

1974

# The Corticolous Mosses of East-Central Illinois

Daniel J. Royse

*Eastern Illinois University*

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Author

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THE CORTICOLOUS MOSSES OF

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EAST-CENTRAL ILLINOIS

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(TITLE)

BY

Daniel J. Royse

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF

Master of Science

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IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY  
CHARLESTON, ILLINOIS

1974

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YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING  
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

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# PHYLOGENETIC LIST OF MOSSES

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Class: Musci  
Order: Bryales

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## INTRODUCTION AND HISTORY

Corticolous mosses comprise some 57 different species in East-Central Illinois. The wooded areas along the Embarrass River, at Fox Ridge State Park, Rocky Branch Preserve, and Lincoln Trail State Park are especially rich in corticolous species. These areas include various types of habitat; the tree inhabiting Fissidens subbasilaris Hedw. and Orthotrichum ohioense Sull. & Lesq. may be found only a few steps from the hydric, rotten wood-inhabiting Tetraphis pellucida Hedw. Most species reported were taken from the mesophytic ravines and woods which are widespread in this area.

Coles, Clark and Cumberland counties are located in the Till Plains Section of the Central Lowland Province. More than 90% of the State of Illinois lies within this province. The Till Plains Section of the Central Lowland Province is characterized by nearly flat to gently undulating glacial terrain lacking strong end moraines and having few lacustrine plains. It extends over many thousands of square miles through Ohio, Indiana, and Illinois and is dominantly a depositional topography. Although some of the Till Plain possesses low enough relief to be considered flat, much more characteristic is the gently undulating terrain. The building of the Till Plains was a cumulative process and the product of at least three, if not four, glaciations. Each glaciation helped in some degree to obliterate the pre-existing, stream-carved topography, more by a filling up of the valleys than by a

cutting down of the hills.

At the edge of the Illinoian and Wisconsin glaciation lie Clark, Coles, and Cumberland counties. The Illinoian drift plain, covering most of the Southern half of Illinois, is generally characterized as having an altitude of 550 to 700 feet above sea level. The topography in the northeastern part of Clark county is quite rugged due to cutting of 50 to 80 feet below the upland by Big Creek and the smaller tributaries of the Wabash River. At some places in the eastern part of Clark county, streams have been superimposed on the buried bedrock beneath the glacial drift such as at Rocky Branch Preserve.

During the various glaciations of the Central Lowlands, great quantities of glacial outwash contributed to countless valleys that led away from the ice front. Two of the major sluiceways carrying outwash were the Embarrass and Wabash Rivers. Between these two major rivers exists a region rich in corticolous mosses.

The vegetation making up the forested areas is mainly oak-hickory (Quercus spp., Carya spp.) with sugar maple (Acer saccharum Marsh.) and some white ash (Fraxinus americana L.) found less frequently.

The purpose of this paper is to describe and illustrate the corticolous Musci of East-Central Illinois and to discuss the nature of the woody substratum of the 57 corticolous mosses collected in Coles, Clark, and Cumberland counties.

## REVIEW OF LITERATURE

A review of the literature reveals that no thorough studies of the corticolous moss vegetation of East-Central Illinois (comprising Coles, Clark, and Cumberland Counties) have been reported. However, some research has been done on Illinois mosses, although the volume is not great. The first to attempt any county bryological studies were Wolf and Hall (1878). Their work was concentrated in Menard and Fulton Counties, but included the southern counties of Union, Johnson, and Jackson. They listed 153 mosses and 45 liverworts. The paper also included several species of lichens found growing in the counties under consideration.

Nine years later, Brendel (1887) did a study of the vegetation of Peoria County in which he included a checklist of 87 mosses and 27 liverworts. A lapse of 43 years followed Brendel's work before Hague (1930) produced a very comprehensive state-wide study of Illinois mosses. She reported 265 species in which she included the counties of Peoria, Fulton, Kane, Cook, McHenry, Lake, Carroll, Menard, La Salle, Will, Kankakee, Marion, DuPage, Sangamon, Champaign, Wabash, Stark, Henderson, Union, Johnson, Ogle, Randolph, Rock Island, Hancock, Schuyler, and Winnabago. Her records did not include Coles, Clark, and Cumberland Counties. Hague (1934) again reported 71 Musci from several southern counties: Saline, Pope, Johnson, Union, Williamson, and Hardin Counties. The same year, Galligan (1934) listed 5 liverworts

and 35 mosses she found in a bryological survey of Macon County.

In 1940, Richards reported 18 liverworts and 33 mosses collected in a survey of Starved Rock State Park, LaSalle County. In a study of Clark County, Illinois, Vaughn (1941) listed 14 hepatics and 74 Musci. A few years later, Arzeni (1947) reported 42 liverworts and 130 mosses collected in a study of Coles and Clark Counties. Following Arzeni's study scattered county reports occurred in the following order: Hatcher (1952) reported 30 liverworts and 63 mosses of Jackson, Union, and Pope Counties in Southern Illinois; and Morrow (1952) listed 17 common Musci of McDonough County. No other work has been done to date related to specific county or state-wide studies in Illinois mosses.



## MATERIALS AND METHODS

The mosses were collected from East-Central Illinois (comprising Coles, Clark, and Cumberland Counties). The material represents mosses from four distinct woody habitats so explicated in the descriptions. Most species were collected on living trees or well-rotted timber. However, fallen uncorticated logs provide a habitat for several different species.

The author's determination of all specimens have been corroborated by Dr. Charles Arzeni. The mosses collected were stored in standard bryological packets containing the following data: scientific name and authority for each species, whether fruiting or sterile, the county and state in which the specimen was collected, habitat information, the collector's name, the determiner's name (if different), the date collected, and the collection number. The specimens were deposited in the author's collection with duplicates placed in the Stover Herbarium, Eastern Illinois University. Taxonomic keys used in the determination of species were by Grout (1929-1940), 1903), Conard (1956), Welch (1957), and Crum (1973).

Description of the gross external morphology as well as microscopic morphology were made for each species. The descriptions included: the general habit of the plant under study, the leaf arrangement on the stem, the branching pattern, the overall size of the plant, the leaf morphology, and the aerolation plus cell size. Sporophyte characteris-

tics which were considered included seta characters such as size and color; capsule color, shape, and size; operculum shape; the peristome characteristics, color, and number of teeth; and the spore size and morphology. Measurements of all microscopic characteristics were made with a calibrated ocular micrometer.

Original illustrations have been prepared for each species. The descriptions of all mosses are arranged phylogenetically as given by Grout (1940).



FAMILY: TETRAPHIDACEAE

Tetraphis pellucida Hedw.

Plants in dense to loose, wide tufts and sods, yellowish green; protonema of a green scale, not filamentous; stems erect, 1-3 cm. long, simple or branched, densely radiculose at base; barren shoots frequently with terminal gemmiferous cups, about 1 mm. in diameter, formed by 4-5 broadly cordate, obovate, or reniform leaves, truncate to apiculate, containing lenticular, many celled, stalked gemmae; upper leaves larger than basal blades, close, ovate to ovate-lanceolate, from a narrow base, 1-1.3 mm. long, 0.5-0.75 mm. wide, ending below apex, apices mostly acute, margins plane, entire; median cells of leaves almost isodiametric, rounded hexagonal, 8-20 $\mu$  in diameter, incrassate.

Autoicous; inflorescence apical; calyptra whitish, conical, acute, solid and rough at apex, lacerate below, enclosing the entire capsule, seta yellowish to reddish or brown, erect, 1-1.5 cm. long; capsule reddish, erect to ascending; operculum lustrous, acutely conical, cleft on one side, beak straight or oblique; urn green when young, bright reddish brown when ripe, usually symmetrical, rarely subarcuate, narrowly cylindrical, 2-2.7 mm. long, persistent; annulus none; peristome reddish to brownish, single, teeth 4, linear-triangular, thick, up to 0.9 mm. long, approximately 1/5 length of capsule; spores 8-12 $\mu$  in diameter, slightly papillose, mature in spring to early fall.

Comments:

Tetraphis pellucida Hedw. is typically found on very rotten stumps or logs but also may be found on wood humus. The name Tetraphis means bearing or producing four, referring to the four peristome teeth.

Tetraphis pellucida Hedw.

1. Habit of sterile plant, 3 X
2. Habit of fruiting plant, 3 X



FAMILY: FISSIDENTACEAE

Fissidens subbasilaris Hedw.

Plants small, scattered to closely gregarious or cepitose in wide mats or dense mats, brownish below, green above; stems erect to ascending when moist, curved toward substratum when dry, 5-10 mm. high, simple or branching at base; central strand present; leaves of stems 10-18 pairs, crispate when dry, close, distichous, spreading to ascending, oblong, the median usually the largest, up to 1.5 mm. long, vaginant lamina boat-shaped, flat, conduplicate about 1/2-3/5 length of leaf, clasping stem and portion of adjacent leaf above, costa strong, ending 10-12 cells below apex of leaf, upper portion covered and obscured by mammillose cells, dorsal lamina usually ending abruptly, either before or after reaching the stem, apices obtuse to subacute and apiculate by a projecting cell, margins minutely and evenly crenulate below by projecting cell angles, minutely and irregularly serrulate above larger cells, border none; cells of leaves incrassate and rather obscure, the median cells of the superior lamina irregularly rounded hexagonal, small, 7-12 $\mu$  in diameter, strongly and bluntly mammillose on both surfaces.

Dioicous; seta light chestnut color, extending approximately to apex of stem, ascending, 3-5 mm. long; sporophyte lateral, arising from axil of leaf near base of stem; capsule chestnut color to dark brown, suberect to erect, symmetric to slightly curved; calyptra small, narrowly cucullate; operculum conic, obliquely rostrate, about 1/2 length of urn;

the urn oblong-cylindric to ovoid-cylindric, 1-1.5 mm. long, tapering at base; annulus present; peristome chestnut color, single, teeth 16, cleft from apex to approximate middle into 2 subulate divisions, nodulose above, not spirally thickened or papillose; spores pale yellowish, pellucid, spherical, 16-18 $\mu$  in diameter, smooth, mature in late autumn.

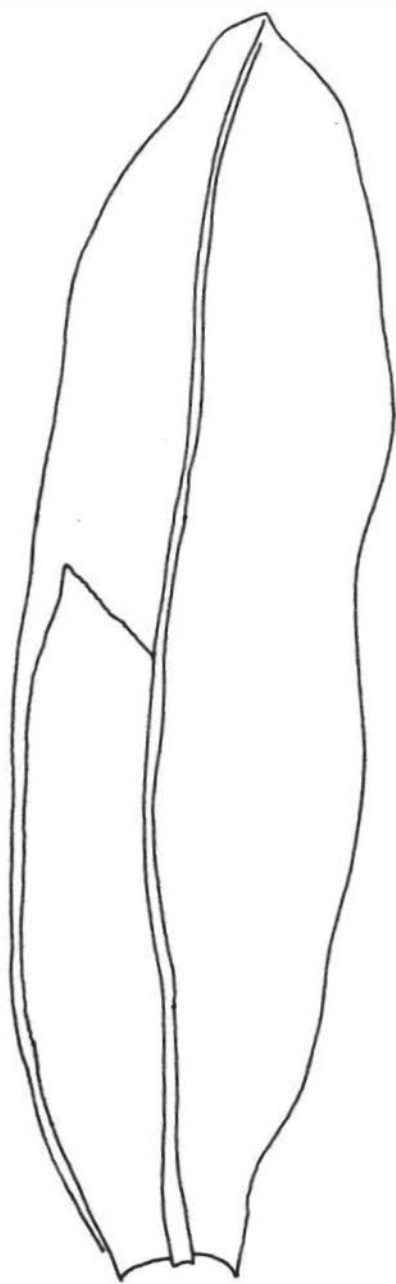
Comments:

Fissidens subbasilaris Hedw. occurs at the base of living trees or more commonly on exposed roots of Quercus alba, Ulmus americana, and Fraxinus americana. The leaves of this species bend down when dry as opposed to Fissidens cristatus Wils.

Fissidens subbasilaris Hedw.

3. leaf, 430 X

4. leaf, 430 X



3.



4



FAMILY: FISSIDENTACEAE

Fissidens cristatus Wils.

Plants medium in size, in tufts and sods, green to dark green, brownish green with age; stems erect, 1-3 cm. high; central strand present; leaves numerous, imbricate, ascending, the upper oblong-lingulate to oblong-lanceolate, 1.5-2.5 mm. long, vaginant lamina boat-shaped, flat, conduplicate, about 1/2 length of leaf or slightly longer, clasping stem and usually a portion of adjacent leaf above, costa percurrent or nearly so, the dorsal or inferior lamina narrowed and slightly decurrent at base, apices acute to rounded and subapiculate, margins entire to crenulate below, irregularly and coarsely serrate above, border sometimes faint to lacking, usually distinct, when present consisting of a band of 3-4 rows of lighter-colored, thick-walled cells, similar in shape to other laminal cells; the cells of leaves obscure, incrassate, irregularly or rounded hexagonal, 6-10 $\mu$  wide, occasionally up to 12 $\mu$ , bulging-mamillose, bistratose in places, leaf surfaces uneven as seen in cross section.

Dioicous, rarely autoicous; calyptra small, 1.75-2 mm. long, narrowly conical; sporophyte lateral from near middle of shoot or below; seta pale chestnut or red, ascending, 1.75 mm. long, sometimes up to 1 cm.; capsule inclined to horizontal; operculum conic, long rostrate, approximate length of urn; about 1.25 mm.; urn chestnut-brown, ascending to nearly erect, oblong, smooth, narrowed to seta, 1-1.5 mm. long, con-

tracted below mouth when dry and empty; annulus present; peristome reddish chestnut, single, teeth 16, cleft from apex to 1/2-2/3 length into 2 subulate, trabeculate divisions, marked with fine longitudinal, spiral, and oblique lines, the apices appendiculate and finely papillose; spores pale yellowish, spherical, 10-15 $\mu$  in diameter, sometimes up to 20 $\mu$  smooth, mature late autumn to winter to early spring.

Comments:

Fissidens cristatus Wils. is more commonly found on exposed roots or bases of living trees but may be found on humus, soil, or rocks in woods. The specific epithet refers to the differentiated leaf margin resembling a crest (such as a rooster's comb) made conspicuous by irregular serrations and pale cells contrasting with the small, dark, bulging cells within.

Fissidens cristatus Wils.

5. Habit, 4 X



FAMILY: DICRANACEAE

Dicranella heteromalla (Hedw.) Schimp.

Plants small, glossy, cespitose or in wide mats, yellowish to dark green; stems erect, 0.5-4 cm. long, frequently branched; leaves numerous, generally falcate-secund, ovate-lanceolate to lanceolate, upper part of blade subulate, broadest at attachment to stem and gradually narrowing to filiform, channelled, rough awn, 2-4 mm. long, upper half of leaf toothed on lower surface, concave below, costa percurrent to excurrent, broad, often  $1/5-1/3$  of width of leaf base, leaf margins plane, usually entire below and faintly to sharply denticulate above, rarely entire nearly to tip, with a few teeth at point; median cells short rectangular or rectangular or rectangular-oblong, with oblique end walls, 1.5-2.1, alar cells not differentiated or only slightly so.

Dioicous; calyptra cucullate; seta usually greenish yellow to pale yellow, sometimes dark red with age, erect to curved, 0.5-3 cm. long; capsule inclined; operculum convex, long and obliquely rostrate, beak 1-1.5 mm. long, curved downward; urn castaneous to dark brown, glossy unsymmetric, ovoid to oblong-cylindric, strongly sulcate when dry and empty, contracted beneath mouth much more strongly on lower side, thus producing an oblique mouth, 1-1.5 mm. long; annulus poorly developed; peristome single, papillose, teeth 16, dark red, 2-3 cleft to middle or below, strongly striate below the subulate divisions; spores yellowish, 10-15 $\mu$  in diameter, smooth, mature in autumn to winter.

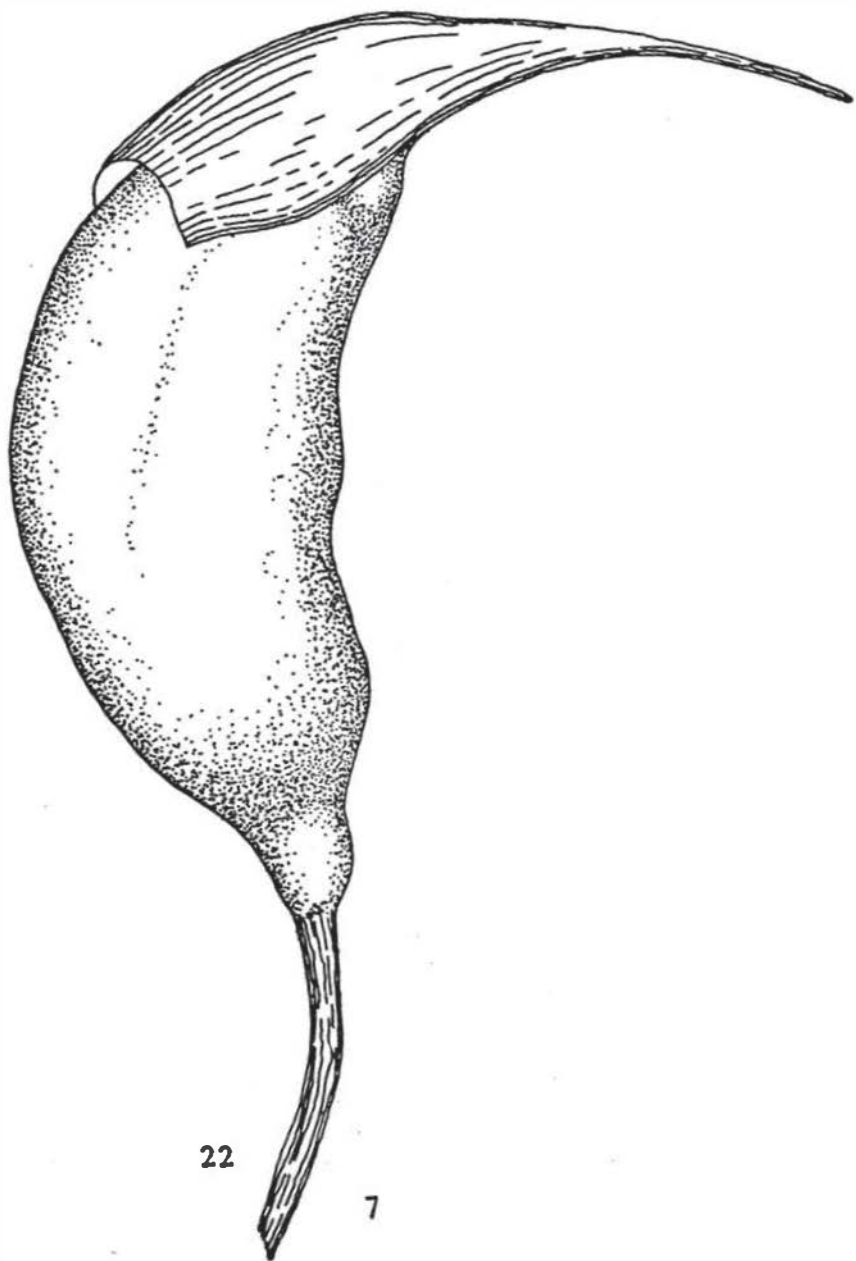
Comments:

Dicranella heteromalla (Hedw.) Schimp. occurs on decorticated logs and may cover much of the substrate with a silky green carpet. As stated by H.S. Conard (1956), the "chuck under the chin" makes the mouth of the dry capsule oblique. This plant resembles a dwarf Dicranum scoparium with its leaves swept to one side.

Dicranella heteromalla (Hedw.) Schimp.

6. Habit, 1.5 X

7. Capsule with calyptra, 4 X





FAMILY: DICRANACEAE

Dicranum flagellare Hedw.

Plants in dense cushions or sods, green or yellowish green above, brownish below; stems erect, 1-5 cm. high, radiculose, often erect, straight, flagelliform branches in axils of upper leaves; central strand present; leaves of stems crispate and subsecund when dry, flaccate-secund when moist, lanceolate, gradually narrowed into a linear, subtubulose acuminate, 3-4 mm. long, concave, costa subpercurrent to percurrent, strong, serrate above on lower surface; margins entire, cells of leaves not papillose, the median cells short rectangular, the alar well differentiated, usually inflated and brownish, extending nearly to costa.

Dioicous; calyptra cucullate, extending to middle of capsule, fugacious; seta reddish to yellowish brown, erect; operculum obliquely and long rostrate, more than 1/2 length of urn; the urn cylindric, symmetric, 2-3 mm. long, sometimes slightly curved and striate when dry and empty; annulus narrow; peristome single, teeth 16, reddish, pale and faintly papillose above, cleft from apices at least 2/3 length of teeth; spores spherical, yellowish, 15-22 $\mu$  in diameter, slightly roughened, mature in summer.

Comments:

Dicranum flagellare Hedw. is very common on well-rotted logs and stumps, rarely on humic soil. Easily recognized by

subtubulose leaves and axillary branchlets with short appressed leaves. The branchlets, too stout and stiff to be considered flagellate, as the name suggests, are usually produced in great numbers.

Dicranum flagellare Hedw.

8. Habit, 2 X



8

FAMILY: DICRANACEAE

Dicranum scoparium Hedw.

Plants large, loosely tufted, in wide sods, glossy, brownish below, stems erect, 2-10 cm. high; leaves of stems strongly falcate-second, narrowly lanceolate, 4-9 mm. long, sometimes up to 12 mm., concave below, subtubulose above, costa strong, at base  $1/4$ - $1/3$  width of leaf, ending in apex, in upper part with 2-4 rather prominent, serrulate lamellae, apices long, narrowly subulate, margins of approximate upper  $1/2$  strongly serrate, entire below; leaf cells elongate and more or less porose; median cells elongate-rectangular incrassate, the alar cells inflated, orange brown, not extending to the costa.

Dioicous; calyptra cucullate, conic-rostrate, 6-7 mm. long; seta reddish brown, erect, solitary, 2.5-4 cm. long, inclined, operculum low conic, long rostrate, beak often oblique, about 2.5 mm. long; urn cylindrical, arcuate, 3-4 mm. long; 0.8 mm. in diameter, usually neck distinct, short; annulus none; peristome reddish brown, single, teeth 16, cleft from apices to middle; spores spherical, slightly rough,  $20-24\mu$  in diameter, mature in late summer to autumn.

Comments:

Dicranum scoparium Hedw., sometimes called the broom or windswept moss, is considered to be corticolous. It frequently occurs on logs entirely decorticated and on partly or well decayed stumps of Acer rubrum, Acer saccharum, and Fagus grandifolia.

Dicranum scoparium Hedw.

9. Habit, 2 X



9

FAMILY: POTTIACEAE

Tortella humilis (Hedw.) Jennings

Plants in loose to dense tufts, green to yellowish green above, brown below; stems erect, from very short to 1.3 cm. high, simple, sometimes branching, densely brownish radiculose; leaves crowded, crispate when dry, erect-spreading when moist, lower leaves oblong-lanceolate, about 2 mm. long, the upper linear-lanceolate, 1.5-4.5 mm. long, subconcave, concave, or carinate, costa strong, yellowish, excurrent, sometimes denticulate, glossy when dry, apices abruptly narrowed, acute, acuminate, or obtusely mucronate because of costa, margins entire, crenulate, sometimes undulate, involute above sometimes; median cells of leaves chlorophyllose, obscure, rounded hexagonal,  $8-9\mu$  long,  $6-8\mu$  wide, papillose on both surfaces, the upper cells similar, the cells of lower  $1/4-1/3$  of blade hyaline, smooth, sharply differentiated from the upper, elongated,  $25-100\mu$  long, 9-18 wide, linear near margins, extending obliquely higher up margins than costa, forming a V-shaped line of demarcation.

Monoicous; calyptra smooth, cucullate, rostrate, usually covering about  $1/2$  of capsule; seta reddish when mature, erect, 1-2 cm. long; capsule yellowish to reddish brown, erect; operculum narrowly conic, rostrate, about  $1/2$  length of urn; urn oblong-cylindric, 1.5-2.5 mm. long, about 0.5 mm. in diameter, symmetric, tapering at base; annulus of 3-4 rows of cells, deciduous in pieces; peristome single, teeth 32, red, filiform, papillose, usually twisted 2-3 times, basal membrane narrow;



spores greenish yellow, translucent, spherical,  $7-11\mu$  in diameter, smooth, mature in spring to early autumn.

Comments:

Tortella humilis (Hedw.) Jennings occurs on soil, rocks, bases of living trees, fallen logs not yet decorticated, and is frequently found in calcareous regions. The twisted teeth of the peristome and the mucronate leaves make this species unique.

Tortella humilis (Hedw.) Jennings

10. Habit, 2 X



10

FAMILY: GRIMMIACEAE

Hedwigia ciliata Hedw.

