

Studies in Indiana Bryophytes II

WINONA H. WELCH, DePauw University

The mosses used in this study are Indiana collections in herbaria in the following institutions: Indiana University, Butler University, DePauw University, Field Museum of Natural History, University of Illinois, University of Wisconsin, and University of Chicago; and the personal herbaria of the following: Chas. C. Deam, J. P. Naylor, and the author. The collections presented to the author by Chas. C. Deam, R. M. Kriebel, William D. Gray, Harriet Gragg Winch, and Earl L. Harger, Jr. have contributed considerably to the range of distribution.

The nomenclature is that of A. J. Grout, *The Moss Flora of North America North of Mexico* 1:28-61. 1936; 77-99. 1937.

The distribution of each species is based largely upon Indiana specimens examined by the author and is shown by the list of counties in which collected. The asterisk preceding the name of a county indicates that the species has been reported from that locality according to published records but not studied by the author.

The asterisk following the name of a species or a variety is an indication that, according to available literature, this is the first published record for Indiana.

All of the author's collections of bryophytes since May, 1937, have been made with the financial assistance of an Indiana Academy of Science Research Grant through the American Association for the Advancement of Science. The writer wishes this acknowledgment to be a sincere expression of her very deep appreciation of this gift.

DITRICHACEAE

Stems generally less than 2 cm. in height; leaves usually subulate from a broader base (more or less lanceolate in *Ceratodon*), alar cells not enlarged; peristome typically of 16 slender teeth split into two fli-form divisions (no peristome in *Bruchia* or *Pleuridium*).

1. Plants minute, rarely collected unless fruiting; stems up to 5 mm. in height; leaves subulate-lanceolate; capsules without peristome.....*Bruchia* and *Pleuridium*
Plants larger, stems up to 2 cm. in height, rarely more than 5 cm.; leaves lanceolate to subulate; capsules with peristome.....2
2. Stems usually 1-2 cm. long, occasionally up to 5 cm. or more; leaves ovate-lanceolate to narrowly lanceolate; upper leaf cells short-rectangular to more or less quadrate*Ceratodon*
Stems 1-1.5 cm. in length; leaves more or less subulate; upper leaf cells more or less elongate or irregularly quadrate.....3
3. Stems up to 1 cm. in height; leaves secund or more or less crisped when dry, 1-2 mm. long, abruptly linear-subulate from an ovate or oblong clasping base, margins of awn more or less revolute; upper cells irregularly quadrate...*Trematodon*
Stems up to 1.5 cm. in height; leaves straight or only slightly curved when dry, 2-5 mm. long, linear-subulate from a non-sheathing lanceolate base; upper cells rectangular to linear.....*Ditrichum*

Bruchia

B. Sullivanti Aust.* (Figs. 1-3.) Stems up to 2 mm. in height; upper leaves abruptly subulate-lanceolate from an ovate base, 1-2 mm. long; seta 1-2 mm. long; capsule pear-shaped, 1-1.5 mm. long, neck about the length of spore sac; spores densely spinose, up to 30-40 μ in diameter, maturing June-July. Owen and Putnam Counties.



All figures are copied, with permission, from A. J. Grout, Mosses with Hand-lens and Microscope. (The figures in parentheses refer to Grout, M.H.M.) *Bruchia Sullivanti* (fig. 30). Fig. 1. Gametophytes and sporophytes, $\times 1$. Fig. 2. Same, enlarged. Fig. 3. Spores, enlarged. *Pleuridium subulatum* (fig. 32). Fig. 4. Gametophyte and sporophyte, enlarged. *Ceratodon purpureus* (figs. 36, 37). Fig. 5. Gametophyte and sporophyte, $\times 2$. Fig. 6. Leaves, $\times 10$. Fig. 7. Calyptra, $\times 10$. Fig. 8. Capsule, $\times 10$. Fig. 9. Apical portion of leaf, enlarged. Fig. 10. Basal portion of leaf, enlarged.

Ceratodon

C. purpureus (Hedw.) Brid. (Figs. 5-10.) Leaf margins reflexed to near the apex; seta dark red; capsule dark reddish-brown, grooved when dry, inclined to horizontal. Allen, Carroll, Dearborn, Delaware, Elkhart, Huntington, Jasper, Jefferson,* Kosciusko, Lagrange, Lake, Lawrence, Marshall, Monroe, Montgomery, Newton, Owen, Parke, Porter, Posey, Putnam, St. Joseph, Starke, Steuben, Sullivan, Tippecanoe,* Warren, Wayne,* Wells, White, and Whitley Counties.

