserve, T20N R8W S4 NW of NW; 25 Apr 1982; *1639, 1641*. Owen Co.: occasional, on limestone along stream, Owen-Putnam State Forest, T11N R4W S14; 24 Apr 1983; *2925b*. This coarse, medium-sized, dark green calciphile is easily confused with the more common *Anomodon minor*, from which it differs in having leaves incurved-contorted when dry, an acute leaf apex, and an auriculate leaf base which is often fimbriate.

Brachylema subulatum (P.-Beauv.) Schimp. *ex* Card. (= *Cryphaea inundata*)—This species was collected by Prince Maximilian von Wied from the Black, Fox, and Wabash rivers during a stopover at New Harmony; Nees von Esenbeck (6) [translated from Latin] "Fruiting on inundated branches. . .with mature fruits in December." Contrary to Welch (10), the Black River is in Posey County, Indiana, not Illinois; Wied (11) p. 191, wrote ". . .Black River, a stream which falls into the Wabash, three miles from Harmony." Topographic maps for this area show a Black River on the east side of the Wabash River exactly three miles north of New Harmony; there is no Black River on the west side of the Wabash near New Harmony. Furthermore, the collection date, which is listed by Nees von Esenbeck and Welch as 1832, is inaccurate since Wied (11), p. 191, recorded the Black River trip as 5 January 1833. This North American endemic is most frequent in the southeastern coastal plain. It has not been found subsequently in Illinois or Indiana.

Calliergonella cuspidata (Hedw.) Loeske—La Grange Co.: common, on peat in Nasby Fen, Mongoquinong Nature Preserve, T37N R10E S1 NE; 22 Jun 1985; *4599*. This large, circumpolar calciphile is best recognized in the field by the cuspidate branch and stem tips which also tend to be lighter colored. Another good character useful for field identification are the inflated alar cells, which appear as hyaline areas at the basal angles of each leaf. The species is probably quite common in calcareous wetlands in northern Indiana.

Catoscopium nigritum (Hedw.) Brid.—La Grange Co.: occasional, on stream cuts in marl flats, Nasby Fen, Mongoquinong Nature Preserve, T37N R10E S1 NE; 22 Jun 1985; *4589, 4596*. The plants lack sporophytes. A rare, circumpolar calciphile which is usually found in wet places. It is regularly an associate of *Drepanocladus revolvens* var. *intermedius* and *Scorpidium scorpioides* in marl flats. *Catoscopium* was recently reported by McKnight (4) from Illinois on marl flats at the southwest end of Lake Michigan. The gametophytes, which grow in erect, compact tufts, look very much like the ubiquitous *Ceratodon purpureus*.

Desmatodon plinthobius Sull. & Lesq. *ex* Sull.—Owen Co.: on limestone boulder, Romona Quarry, 1.5 miles NE of Spencer, T10N R3W S3 SE of SW; 23 Oct 1983; *Allen 3779* (DPU and Allen's pers. coll.). The awned leaves of this diminutive limestone inhabiting species are diagnostic. Its primary range in North America is the southern and western United States. And, as the specific epithet implies, it is often found on manmade substrates such as concrete or mortar.

Distichium capillaceum (Hedw.) BSG—Owen Co.: rare, on shaded limestone boulder, Romona Quarry, T10N R3W S3 SE of SW; 24 May 1983; *2931a*; dup. ver. by H. Crum (MICH). A silky calciphile characterized by distichous branches with shiny white leaf bases. The only previous Indiana report for this species was a Pleistocene fossil report from Fayette County, Kapp & Gooding (3). The Owen County population is on a north-facing slope north of the Romona Quarry which has been inactive for at least 25 years. When the quarry was in operation, the culled boulders (grout) were dumped along this slope. The moist, cool air drainage between these boulders created

a peculiar habitat that remains perennially very much cooler than the ambient environment. This type of habitat occurs naturally on talus slopes in the Driftless Area and is called an algific slope. *Distichium capillaceum* was recently found by McKnight (5) on an algific slope in extreme northwestern Illinois.

