

## Studies in Indiana Bryophytes XIV

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### Abstract

Two additional species and two additional varieties have been found to occur in Indiana since the publication of Studies in Indiana Bryophytes XIII (15): *Atrichum undulatum* (Hedw.) P. Beauv. var. *oerstedianum* (C. Müll.) Crum; *Grimmia pulvinata* (Hedw.) Smith; *Isopterygium distichaceum* (Mitt.) Jaeg. & Sauerb.; and *Pohlia annotina* (Hedw.) Lindb. var. *loeskei* Crum, Steere and Andrews. Specimens of each have been deposited in the Herbarium of DePauw University. One species, *Grimmia indianensis* (Sayre) Crum (3), originally *G. trichophylla* Grev. var. *indianensis* Sayre (12), has now become a synonym of *G. pulvinata* (Hedw.) Smith. The total number of known species of mosses in Indiana is presently 228, varieties 39, and forms 9, a total of 276 kinds.

The American Bryological and Lichenological Society 1970 foray was held in West Central Indiana, including habitats in Putnam and Parke Counties. One species, *Isopterygium distichaceum* (Mitt.) Jaeg. & Sauerb., and one variety, *Pohlia annotina* (Hedw.) Lindb. var. *loeskei* Crum, Steere and Anderson, were collected by two foray members, which are first records for Indiana. Another collection is that of a species (9) or a variety (4) which has been present in eastern United States indefinitely, within the species *Atrichum undulatum* (Hedw.) P. Beauv. *A. oerstedianum* (C. Müll.) Mitt. was not known to occur in the United States until the research on *Atrichum* published by Ireland (9).

On July 22, 1971, Keith Hoss, an Army Corps Engineer, and I visited Rocky Ford, on Big Pine Creek, in Warren Co., Indiana, searching for *Grimmia indianensis* (Sayre) Crum, in the area in which I collected the type, Nov. 27, 1937. The search was in vain. All of our collections were *G. alpicola* Hedw. The next day Mr. Hoss returned to Rocky Ford, crossed Big Pine Creek, on to Mud Pine Creek, a tributary to Big Pine, and climbed Table Rock in the creek bed. Table Rock has a flat top and steep sides. Mr. Hoss estimated this block of sandstone, a remnant of erosion (11) to be ca. 8 feet high, 50 feet long, and 30 feet wide, and exposed 6-7 feet above the water in the stream. On the flat top surface, there is a pothole, 2 feet deep and 10 feet in diameter. On this rock Hoss made several collections of *G. pulvinata* (Hedw.) Smith,<sup>1</sup> a

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<sup>1</sup>From a letter from H. A. Crum, Oct. 22, 1971: "I am convinced that *Grimmia indianensis* is a synonym of *G. pulvinata*. I would perhaps never have thought of it, except for the several collections you recently sent from Warren County and the type locality. It appears that both typical *G. pulvinata* and typical *G. indianensis* grow in the same locality, the latter probably no more than a shaded expression with less obviously contorted leaves and a poor development of hairpoints on the leaves. (I have seen a similar development from Scotland.) The specimen which you sent could be called *G. indianensis*, but it merges in its variations almost completely into typical *G. pulvinata*."

first record for Indiana, and *G. laevigata* (Brid.) Brid. We are indebted to Howard Crum, Univ. of Michigan, for making or checking determinations.

### Bryaceae

*Pohlia annotina* (Hedw.) Lindb. var. *loeskei* Crum, Steere, and Anderson. [Var. *decipiens* Loeske, in Grout (8).] (Fig. 1). Plants in loose tufts, pale green, yellowish green, or green, not glossy when dry,