Ditrichum

1. Upper leaves 3-5 mm. long, concave, channeled above, basal cells laxly oblong-hexagonal, up to 25 μ wide, 65-85 μ long; seta bright yellowish-orange, 1-4 cm. long; capsule light brown to yellowish, usually inclined and unsymmetric, urn 1-2.5 mm. long, grooved and narrowed at mouth when dry; teeth spinose-papillose; spores warty, 14-18 μ in diameter, maturing in early spring.....*D. pallidum*

Upper leaves 2-3 mm. long, margins slightly revolute, basal cells linear-rectangular to hexagonal, 10-15 μ wide, 2-5:1; seta reddish-brown, 5-15 mm. long; capsule reddish-brown, usually more or less erect, urn 0.5-1.5 mm. long; commonly not conspicuously grooved or narrowed at mouth when dry; teeth faintly papillose; spores smooth, 10-15 μ in diameter, maturing in autumn.....*D. pusillum*

Ditrichum pallidum (Schreb., Hedw.) Hampe. (Figs. 11, 12.) Carroll, Clark, Dubois, Elkhart, Floyd, Fountain, Franklin, Harrison, Jackson, Jasper, Jefferson, Lagrange, LaPorte, Lawrence, Madison, Marion, Marshall, Martin, Monroe,* Montgomery, Owen, Parke, Perry, Pike, Porter, Posey, Putnam, Ripley,* Spencer, Starke, Steuben, Vigo,* Washington, Wayne,* and White Counties.

Ditrichum pusillum (Hedw.); E. G. Britton, N. Am. Fl. 15:62. 1913. (*D. tortile* Brockm.) (Figs. 13, 14.) Lake, Monroe, Putnam, and Spencer* Counties.

Pleuridium

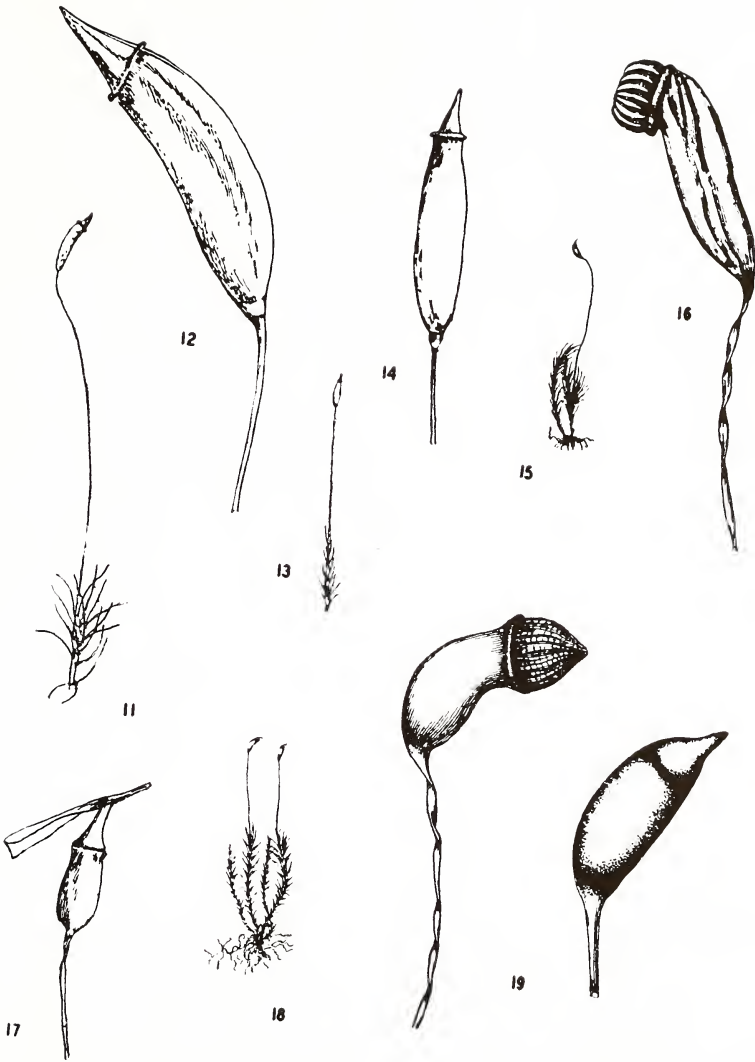
P. subulatum (Hedw.) Lindb. (*P. alternifolium* (Dicks.; Kaulf.) Rabenh.) (Fig. 4.) Stems up to 5 mm. in height; upper leaves long subulate-acuminate from an ovate or lanceolate base, 3-4 mm. long; seta 0.4-1 mm. long; capsule immersed, ovoid, about 1 mm. long; spores densely papillose, up to 28 μ in diameter, mature in late spring to early summer. Morgan, Owen, and Putnam Counties.