Plants in loose patches, grayish green or glaucous-green, somewhat hoary because of the colorless tips of the leaves, especially so in late summer or in autumn; stems spreading, rather slender, 2-10 cm. long, with rhizoids at base, irregularly divided into rather short branches; leaves in 8 rows, imbricate when dry, with apices recurved, spreading when moist, unistratose, ovate, concave, 1.5-3 mm. long, costa none, apices subobtuse to long acuminate, subhyaline to hyaline, papillose denticulate, margins revolute; cells of leaves with thick walls, oblong, subquadrate, quadrate, rectangular, the median and upper cells apillose, in longitudinal rows, rounded or hexagonal, lower ones elongated, those near the base quadrate, the median basal cells yellowish pellucid, not papillose, narrowly linear, walls porose, cells toward margins subquadrate to rectangular, cells in angles of leaves often brownish and larger.

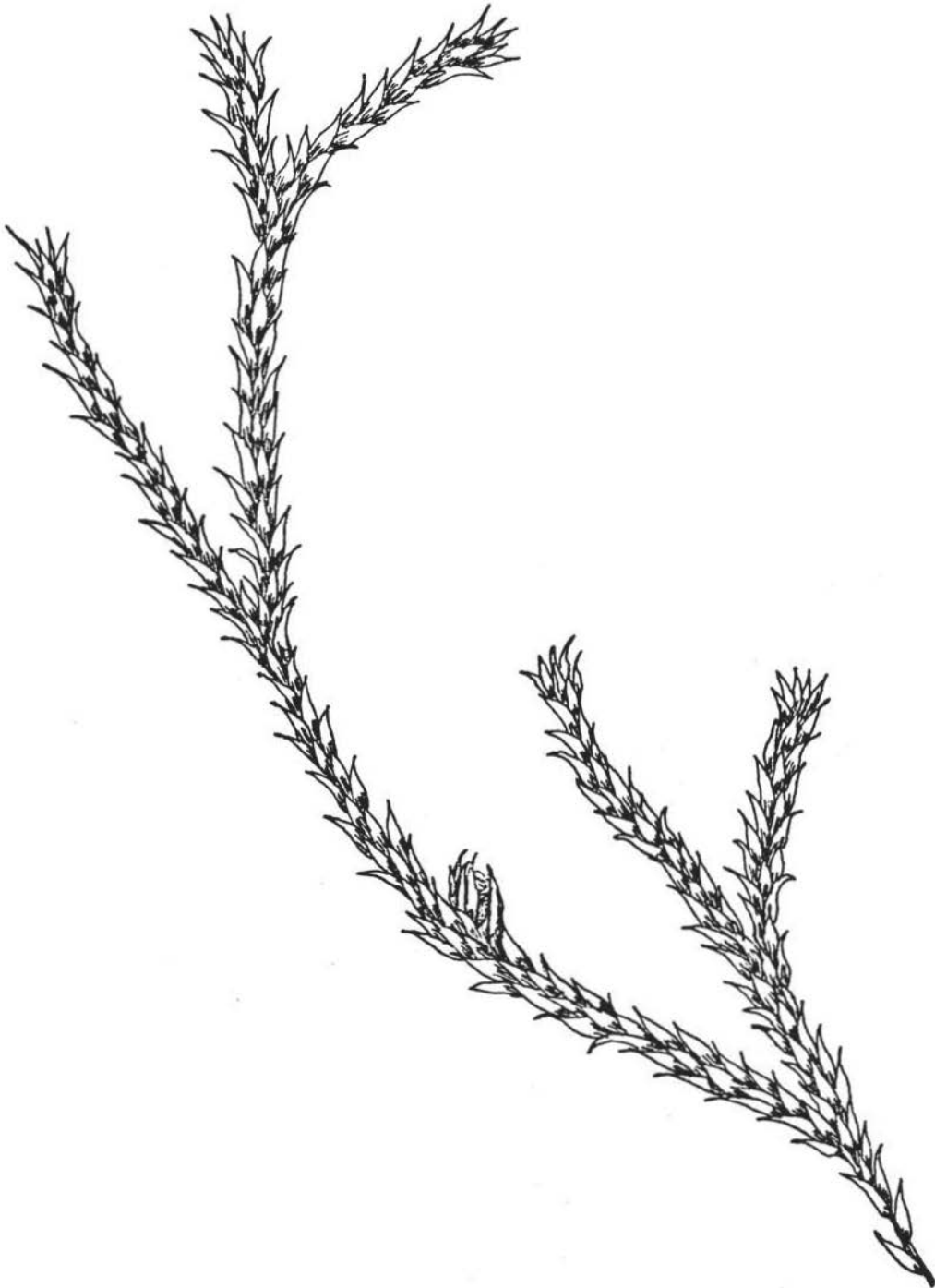
Autoicous; pericchaetial leaves larger, conspicuously ciliate toward apex; calyptra small, subcucullate, covering only the operculum, fugaceous; seta yellowish, erect, very short, capsule immersed, subsessile, erect; operculum broad, convex, sometimes mamillate; urn globose, or obovoid and with wide mouth when dry and empty, 0.5-1 mm. in diameter; peristome none; spores yellowish, shallowly pitted, with vermiform striations, 25-32 $\mu$  in diameter, mature in spring.

Comments:

Hedwigia ciliata Hedw. is generally calcareous but is sometimes found on trunks of Quercus rubra and Quercus alba. The specific name refers to long, jointed, hyaline cilia fringing the perichaetial leaves.

Hedwigia ciliata Hedw.

11. Habit, 2 X



11

FAMILY: ORTHOTRICHACEAE

Orthotrichum ohioense Sull. & Lesq.

Plants in moderately small, dense cushions or tufts, yellowish green above; brownish below; stems erect, 5-10 mm. high, branching above; leaves appressed-imbricate when dry, ascending to spreading when wet, oblong-lanceolate, 1.5-3 mm. long, concave, costa strong, ending slightly below the apex of the blade, apices rounded obtuse, or obtusely acute, margins revolute, entire; upper cells of leaves irregularly rounded, nearly isodiametric, 10-12 $\mu$  in diameter with thick walls, densely papillose, median cells becoming longer toward the base, smooth at base.

Autoicous; calyptra conic, campanulate, plicate, with erect hairs; seta shorter than urn; capsule subimmersed to immersed, symmetric, 1-1.3 mm. long; operculum convex, apiculate to rostrate; urn oblong-ovoid when moist, straw-colored and somewhat 8-ribbed when dry and slighted or not at all contracted beneath mouth, tapering at base, neck short to almost lacking, stomata immersed, slightly below middle of urn; annulus narrow; peristome double, teeth yellowish pellucid, reflexed when dry, 16, frequently united in pairs, triangular-lanceolate, densely and finely papillose, segments of inner peristome 8, linear, shorter than teeth, of 1-2 vertical rows of cells; spores spherical, slightly papillose, 10-17 $\mu$  in diameter, maturing in late spring.

Comments:



Orthotrichum ohioense Sull. & Lesq. is distinguished by pale yellow capsules with narrow and remote but fairly well-marked ribs. This member of the genus is likely confined to the trunks of living trees.

Orthotrichum ohioense Sull. & Lesq.

12. Habit, 2 X

13. leaf 25 X



12



13

41

FAMILY: ORTHOTRICHACEAE

Orthotrichum pumilum Sw.

Plants in close tufts, dark green; stems erect, up to 1 cm. long; central strand none; leaves imbricate and not contorted when dry, erect-spreading when moist, broadly to narrowly oblong-lanceolate, about 2 mm. long, concave, costa strong, ending below apex, apices briefly acuminate to narrowly obtuse, mostly acute, often apiculate, usually with a single subhyaline cells at apex, margins revolute nearly to apex, entire; upper cells of leaves irregularly rounded hexagonal, 12-16 $\mu$  in diameter, walls rather thin, slightly collenchymatous, papillose with low papillae, basal cells smooth.

Autoicous; calyptra strongly plicate, usually with a few very short hairs near apex, sometimes naked; seta very short, about 0.5 mm. long; capsule immersed to slightly emergent; operculum conic, apiculate; urn usually light colored, oblong to oblong-ovoid when moist, up to 1.5 mm. long, 8-ribbed and contracted below mouth when dry, abruptly narrowed to seta, neck distinct, stomata immersed; annulus present; peristome double, teeth 16, triangular-lanceolate, usually united in pairs, reflexed when dry, finely papillose, segments of inner peristome 8, linear, slightly shorter than teeth, of 2 vertical rows of cells at base; spores 12-15 $\mu$  in diameter, maturing in spring.

Comments:

Orthotrichum pumilum Sw. occurs on living trees. It is

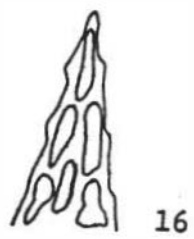
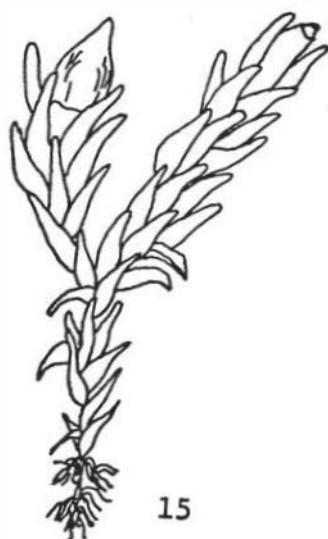
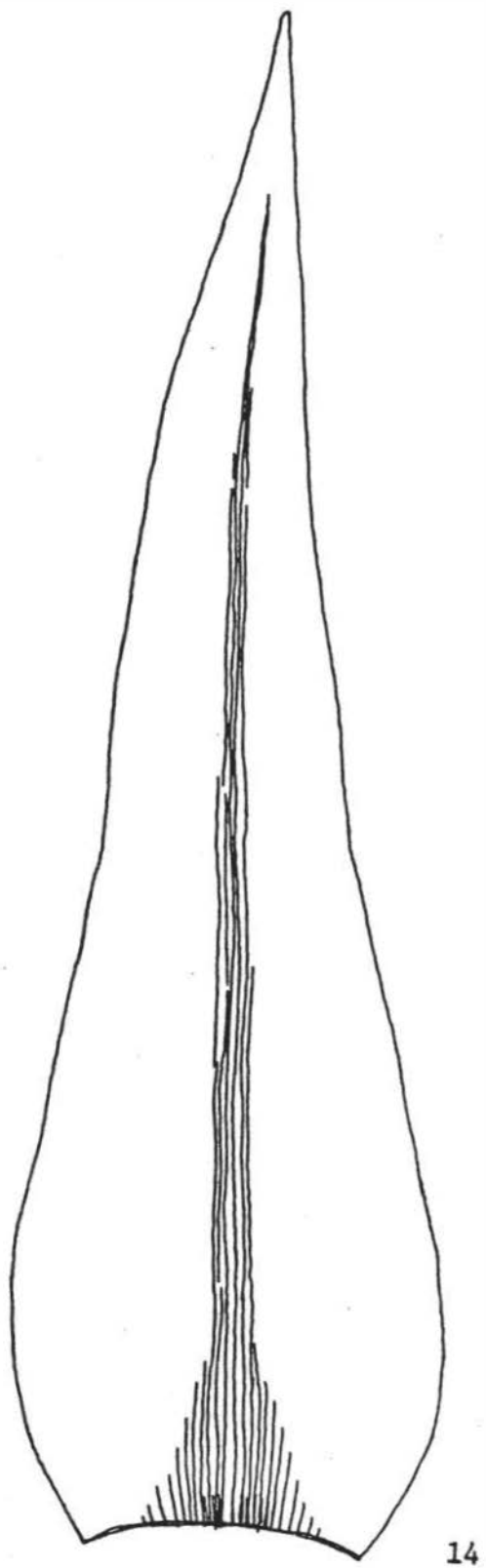
known by apiculate upper and perichaetial leaves and strongly ribbed capsules which may be more or less strangulate (but the ribs are not completely drawn together as in O. stellatum).

Orthotrichum pumilum Siv.

14. Leaf, 40 X

15. Habit, 2 X

16. Leaf apex 400 X



FAMILY: ORTHTRICHACEAE

Drummondia prorepens (Hedw.) Schimp.

Plants slender, in low, dense, often extensive mats, dark green above, nearly black below; primary stems long, up to 10 cm. or more in length, creeping, brown radiculose along lower surface, with numerous, short (2-10 mm.), crowded, erect, simple or forked, densely foliated branches; central strand none; leaves closely appressed when dry, erect-spreading when moist, oblong-lanceolate to ovate-lanceolate, 1-2 mm. long, concave or carinate, not papillose, costa strong, nearly percurrent, apices acute to obtuse, margins entire, plane to broadly inrolled; upper cells of leaves small, lument 7-10 $\mu$  in diameter, rounded, with thick walls.

Dioicous; calyptra large, conic to cucullate, without hairs; seta erect, 2-3 mm. long; capsule erect, symmetric; operculum conic, with long, oblique beak; urn ovoid-globose, 1-1.3 mm. long, smooth, shriveled when dry; annulus none; peristome single, teeth 16, short (about 60 $\mu$  long), entire, truncate, smooth, persistent; spores green, spherical to ovoid, very large, 60-90 $\mu$  in diameter, minutely roughened, mature in spring to summer.

Comments:

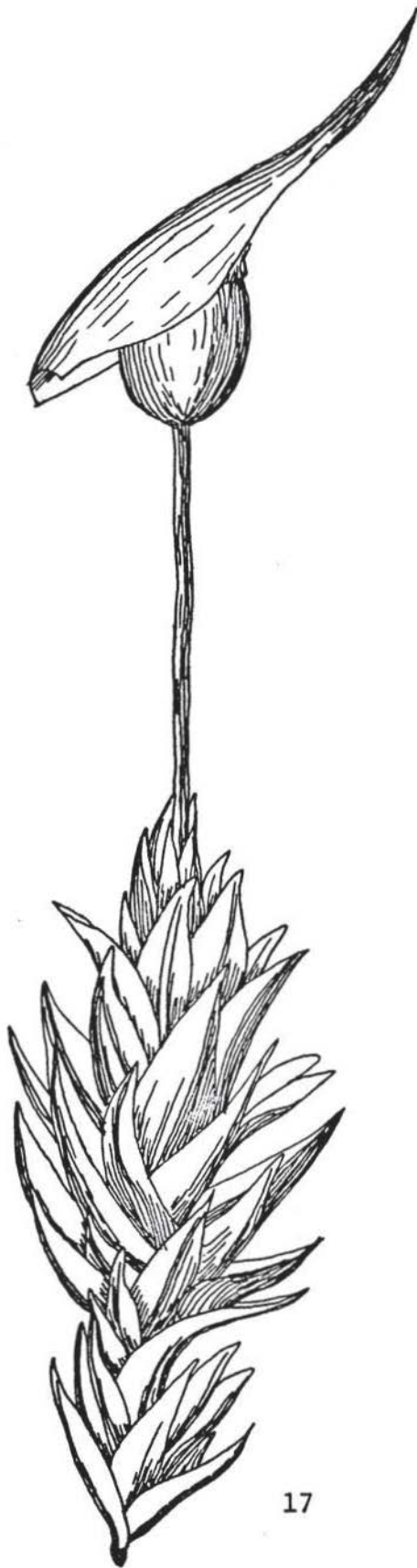
Drummondia prorepens (Hedw.) Schimp. is found on living trees (often on Acer saccharum). It forms broad mats 6 to 8 feet above the ground, closely attached to the bark and freely



fruiting. The calyptra covers the capsule, has 4 or 5  
slits at the base, and is prickly at the top.

Drummondia prorepens (Hedw.) Jennings

17. Habit, 4 X



17

FAMILY: TIMMIACEAE

Timmia megapolitana Hedw.

Plants moderately robust, often in dense tufts, green to yellowish green above, brown below; stems erect to ascending, 3-10 cm. long, brown; central strand distinct; leaves crisped when dry, spreading when wet, linear-lanceolate to lanceolate, gradually narrowed to the acute apex, concave to carinate, 5-10 mm. long, 1-1.5 mm. wide, sheath hyaline to yellowish, about 1/6 length of leaf, usually wider than blade above, smooth to slightly papillose in upper part, costa strong, forming ridge on back of leaf, often appearing white in field, percurrent or ending a few cells below apex, smooth on back in lower part, papillose above, margins involute or slightly so, strongly toothed from apex to sheath, in upper 1/3 with broad teeth often composed of several cells; upper cells 10-14 $\mu$  in diameter, rounded, somewhat collenchymatous, median cells hexagonal to quadrate, 12-16 $\mu$  in diameter, cells of sheath nearly uniform, elongate and thin-walled, 60-120 $\mu$  long, 10-12 $\mu$  wide, without chlorophyll.

Autoicous; calyptra erect from seta behind capsule, cucullate, or split at middle and entire below; seta dark red, 2-2.5 cm. long; dry capsule yellowish brown, nearly erect to cernous; operculum rounded, apiculate; urn oblong, usually unsymmetric, furrowed with age, about 3 mm. long and 1.25 mm. wide; annulus of 3-4 rows of cells, deciduous; peristome double teeth, yellowish pellucid, slightly papillose in lower

half, more coarsely papillose and sometimes perforate in upper half, inner peristome with basal membrane extending about 1/2 length of teeth and 64 cilia united into groups of 4 each, opposite to and approximate length of teeth; spores yellowish brown, slightly papillose to almost smooth, 12-18<sub>μ</sub> in diameter, mature in late spring.

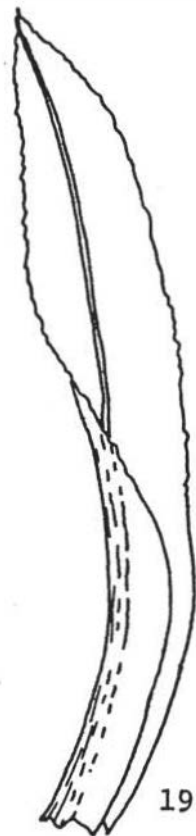
Comments:

Timmia megapolitana Hedw. is sometimes found on well rotted logs or stumps but occurs more commonly on moist or wet, shaded soil or humus. Resembling an Atrichum or Polytrichum without lamellae, it is somewhat smaller with the leaves rolled and incurved when dry. The way in which the calyptra remains attached to the tip of the seta after slipping off the mature capsule aids in recognition.

Timmia megapolitana Hedw.

18. Habit, 3 X

19. Leaf, 40 X



FAMILY: AULACOMNIACEAE

Aulacomnium palustre (Hedw.) Schwaegr.

Plants robust, varying from 2-13 cm. in height, usually in dense tufts, often 5-8 cm. deep, pale yellowish green above, darker below; stems with few to many branches, covered with a coarse reddish brown tomentum; leaves close to distant, oblong to long lanceolate, about 4 mm. long and 0.75 mm. wide, crispate when dry, keeles, commonly uniform along the stem, sometimes lower leaves gradually shorter and broader, costa stout, ending just below apex, apices acute to slenderly acuminate, margins revolute below the upper 1/4, subdenticulate to denticulate near the apex; upper cells of leaves small, 9-18 $\mu$  in diameter, angular, walls sinuose, strongly thickened at the angles, unipapillate on each surface; basal cells swollen, rectangular or hexagonal, 10-16 $\mu$  by 15-25 $\mu$  in diameter; pseudopodia about 5 mm. long, naked or with minute ecostate leaf-like propagula clustered at tip.

Dioicous; calyptra cucullate, long rostrate; seta erect, 2-4 cm. long; capsule suberect to horizontal; operculum long conic, usually straight, sometimes slightly recurved; urn subcylindrical, slightly unsymmetric, 3-5 mm. long, 1 mm. wide, 8-12 striate, when dry strongly ridged or longitudinally grooved and contracted below mouth; annulus wide; teeth of peristome yellowish, linear-lanceolate, subulate-acuminate, segments hyaline, slightly shorter than teeth, cilia 3-4 between the segments, equal in length; spores smooth, 8-12 $\mu$  in diameter, mature



in early summer.

Comments:

Aulacomnium palustre (Hedw.) Schwaegr. is found on various substrata, particularly on soil or humus and well-decayed logs or stumps. This exceedingly common moss has brownish swollen cells near the leaf insertion and may be green or brown, but it always has a yellow cast as well.

Aulacomnium palustre (Hedw.) Schwaegr.

20. Habit, 3 x



FAMILY: BRYACEAE

Pohlia nutans (Hedw.) Lindb.

Plants in loose tufts, dark green, or yellowish green; stems erect, reddish, simple or with basal or lateral branches, up to 2 cm. high, occasionally up to 5 cm., brown radiculose below; leaves slightly shrunken, twisted, and glossy when dry, progressively larger from base to apical tuft, erect, imbricate, ovate-lanceolate to linear-lanceolate above, 3-4 mm. long and approximately 0.6 mm. wide, not decurrent or very slightly so, costa rather strong, usually ending below apex, occasionally percurrent, apices acuminate, margins slightly reflexed, at least in lower part, entire below, denticulate above; median cells of leaves linear, long rhomboidal or elongate-hexagonal, up to 10 $\mu$ . wide and 70 $\mu$ . long.

Paroicous or autoicous, antheridia generally in pairs in axils of perichaetial leaves; calyptra cucullate, generally smooth and fugacious; seta erect, often curved, reddish brown, up to 4 cm. long; capsule horizontal to pendulous, yellowish, light brown, or brown; operculum convex, mammillate or apiculate; urn pyriform, oblong, or obovate, symmetrical to slightly curved, 3-4 mm. long, contracted below mouth when dry, neck not strongly differentiated, normally shorter than the rest of capsule; annulus biseriate, deciduous; peristome double, up to 0.54 mm. long, teeth yellowish orange, rather abruptly narrowed above, papillose, segments of inner peristome light yellow,

well-developed, carinately splitting, approximate length of teeth, basal membrane  $1/3$ - $1/2$  height of teeth, cilia 2-3, nearly as long as segments, nodulose, rarely slightly appendiculate; spores yellowish, nearly smooth, about  $14-24\mu$  in diameter, maturing in early summer.

Comments:

Pohlia nutans (Hedw.) Lindb. occurs on turfy soil, well-decayed logs and especially tops of rotten stumps, and soil in rock crevices. The orange setae and capsules help in field identification.

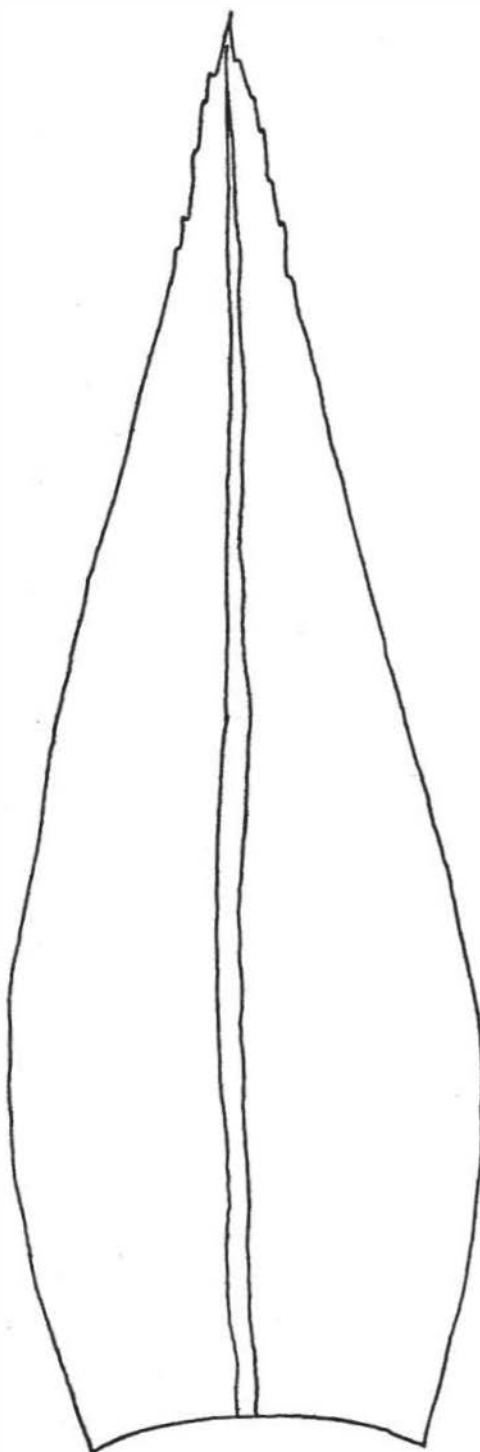
Pohlia nutans (Hedw.) Lindb.

21. Habit, 2 X

22. Leaf, 40 X



21



22

61

FAMILY: BRYACEAE

Bryum pendulum (Hornsch.) Schimp.

Plants in tufts, yellowish to dark green; stems erect, red, about 5-9 mm., high, densely brown radiculose below; central strand present; leaves shrunk and twisted when dry, progressively larger from base to summit of stem, upper leaves close, erect-spreading, arranged in a rosette, narrowly ovate-lanceolate, reddish at base, costa red at base, very strong, excurrent, apices long, acuminate, margins revolute throughout, entire below, denticulate at apex, median cells of leaves hexagonal, with thick non-pitted walls.