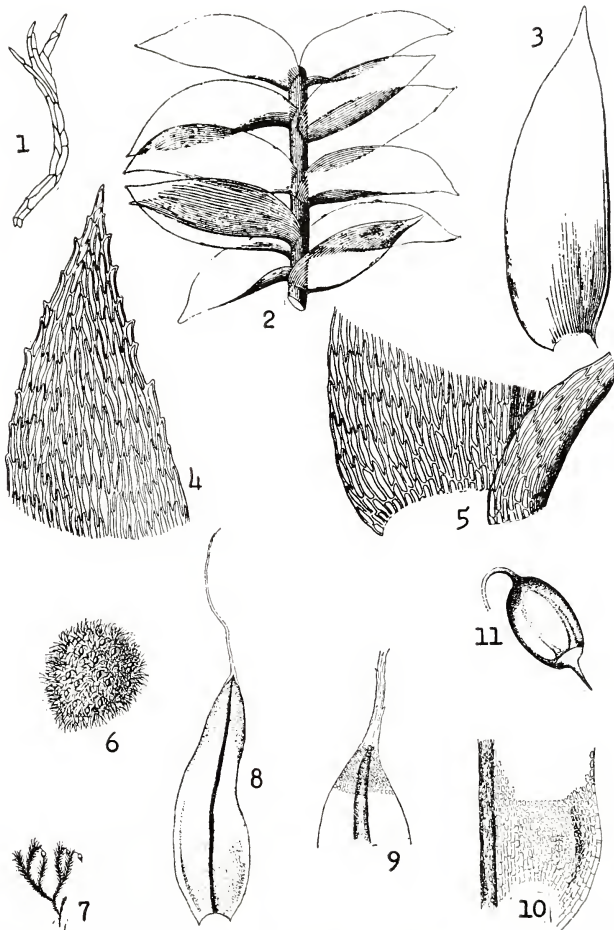


FIGURE 1. *Pohlia annotina loeskei* (Conrad, 2, Fig. 107e), gemma. FIGURES: 2-5. *Isopterygium distichaceum* (Grout, 6, Pl. 43C, from Sullivant, 13, Pl. 67). 2. Portion of foliated axis. 3. Leaf. 4. Upper portion of leaf. 5. Base of leaf. FIGURES 6-11. *Grimmia pulvinata* (Grout, 7, Pl. 13C, from Braithwaite, 1, Pl. 48C.) 6. Habit. 7. Plant, with sporophytes. 8. Leaf. 9. Leaf apex, with base of hair point. 10. Basal portion of leaf. 11. Upper seta, with capsule. *Atrichum undulatum oerstedianum* is not illustrated because Welch (14), Fig. 21, is sufficient. [Figures by permission, from the late H. S. Conrad and the late A. J. Grout.]

to 2 cm high, with some radicles. Stems slender, erect, simple or branched from the base, flexuose reddish at base. Leaves erect-spreading, frequently decurrent, ovate-lanceolate, lanceolate below, narrowly lanceolate above, the upper ones erect or nearly so. Apices mostly acute, occasionally acuminate. Margins of leaves plane to slightly recurved, especially near base in dry leaves, entire below, toothed above. Costa strong, commonly percurrent, yellowish to reddish at base. Cells of leaves narrowly rhomboidal to linear, to  $80 \times 7\mu$ , the walls moderately thick. Gemmae in leaf axils, especially the upper ones, commonly 2-5 each, hyaline or yellowish to green, elongated, twisted-vermiform, generally with 3-4 acute erect leaf-points. Dioecious. Usually sterile. Seta red, flexuose, slender, to 2 cm long. Capsule reddish brown, inclined, horizontal, or pendulous. Urn long-pyriform or broadly oval, to + 3 mm long, with a tapering neck,  $\pm$  the length of the urn. Operculum conic, apiculate. Annulus removable. Peristome teeth yellowish, slender. Segments hyaline, slender, carinate, split along the keel. Cilia in pairs. Spores  $\pm 18\mu$  in diameter.

Habitat: Moist, sandy soil, especially among sandstone rocks.

Indiana distribution: Parke Co.: wet faces of Mississippian sandstone gorge wall, in Sword Moss Gorge, ca. 14 miles W of Greencastle, Norton G. Miller 5929 (DPU, NCU).

