

Studies in Indiana Bryophytes IX

WINONA H. WELCH, DePauw University

The introductory remarks for this study are comparable to those of number eight in the series. The writer is indebted to the Indiana Academy of Science and the Graduate Council of DePauw University for research grants and to the University of Iowa for two honoraria. The latter were used during the summers of 1950 and 1951 at the Iowa Lakeside Laboratory, in research on Indiana mosses under the leadership and generous counsel of Dr. H. S. Conard. The author in this way wishes to express deep appreciation to Dr. Conard.

LESKEACEAE

Plants in tufts or mats; stems prostrate, ascending or erect; leaves costate; majority of leaf cells papillose, those of basal portion of leaf slightly papillose to smooth; paraphyllia present in many species.

Subfamily THUIDIEAE

Stems rather stiff, pinnately branched; branches complanate; capsules inclined, unsymmetric; peristome perfect, with well developed cilia.

Key to the genera of Thuidieae

- Stem leaves with paraphyllia-like filaments at base; apical cells of branch leaves without papillae *Helodium*
Stem leaves without paraphyllose filaments at base; apical cells of branch leaves with 1-4 papillae *Thuidium*

HELODIUM

Plants forming soft, green, yellowish green, or brownish tufts; stems usually simple, erect or nearly so, pinnately branched; branches slender, attenuate; paraphyllia abundant and matted on stem, filamentous, freely branched; leaves costate, concave, plicate, with paraphyllia on base; leaf cells smooth or unipapillate over the lumen or at the upper angle; capsule inclined to horizontal, more or less arcuate, somewhat cylindrical; peristome double, with 3 cilia, endostome with high basal membrane, carinate; operculum conic.

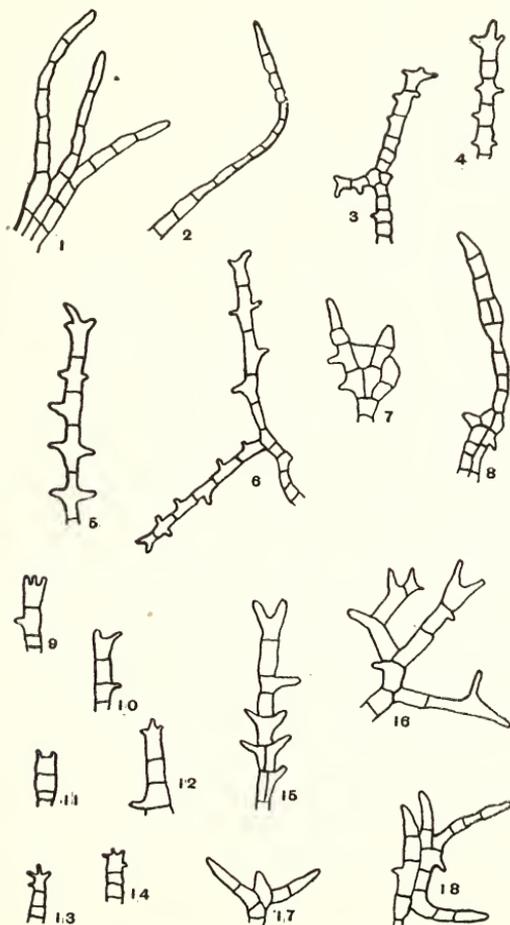
Key to species of Helodium

- Stem irregularly branching; leaf costate nearly to apex; papillae on leaf cells small.
Median leaf cells short linear-oblong to linear-rhomboid, usually smooth, sometimes papillose at distal end *H. paludosum*
Median leaf cells elliptic to oval, frequently subcentrally papillose *H. paludosum* var. *Helodioides*

Stem very regularly pinnately branching; leaf costate to middle or slightly above; large papillae at distal angle of leaf cells *H. Blandowii*¹