Usually synoicous, sometimes subautoicous; calyptra small, cucullate, fugacious; seta erect, castaneous, 2-3 cm. long; capsule horizontal, brownish, 4-5 mm. long; operculum rather persistent, small conic, apiculate; urn elongate oval-pyriform, tapering into a neck about 1.5 mm. long; annulus wide, deciduous; peristome double, teeth brown, hyaline and papillose above, the inner peristome adherent to the teeth in lower 2/3 or more, coarsely papillose, carinately split, basal membrane about 2/5 height of the teeth, cilia sometimes absent, if present 2-3 short and imperfect or rudimentary; spores brownish, papillose, large, 20-35 $\mu$  in diameter, maturing in early summer.

Comments:

Bryum pendulum (Hornsch.) Schimp. is recognized by its teeth with oblique bars on the inner side between the trans-



verse bars. This species is considered to be somewhat rare in Illinois and is found on logs entirely decorticated and partly decayed.

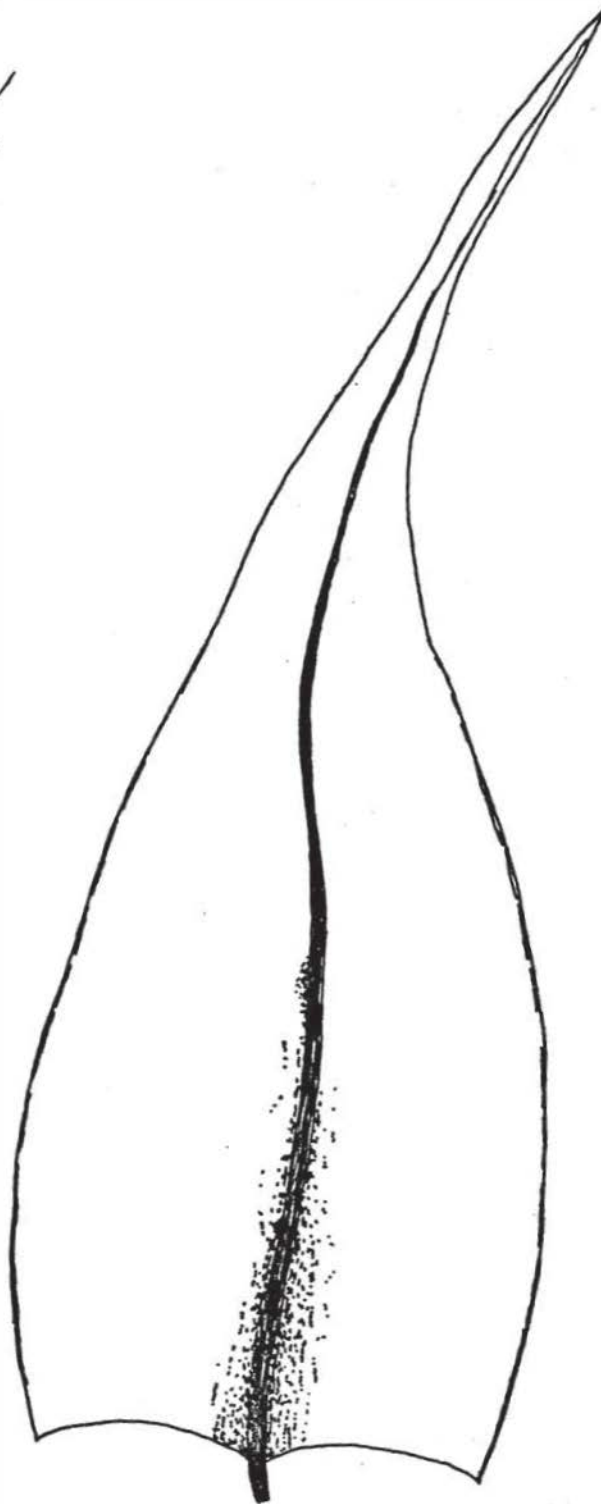
Bryum pendulum (Hornsch.) Schimp.

23. Habit, 4 X

24. Leaf, 40 X



23



24

FAMILY: BRYACEAE

Bryum pseudotriquetrum (Hedw.) Gärtn., Meyer & Scherb.

Plants perennial, sometimes robust, in tufts, dark green or tinged with red, sometimes purple; stems erect, rigid, red, up to 8 cm. high, in cross section pentagonal with central strand, much matted with brown radicles; branches few; leaves somewhat shrunken and irregularly twisted and contorted when dry, erect-spreading to spreading when moist, distant below, closer in apical part, ovate-lanceolate, oblong-lanceolate, or elliptic, concave, 2-3 mm. long, occasionally up to 4.5 mm. long, up to 1.4 mm. wide, briefly to long decurrent, costa reddish throughout, or red at base and yellowish to brownish green above, strong, percurrent to briefly excurrent in a denticulate, cuspidate point, apices gradually acuminate, margins entire throughout or serrulate above, revolute to apex or nearly so; median cells of leaves rhomboidal-hexagonal, up to  $50\mu$  long and  $15\mu$  wide, with walls moderately thick, pitted, marginal cells yellowish pellucid, linear, prosenchymatous, incrassate, in 3-4 rows, forming a distinct border, basal cells red, rectangular, inflated.

Usually synoicous, sometimes dioicous; calyptra small, cucullate, fugacious; seta erect, castaneous or dark purple, 2.5-5.5 cm. long; capsule inclined to pendulous, brown, glossy; operculum large, rounded, with a prominent point; urn clavate to subcylindric, 3-6 mm. long, slightly contracted below mouth when dry and empty, generally straight,

sometimes unsymmetric and curving upward, tapering into a neck approximately length of remainder of capsule; annulus wide, deciduous; peristome double, up to 0.7 mm. high, teeth brownish yellow below, subhyaline and papillose above, linear-triangular, tapering more rapidly above, inner peristome light yellow to hyaline, papillose, segments broad, carinate, broadly fenestrate, slightly shorter than teeth, basal membrane high, up to 1/2 or more the height of teeth, cilia 3, strongly appendiculate; spores brownish yellow, roughened, 14-20 $\mu$  in diameter, maturing in summer.

Comments:

Bryum pseudotriquetrum (Hedw.) Gärtn., Meyer & Scherb.  
is common in lowland areas near brooks and ponds and can be found on well-decayed logs or stumps. More often, however, it is found on wet soil or humus and is easy to recognize in a sterile state because of red stems and obviously decurrent leaves with rather broad points.

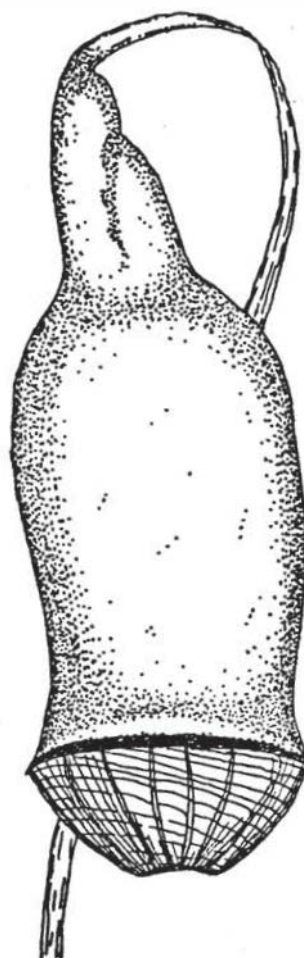
Bryum pseudotriquetrum (Hedw.) Gärtn, Meyer  
& Scherb.

25. Habit, 3 X

26. Capsule, 15 X



25



26

FAMILY: BRYACEAE

Rhodobryum roseum (BSG) Limpr.

Plants loosely tufted dark green; stems stout, erect from long creeping rhizome-like stolons, 2-5 cm. high, with minute appressed bract-like leaves up to the summit, densely purplish brown radiculose below; leaves numerous, in a conspicuous terminal rosette about 1 cm. in diameter, contorted when dry, spreading when moist, obovate-spatulate from a narrow base, up to 5 mm. long, costa strong at base, ending slightly below apex of leaf, percurrent in the sharp point, ending abruptly and narrowed and acuminate, twisted, margins revolute  $3/4$  length of leaf, plane above, entire below, sharply pinnulose-dentate above; median cells elongate-hexagonal, up to  $100\mu$  long and  $40\mu$  wide with thick walls, strongly pitted, diminishing in width toward margins, forming a border of 1-2 rows of narrow cells.

Dioicous; calyptra small, cucullate, fugacious, setae erect, reddish brown, lustrous, 2-5 cm. long; capsule pale brown, horizontal to pendulous, up to 7 mm. long, operculum convex-conical, apiculate, urn oblong-cylindric to cylindrical, incurved slightly, 2-4 cm. long, slightly contracted beneath mouth when empty and abruptly narrowed below, neck narrow, incurved, approximately  $1/3$  length of rest of capsule; annulus wide, deciduous; peristome double, teeth large, yellowish to brown, linear-lanceolate, tapering to hyaline tip, narrowly bordered, inner peristome yellow, carinately split, spores brownish yellow,



slightly roughened, 18-25 $\mu$  in diameter, mature in late autumn or winter.

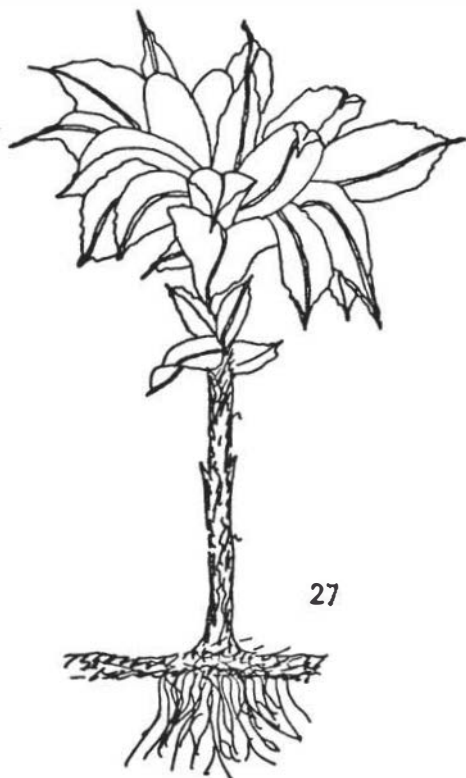
Comments:

Rhodobryum roseum (BSG) Limpr. is sometimes called the rose moss which refers to a flower arrangement of leaves at the tips of the upright stems, and perhaps to reddish tinges on the plant as well. On fallen but not yet decorticated logs and on bark at the bases of living trees.

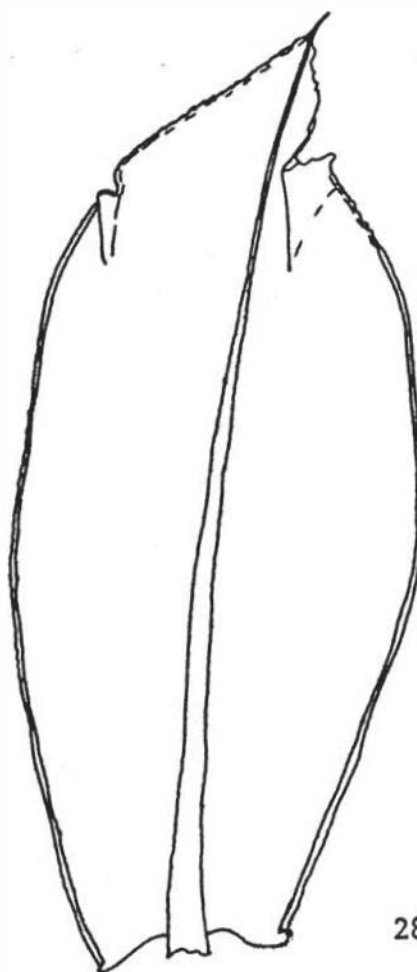
Rhodobryum roseum (BSG) Limpr.

27. Habit, 2 X

28. Leaf, 10 X



27



28

FAMILY: MNIACEAE

Mnium cuspidatum Hedw.

Plants often in large mats or tufts, light to yellowish green; fertile stems reddish, simple, erect, radiculose below, sterile shoots elongated, suberect, creeping or deflexed; leaves few, distant at the basal end of stem and gradually closer together until a rosette is reached, crisped and distorted when dry, spreading when moist, obovate, 2-4 mm. long, bases narrow, decurrent, costa strong, ending below the apex, confluent with border in apiculate apex, apices acute, border unistratose, of 2-5 rows of linear cells, margin serrate in upper 1/2 with 1-celled teeth, median cells of leaves collenchymatous, irregularly rounded hexagonal, with rather thick walls, 20-25 $\mu$  in diameter, with larger cells intermingled.

Synicous; calyptra cucullate, inconspicuous, fugacious; seta single, erect slightly reddish yellow up to 3 cm. high; capsule subpendulous, yellowish brown when mature; operculum rather large, conic, obtuse; urn oval, up to 3.5 mm. long, neck very short; annulus of 3-4 rows of cells, deciduous in pieces; peristome double, teeth greenish yellow, 16, linear-lanceolate, papillose, about 0.8 mm. long, inner peristome reddish yellow to brown, papillose, segments carnate, ending in an awn-like tip; spores yellow, faintly papillose, 20-28 $\mu$  in diameter, maturing in April or May.

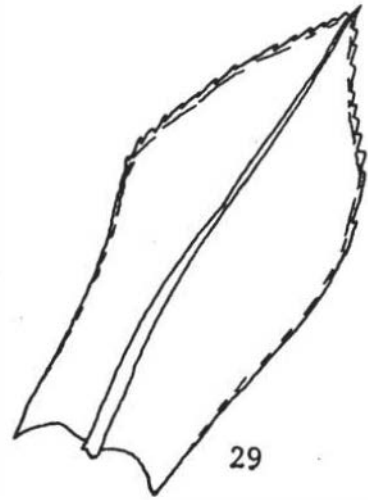
Comments:

Mnium cuspidatum Hedw. is one of the most common mosses in eastern Illinois. It is characteristic of moist hardwood forests but also may be found in many other habitats such as in poor lawns and along creek banks, and on decaying logs in woodlands. It is often called the woodsy Mnium (translating a synonym formerly in usage, M. sylvaticum).

Mnium cuspidatum Hedw.

29. Leaf, 10 X

30. Habit, 2 X



29



30

FAMILY: MNIACEAE

Mnium affine Bland.

Plants moderately large, close tufts, green; fertile stems erect or nearly so, up to 3 cm. or more high, radiculose below, central strand present; leaves small distant below, becoming larger and closer above and forming a terminal rosette, irregularly distorted when dry, spreading, on fertile stems ovate, 6-10 mm. long, bases narrowed, decurrent, costa strong, precurrent, apices cuspidate, border unistratose, of 2-5 rows of linear, prosenchymatous cells, margins usually toothed throughout with a row of sharp, distinct, slender teeth of 1-4 cells each, median cells of leaves hexagonal, in rows, radiating from costa, cells walls moderately thick, usually 20-40 $\mu$  in largest cells near costa.

Dioicous; antheridial flower terminal, discoid, calyptra cucullate, fugacious; seta erect, capsule pendulous, operculum short, urn oblong, narrowed to a short neck 4-5 mm. long, annulus biserate, peristome double, teeth greenish-yellow, 16, densely papillose, cuspidate, spores yellowish pellucid, finely papillose, 22-32 $\mu$  in diameter, maturing in spring.

Comments:

Mnium affine Bland. occurs on rotten logs and stumps in swampy woods and can frequently be found among willows and other shrubs along small streams. This species differs mainly

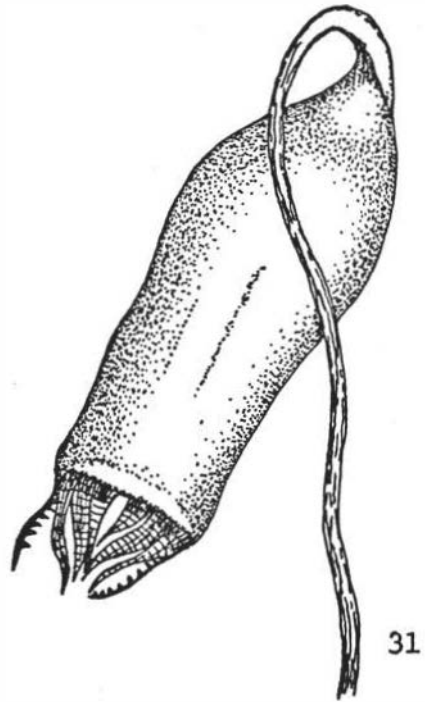


from M. cuspidatum in that the leaves are toothed all around as opposed to teeth present in the upper one-half of the leaf in M. cuspidatum.

Mnium affine Bland.

31. Seta and capsule, 10 X

32. Habit, 2 X



FAMILY: HYPNACEAE

Amblystegium juratzkanum (Schimp.) Rau. & Herv.

Plants slender, bright green; stems prostrate, irregularly divided; branches ascending to erect, 1-1.5 cm. long; central strand present; leaves widely spreading wet or dry, ovate to ovate-lanceolate, concave, up to 1.4 mm. long and 0.6 mm. wide, narrowed at base, decurrent, costate to slightly beyond the middle, occasionally almost percurrent, apices long, slenderly and gradually acuminate, margins plane, almost entire to subserrate or serrulate; median cells of leaves oblong to linear-rhomboidal or linear-hexagonal, approximately  $60\mu$  long and  $10\mu$  wide, about 4-8:1, moderately incrassate, alar and other basal cells short oblong to rectangular, 1.5-2:1, incrassate, the alar forming a rather distinct group.

Monoicous; calyptra small, conical, fugacious; seta castaneous, 15-30 mm. long; capsule yellow, light brown, reddish brown, cylindric, curved, and cernous, 1.5-2 mm. long; operculum conic; urn unsymmetric, arcuate, much contracted below mouth when dry and empty; annulus of 2-3 rows of cells; peristome perfect, hypnaceous, teeth 16, reddish, about 0.6 mm. long, strongly articulate and trabeculate, slightly united at base, hyaline margined, transversely striate, segments as long as teeth, reddish yellow, carinate, not split on keel or only slightly so, basal membrane 0.2 mm. high, cilia 1-3, approximate length of segments, nodose to shortly appendiculate; spores minutely papillose,  $10-12\mu$  in

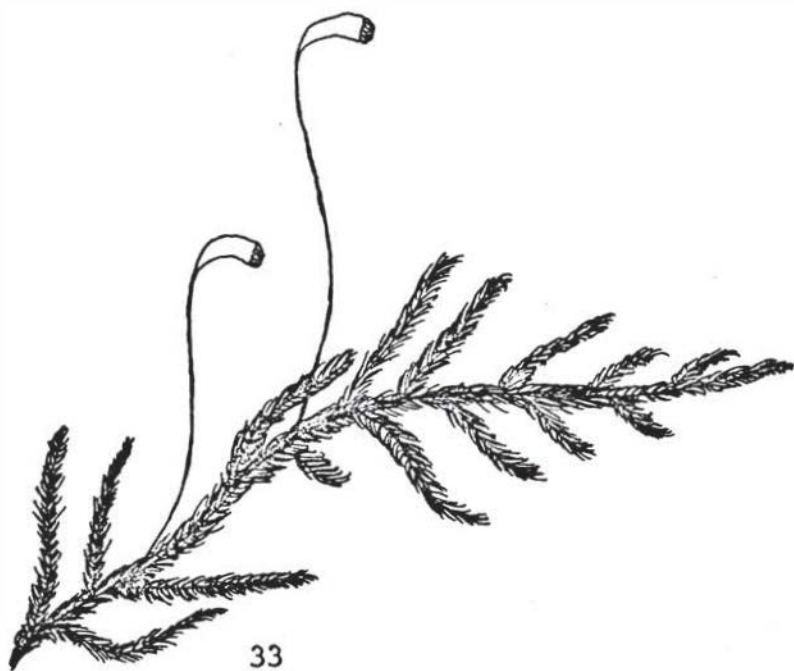
diameter, mature in spring.

Comments:

Amblystegium juratzkanum (Schimp.) Rau. & Herv. is found in similar habitats (well-rotted logs and stumps) as A. serpens but is somewhat larger.

Amblystegium juratzkanum (Schimp.) Rau. & Herv.

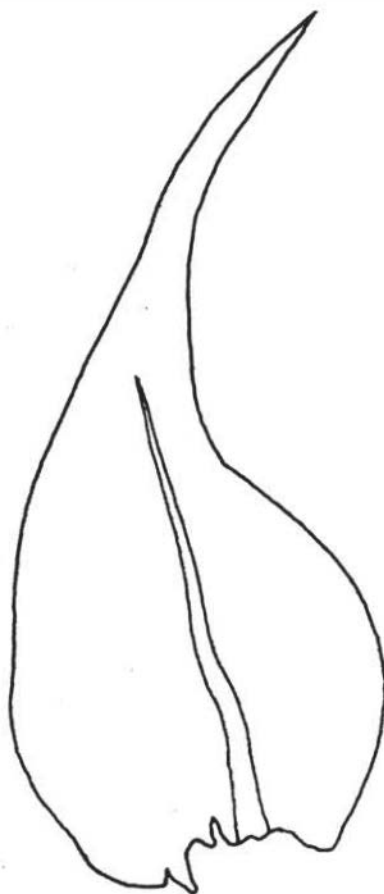
- 33. Habit, 2 X
- 34. Capsule, 10 X
- 35. Leaf, 10 X



33



34



35

85

FAMILY: HYPNACEAE

Amblystegium serpens (Hedw.) BSG

Plants slender, very small; stems prostrate, irregularly branching; central strand present; leaves usually rather close, not widely spreading, ovate-lanceolate, subconcave, up to 1.2 mm. long and 0.5 mm. wide, commonly smaller, narrowed at insertion, bases slightly decurrent, costate to middle of leaf or slightly beyond, apices long acuminate, margins plane, entire to serrulate; median cells of leaves oblong-hexagonal to rhomboidal-hexagonal, 30-55 $\mu$  long, 3-4:1, marginal alar cells quadrate to transversely elongate.

Autoicous; calyptra small, conical, fugacious; seta 1-3 cm. long; capsule yellow to light brown, cernous, cylindric, 1.5-2 mm. long; operculum convex, conical, obtusely apiculate; urn strongly curved, contacted below mouth when dry and empty; annulus of 2-3 rows of cells; peristome perfect, hypnaceous, teeth pale brown, 16, strongly trabeculate, transversely striate below, margin hyaline, somewhat crenate, segments about as long as teeth, keeled, split along keel, basal membrane about 2/5 as high as segments, cilia usually 1 between segments, nodose to appendiculate; spores papillae, 14-18 $\mu$  in diameter, mature in spring.

Comments:

Amblystegium serpens (Hedw.) BSG is common on wet soil, humus, well-rotted wood in lowland areas. The small leaves

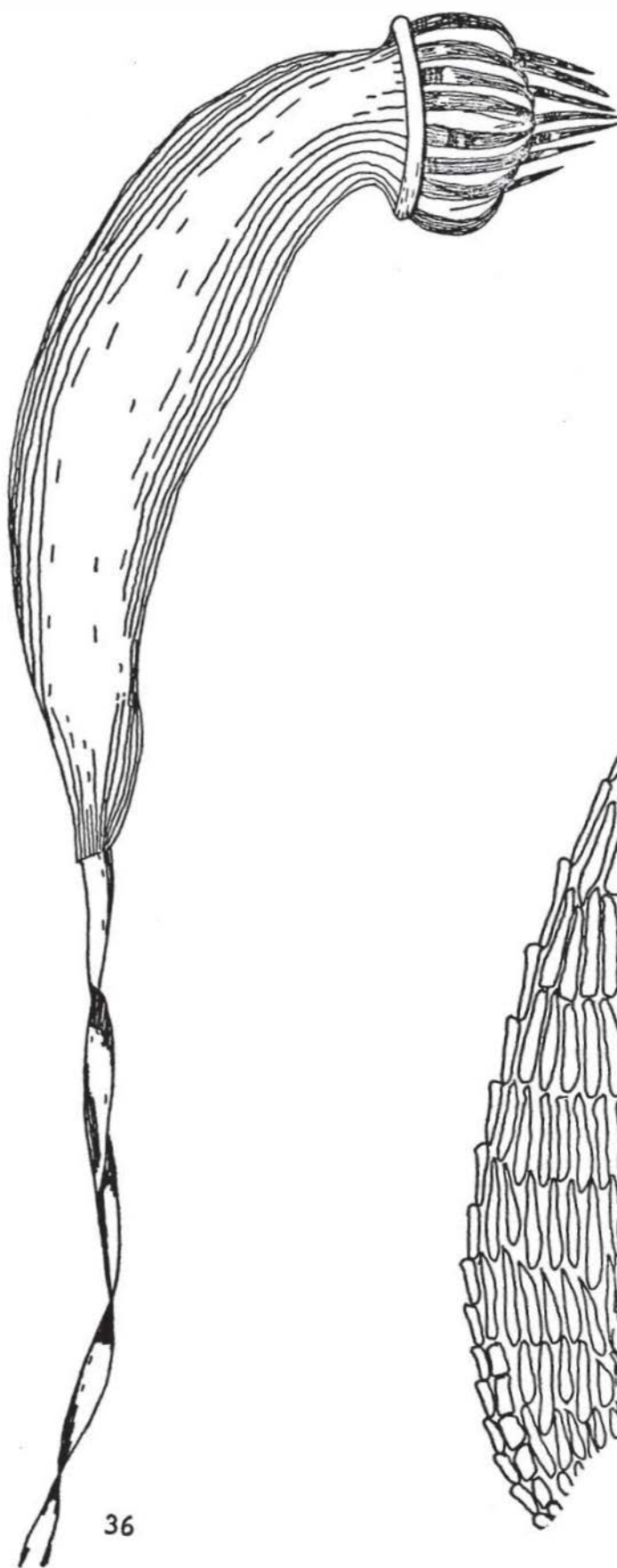


with short, firm cells and short midrib are distinctive characters. In its more typical form the leaves are more or less erect when dry as opposed to A. juratzkanum where the leaves are wide-spreading wet or dry.