#### Grimmiaceae

*Grimmia pulvinata* (Hedw.) Sm. (Fig. 6-11). Plants in small, round tufts, appearing grayish green due to long hyaline hair points. Upper leaves oblong-lanceolate, to 2 mm in length, abruptly narrowed into a long, hyaline, flexuose, serrate hair point. Both margins revolute from base nearly to tip, or plane and bistratose at apex. In upper-lanceolate leaves, hair points nearly as long as blades. Upper cells of leaves rounded, incrassate, the lower ones thin-walled, quadrate, except 5-6 rows near costa rectangular. Autoecious. Calyptra mitrate. Capsule exserted, pendent,  $\pm$  ovoid. Operculum rostrate. Seta arcuate, 2-3 times the length of capsule.

Habitat: Common on dry rocks, also on walls and roofs, usually at lower altitudes.

Indiana distribution: Warren County.

#### Hypnaceae

Welch (14) considers the genus *Plagiothecium* B.S.G. in the family of Hypnaceae. Crum *et al.* (5) regard *Plagiothecium* as a genus in the family of Plagiotheciaceae. Ireland (10) in his revision of the genus *Plagiothecium* treated it as a genus in the Hypnaceae.

According to Ireland (10), the Indiana species in Welch (14) should be revised as follows. *Plagiothecium denticulatum* (Hedw.) B.S.G. and *P. roesanum* B.S.G. are correct; *P. micans* (Sw.) Paris = *Isop-*

*terrygium tenerum* (Sw.) Mitt.; *Plagiothecium muellerianum* Schimp. = *Isopterygium muellerianum* (Schimp.) Jaeg. & Sauerb.; *Plagiothecium deplanatum* (Sull.) Spruce = *Taxiphyllum deplanatum* (Sull.) Fleisch.; *Plagiothecium geophilum* (Aust.) Fleisch. = *Taxiphyllum taxirameum* (Mitt.) Fleisch.; *Plagiothecium sylvaticum* (Brid.) B.S.G. is a European species and has been excluded from North America. "Most of the North American plants named *P. sylvaticum* are depauperate *P. roeseanum* B.S.G."

*Isopterygium distichaceum* (Mitt.) Jaeg. [*Plagiothecium subfalcatum* Aust. in Grout (6)] (Fig. 2-5). Plants in thin, soft, intertwined mats, bright green to yellowish green, glossy. Stems usually prostrate, sometimes ascending to erect, appearing flattened because of complanate leaves. The leaves often distant, appearing distichous, spreading, obliquely attached to axis, subfalcate, many apices pointing toward base of axis or substratum, frequently asymmetric, sometimes subcultriform, at times undulate, oblong-lanceolate to ovate-lanceolate, not decurrent,  $0.3-1.8 \times 0.2-0.6$  mm. Apices acute or sometimes broadly short acuminate. Margins plane or narrowly recurved below, entire to serrulate below, the apices serrate-dentate. Leaf cells usually smooth, sometimes papillose on lower surface by projecting cell angles in apices. Median cells linear,  $48-100 \times 4-7\mu$ . Propagula commonly in leaf axils of the apical portions of the axes, elongated, twisted-vermiform, 2-4 rows of cells wide, to 0.5 mm long, with 1-5 acute apical points. Calyptrae, antheridia, archegonia, and sporophytes not known in North America.

Habitat: In shade, on sandstone cliffs in crevices of rocks, and on banks of soil and humus.

Indiana distribution; Putnam Co., Hoosier Highlands, on Mansfield sandstone, ca. 14 mis. S of Greencastle, *Nancy G. Slack* 851 (DPU). Verified by R. Ireland.

### Polytrichaceae

*Atrichum undulatum* (Hedw.) P. Beauv. var. *oerstedianum* (C. Müll.) Crum. *Atrichum undulatum* in Indiana was described and illustrated by Welch (14), based on collections from 50 counties. Ireland (9) states that most of the eastern North American specimens of *Atrichum* in the herbarium of the Museum of Natural Science, National Museums of Canada named *A. undulatum* are *A. oerstedianum* (C. Müll.) Mitt. and that *A. undulatum* is not as common as once believed.