H. paludosum (Sull.) Aust. (Figs. 1, 2, 19.) Allen, Jefferson, and Porter counties.

H. paludosum var. *Helodioides* (R. & C.) Grout. Allen and La-grange counties.



Figs. 1-30, enlarged, unless otherwise indicated. Figs. 1-18, original; 19, 23, 24, 29, 30, Grout, Mosses with Hand-lens and Microscope, by permission; 20-22, 25-28, Conard, How to know the Mosses, by permission. Figs. 1-18, paraphyllia. Figs. 1-2. *Helodium paludosum*. Figs. 3-4. *Thuidium abietinum*. Figs. 5-6. *T. delicatulum*. Figs. 7-8. *T. microphyllum*. Figs. 9-12. *T. minutulum*. Figs. 13-14. *T. pygmaeum*. Figs. 15-16. *T. recognitum*. Figs. 17-18. *T. virginianum*.

¹*Helodium Blandowii* (W. & M.) Warnst. not yet reported from Indiana.

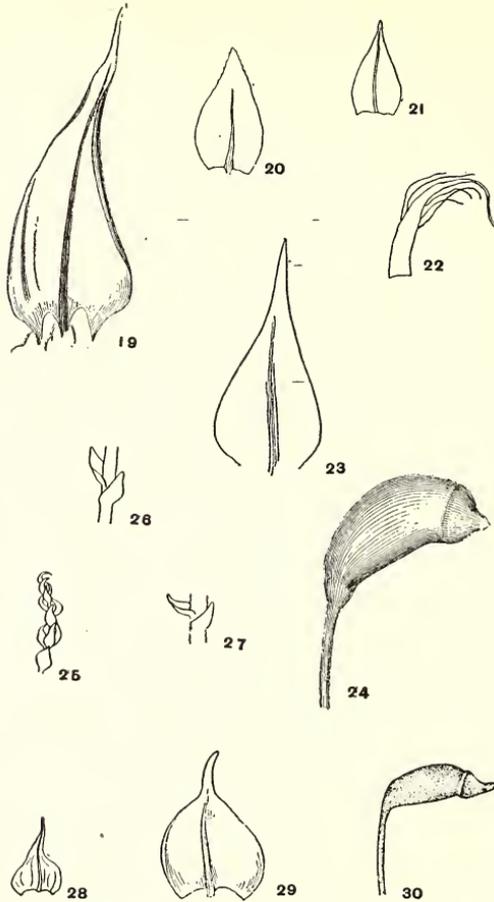


Fig. 19. *Helodium paludosum* (Grout, pl. 53), stem leaf. Fig. 20. *Thuidium abietinum* (Conard, fig. 133), stem leaf. Figs. 21-22. *T. delicatulum* (Conard, fig. 134). Fig. 21. Stem leaf. Fig. 22. Perichaetial leaf. Figs. 23-24. *T. microphyllum*. Fig. 23. Stem leaf, X 60 (Grout, fig. 130). Fig. 24. Capsule (Grout, pl. 55). Figs. 25-26. *T. minutulum* (Conard, fig. 132). Fig. 25. Dry, foliated branch. Fig. 26. Smooth branch. Fig. 27. *T. pygmaeum* (Conard, fig. 132), papillose branch. Fig. 28. *T. recognitum* (Conard, fig. 134), stem leaf. Figs. 29-30. *T. virginianum* (Grout, pl. 54). Fig. 29. Stem leaf. Fig. 30. Capsule.

THUIDIUM (FERN MOSSES)

Plants usually stiff, in yellowish, greenish or brownish mats or cushions; stems prostrate to erect, pinnately branched, often regularly and in one plane, resembling the frond of a fern; branches simple to bipinnate; paraphyllia more or less abundant on stems and branches; cauline leaves plicate, costate, papillose on one or both surfaces; inner perichaetial leaves generally lanceolate, often with an acuminate to

filiform apex, sometimes margins ciliate; seta long; capsules more or less arcuate, somewhat cylindrical; peristome double, with cilia, endostomal band approximately 1/3 the length of the teeth; operculum conical to rostrate.