Drepanocladus revolvens (Sw.) Warnst. var. *intermedius* (Lindb.) Cheney *ex* Wils.—La Grange Co.: common, on stream cuts in marl flats, Nasby Fen, Mongoquinong Nature Preserve, T37N R10E S1 NE; 22 Jun 1985; *4588*. A robust, glossy, yellow brown species, with strongly falcate-secund leaves. It has a circumpolar distribution where it is common in calcareous wetlands. This population is at the southern edge of the range for the species.

Isopterygium distichaceum (Mitt.) Jaeg. & Sauerb.—Fountain Co.: rare, on sandstone ledges, Portland Arch Nature Preserve, T21N R8W S33 SW of SW; *4844*. A shiny, complanate, pleurocarpous moss identifiable by its asymmetric leaves and the small, twisted, elongate, brood bodies clustered at the stem terminus. The species has a temperature distribution in North America.

Orthrichum anomalum Hedw.—Monroe Co.: rare, on limestone along river, Cedar Bluffs Nature Preserve, T7N R1W S18; 21 Oct 1984; *4284*. Owen Co.: rare, on limestone boulders along stream, Romona Quarry, T10N R3W S3 SE of SW; 24 May 1983; *2934a*; dup. ver. by H. Crum (MICH). A saxicolous calciphile distinguished from other local members of the genus by exerted capsules. The species is infrequent but widespread in North America, especially in the western mountains. This report extends the southern range of this species in the Great Lakes region.

Philonotis capillaris (Hedw.) Brid.—Owen Co.: rare, on limestone beside creek, Upper Cataract Falls, T12N R4W S26; 6 Jan 1983; *2528*; dup. det. by H. Crum (MICH). As the name implies, this is a slender, moisture-loving species. It is widespread but most frequent in the North and southward into mountainous areas.

Physcomitrium hookeri Hampe—Fountain Co.: rare, on soil in corn stubble, 0.5 mile SE of Fountain, T21N R8W S33 NE of SW; 4 Mar 1983; *2652b* (also in axenic culture collection of M. Sargent, Univ. Illinois). This ephemeral grows well in culture. Apparently, this is one of the easternmost populations of this uncommon North American endemic which has a primarily upper Great Plains distribution. It is only a fraction the size of *Physcomitrium pyriforme*, an abundant species of similar appearance and habitat.

Pohlia melanodon (Brid.) Shaw—Fountain Co.: occasional, on soil-covered sandstone boulder in stream, Portland Arch Nature Preserve, T20N R8W S4 SE of NW; 19 May 1982; *1855, 1872*; dups. det. by J. Shaw (DUKE). The red sporophytes produced by this small, tufted, dirty-green species are very attractive. The red stems are also characteristic. This moss is rarely collected, though probably not uncommon (Shaw, pers. comm.).

Rhytidiadelphus triquetrus (Hedw.) Warnst.—Montgomery Co.: rare, on north-facing shale slope above Indian Creek, Pine Hills Nature Preserve, T17N R6W S1; 9 May 1982; *1687*. Visual confirmation of population on 2 Jul 1985. This is one of the largest bryophytes in North America. It grows in woodlands and has a primarily boreal distribution. It is rare in the lower Midwest. The Pine Hills population is part of a postglacial relic assembledge along with *Pinus strobus*, *Rhytidium rugosum*, *Taxus canadensis*, and *Tsuga canadensis*. The habitat for the Pine Hills population, a moist, shaded, shale slope, demonstrates a habitat switch. The phenomenom of habitat switch for species at the edge of their range is not uncommon but is often overlooked.

Sciaromium lescurii (Sull.) Broth.—Crawford Co.: occasional, on sandstone in stream

bed, Yellow Birch Ravine Nature Preserve; T2S R1W S20 NW of SW; 20 Oct 1984; *4227, 4232* (dup. MICH). A small to moderate-sized species forming a dull, dark green layer over sandstone in intermittent stream beds. The several rows of linear cells form a prominent leaf margin that serves to distinguish the species from *Amblystegium tenax* which is similar in appearance and habitat. *Sciaromium* apparently is widespread in eastern North America, especially in southern mountainous areas.