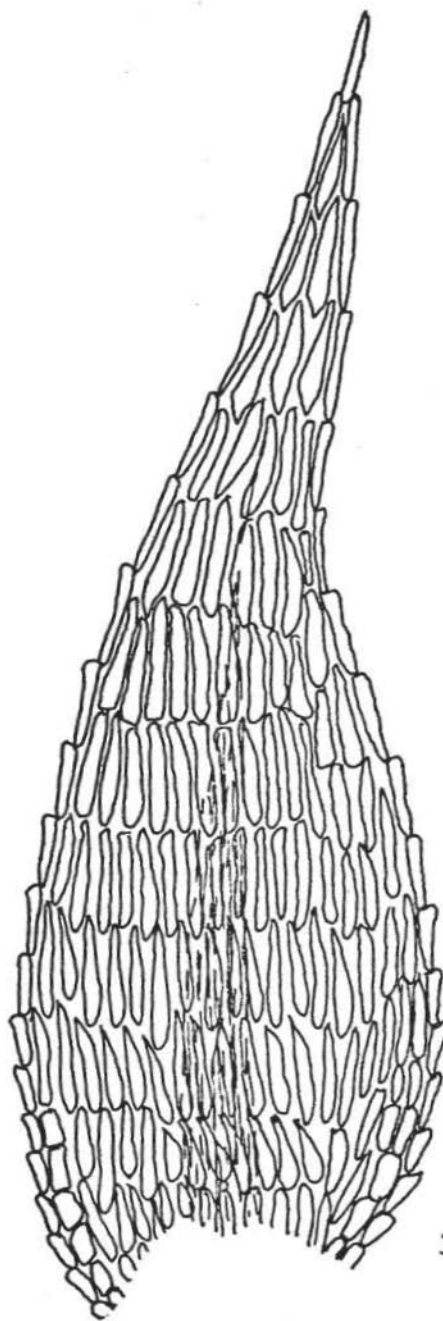
Amblystegium serpens (Hedw.) BSG

36. Capsule, 15 X

37. Leaf, 100 X



36



37

FAMILY: HYPNACEAE

Brachythecium acutum (Mitt.) Sull.

Plants moderately robust, in thin mats, green to yellowish green, glossy; stems prostrate, occasionally floating, 5-10 cm. long, distantly and irregularly divided; branches few, 5-10 mm. long, often subcomplanate-foliate; central strand present; leaves of branches distant, spreading, wedge-shaped, triangular-ovate, lanceolate, or ovate-lanceolate, gradually narrowed from near base to apex, very slightly concave, not striate or plicate, 1.6-2 mm. long, 0.5-0.7 mm. wide, decurrent, costa extending  $\frac{2}{3}$  length of blade, apices acuminate, margins plane, entire to distantly serrate; median cells linear-flexuose, 10:1, basal cells shorter, broader, alar cells small, numerous, oblong-rhomboidal to quadrate, extending downward, forming a moderately strong decurrent portion; leaves of stems triangular-ovate, 2-2.5 mm. long, about 1 mm. wide, long and slenderly acuminate, margin nearly entire.

Monoicous; calyptra narrowly cucullate, extending to middle of urn, fugacious; seta reddish brown, smooth, 2.5-3.5 cm. long; capsule reddish brown, inclined to horizontal; operculum long conic, apiculate or conic-acuminate; urn oblong-ovoid to short cylindric, about 3 mm. long, 3:1, usually slightly curved, occasionally nearly symmetric; annulus of 1-2 rows of cells; synnaceous, perfect, teeth orange, 16, segments nearly as long as teeth, carinately split, cilia 2-3, strongly

nodose to slightly appendiculate; spores minutely roughened, 13-15 $\mu$ . in diameter, maturing in late autumn to winter.

Comments:

Brachytheций acutum (Mitt.) Sull. is monoicous, with the leaves wedge-shaped, i.e., the sides are straight, from the broad base to apex. Commonly found on living trees or fallen logs not yet decorticated.

Brachythecium acutum (Mitt.) Sull.

38. Branch showing leaf arrangement, 20 X



FAMILY: HYPNACEAE

Brachythecium oxycladon (Brid.) Jaeger and Sauerb.

Plants in wide mats, yellowish green, glossy; stems prostrate, irregularly divided; branches erect, leaves close, loosely imbricate, erect-spreading, plicate, concave, alar portion decurrent, costa extending to middle of leaf or beyond, apices slenderly acuminate, leaves of stems ovate-lanceolate, 1.5-2 mm. long, 0.45-0.8 mm. wide, margins serrulate, median cells of leaves narrowly linear, flexuose, basal cells shorter, broader, subquadrate to quadrate, alar cells numerous, small, quadrate, rather thick-walled.

Generally dioicous; calyptra narrowly cucullate, extending to middle of urn, fugacious, seta reddish-brown, suberect, often inclined when dry, 3-4 mm. long operculum conic, urn oblong, subarcuate, slightly contracted below mouth when dry, neck gradually narrowed to seta, 2.5-3.5 mm. long, annulus none, peristome hypnaceous, perfect, teeth 16, light reddish brown, 0.65 mm. long, segments carinately split, cilia 2, basal membrane broad, spores finely papillose, about 15 $\mu$  in diameter, mature in autumn or winter.

Comments:

Brachythecium oxycladon (Brid.) Jaeger and Sauerb. is very common and most likely to be confused with B. salebrosum which is autoicous and has larger, laxer, more transparent alar cells.

Both species are found on the bases of living trees.

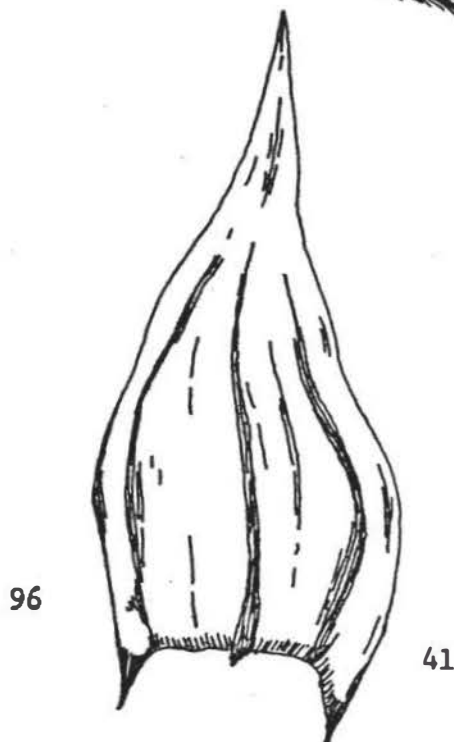
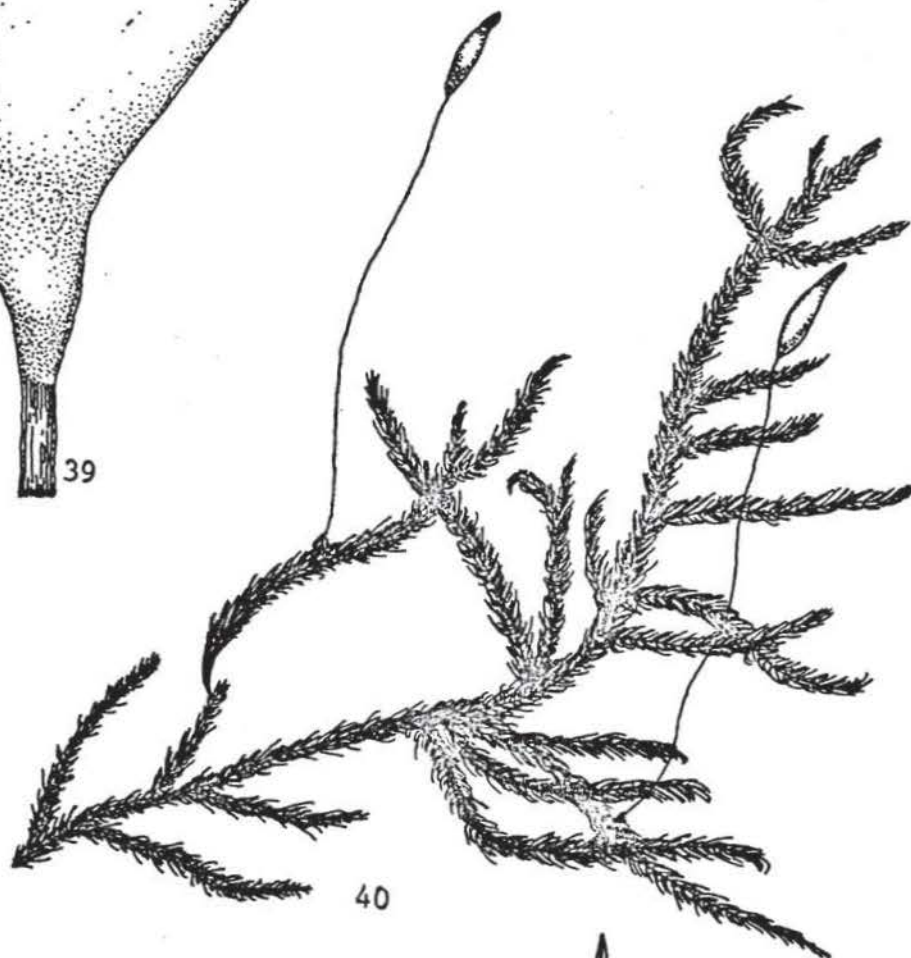
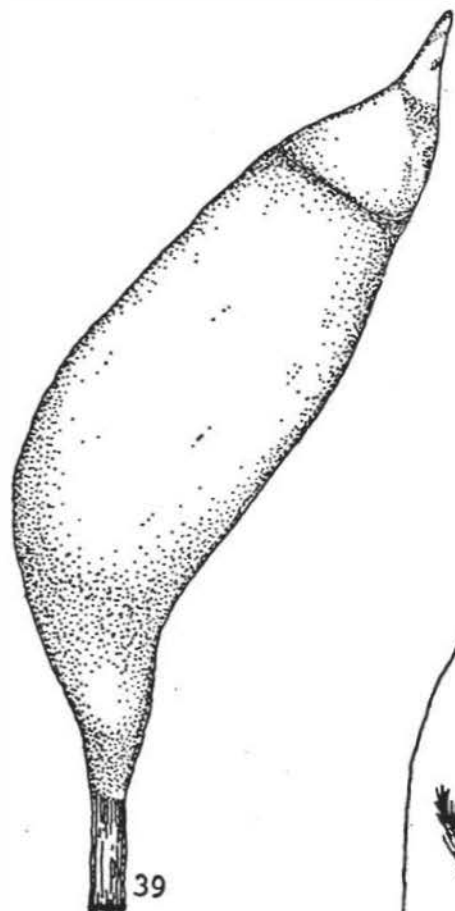


Brachythecium oxycladon (Brid.) Jaeger and  
Sauerb.

39. Capsule, 10 X

40. Habit, 2 X

41. Leaf, 10 X



FAMILY: HYPNACEAE

Brachythecium salebrosum (Web. and Mohr.) BSG

Plants in wide mats, dark yellow-green, glossy, stems prostrate, 6 cm. or longer, irregularly divided, branches usually terete-foliate; central strand present, leaves of branches erect-spreading, lanceolate, plicate, concave, 1.8-2.3 mm. long, 0.5-0.65 mm. wide, not decurrent, costa extending beyond middle of blade, apices abruptly acuminate, margins serrate above, entire to subserrate below and reflexed, median cells linear, 8-21:1, basal cells shorter, broader, usually 2-3 rows of large subquadrate cells numerous, subquadrate with thin walls, leaves of stems erect-spreading, ovate lanceolate, concave, plicate, 1.5-2.2 mm. long, 0.6-1.1 mm. wide.

Autocious, calyptra narrowly cucullate; seta reddish brown, smooth, 1-2 cm. long; capsule reddish brown, inclined to horizontal, operculum conic-apiculate to conic-acuminate, about 1 mm. long, annulus very narrow, inconspicuous, often remaining attached to the operculum; peristome hypnaceous, perfect teeth, 16, permanently margined, 0.55-0.7 mm. long, segments about as long as teeth, split, spores brownish, slightly papillose to nearly smooth, 15-20 $\mu$  in diameter, mature in autumn or early winter.

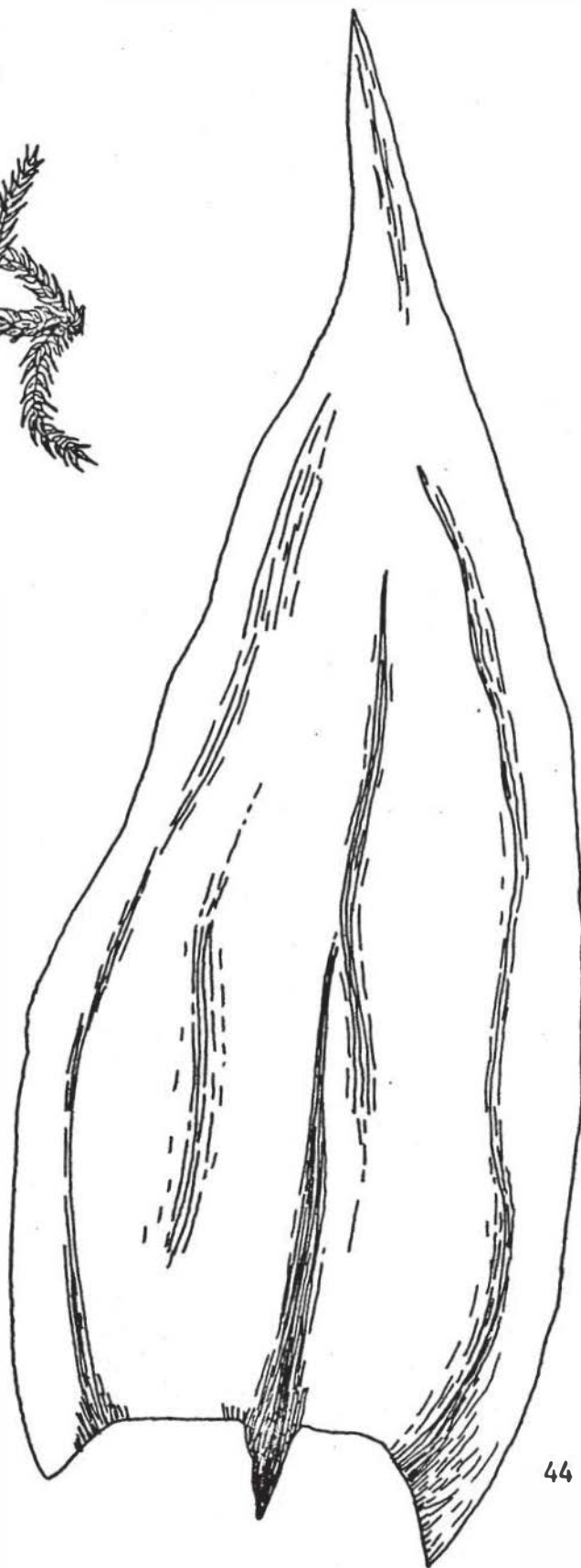
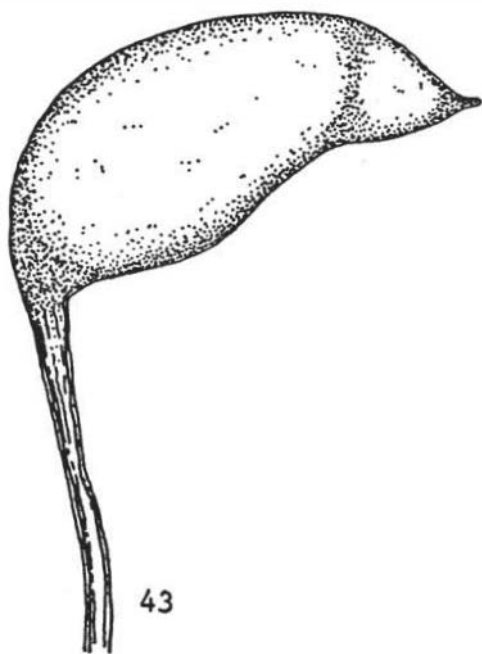
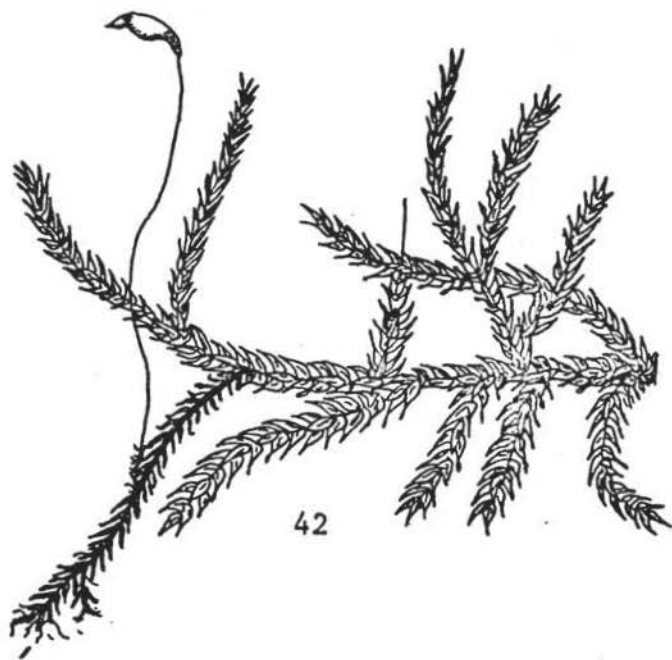
Comments:

Brachythecium salebrosum (Web. and Mohr.) BSG is quite common in lawns and may be found at the bases of living trees (usually

Acer spp.). This species thrives well in disturbed places and is most likely to be confused with B. oxycladon which is dioicous and has small, rather opaque, quadrate alar cells.

Brachythecium salebrosum (Web. and Mohr.) BSG

- 42. Habit, 3 X
- 43. Capsule, 10 X
- 44. Leaf, 25 X



FAMILY: HYPNACEAE

Brotherella recurvans (Ms.) Fleisch.

Plants in mats, yellowish green, very glossy; stems prostrate, reddish, irregularly pinnately divided; central strand present; leaves close, imbricate at base, strongly complanately falcate-secund and turned downwards; leaves of stems ovate-lanceolate, slightly concave, 1.2-1.5 mm. long, not decurrent, costa absent or short and double, apices slenderly long acuminate, margins often narrowly recurved below, sharply serrate above; median cells of leaves linear-flexuose, about  $90\mu$  long, basal cells yellowish or brownish, shorted, wider, alar cells hyaline or colored, 4-8 very much enlarged and inflated, 3-4 along leaf margin and 3-4 transversely, the group bordered above by a few subquadrate, smaller cells.

Dioicous; calyptra cucullate, smooth, fugacious; seta brown, glossy, 1-2 cm. long; capsule pale chestnut-brown, the tapering base darker, obliquely inclined to almost horizontal; operculum conic, long rostrate; the urn oblong-oval, slightly curved when young, strongly arcuate with age, 1.5-2 mm. long; annulus absent; peristome hypnaceous, perfect, teeth 16, segments about as long as teeth, basal membrane about  $2/5$  height of teeth, cilia 1-2; spores brownish, granulose,  $16-18\mu$  in diameter, mature in late autumn.

Comments:

Brotherella recurvans (Mx.) Fleisch. is found at the bases of

living trees and to a lesser extent on soil and humus. Recognizable because of an extraordinary golden sheen, this species is distinguished because of soft, crowded, complanate leaves with secund tips.



Brotherella recurvans (Mx.) Fleisch.

45. Branch showing leaf arrangement, 10 X

46. Leaf, 20 X



45



104

46

FAMILY: HYPNACEAE

Campylium hispidulum (Brid.) Mitt.

Plants slender, in tufts, bright green, yellowish below, stems prostrate, irregularly divided; central strand present; leaves widely spreading, triangular-cordate, abruptly narrowed to acumen, 0.5-0.8 mm. long, decurrent, costa none, acumen slender, 1/3 to as long as main body of the leaf, margins subserrulate throughout, more strongly serrulate at base; median cells of leaves elongate-oblong with blunt ends, 5-6 $\mu$ , wide, basal cells shorter, wider, alar cells numerous, subrectangular to quadrate; leaves of branches similar, less broadly ovate, more gradually acuminate.

Autocious, calyptra narrowly cucullate, smooth, fugacious; seta chestnut-brown, 1.5-2 cm. long; capsule cernuous, 1.4-2 mm. long, yellowish brown, darker with age; operculum conic-apiculate or convex-conic with an upturned apiculation; urn oblong, curved or slightly so, contracted beneath mouth and furrowed when dry and empty; annulus of 1 row of cells; peristome hypnaceous, perfect, teeth 16, yellowish, about 0.45 mm. long, inner peristome high, cilia 2-3, nodose to slightly appendiculate, approximate length of segments; spores yellowish, minutely papillose, 10-14 $\mu$ , in diameter, mature in late spring or autumn.

Comments:

Campylium hispidulum (Brid.) Mitt. is primarily a calciphile but is not uncommon on decorticated logs. This species is smaller

than C. chrysophyllum and is recognized by crowded, cordate leaves abruptly narrowed to a wide-spreading or squarrose, channeled acumen.

Campylium hispidulum (Brid.) Mitt.

47. Branch showing leaf arrangement, 25 X



47

FAMILY: HYPNACEAE

Campylium chrysophyllum (Brid.) Bryhn

Plants slender, in tufts or in thin mats, bright golden green; stems prostrate, irregularly to subpinnately divided; central strand of few cells; leaves close, squarrose-spreading from a slightly clasping base; leaves of stems ovate to ovate-lanceolate, or ovate-cordate to triangular-cordate, 1-1.5 mm. long, 0.4-0.8 mm. wide, decurrent, costa single, extending to middle of leaf or beyond, apices rather abruptly narrowed into a long, slender, slightly canaliculate acumen, margins usually entire throughout, sometimes subdenticulate at base; leaves of branches narrower, lanceolate to ovate-lanceolate; median cells of leaves 5-10 $\mu$  wide, 4-10:1, alar cells shorter, few, subquadrate, sub-opaque, thick-walled.

Dioicous; calyptra narrowly cucullate, smooth, fugacious; seta chestnut-brown, 2-2.5 cm. long; capsule chestnut-brown to orange, inclined to horizontal; operculum about 0.7 mm. high, conic-apiculate; urn oblong-cylindric, approximately 3 mm. long and 0.75 mm. in diameter, curved, contracted beneath mouth when dry and empty; annulus large, of 3 rows of cells; peristome hypnaceous, perfect, teeth 16, about 0.6 mm. long, yellowish to orange, inner peristome yellowish segments carinately split, basal membrane about 0.18 mm. high, cilia 2-3 nodose; spores pale yellow to light brown, 8-12 $\mu$  in diameter, smooth or nearly so, mature in spring to early summer.