Key to species of *Thuidium*

1. Paraphyllia on stems simple or branched, sometimes 2, 3, or more cells wide, linear to multiform, cells numerous 2.
2. Apical cell of paraphyllia with 2-4 papillae 3.
 3. Stems closely once pinnate; branches slender, attenuate, cylindrical or terete when dry *T. abietinum*
 3. Stems loosely pinnate; branches pinnate to bipinnate 4.
 4. Paraphyllia with lateral papillae usually only at ends of cells; margins of perichaetial leaves not ciliate
..... *T. recognitum*
 4. Paraphyllia with lateral papillae usually only at center of cells or approximately so; margins of inner perichaetial leaves ciliate *T. delicatulum*
2. Apical cell of paraphyllia with a single terminal pappila 3.
 3. Cauline leaves rounded ovate, 0.6-0.8 mm. long, abruptly short acuminate; operculum short rostrate, obtuse, approximately 1/3 the length of the urn *T. virginianum*
 3. Cauline leaves broadly ovate to ovate-lanceolate, narrowly acuminate 4.
 4. Cauline leaves 0.75-1.20 mm. long, gradually long and narrowly acuminate; operculum short conical, apiculate or obtuse, or mammillate *T. microphyllum*
 4. Cauline leaves 1.30 mm. or more in length, abruptly narrowed to long narrow acumination
..... *T. microphyllum* var. *lignicolum*
1. Paraphyllia on stems not branched, linear, 2-6 cells long 2.
 2. Branches of stem smooth; paraphyllia 3-6 cells long; on bark, usually *T. minutulum*
 2. Branches of stem papillose; paraphyllia 2-5 cells long; on rocks, usually *T. pygmaeum*

T. abietinum (Brid.) Bry. Eur. (Figs. 3, 4, 20.) Lake county.

T. delicatulum (Hedw.) Mitt. (Figs. 5, 6, 21, 22.) Allen, Blackford, Clark, Crawford, Delaware, Dubois, Fountain, Hamilton, Harrison, Henry, Jasper, Jay, Jefferson, Lagrange, Lake, Laporte, Lawrence, Madison, Marshall, Martin, Monroe, Montgomery, Owen, Parke, Perry, Pike, Porter, Putnam, Saint Joseph, Steuben, Warren, Wayne, and Wells counties.

T. microphyllum (Hedw.) Best. (Figs. 7, 8, 23, 24.) Clark, Gibson, Grant, Knox, Lake, Laporte, Montgomery, Perry, Putnam, Starke, Steuben, and Warrick counties.

T. microphyllum var. *lignicolum* (Kindb.) Best. Putnam county.

T. minutulum (Hedw.) Bry. Eur. (Figs. 9-12, 25, 26.) Dubois, Jefferson, Laporte, Montgomery, Putnam, and Wayne counties.

T. pygmaeum Bry. Eur. (Figs. 13, 14, 27.) Jefferson, Martin, Monroe, Montgomery, Parke, and Putnam counties.

T. recognitum (Hedw.) Lindb. (Figs. 15, 16, 28.) Brown, Carroll, Clark, Delaware, Harrison, Jefferson, Lawrence, Madison, Montgomery, Noble, Owen, Parke, Porter, Putnam, Ripley, Steuben, Tippecanoe, Vermillion, Warren, Washington, and Wayne counties.

T. virginianum (Brid.) Lindb. (Figs. 17, 18, 29, 30.) Clark, Dearborn, Fountain, Gibson, Hamilton, Jefferson, Knox, Lake, Lawrence, Marshall, Martin, Monroe, Montgomery, Orange, Parke, Perry, Porter, Posey, Putnam, Ripley, Spencer, Starke, Steuben, Washington, and Wayne counties.