Scorpidium scorpioides (Hedw.) Limpr.—La Grange Co.: occasional, in shallow water among sedges and on marl, Nasby Fen, Mongoquinong Nature Preserve; T37N R10E S1 NE; 22 Jun 1985; *4591, 4593, 4597.* The specimens lack sporophytes. This is one of the southernmost populations in North America for this rare, large, burgundy-colored calciphile. The plants are turgid and wormlike but they are also often covered with a limy deposit and then coarse and brittle. The curved branch tips look more like the dilated neck and head of an aroused cobra than a scorpion's tail as implied by the species name. This is another example of a circumpolar bryophyte at the edge of its southern range.

Sphagnum fuscum (Schimp.) Klinggr.—Putnam Co.: in abandoned sandstone quarry, Fern Cliff, T14N R5W S33; 22 Oct 1983; *3593, 3611*; dups. det. by H. crum (MICH). This species is characterized by brown leaves and stem. It is also reported by Andrus & Wilcox (1) from this site. *Sphagnum* is rare in the southern two-thirds of Indiana.

Sphagnum russowii Warnst.—Putnam Co.: in abandoned sandstone quarry, Fern Cliff, T14N R5W S33; 22 Oct 1983; *3592*; dup. det. by H. Crum (MICH). This species is characterized by reddish green leaves and green stems. It is also reported by Andrus & Wilcox (1) from Fern Cliff.

Sphagnum squarrosum Crome—Putnam Co.: in abandoned sandstone quarry, Fern Cliff, T14N R5W S33; 22 Oct 1983; *3600, 3601*; dups. det. by H. Crum (MICH). The previous state record report of *Sphagnum wulfianum* by McKnight & Sargent (5) is actually a misdetermined specimen of *S. squarrosum*. Andrus & Wilcox (1) also report *S. wulfianum* from Fern Cliff. Howard Crum has examined material that was field identified during the 1983 Midwest Bryophyte Foray (4) as *Sphagnum wulfianum* and which is the basis for the Andrus & Wilcox report. Crum indicated (pers. comm.) that it is "poorly developed" *Sphagnum squarrosum*—a robust, green species, usually easy to recognize in the field by narrow, wide-spreading leaves and prominent terminal bud.

Syrrhopodon texanus Sull.—Crawford Co.: occasional, on north-facing sandstone wall, Yellow Birch Ravine Nature Preserve, T2S R1W S19 SE & S20 SW; 20 Oct 1984; *4266a* (dup. MICH). The plants lack sporophytes. The species often has masses of brood bodies clustered at the leaf apices. The leaves are also quite distinctive microscopically. Although this North American endemic is found primarily in the Coastal Plain, disjunct populations have been reported by Reese (7) in the Midwest from three counties in southern Illinois (Gallatin, Johnson, Saline), Van Buren County, Arkansas, and St. Genevieve County, Missouri. This is another example of a species that exhibits a habitat switch at the edge of its range. According to Reese (pers. comm.) the principle habitat for this species in the Coastal Plain is on trees, decaying logs and stumps, and sandy stream banks. The habitat for the Indiana and southern Illinois populations is shaded sandstone.

Conclusions

These 24 species bring the number of bryophytes reported from Indiana to 373 (96 liverworts and 277 mosses).

More than half of these new reports represent species at the southern or

northwestern edge of their range. A few of these range margin species exhibit the phenomenom of habitat switching—the substrate and/or habitat is different from that typical for the species in the main part of its range. Furthermore, as is usually the case for range margin species, the plants are both less robust and less sexually fecund. Only a few of the taxa listed above can be considered rare in Indiana: *Brachylema subulatum*, *Catoscopium nigritum*, *Mylia anomala*, *Orthotrichum anomalum*, *Physcomitrium hookeri*, *Rhytdiadelphus triquetrus*, *Sciaromium lescurii*, *Scorpidium scorpioides*, and *Syrrhopodon texanus*. Two-thirds of the mosses listed are calciphiles whereas all the liverworts reported are calciphobes.

The results of this report illustrate the need for more extensive bryophyte field studies in Indiana—I estimate that at least 100 more species of bryophytes are as yet unreported from Indiana.

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