Trematodon

T. longicollis Mx.* Seta yellow; capsule with long neck, urn 1-2 mm. long, neck 2-4 mm. long, curved, with a goiter; spores maturing from April to July. Putnam County (?).

DICRANACEAE

Plants very small to large, stems dichotomously branching, growing in compact mats or cushions; leaves straight and erect to curved and



Ditrichum pallidum (fig. 33). Fig. 11. Gametophyte and sporophyte, $\times 2\frac{1}{4}$. Fig. 12. Capsule, $\times 22\frac{1}{2}$. *Ditrichum pusillum* (fig. 33). Fig. 13. Gametophyte and sporophyte, $\times 2\frac{1}{4}$. Fig. 14. Capsule, $\times 22\frac{1}{2}$. *Dicranella heteromalla* (pl. 11). Fig. 15. Gametophytes and sporophyte, $\times 1$. Fig. 16. Capsule, enlarged, *Dicranella heteromalla*, var. *orthocarpa* (fig. 39). Fig. 17. Capsule and calyptra, $\times 10$. *Dicranella varia* (pl. 13). Fig. 18. Gametophytes and sporophytes, $\times 1$. Fig. 19. Capsules, enlarged.

secund as though all were blown in one direction by the wind, sometimes crispate; peristome of 16 teeth from a low basal membrane, mostly divided more than one-half the way down into narrowly lanceolate or filiform forks.

1. Leaves lanceolate-subulate, alar cells not differentiated.....*Dicranella*
 Leaves broadly to narrowly lanceolate, usually falcate-secund, alar cells strongly differentiated, enlarged, inflated, usually forming a more or less square group of brown or reddish cells.....*Dicranum*

Dicranella

1. Plants light green; leaf margins entire, apices slightly denticulate; costa at base 1/5 of leaf width; seta reddish; capsule oval, more or less nodding and curved, smooth or only slightly wrinkled when dry and empty and mouth not oblique; spores papillose, about 18 μ in diameter, maturing in late autumn.....*D. varia*
 Plants dark green; leaf margins serrulate nearly to base; costa at base 1/3 of leaf width; seta yellowish; capsule ovoid to cylindric; spores smooth, about 15 μ in diameter, maturing from autumn to winter.....2
2. Capsule more or less inclined and unsymmetric, strongly furrowed when dry and empty and mouth oblique.....*D. heteromalla*
 Capsule erect and symmetric or nearly so, shrunken and coarsely furrowed when dry and empty, mouth little or not at all oblique..*D. heteromalla*, var. *orthocarpa*

D. heteromalla (Hedw.) Schimp. (Figs. 15, 16.) Brown, Dubois, Floyd, Fountain, Jasper, Jefferson, Lake, Laporte, Marion, Monroe, Montgomery, Owen, Parke, Perry, Pike, Porter, Putnam, Spencer, Steuben, and Wabash Counties.

D. heteromalla (Hedw.) Schimp., var. *orthocarpa* (Hedw.) Paris, Index Bryol. 330. 1895.* (Fig. 17.) Monroe, Putnam, and Tippecanoe Counties.

D. varia (Hedw.) Schimp. (Figs. 18, 19.) Jefferson, Laporte, Monroe, and Putnam Counties.

Dicranum

1. Plants bearing in axils of upper leaves numerous slender flagella covered with minute scale-like ecostate leaves.....*D. flagellare*
 Plants without flagella.....2
2. Leaf cells elongate throughout the blade.....3
 Upper leaf cells short rectangular or more or less quadrate, lower leaf cells elongate4
3. Leaves erect-spreading, rarely curved-secund, sometimes undulate; apex broadly acute to obtuse, more or less flat; margin and back of costa slightly or not at all toothed.....*D. Bonjeani*
 Leaves curved-secund, not undulate, strongly serrate above on the long, narrow, more or less tubulose apex.....*D. scoparium*
4. Upper leaf cells short and irregular with angular, somewhat unequally thickened walls; leaves nearly straight when moist, more or less crispate when dry; on dry, sandy soil.....*D. condensatum*
 Upper leaf cells quadrate to short rectangular, rarely more than 2:1; alar cells reaching costa; archegonial plants yellowish-brown or brownish-green; on rock or wood.....5