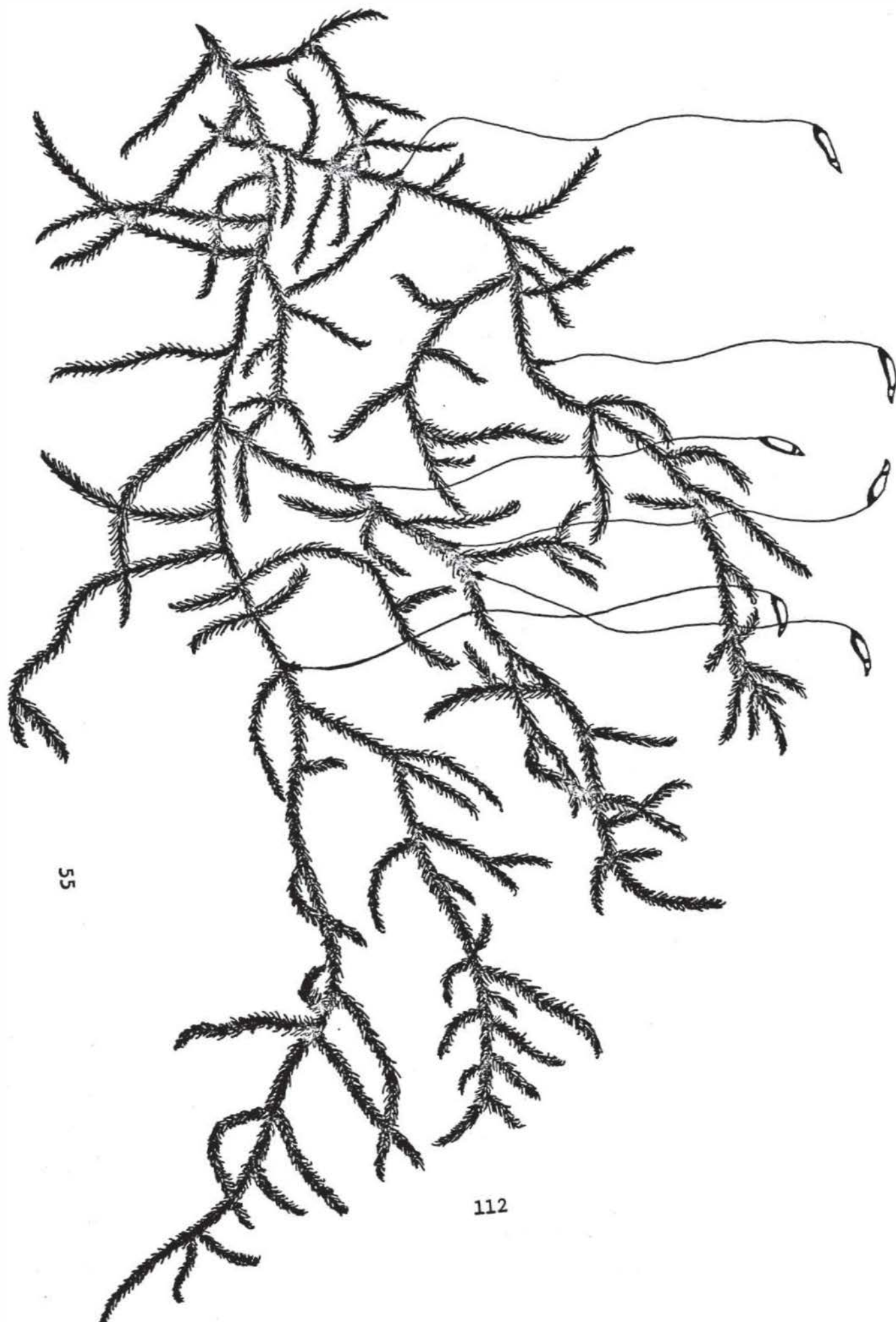
Comments:

Campylium chrysophyllum (Brid.) J. Lange is found at the bases of living trees and on well rotted wood of Quercus alba, Quercus rubra, and various species of Acer. This species is rather small but considerably stouter than C. hispidulum, from which it is easily distinguished by its leaves with a single costa.



Campylium chrysophyllum (Brid.) Bryhn

48. Habit, 2 X



55

FAMILY: HYPNACEAE

Chamberlainia acuminata (Hedw.) Grout

Plants slender, in wide mats, green, dark green, yellowish green; stems prostrate, up to 8 cm. in length, distantly and irregularly divided; branches unequal, ascending to erect, terete-foliate, subjulaceous, tapering to acute ends, 1-3 cm. long; central strand present; leaves of branches erect-spreading when moist, erect-imbricate and appressed when dry, lanceolate to ovate-lanceolate, concave, slightly plicate, 1-1.6 mm. long, 0.4-0.6 mm. wide, bases narrowed, slightly decurrent, costa extending to above middle of blade, apices acuminate, margins frequently slightly revolute, entire below, serrulate above; leaves of stems similar; median cells of leaves linear-flexuose to oblong-rhomboidal, 5-10:1, basal cells enlarged, thin-walled, a distinct area extending from margin to costa.

Dioicous; calyptra glabrous, narrowly cucullate, extending to middle of urn, fugacious; seta reddish brown, smooth, 1-2 cm. high; capsule brown, erect, 1.5-3 mm. long; operculum conic, acute to short rostrate; urn cylindric, usually symmetric, occasionally slightly curved, tapering at base, 1.5-3 mm. long; annulus none; peristome hypnaceous, teeth 16, carnately split, about length of teeth, basal membrane about 1/4 height of segments; spores chestnut-brown, papillose, 12-18 $\mu$  in diameter, mature in autumn or winter.

Comments:

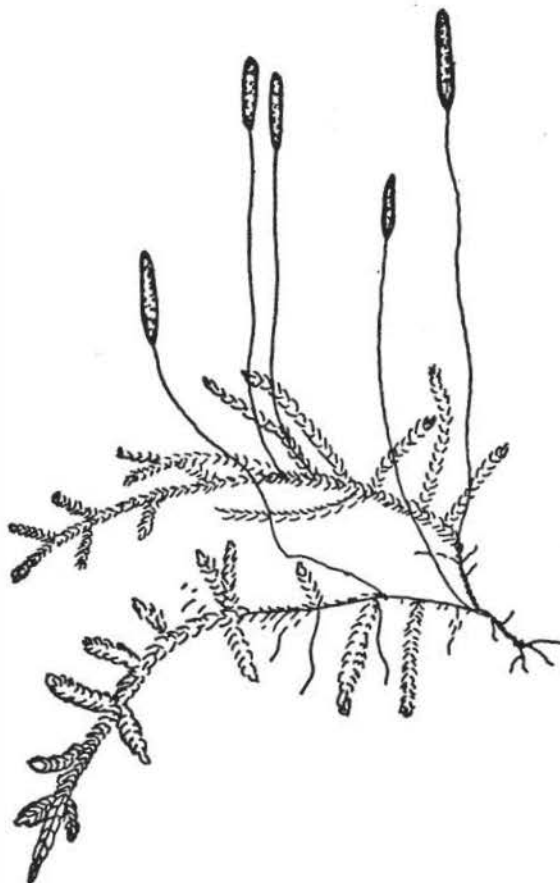
Chamberlainia acuminata (Hedw.) Grout is found on well decayed logs or stumps and varies from filiform to robust and julaceous. Sterile plants of Brachythecium salebrosum often resemble those of C. acuminata but differ in having a conspicuous triangular area extending from margin to costa.

Chamberlania acuminata (Hedw.) Grout

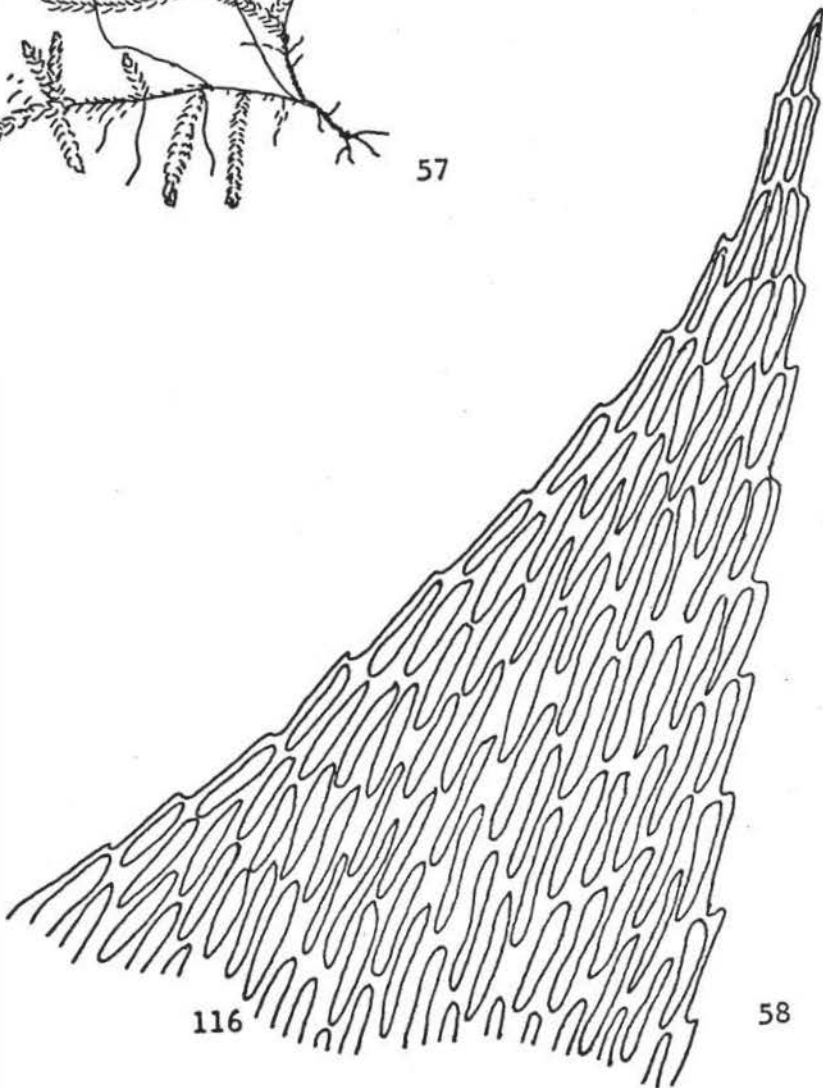
- 56. Branch showing leaf arrangement, 10 X
- 57. Habit, 2 X
- 58. Leaf apex, 200 X



56



57



116

58

FAMILY: HYPNACEAE

Climacium americanum Brid.

Plants robust, loosely caespitose, yellowish green, glossy, primary stems prostrate, secondary stems erect, 5-8 cm. high, irregularly divided into a cluster of spreading foliated, terete branches, 1.5-2.5 cm. long, tips acute, central strand present, paraphyllia present, conspicuous on branches and secondary stems; erect spreading when moist, broadly lanceolate, upper leaves oblong-lanceolate, upper leaves ovate-lanceolate, bases broad, costa nearly to apex, apices acute, margins denticulate below, sharply serrulate above; median cells of leaves oblong-hexagonal, ends rounded, alar cells quadrate along margin to diamond-shaped elsewhere; apical and upper marginal cells larger than median and rhombic-oblong.

Dioicous; calyptra enclosing capsule, cleft on one side to apex; seta erect, chestnut brown, cylindric 5-6 mm. long, operculum conic, about 1 mm. long; urn nearly smooth, slightly contracted below mouth when dry and empty; annulus none; peristome double, teeth orange, 16, slender, segments yellowish, longer than teeth, granular-papillose, basal membrane very narrow, spores yellowish, minutely roughened, 16-18 $\mu$  in diameter, mature in autumn.

Comments:

Climacium americanum Brid. commonly known as the tree moss grows on well-rotted logs and wet soil. This species is distinctly

dendroid as opposed to C. kindbergii which is irregularly branched.



Climacium americanum Brid.

59. Habit, 2 X



59

FAMILY: HYPNACEAE

Climacium kindbergii (Ren & Card.) Grout

Plants in dense tufts or cushions, dark yellowish green, dark green, or almost black; secondary stems obscurely dendroid, stout, 3-6 cm. tall, irregularly divided into a cluster of ascending to widely spreading branches, 1.5-2.5 cm. long; central strand present; paraphyllia filiform, conspicuous on branches and secondary stems; leaves of well developed branches broadly lance-ovate, strongly sulcate, 1.5-2.5 mm. long, slightly clasping by the auriculate base, costa strong, extending almost to apex, apices obtuse to acute, margins plane, entire in lower half, serrate in upper half; median cells of branch leaves oblong-hexagonal, 2-3:1, median basal cells longer, ends rounded, thick-walled, somewhat castaneous and pellucid, alar cells short rhombic to quadrate-rectangular, forming rounded auricles.

Dioicous; calyptra and sporophyte similar to that of C. americanum, but with seta longer, capsule 4-6 mm. long and teeth of peristome perforate.

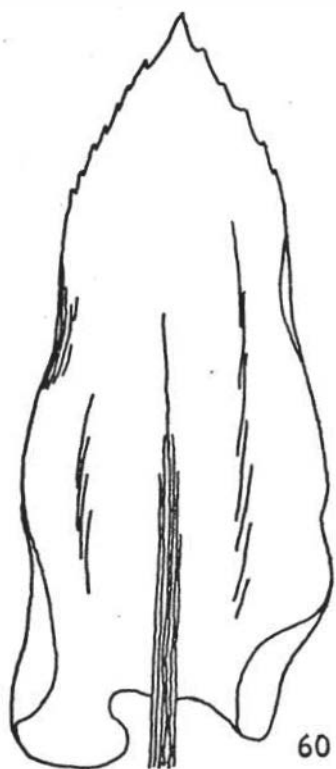
Comments:

Climacium kindbergii (Ren & Card.) Grout is an irregularly branched form of C. americanum induced by flooding (Crum, 1973).

Climacium kindbergii (Ren & Card.) Grout

60. Leaf, 25 X

61. Leaf, 25 X



60



61

123.

FAMILY: HYPNACEAE

Entodon cladorrhizans (Hedw.) C.M.

Plants in wide, yellow green, glossy mats; stems about 5 cm. long, subpennately divided, densely foliated and flattened, 2-3 mm. wide, attenuate at tips; leaves of branches imbricate, oblong-ovate very concave, 1-2 mm. long. 0.5-1 mm. wide, costa none or indistinct, short and double, apices acute, frequently slightly turned backwards, margins plane, entire, or slightly serrulate at apex; median cells linear-fusiform,  $6\mu$  wide, 10-15:1, alar cells numerous, quadrate-rectangular, 8-10 along the margin; leaves of stems larger, bases broader, and apices more abruptly acute.

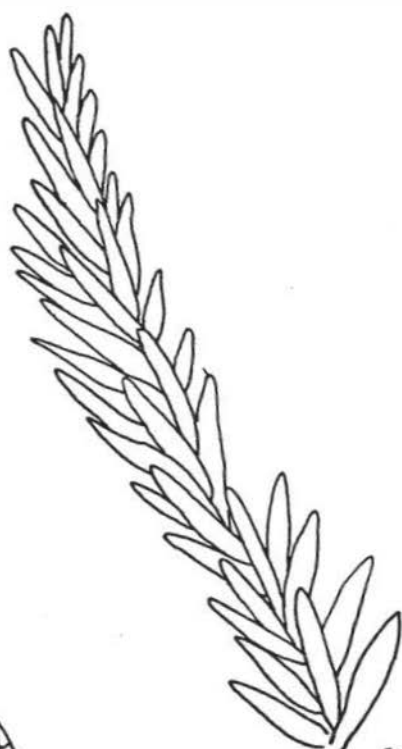
Monoicous; calyptra cuculate; seta erect, smooth, reddish brown, glossy, 8-20 mm. long; capsule chestnut brown, erect, symmetric, 2-3 rows of cells, deciduous; peristome double, deeply inserted below mouth, teeth chestnut brown, 16, about 0.45 mm. long with 15-20 cross-bars, basal membrane none; spores castaneous, papillose, 14-20 $\mu$  in diameter, mature in late autumn or early winter.

Comments:

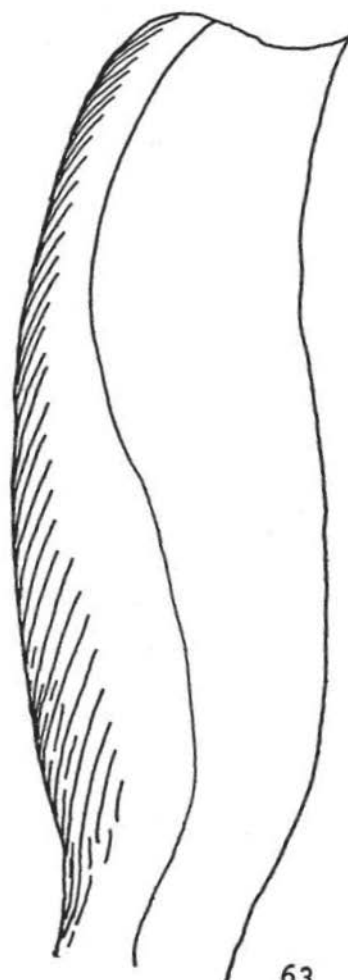
Entodon cladorrhizans (Hedw.) C.M. is recognized by shiny, erect-spreading, complante leaves. This species is commonly found on exposed roots and the bases of living trees.

Entodon cladorrhizans (Hedw.) C.M.

- 62. Branch showing leaf arrangement, 10 X
- 63. Leaf, 25 X
- 64. Habit, 2 X



62



63



64



FAMILY: LESKEACEAE

Entodon compressus (Hedw.) C.M.

Plants in wide yellowish green mats, sometimes dull, sometimes glossy; foliated stems and branches flattened, when dry the leaves frequently slant downward from both sides of a ridge extending along shoot, up to 1 mm. in width, stems pinnately divided; central strand present; leaves of branches imbricate, very concave, oblong-ovate, 1-1.1 mm. long, 0.4-0.5 mm. wide, 2:1, costa none to short and double, apices to broadly acute, margins entire; median cells of leaves linear, 5 $\mu$  wide, 8-12:1, basal cells shorter and broader, alar cells numerous, quadrate, extending almost to middle of leaf base, 8-10 along the margin; leaves of stems larger, about 1.5 mm. long, 0.9-1 mm. wide.

Monoicous; calyptra cucullate; seta erect, 0.6-1.5 cm. long; capsule erect, brown; operculum conic-rostrate, about 0.9 mm. long, beak slender, curved; urn ovoid to elliptic, 2-2.5 mm. long, 0.6-0.7 mm. in diameter, contracted toward mouth; annulus large, rather persistent, of 2 rows of cells, easily deciduous; peristome almost orange, double, teeth 16, narrowly linear-lanceolate, cross-bars close and regularly arranged, densely and minutely papillose, inner peristome fragile, segments small, linear-subulate, carinately split, densely and minutely papillose, shorter than teeth to approximately same length, basal membrane not evident, cilia none; spores mature from autumn to early winter.

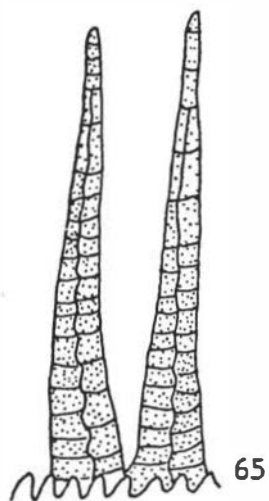
Comments:

Entodon compressus (Hedw.) C.M. is found on well-decayed logs or stumps and on the bark of living trees. The dry shoots have the leaves sloping down from the stem like shingles from the comb of a roof. The orange peristome is the certain recognition character.

Entodon compressus (Hedw.) C.M.

65. Peristome, 200 X

66. Seta & capsule, 10 X



65



66

FAMILY: HYPNACEAE

Entodon seductrix (Hedw.) C.M.

Plants in wide yellowish green mats, glossy; stems about 5 cm. long, subpinnately divided, juleaceous, 5-25 mm. long; leaves imbricate; deeply concave, oblong-elliptical to ovate, narrowed at the insertion, 0.8-1.4 mm. long, about 0.7 mm. wide, costa short and double, apices short apiculate, margins plane or slightly reflexed at the base, entire, or slightly serrulate at apex, median cells of leaves linear,  $6\mu$  wide, alar cells numerous, quadrate, 10-20 along the margin, sometimes extending along the margin  $1/4$  length of the leaf; leaves of stems larger, ovate.

Monoicous, calyptra cucullate, covering about  $1/2$  of the capsule; seta reddish brown, erect, glossy, about 1.5 cm. long, capsule reddish brown, erect, symmetric; operculum conic-rostrate, frequently suboblique, 0.5-0.8 mm. long; sporophyte cylindric, 2-3.5 mm. long, annulus rather indistinct, 2-3 rows of small cells, peristome double, teeth 16, deeply inserted below mouth, with 7-10 crossbars appearing above mouth of capsule; spores yellowish, minutely roughened,  $14-18\mu$  in diameter, mature from late summer to winter.

Comments:

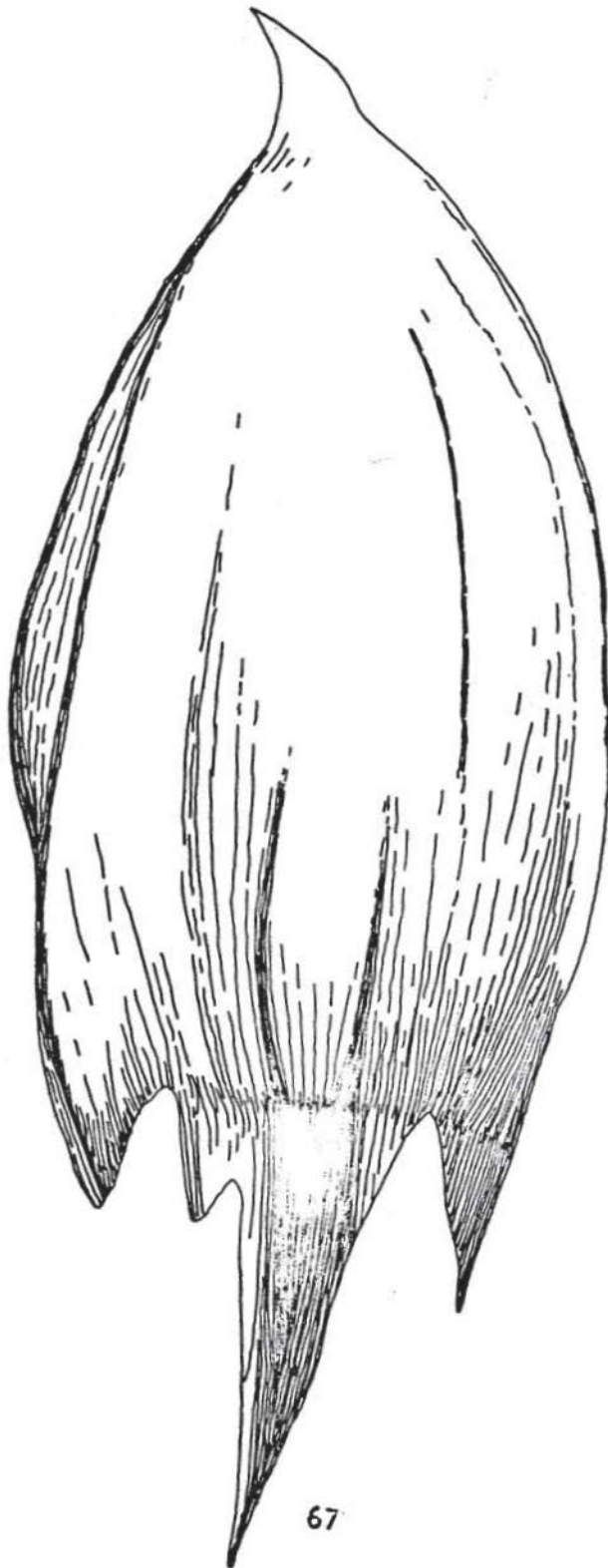
Entodon seductrix (Hedw.) C.M. is shiny and attractive and is distinguished from E. cladorrhizans by its julaceous stems and branches. It is found on well-rotted wood and bases of trees in

shady, often rather dry places.

Entodon seductrix (Hedw.) C.M.

67. Leaf, 20 X

68. Capsule, 4 X



67



68



FAMILY: HYPACEAE

Eurhynchium serrulatum (Hedw.) Kindb.

Plants flattened, in thin mats, green to bright yellowish green or pale green, slightly glossy when dry; stems prostrate, irregularly divided; branches elongated, somewhat 2-ranked; central strand present; leaves of branches complanate, distant, thin, slightly contorted when dry, ovate-lanceolate, subconcave to concave, 1.5-2 mm. long, not decurrent, costa narrow, extending to middle of blade or beyond, apices long acuminate and often twisted, margins plane, strongly serrulate from below the middle to the tip, median cells of leaves 7-10:1, apical cells not conspicuously different but slightly shorter and broader, basal cells somewhat broader and shorter, alar cells not especially differentiated; leaves of stems cordate-triangular, abruptly and narrowly acuminate, apices very slender, margins subserrulate above.

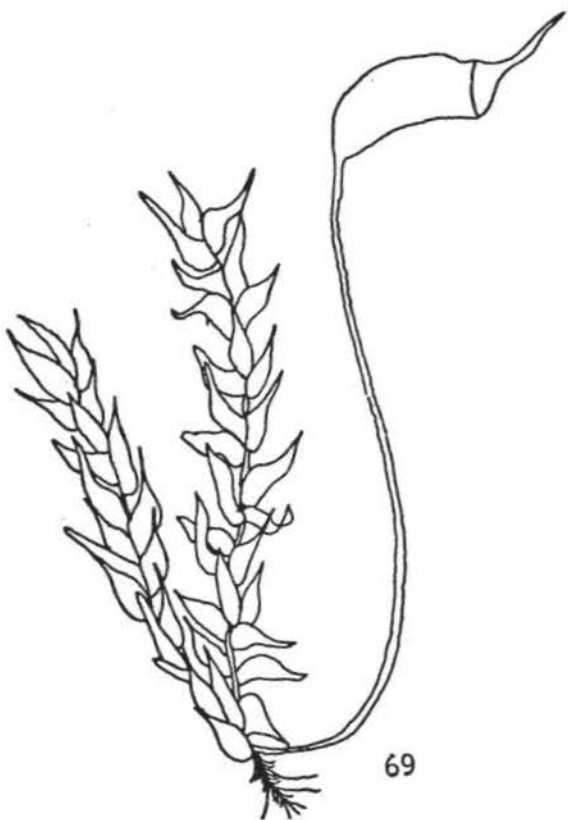
Autoicous; calyptra narrowly cucullate, glabrous, fugacious; seta chestnut-brown, smooth, about 2.5 cm. long; capsule pale yellow to dark chestnut-brown, cernous; operculum conic, 1/3-1/2 length of urn, slenderly rostrate, beak long, recurved; urn curved, about 2 mm. long, contracted below mouth when dry and empty; annulus large deciduous; peristome hypnaceous, perfect, teeth 16, yellowish brown, narrowly lanceolate, basal membrane approximately 1/2 height of segments, cilia usually 3; spores yellowish, finely papillose, 9-12 $\mu$  in diameter, mature in early fall.