The following is a brief summary of Ireland's description. Plants 2-6 cm high. Dry leaves usually undulate, twisted and crispate, lingulate to lanceolate,  $5-9 \times 0.8-1.6$  mm, acute, ending in a tooth. Margins bordered  $\pm$  throughout with 2-3 rows of narrow, linear, thick-walled cells, the border usually bistratose; upper margins toothed, singly or doubly. Costa subpercurrent to percurrent, toothed on lower surface from midleaf to apex, lamellae on upper surface. Lamellae 4-6, often undulate, 2-4 cells high, occasionally 6. Leaf cells smooth or minutely papillose. Median cells rounded or irregularly

angled, 12-31 $\mu$  in longest dimension, averaging less than 17 $\mu$  in shortest dimension. Calyptra hispid at tip. Dioecious. Seta 1.5-4 cm long, 1-3 per perichaetium. Capsule cylindrical, usually inclined and subarcuate. Urn 4-7 mm long. Operculum obliquely rostrate, 2-3.5 mm long. Spores 12-17 $\mu$  in longest dimension.

Ireland states that *A. oerstedianum* is our native species and one of the common species in eastern North America and that *A. undulatum* has been introduced, probably from Europe, and rarely collected on this continent. Ireland adds that the latter prefers a dry, weedy habitat, such as weedy roadside ditches and the former occurs in wet habitats, especially on humus and soil along stream banks and inundated areas.

Crum (4) reduces this species to the synonymy of *Atrichum undulatum* and makes the var. *oerstedianum* (C. Mull.) Crum. He states, "Without sex organs or capsules, the var. *undulatum* and the var. *oerstedianum* are impossible to distinguish (except sometimes by size and habitat)." The var. *undulatum*, at least in some plants, is monoecious, and the var. *oerstedianum* is dioecious.

Habitat: On soil or humus, mostly in shaded situations; often in wet areas along streams or occasionally at margins of swamps.

Indiana distribution: Putnam Co., Fern Cliff, on bank,  $\pm$  9 mis. W of Greencastle, *Nancy G. Slack 763, 778* (DPU). Determined by R. Ireland.

### Literature Cited

1. BRAITHWAITE, R. 1888. *The British Moss-Flora* 2:17-18.
2. CONARD, H. S. 1944. *How to know the mosses and liverworts*. H. E. Jacques Co., Mt. Pleasant, Iowa. 166 p.
3. CRUM, H. A. 1965. *Grimmia trichophylla* v. *indianensis* reviewed. *The Bryologist* 68:233-235.
4. CRUM, H. A. 1971. Nomenclatural changes in the Musci. *The Bryologist* 74:165-174.
5. \_\_\_\_\_, W. C. STEERE, and L. E. ANDERSON. 1965. A list of the mosses of North America. *The Bryologist* 68:377-432.
6. GROUT, A. J. 1932. *Moss Flora of North America North of Mexico* 3:166.
7. \_\_\_\_\_. 1933. *Moss Flora of North America North of Mexico* 2:34-35.
8. \_\_\_\_\_. 1935. *Moss Flora of North America North of Mexico* 2:200.
9. IRELAND, R. R. Taxonomic studies on the genus *Atrichum* in North America. *Can. J. Bot.* 47:353-368.
10. \_\_\_\_\_. 1969. A taxonomic revision of the genus *Plagiothecium*. *Nat. Mus. Can. Publ. Bot.* 1:1-118.
11. LINDSEY, A. A., D. V. SCHMELZ, and S. A. NICHOLS. 1969. Natural areas in Indiana and their preservation. *Indiana Natural Areas Survey*, Purdue University, Lafayette, Indiana. 594 p.

12. SAYRE, G. 1954. A new variety of *Grimmia trichophylla* from Indiana. The Bryologist 57:21-25.
13. SULLIVANT, W. S. 1874. Mosses peculiar to North America. Icones Muscorum, Suppl. Triebner and Co., London, Eng. 109 p.
14. WELCH, W. H. 1957. Mosses of Indiana. Indiana Department of Conservation, Indianapolis, Indiana 478 p.
15. ————. 1962. Studies in Indiana Bryophytes XIII. Proc. Indiana Acad. Sci. 72:270-278.