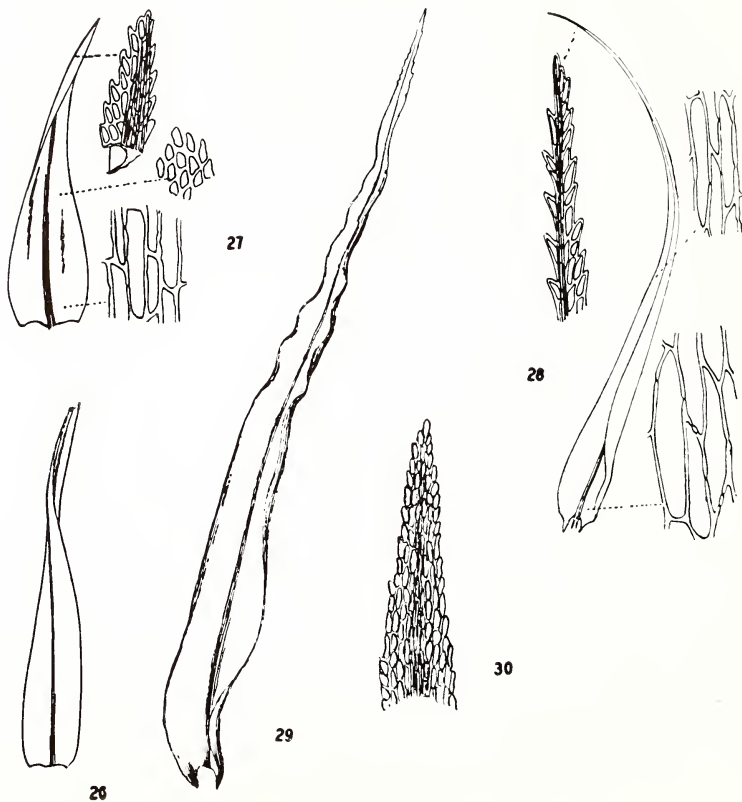
Dicranum flagellare (fig. 46). Fig. 20. Gametophytes, sporophyte, and flagella, $\times 2\frac{1}{4}$. Fig. 21. Flagella, $\times 11\frac{1}{2}$. *Dicranum fulvum* (fig. 46). Fig. 22. Gametophyte and sporophyte, $\times 2\frac{1}{4}$. Fig. 23. Capsule and leaf, $\times 11$. *Dicranum fulvum*, var. *viride* (fig. 48). Fig. 24. Sterile plants, $\times 1\frac{1}{2}$. Fig. 25. Portion of sterile plant from which leaf apices have fallen.

5. Leaves curved and secund; apex present, linear and channeled, usually slightly serrulate and somewhat papillose roughened; on shaded rocks.....*D. fulvum*

Leaves scarcely secund; apex broken off all except the young upper leaves, when present, entire and little or not at all papillose at back; usually growing on wood.....*D. fulvum*, var. *viride*

D. Bonjeani De Not.* (Figs. 29, 30.) Jefferson, Lake, and Noble Counties.

D. condensatum Hedw.* (Figs. 26, 27.) Fountain, Jefferson, Lake, and Putnam Counties.



Dieranum condensatum (fig. 45). Fig. 26. Leaf, x 10. Fig. 27. Leaf, x 10, with apical, median, and basal cells, x 200. *Dieranum scoparium* (fig. 44). Fig. 28. Leaf, x 11, and apical, median, and basal cells, x 225. *Dieranum Bonjeani* (pl. 15). Fig. 29. Leaf showing undulations, enlarged. Fig. 30. Leaf apex, enlarged.

D. flagellare Hedw. (Figs. 20, 21.) Fountain, Lake, Marion, Porter, Putnam, Ripley, Steuben, Wayne,* and Wells Counties.

D. fulvum Hook. (Figs. 22, 23.) Dubois, Fountain, Martin, Monroe,* Montgomery, Parke, Perry, and Putnam Counties.

D. fulvum Hook., var. *viride* (Sull. & Lesq.) Grout. (Figs. 24, 25.) Monroe, Parke, and Wayne* Counties.

D. scoparium (L.) Hedw. (Fig. 28.) Allen, Carroll, Clark, Crawford, Floyd, Fountain, Jasper, Jefferson, Lagrange, Lake, Laporte, Lawrence, Marshall, Martin, Monroe, Montgomery, Owen, Parke, Perry, Porter, Putnam, Washington, Wayne,* and Wells Counties.

LEUCOBRYACEAE

Plants whitish; leaves with very little chlorophyll, composed almost entirely of costa; capsules unsymmetric, inclined; peristome teeth 16, forked as in *Dicranum*.

Leucobryum glaucum (Hedw.) Schimp. Mature plants in deep rounded cushions up to 10 cm. or more high; leaves erect-spreading, 3-10 mm. long, upper tubulose portion about 3 times the length of the basal portion. Allen, Carroll, Clark, Crawford, Delaware, Floyd, Fountain, Jasper, Jefferson, Lagrange, Lake, Laporte, Lawrence, Marshall, Martin, Monroe, Montgomery, Noble, Owen, Parke, Perry, Porter, Putnam, Steuben, Warren, Washington, and Wayne* Counties.