Comments:

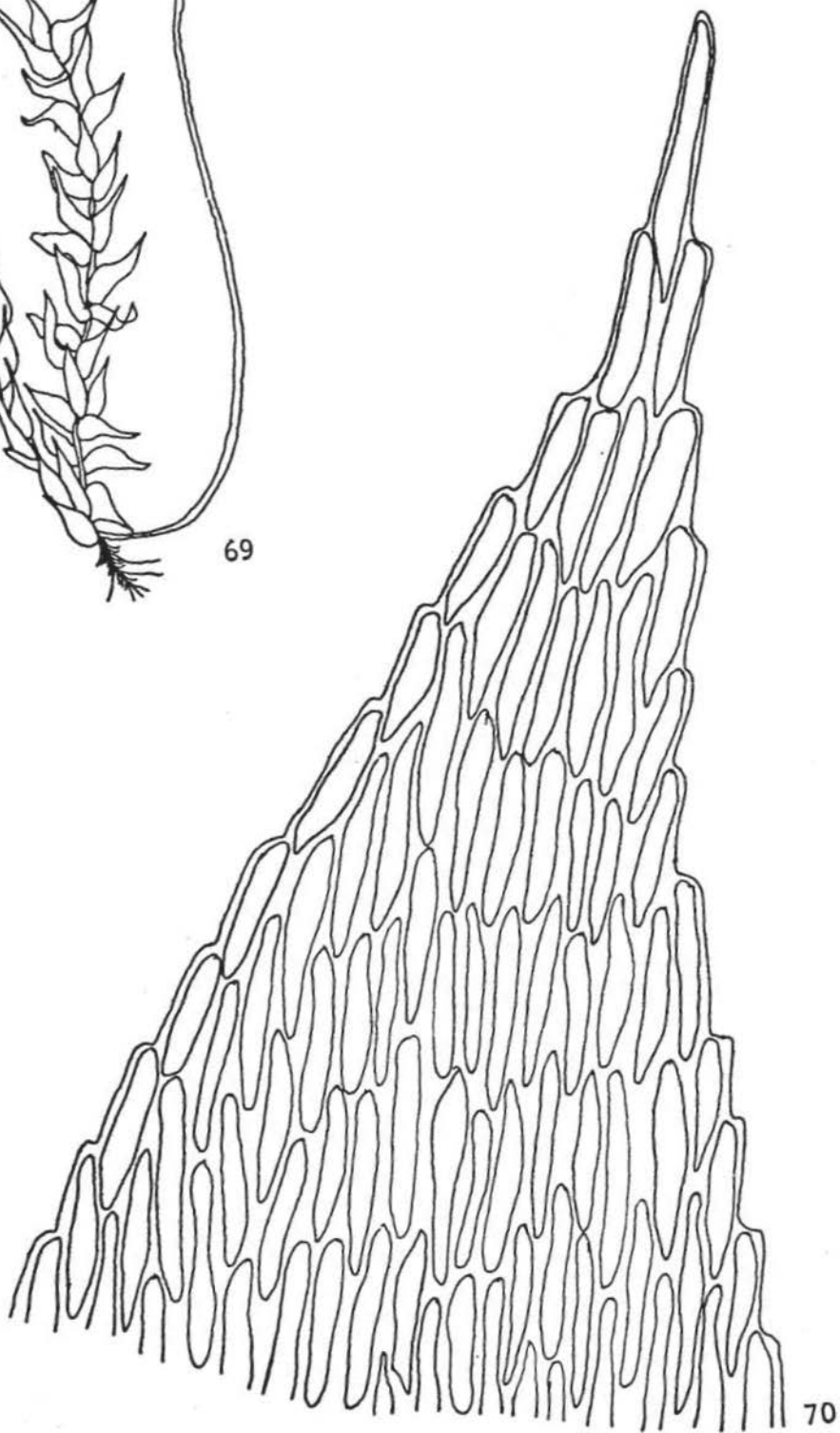
Eurhynchium serrulatum (Hedw.) Kindb. is irregularly branched and has sharply serrate leaves with a twisted apex. This species is found on the trunks of living trees and fallen logs not yet decorticated.

Eurhynchium serrulatum (Hedw.) Kindb.

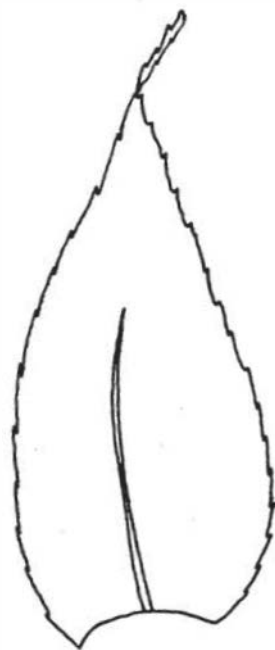
- 69. Habit, 3 X
- 70. Leaf apex, 400 X
- 71. Leaf, 10 X



69



70



71

FAMILY: HYPNACEAE

Heterophyllum haldanianum (Grev.) Kindb.

Plants robust, glossy, in wide, loose mats, dark to brownish green; stems prostrate, 3-8 cm. long, irregularly branching; central strand present; paraphyllia large, numerous, multiform, ovate, lanceolate, and palmate; leaves on the ascending stems and branches loosely and nearly evenly imbricate, broadly ovate-lanceolate to oblong-ovate, rather rapidly narrowed to a short, slender acumen, very concave, 1.5-2 mm. long, 0.6-0.9 mm. wide, not decurrent, costa absent, rudimentary, or short or double, margins plane, entire; median cells linear-flexuose, about 6 $\mu$  wide, 12-20:1 basal cells shorter and broader, alar cells enlarged, inflated, forming conspicuous auricles, alar area bordered above by a row of smaller, quadrate, subopaque cells.

Monoicous; calyptra narrowly cucullate, glabrous, fugacious; seta red or chestnut-brown, glossy, 1-2 cm. long; capsule dull chestnut-brown, suberect to inclined, 3-3.5 mm. long, 4-6:1, operculum conic, 0.9 mm. long, beak short, oblique; urn long cylindric, 2-3 mm. long, 0.75 mm. in diameter, slightly curved, somewhat contracted beneath mouth when dry and empty; annulus of 2 rows of small cells, deciduous; peristome perfect, teeth 16, pale yellow to brownish yellow, about 0.7 mm. long, confluent at base, papillose in rows in upper portion, inner peristome fragile, whitish, papillose, segments about as long as teeth, slightly carinately split, basal membrane 16-20 $\mu$  high, cilia usually 1

and shorter than teeth and segments, sometimes 2 and rudimentary, sometimes none; spores yellowish brown, granulose, 14-18 $\mu$  in diameter, mature in late autumn or in winter.

Comments:

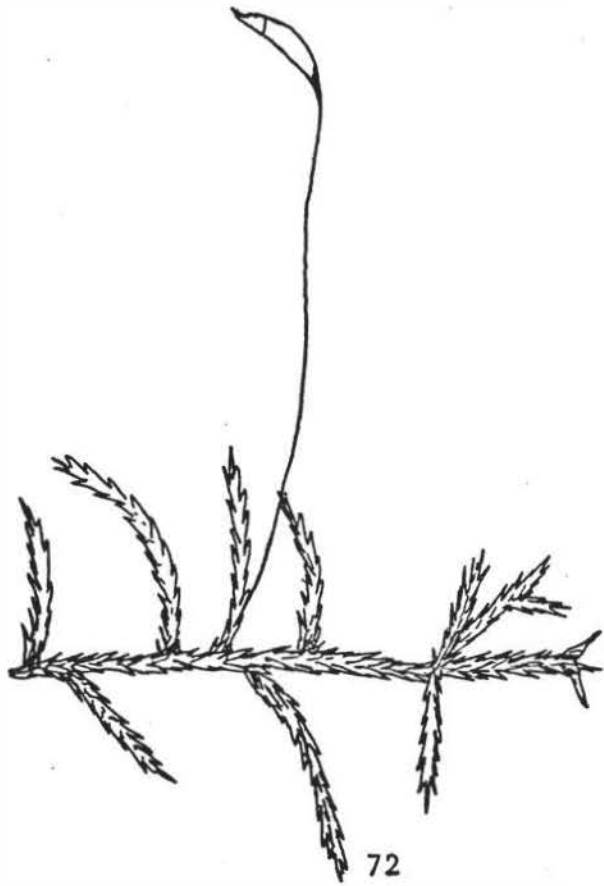
Heterophyllum haldanianum (Grev.) Kindb. is usually found on well-decayed logs or stumps and occasionally on the bark of living trees. This species has considerable character because of the short, tapered, and somewhat flattened branches (resembling small swords) and also because of the curved but nearly erect capsules.

Heterophyllum haldanianum (Grev.) Kindb.

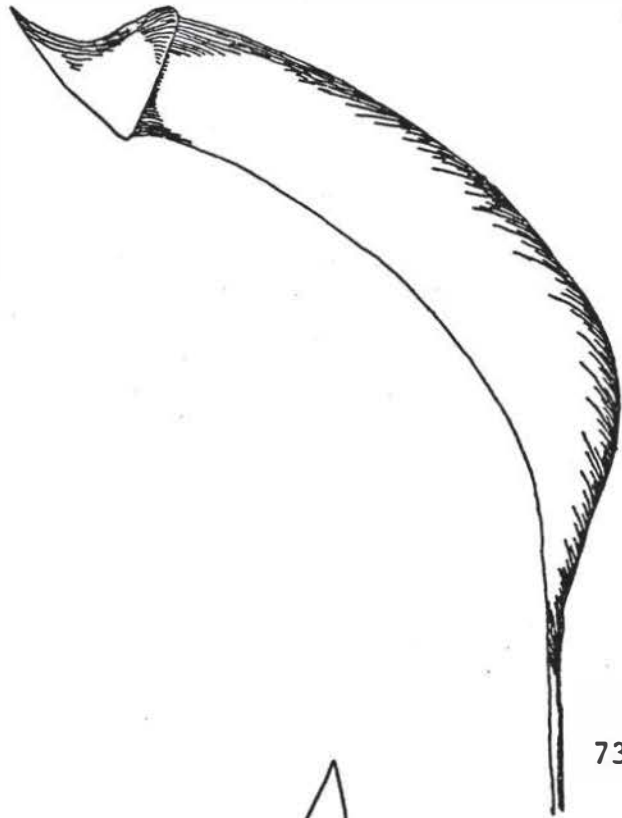
72. Habit, 2 X

73. Capsule, 3 X

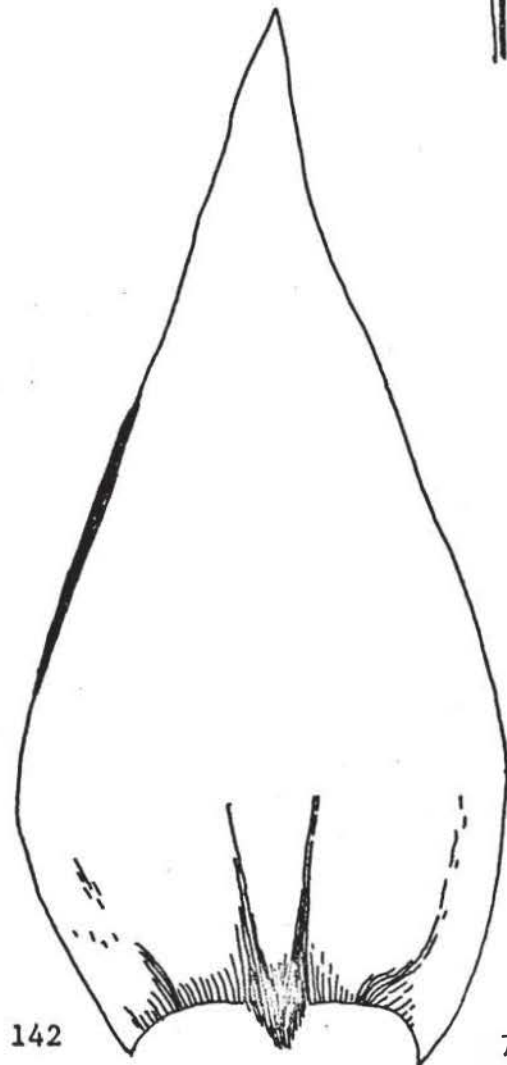
74. Leaf, 25 X



72



73



142

74



FAMILY: HYPNACEAE

Hypnum curvifolium Hedw.

Plants robust, complanate, resembling braids, in wide mats, green to yellowish-green above, brown below, glossy; stems prostrate, regularly or irregularly pinnately divided; branches short, unequal; central strand small; paraphyllia few to none; leaves in two rows, flaccate-secund, stem leaves oblong-ovate to elongate-triangular-ovate, concave, 1.4-2 mm. long, 0.7-0.8 mm. wide, abruptly narrowed at the cordate to subcordate base, slightly decurrent, costa absent or short and double, apices gradually long acuminate, channelled, margins plane, entire throughout or serrulate near apex and base; median cells of leaves linear-flexuose,  $35-75\mu$  long,  $5-7\mu$  wide, basal cells shorter, broader, thick-walled, pitted, often colored, a few alar cells subquadrate.

Dioicous; calyptra narrowly cucullate, glabrous, fugacious; seta reddish brown below, about 2.5 cm. long; capsule light brown to dark brown, inclined to horizontal; operculum conic, apiculate; urn oblong, curved, plicate, slightly contracted beneath mouth when dry and empty; annulus of 3 rows of cells, deciduous; peristome hypnaceous, perfect, teeth 16, apices hyaline, papillose, basal membrane about  $1/3$  height of teeth, cilia 2-3, hyaline, papillose; spores yellowish, finely roughened,  $19-23\mu$  in diameter, mature in early spring.

Comments:

Hypnum curvifolium Hedw. has broadly acuminate leaves that

are abruptly narrowed to a shortly decurrent base. The curved and strongly inclined capsules are plicate when dry and empty. This species is more commonly found on soil but may occur on fallen logs not yet decorticated and at the base of trees in moist or wet, shaded places.

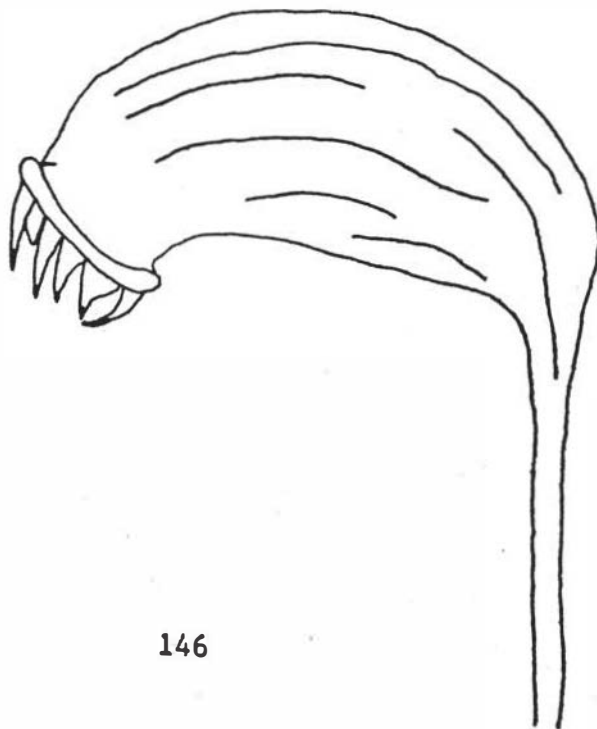
Hypnum curvifolium Hedw.

75. Leaf, 10 X

76. Capsule, 4 X



75



146

76

FAMILY: HYPNACEAE

Homomallium adnatum (Hedw.) Broth.

Plants slender, in thin closely adherent mats, dark to light green, sometimes yellowish green; stems prostrate, irregularly divided; branches erect, short, about 2.5 mm. in length; central strand present; leaves close, erect-spreading when moist, loosely appresses when dry, ovate to oblong-ovate, concave, 0.6-1.2 mm. long, up to about 0.4 mm. wide, narrowed at base, costa often absent, occasionally single, usually short and double, apices abruptly and broadly short acuminate, margins entire, frequently slightly recurved below; median cells of leaves linear-hexagonal to subrhomboidal, prosenchymatous, about  $6.5\mu$  long,  $4.3\mu$  wide, and 4-8:1, apical cells shorter, nearly rhomboidal, alar cells small, very numerous, quadrate, often slightly elongated transversely, extending along the leaf margin  $1/4$ - $1/3$  length of leaf.

Autoicous; calyptra narrowly cucullate, glabrous, fugacious, as long as capsule brown to reddish brown or yellowish, curved, inclined, 1.5-2 mm. long; operculum lighter in color, acutely conic to long conic, obliquely apiculate; urn oblong to oblong-cylindric, contracted beneath mouth when dry and empty; annulus broad; peristome perfect, teeth 16, with prominent, numerous trabeculae, cross-striate on dorsal surface, apices hyaline, papillose, margins hyaline, segments of inner peristome approximate length of teeth, entire to very slightly carinately split, basal membrane approximately  $2/5$  height of teeth, cilia 1-2, hyaline,

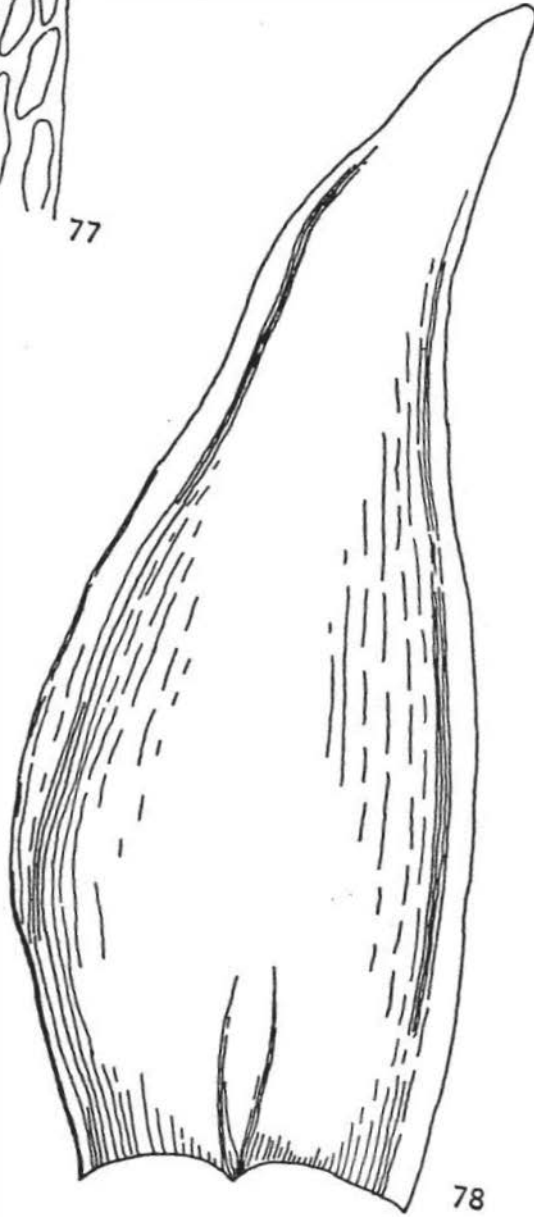
nodose, subpapillose, about as long as segments; spores light chestnut brown, papillose, 9-12 $\mu$  in diameter, mature in summer.

Comments:

Homomallium adnatum (Hedw.) Broth. occurs more commonly on limestone and is sometimes found on the bases of hardwood trees. It is rather similar to Platygyrium repens in appearance but differs most noticeably in having leaves with erect, rather reflexed margins.

Homomallium adnatum (Hedw.) Broth.

- 77. Leaf cells at apex, 200 X
- 78. Leaf, 100 X
- 79. Branch, 10 X





FAMILY: HYPNACEAE

Hypnum imponens Hedw.

Plants robust, somewhat flattened, in broad mats or sheets, dark green to yellow-green above, brownish below; stems prostrate to suberect, red to reddish brown, stiff, 10 cm. or more long, rather regularly pinnately divided, outer cells in cross section small and thick-walled; central strand present; paraphyllia numerous for the genus, broad, often ciliate; leaves of stems strongly falcate-secund to circinate, broadly triangular-oblong, gradually narrowed to apex, concave, about 2 mm. long, 0.5-0.7 mm. wide, not decurrent to slightly so, narrowed and slightly rounded to insertion, costa none or very short and double, apices curving toward substratum, slenderly long, acuminate, margins plane or slightly recurved at base, serrulate; median cells of leaves linear-flexuose, about  $6\mu$  wide, 6-15:1, basal cells wider, thick-walled, colored, often orange-brown, alar cells small, subquadrate to quadrate, 4-6 along margin, at extreme angles 3-4 marginal cells larger, slightly inflated, usually orange-brown, thick-walled, auricles small, distinct.

Dioicous; calyptra narrowly cucullate, glabrous, fugacious; seta chestnut-brown, 1.5-3.5 cm. long; capsule suberect, chestnut-brown with age, 3-4 mm. long, 4-6:1; operculum conic, long apiculate to rostellate, beak often oblique; urn cylindric, about 2.4 mm. long and 1 mm. in diameter, slightly curved; annulus of 2-3 rows of cells; peristome hypna-

ceous, perfect, teeth 16, golden yellow, about 0.54 mm. long, the tips papillose, inner peristome yellowish, finely papillose, basal membrane about 0.18 mm. high, segments carinately split, cilia 1-2; spores' yellowish, minutely roughened, 13-18 $\mu$  in diameter, mature in late autumn to early winter.

Comments:

Hypnum imponens Hedw. is typically found on well-rotted logs and stumps but may occasionally be present on the bark of living trees. This species has red-brown stems and, for the genus, relative numerous, often branched paraphyllia. The rather thick-walled, orange-brown, quadrate alar cells are distinctive, as are the suberect capsules.

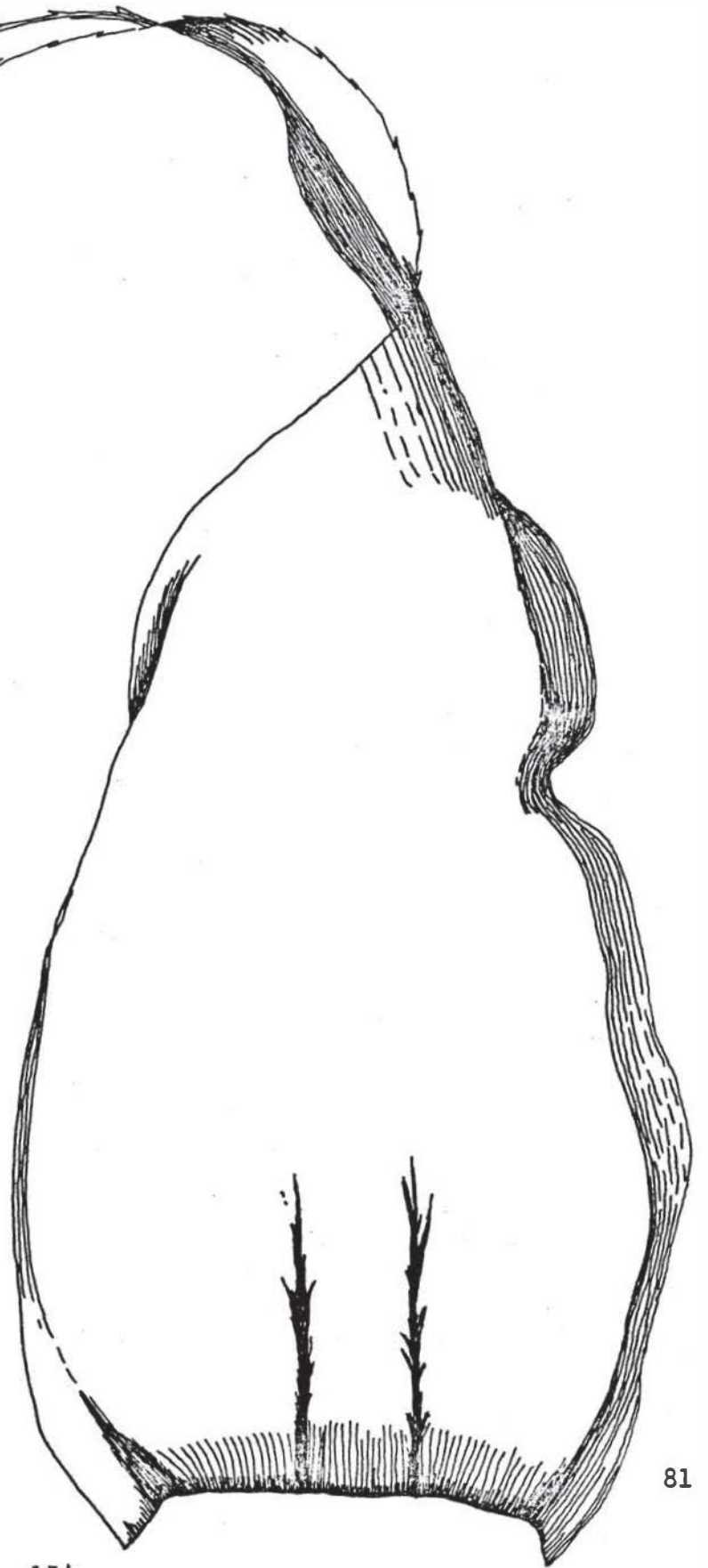
Hypnum imponens Hedw.

80. Habit, 1 X

81. Leaf, 10 X



80



81

FAMILY: HYPNACEAE

Hypnum reptile Mx.

Plants small, slender, in mats, dark green or yellowish green, glossy; stems prostrate, 2-5 cm. long, more or less regularly pinnately divided or nearly so, outer cells in cross section small and thick-walled; central strand present; paraphyllia few, lanceolate, moderately large; leaves of stems close, strongly falcate-secund, slenderly long acuminate from an ovate base, curved toward substratum, concave, not plicate, about 1 mm. long, 0.4-0.5 mm. wide, slightly narrowed to insertion, briefly decurrent, costa absent, or short and double, occasionally one branch longer and extending nearly to middle of blade, margins frequently slightly revolute, sometimes plane, strongly serrate above, serrulate to entire below; median cells of leaves linear-rhomboidal to linear-flexuose, 6-7 $\mu$  wide, 6-12:1, basal cells shorter, broader, and slightly colored, alar cells numerous, quadrate, none inflated, subopaque, thick-walled, 10-20 marginal, not forming auricles.

Monoicous; calyptra narrowly cucullate, glabrous, fugacious; seta chestnut-brown, 1-1.5 cm. long; capsule yellowish, inclined, 2.5-3 mm. long; operculum conic, about 0.9 mm. long, obliquely and briefly rostrate; urn subcylindric, about 2.7 mm. long and 0.7 mm. in diameter, curved, slightly wrinkled when dry and empty and contracted below mouth, especially on lower side of mouth so that the direction of operculum is almost perpendicular to the direction of base of urn; annulus large,

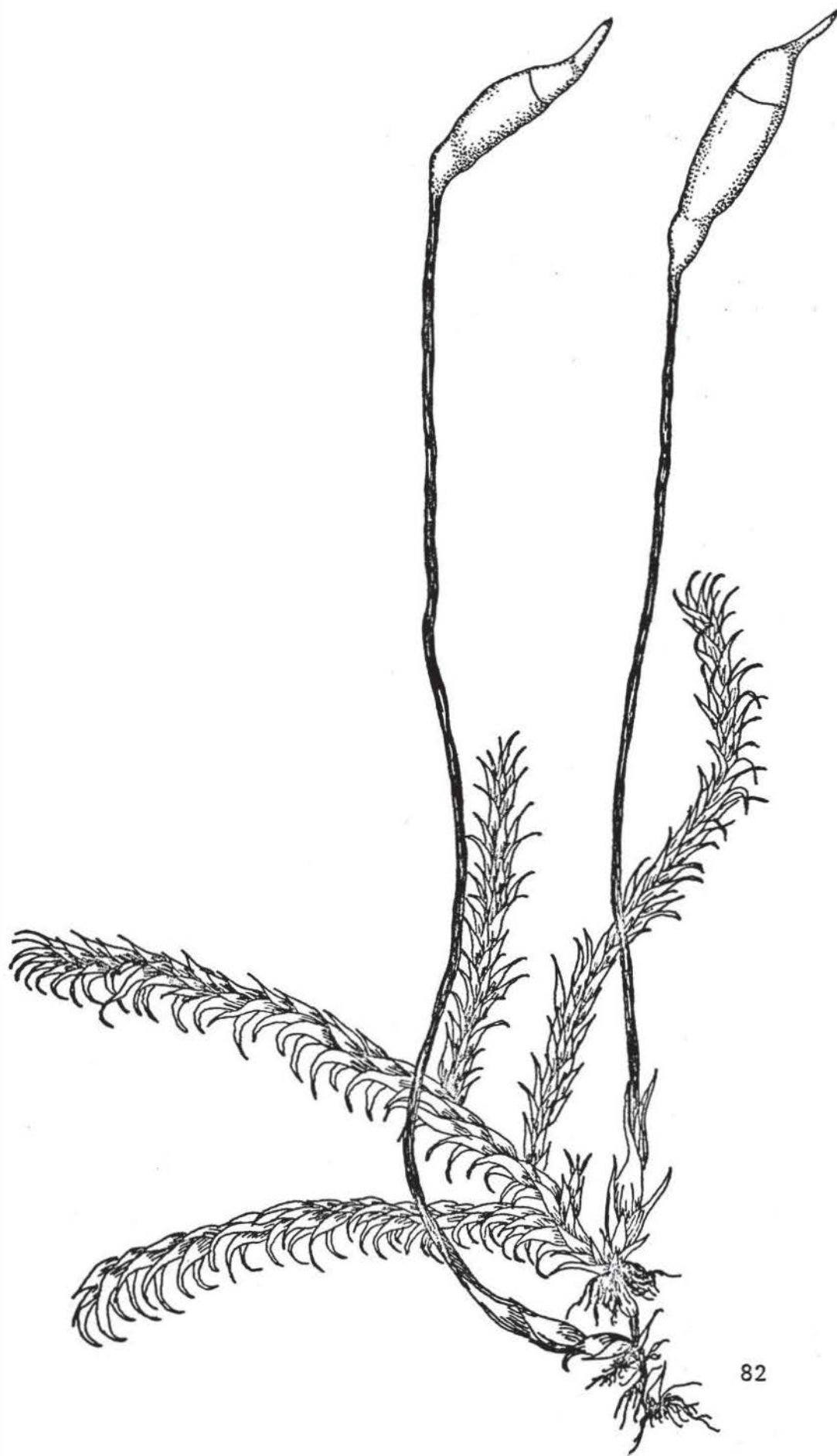
of 2-3 rows of cells, deciduous; peristome hypnaceous, perfect, teeth orange-yellow, 16, subulate, about 0.6 mm. long, dorsally cross striate at base, hyaline and papillose above, segments approximate length of teeth, carinately split, basal membrane 1/3 height of teeth, cilia 2-3, usually 2, slightly shorter than segments, nodose; spores yellowish-brown, papillose, 14-17 $\mu$  in diameter, mature in midsummer.

Comments:

Hypnum reptile Mx. forms dense mats on fallen logs not yet decorticated and well-rotted logs or stumps. H. pallescens is similar but has leaves that are more slender and farther apart.

Hypnum reptile Mx.

82. Habit, 3 X



82



FAMILY: HYPNACEAE

Plagiothecium denticulatum (Hedw.) BSG

Plants moderately robust, in flattened mats, green to pale green, glossy, varying in robustness; stems prostrate, irregularly divided, branches prostrate to ascending; median leaves of well developed branches complanate, slightly spreading, scarcely shrinking in drying, overlapping wet or dry, oblong-ovate, broadest slightly above base, slightly concave and unsymmetric, 1.5-3 mm. long, bases slightly narrowed to insertion, strongly decurrent, costa none to short and double, occasionally forking with one branch reaching 1/2 length of leaf, apices acute to short acuminate, margins plane or sometimes narrowly recurved below, entire except a few occasional short teeth near apex; median cells linear to linear-rhomboidal, 10-15 $\mu$  wide, usually chlorophyllose, basal cells broader and shorter, subrectangular, pellucid, alar cells subrectangular, slightly inflated, hyaline and strongly decurrent, not forming distinct auricles.

Monoicous; calyptra small, split on one side, whitish to straw-colored, smooth fugacious; seta 2.5-4 cm. long; capsule suberect to horizontal, 2-3 mm. long, usually smooth when dry; operculum long conic to short rostrate, about 1/3 as long as urn; the urn cylindric, 1.5-2 mm. long, about 0.75 mm. in diameter, somewhat unsymmetric or curved, with a distinct neck, contracted below mouth when dry and empty; annulus large, deciduous, of 2-3 rows of cells; peristome perfect, of 16 teeth,

about 0.6 mm. long, hyaline and papillose above, yellowish below, lance-subulate, segments slender, sometimes carnately split, as long as teeth, basal membrane  $1/3-1/2$  as high as peristome, cilia 2-3, nodost'; spores yellowish or green, smooth,  $8-13\mu$  in diameter, mature in summer.

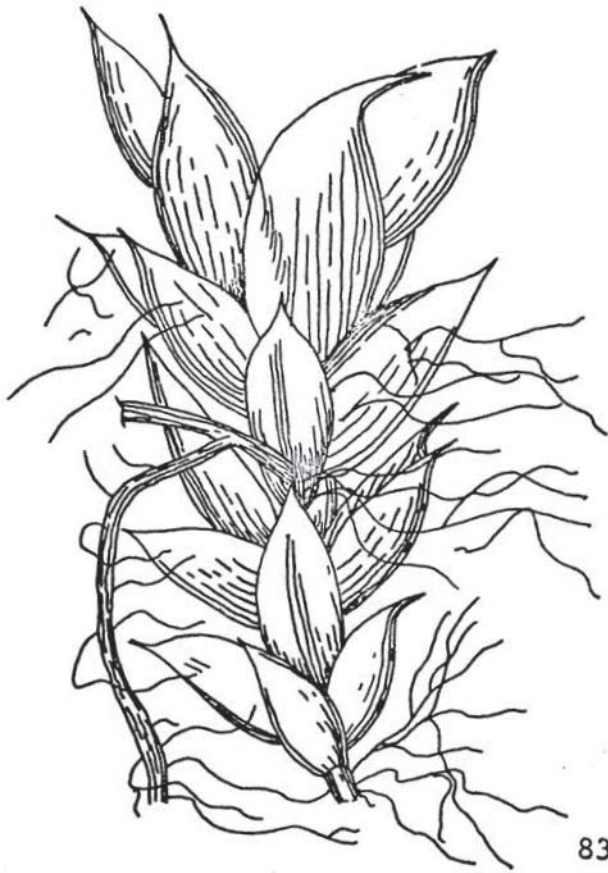
Comments:

Plagiothecium denticulatum (Hedw.) BSG occurs in wet woods, on well-rotted logs or stumps and at the bases of living trees. This species has shiny, crowded, complanate leaves with a few small and irregular teeth at the very tips. The leaf margins are usually distinctly recurved.

Plagiothecium denticulatum (Hedw.) BSG

83. Developing rhizoids of new plant, 10 X

84. Habit, 2 X



83



84

FAMILY: HYPNACEAE

Platygyrium repens (Brid.) BSG

Plants in rather thin mats, glossy, dark green; stems prostrate, 2-6 cm. long, irregularly divided, branches short, cylindric, ascending, slightly curved; leaves imbricate when dry, erect spreading when moist, oblong-ovate, concave, decurrent, costa short, apices acuminate, margins recurved below, entire; linear-rhomboidal, alar cells numerous, quadrate, extending up margin of leaf.

Dioicous, calyptra cucullate, long, glabrous, seta erect, chestnut brown, glossy, smooth, 1-2 cm. long, capsule erect, brown, operculum long conic, obliquely rostrate; urn chestnut brown, erect, peristome teeth 16, linear-lanceolate, with hyaline margins, raised lines at base, nearly as long as teeth, carinately split, spores minutely roughened, 12-18 $\mu$  in diameter, mature in early autumn.

Comments:

Platygyrium repens (Brid.) BSG is common on trunks of trees, especially in open places in woods or in brushy ectones, as blackish-green mats with a curious oily sheen. The axillary clusters of broad-branchlets (actually little buds) are invariably present and provide the easiest means of recognition.

Platygyrium repens (Brid.) BSG

85. Branch with gemniferous shoots, 25 X



85



FAMILY: LESKEACEAE

Anomodon attenuatus (Hedw.) Hueben.

Plants slender, in loose, wide tufts, primary stems prostrate, secondary stems abundantly branching, many branches slender, no central strand, leaves of stems appressed when dry, spreading when moist, broadly ovate at base, gradually narrowed to upper sublinguate portion, concave, 0.8-1.8 mm. long, bases narrowed to insertion, costa strong, pellucid, ending near apex, apices subacute, margins entire below, slightly serrulate near apiculus; median cells of leaves obscure, densely papillose on both sides, irregularly hexagonal to rounded quadrate, 6-9 $\mu$  in diameter.

Dioicous; calyptra cucullate; seta 1.5-2 cm. long; capsule erect; operculum long rostrate, 1/2 length of urn; urn 2-3 mm. long, 0.6 mm. in diameter, with stomata; annulus lacking peristome double, teeth 16, yellow, narrowly lanceolate, 0.4 mm. long segments of inner peristome yellowish, filiform, spores greenish brown, almost smooth, 7-9 $\mu$  in diameter, mature in autumn.

Comments:

Anomodon attenuatus (Hedw.) Hueben. is our most common member of the genus, best recognized by drooping, tapered branching and broadly short-pointed leaves. This species is most commonly found at the bases of living trees, such as Quercus rubra and Quercus alba.



Anomodon attenuatus (Hedw.) Hueben.

86. Habit, 4 X



FAMILY: LESKEACEAE

Anomodon minor (Hedw.) F  rn  r.

Plants in loose mats, green above, brownish below; primary stems prostrate, flagellate, secondary stems erect or nearly so, up to 4 cm. long, central strand present; leaves of secondary stems 2-ranked, appressed when dry, spreading when moist, broadly lingulate from a broadly ovate base, opaque, concave at base, costa strong, pellucid, ending below apex, apices rounded, margins entire; majority of cells of leaves densely papillose on both surfaces, papillae small, median cells rounded, basal median cells elongate, usually not papillose.

Dioicous; calyptra cucullate, extending to middle of urn or farther; seta erect, about 1 cm. long; capsule erect, symmetric, 2-3 mm. long; operculum conic, acuminate; the urn chestnut-brown in color, oblong-cylindric, about 2.4 mm. long, without stomata, mouth small; annulus of 2 rows of cells; peristome teeth 16, narrowly linear-lanceolate, about 0.32 mm. long, hyaline, faintly papillose, segments of inner peristome very short to rudimentary to none, from a very narrow basal membrane, cilia none; spores brownish, papillose, 9-18  $\mu$  in diameter, mature in late autumn or winter.

Comments:

Anomodon minor (Hedw.) F  rn  r. is most likely to be confused with A. rugelii, this species is distinguished from it (and all the other species) by broadly lingulate, rounded-obtuse leaf points

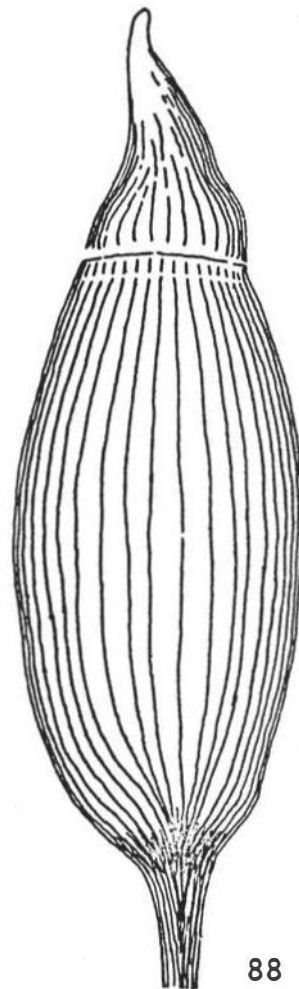
which are erect and scarcely incurved or contorted when dry.

As Grout states (1956), "Any Anomodon with any of the leaves acute, apiculate, or serrulate at the apex is pretty surely not this species."

Anomodon minor (Hedw.) Fűrnr.

87. Branch showing leaf arrangement, 10 X

88. Capsule, 10 X



FAMILY: LESKEACEAE

Anomodon rostratus (Hedw.) Schimp.

Plants slender, dense mats, yellowish green, primary stems slender, up to 4 mm. long, slender, julaceous; central strand small; leaves dense, imbricate, lanceolate from an ovate base, concave, 0.75-0.9 mm. long, distinct costa extending almost to apex, apices acuminate, hyaline, smooth, margins frequently recurved, crenulate-papillose; median cells of leaves rounded, opaque, papillose with several papillae on each surface, 8-10  $\mu$  wide, median basal cells elongated, smooth, slightly papillose.

Dioicous; calyptra cucullate; seta erect, 6-10 mm. long, castaneous; capsule erect, symmetrical, chestnut-brown; operculum obliquely rostrate; annulus present, peristome teeth 16, linear-lanceolate, about 0.22 mm. long, papillose, segments of inner peristome linear, about as long as teeth, spores brownish, nearly smooth, 7-10  $\mu$  in diameter, mature in autumn.

Comments:

Anomodon rostratus (Hedw.) Schimp. probably prefers calcareous habitats but is quite common on the bases of living trees, in rather moist shady places. This species is clearly distinguished from our other species by crowded, terete branches and ovate-acuminate leaves with hyaline hair-points.

Anomodon rostratus (Hedw.) Schimp.

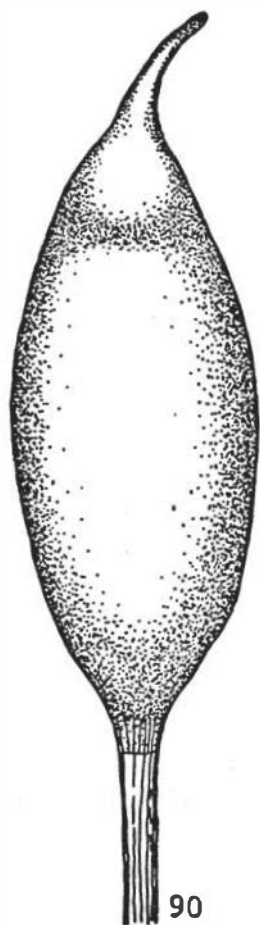
89. Habit, 2 X

90. Capsule, 10 X





89



175

90

FAMILY: LESKEACEAE

Leskea gracilescens Hedw.

Plants in thin mats, dark green, brown below, stems prostrate, up to 4 cm. long, pinnately divided, branches numerous, simple, erect, no central strand present, paraphyllia few, leaves of stem appressed-imbricate when dry, erect-spreading when moist, ovate, straight, symmetric, costa subpercurrent, spines acute, margins entire, cells of leaves unipapillate on lower surface, usually smooth on upper, median cells quadrate-hexagonal, 8-10 $\mu$  wide, alar and basal cells quadrate.

Autoicous; calyptra cucullate; seta red, 8-10 mm. long, capsule erect, reddish, operculum conic, obtuse, urn oblong-cylindric, tapering at base, annulus of 2 rows of cells, deciduous; peristome double, teeth 16, whitish, linear-lanceolate, about 0.4 mm. long, spores smooth, 8-11 $\mu$  in diameter, mature in early summer.

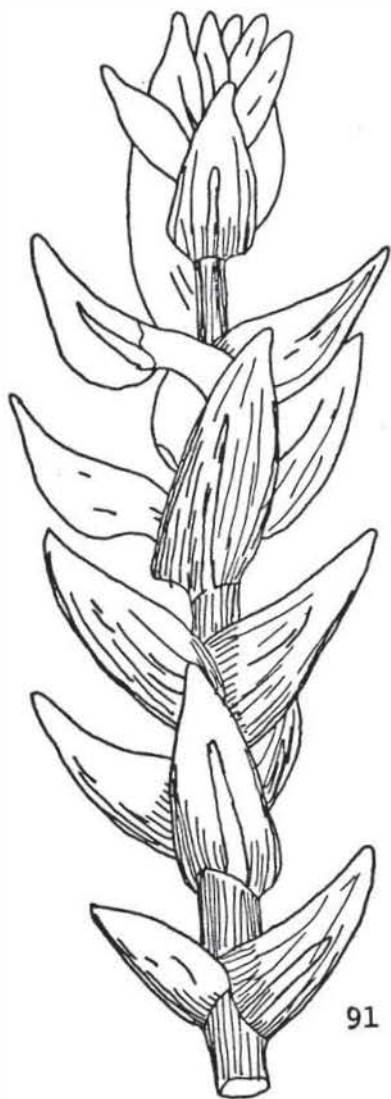
Comments:

Leskea gracilescens Hedw. is the most common member of this genus and is most frequently found on living trees. The species of Leskea are not well marked, and their names have been much misused. If, as Best and Grout advise, intermediates are to be called L. gracilescens, that name will conveniently cover a multitude of forms.

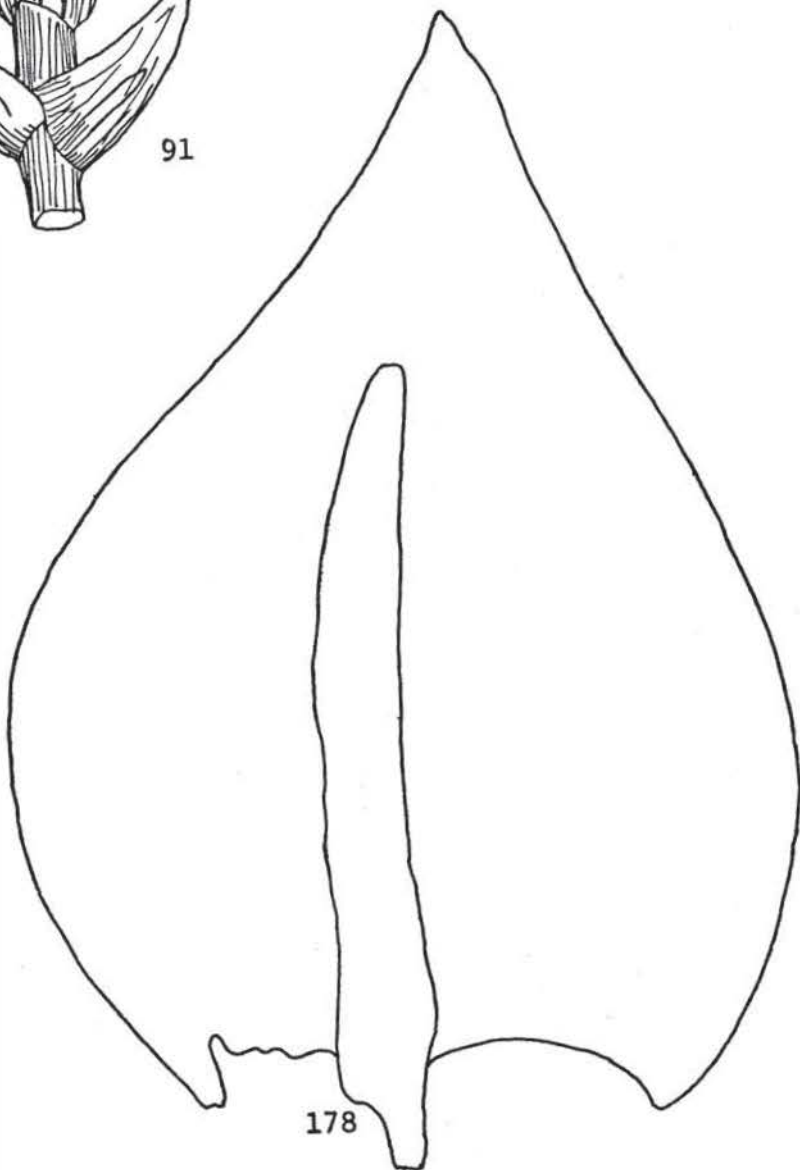
Leskea gracilescens Hedw.

91. Branch, 10 X

92. Leaf, 200 X



91



92

178

FAMILY: LESKEACEAE

Leskea obscura Hedw.

Plants small, in loose spreading tufts, olive green above, reddish below; stems prostrate, irregularly and sparingly divided, up to 5 cm. long; paraphyllia few to none; leaves of stems incurved, appresses when dry, spreading when moist, concave, ovate-oblong, 0.8-1.3 mm. long, 0.4-0.7 mm. wide, straight or slightly curved, asymmetric, scarcely plicate, costa ending a little below apex, apices subacute; margins plane, entire or serrulate; cells of leaves pluri-papillate on lower surface with small papillae, papillose to nearly smooth on the upper, the median cells quadrate-hexagonal, 8-10 $\mu$  wide.

Autoicous; calyptra cucullate; seta reddish, 1-2 cm. long; capsule erect, straight; operculum short conic, subobtuse, obtuse, or spiculate; urn yellowish, oblong-cylindric, slightly contracted below mouth when dry and empty, 1.75-2.25 mm. long, about 0.8 mm. wide; annulus of 2 rows of cells; peristome double, teeth 16, from yellowish basal membrane about 1/5 length of teeth, cilia none; spores smooth, 11-14 $\mu$  in diameter, mature in early spring.

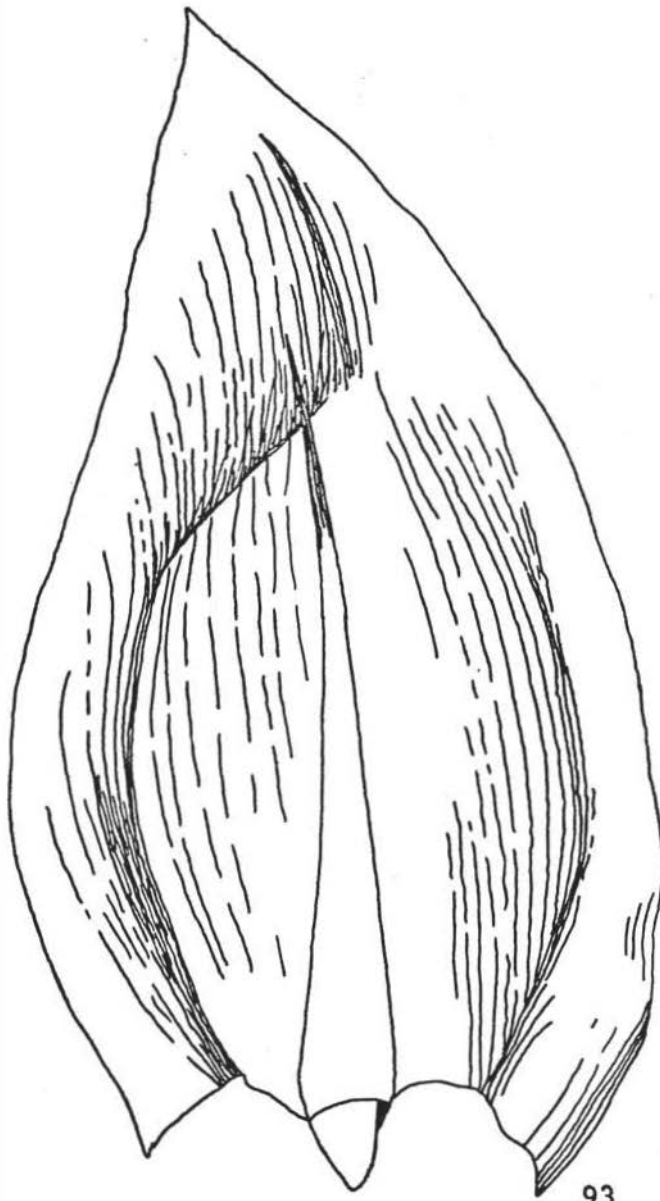
Comments:

Leskea obscura Hedw. in comparison to Leskea gracilescens has leaves somewhat longer than wide and somewhat oblique and subsecund at the tips, and the capsules are subcylindric and curved.

Leskea obscura Hedw.

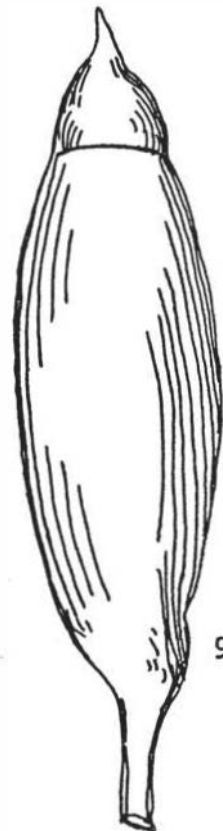
93. Leaf, 100 X

94. Capsule, 10 X



93

181



94

FAMILY: LESKEACEAE

Leskea polycarpa Hedw.

Plants in thin mats, various shades of green above, brownish to blackish below; stems prostrate, up to 4 cm. long, pinnately divided; branches numerous, simple erect, often subjulaceous; central strand rudimentary to none; paraphyllia few, lanceolate, occasionally none; leaves of stems appressed-imbricate when dry, erect-spreading when moist, ovate, oblique and subsecund at the tip, symmetric, lightly 2-plicate, 0.65-0.9 mm. long, 0.4-0.5 mm. wide, costa subpercurrent, apices gradually acute to obtuse, occasionally subacuminate, margins entire, sometimes plane, often revolute; cells of leaves unipapillate on lower surface, usually smooth on upper, median cells quadrate-hexagonal, 8-10 $\mu$  wide, alar and basal cells quadrate.

Autoicous; calyptra cucullate; seta red, 8-10 mm. long; capsule erect, reddish when empty; operculum conic, obtuse to acute; urn oblong-cylindric, tapering at base; annulus of 2 rows of cells, deciduous; peristome double, teeth 16, whitish, linear-lanceolate, about 0.4 mm. long, segments of inner peristome linear, carinate, usually shorter than teeth, basal membrane 1/4 length of teeth, cilia lacking; spores smooth, 8-11 $\mu$  in diameter, mature in early summer.

Comments:

Leskea polycarpa Hedw. differs from L. gracilescens in having broad, concave, non-plicate leaves, rounded or rounded-obtuse at

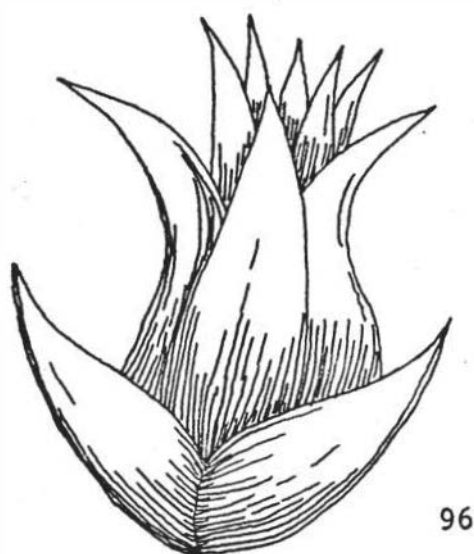
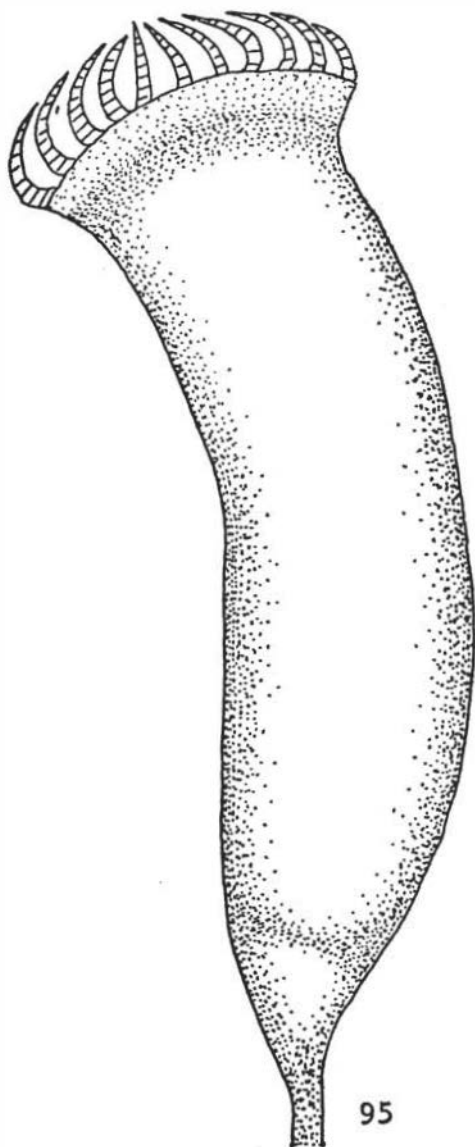


the apex, and erect at the margins.

Leskea polycarpa Hedw.

95. Capsule with peristome, 15 X

96. Gemmae, 10 X



FAMILY: LESKEACEAE

Lindbergia brachyptera (Mitt.) Kindb. var. austini (Sull.) Grout

Plants medium in size, in mats, green to yellowish green above, brownish green below; stems prostrate, up to 3 cm. long, irregularly pinnately divided into unequal branches; central strand present; paraphyllia few to none; gemmae in form of very short branchlets with minute papillose leaves frequently present; leaves of stems close, imbricate when dry, spreading to subquarrose or squarrose when moist, ovate to ovate-lanceolate, subconcave to concave, 0.7-1.2 mm. long, 0.35-0.5 mm. wide, not decurrent to slightly so, costate beyond middle of blade, apices long and narrowly acuminate, the tip of the apical portion often colorless, margins plane, usually entire, occasionally indistinctly serrulate above; cells of leaves unipapillate on both surfaces except the elongated smooth apical cells, median cells of leaves rounded oval to elliptic-rhomboid, basal marginal cells rounded quadrate to transversely broader.

Autoicous; calyptra cucullate; seta erect, 8-20 mm. long; capsule erect; operculum short conical, obtuse; urn oval-cylindric with small mouth, about 1.5 mm. long; annulus lacking; peristome double, teeth 16, deeply inserted, broadly lanceolate, comparatively short, obtuse, papillose, inner peristome consisting of a low, basal undivided membrane, scarcely extending above the rim of the urn; spores minutely roughened, 19-30  $\mu$  in diameter, mature in late winter or early summer.

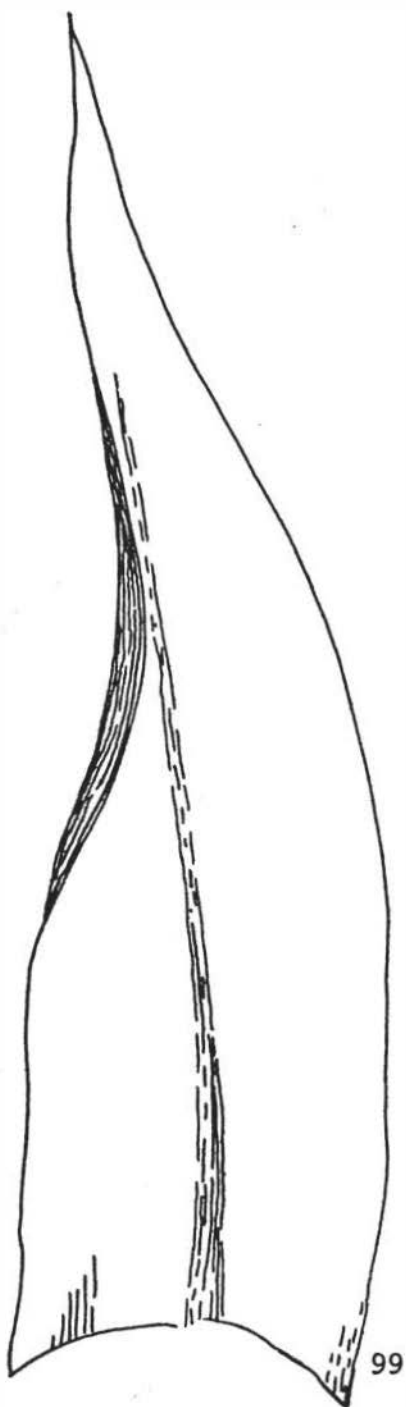
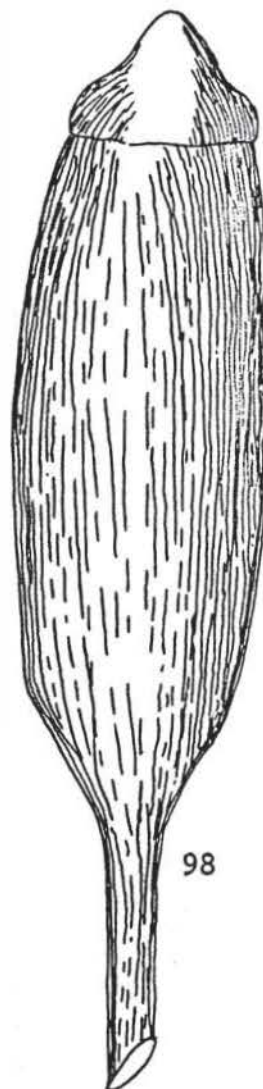
Comments:

Lindbergia brachyptera (Mitt.) Kindb. var. austinii (Sull.)

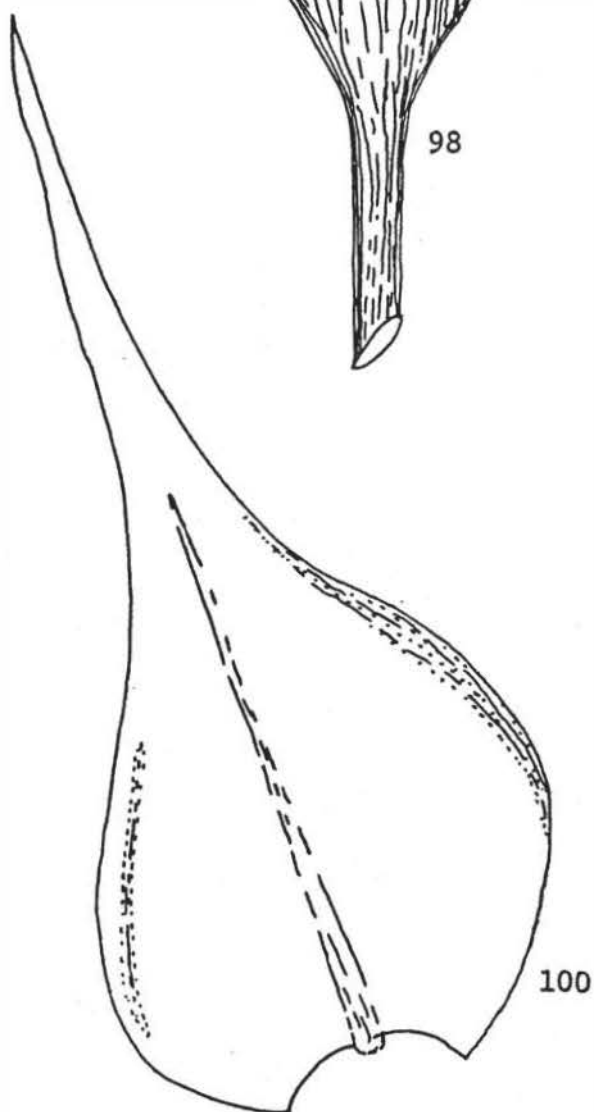
Grout is most generally found on the roadside trees Ulmus and Acer, but is sometimes found on well-rotted logs and stumps. The plants generally occur as scattered strands. The dark-green leaves, squarrose when moist and tipped with short hair-points are distinctive, as are the dense clusters of short, axillary branchlets.

Lindbergia brachyptera (Mitt.) Kindb. var. austini  
(Sull.) Grout

- 97. Habit, 2 X
- 98. Capsule, 10 X
- 99. Leaf, 100 X
- 100. Leaf, 100 X



189



FAMILY: LESKEACEAE

Thuidium delicatulum (Hedw.) BSG

Large plants, in interwoven mats, bright green or yellowish above, fern-like in appearance; stems prostrate or arched, elongate, up to 12 cm. in length, regularly twice to thrice pinnately divided; paraphyllia very numerous, simple to branched, linear to multiform, apical cells with 2-4 papillae, majority of lateral papillae at center of cells or approximately so; leaves of stems appressed when dry, erect-spreading when moist, furrowed, triangular-ovate, 0.8-1 mm. long, 0.75-0.9 mm. wide, subcordate at base, costa strong at base, gradually thinner toward tip of leaf, disappearing in apex of leaf, apices gradually acuminate, margins recurved, papillate-serrate; median cells of leaves oblong-quadrate,  $7-8\mu$  wide, 1-3:1, usually unipapillate on both surfaces, the papillae up to  $6.8\mu$  long; leaves of branches smaller, ovate, about 0.6 mm. long and 0.3 mm. wide, acuminate, apical cells with 2-4 papillae.

Dioicous; in perichaetial leaves ciliate; calyptra cucullate; operculum conic-rostrate, 1.5-2 mm. long; urn curved, cylindric, 2-5-4 mm. long; annulus of 2-3 rows of cells; peristome large, teeth 16, up to 0.9 mm. long, segments of inner peristome lanceolate, about as long as teeth, basal membrane about 1/3 height of peristome; spores brownish yellow, very slightly roughened,  $14-18\mu$  in diameter, mature in late autumn or winter.

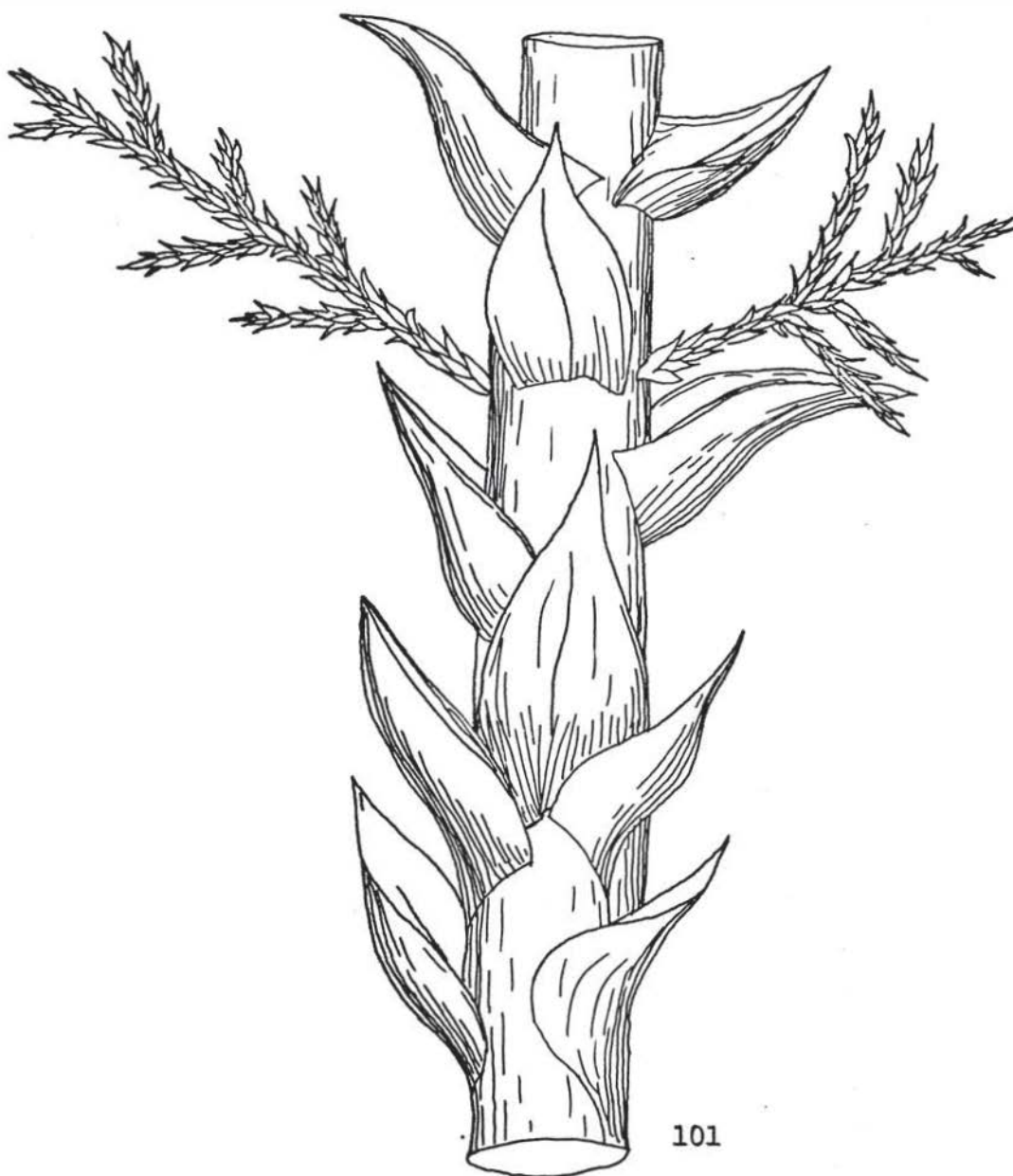
Comments:



Thuidium delicatulum (Hedw.) BSG occurs on well-decayed wood and is often found on exposed roots or bases of trees in moist or wet places. Frequently called the common fern moss, this species is often confused with T. recognitum which has plicate leaves.

Thuidium delicatulum (Hedw.) BSG

101. Stem and branches, 25 X



FAMILY: LESKEACEAE

Thuidium recognitum (Hedw.) Lindb.

Plants large, in interwoven mats, yellowish green above, darker green below, stiff when dry, fern-like in appearance; stems prostrate or arched, elongate, up to 12 cm. in length, pinnately to bipinnately divided; primary branches approximately equal in length; central strand present; paraphyllia numerous, simple or branched, linear to multiform, apical cells with 2-4 papillae, majority of lateral papillae at ends of cells; leaves of stems broadly triangular, 0.6-1.5 mm. long, up to 1 mm. wide, cordate at base, costa subpercurrent to percurrent, strong throughout the blade, often filling the apex, apices abruptly acuminate, margins serrulate, usually plane; median cells of leaves oblong-rhombic to rounded quadrate, about  $9\mu$  wide, usually unipapillate on both surfaces; branch leaves ovate to ovate-lanceolate, up to 0.4 mm. long and 0.3 mm. wide, apical cells with 2-4 papillae.

Dioicous; inner perichaetial leaves not ciliate; calyptra cucullate; seta chestnut brown, 2-2.5 cm. long; capsule chestnut brown, somewhat inclined, up to 4 mm. long; operculum short rostrate, about 1.2 mm. in length; urn curved, oblong-cylindric, 2.5-3 mm. long; 0.6-0.7 mm. wide; annulus of 3 rows of cells; peristome large, teeth 16, up to 0.9 mm. in length, segments of inner peristome pale, lanceolate, approximately length of teeth, basal membrane about  $1/3$  height of peristome, cilia 2-3 nodose, finally papillose; spores yellowish, granular-roughened,  $10-14\mu$

in diameter, mature in summer.

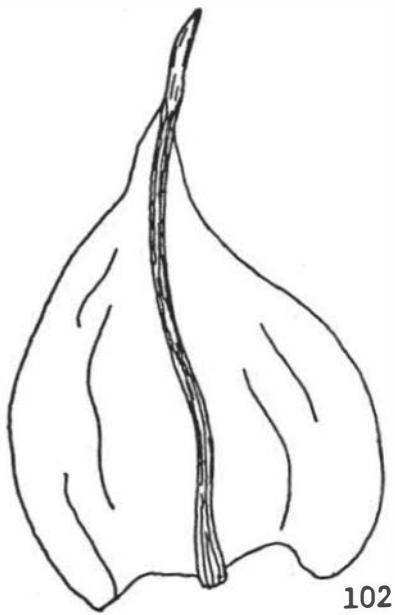
Comments:

Thuidium recognitum (Hedw.) Lindb. has stem leaves which are shortly, broadly, and abruptly acuminate. They are plicate as opposed to T. delicatulum and T. virginianum which are not. All three species of Thuidium are found on well decayed logs and stumps in moist shaded places.

Thuidium recognitum

102. Stem leaf, 25 X

103. Perichaetial leaf, 30 X



102



103

FAMILY: LESKEACEAE

Thuidium virginianum (Brid.) Lindb.

Plants small to medium in size, in mats, dark green; stems prostrate, 2-4 cm. long, irregularly pinnately divided; branches short, erect to ascending; central strand present; paraphyllia simple or branched, linear to multiform, apical cells with a single terminal papilla; leaves of stems appressed when dry, loose when moist, rounded ovate, 0.6-0.8 mm. long, 0.33-0.45 mm. wide, concave, slightly furrowed, bases rounded and narrowed, costa disappearing in apex, apices abruptly short acuminate, margins plane throughout or recurved below, serrate above, erose-dentate below; median cells of leaves oblong-quadrate to hexagonal, about  $9\mu$  wide, with a single stout broad papilla, occasionally 2-forked; leaves of branches close, oval-lanceolate, 0.4-0.6 mm. long, about 0.27 mm. wide, apices acute to broadly and briefly acuminate, less abruptly narrowed than in stem leaves, margins serrulate above, apical cells with a single terminal papilla.

Autoicous; perichaetial leaves with margins denticulate-serrate; calyptra cucullate; seta dark chestnut-brown, curved above, 2-2.5 cm. long; capsule chestnut-brown, inclined to horizontal; operculum short rostrate, obtuse, about  $1/3$  length of urn; the urn oblong-cylindric, curved, 1.8-2.5 mm. long, 0.6-0.75 mm. in diameter, about 2.5:1, contracted below mouth when dry and empty; annulus of 3 rows of cells; peristome hypnaceous, perfect, yellowish, teeth 16, lance-linear, about



0.6 mm. long, whitish and faintly papillose above, inner peristome yellowish, smooth, segments lanceolate carinate, about as long as teeth, basal membrane about 2/5 height of teeth, cilia 2-3, occasionally 1, nodose, often briefly appendiculate; spores yellowish to olive-green, faintly papillose to smooth, 8-14 $\mu$  in diameter, mature in spring.

Comments:

Thuidium virginianum (Brid.) Lindb. occurs in close mats on logs not yet decorticated and the bases of living trees. This species differs from T. recognitum and T. delicatulum in that the apical cell of the branch leaves have only one terminal papilla.

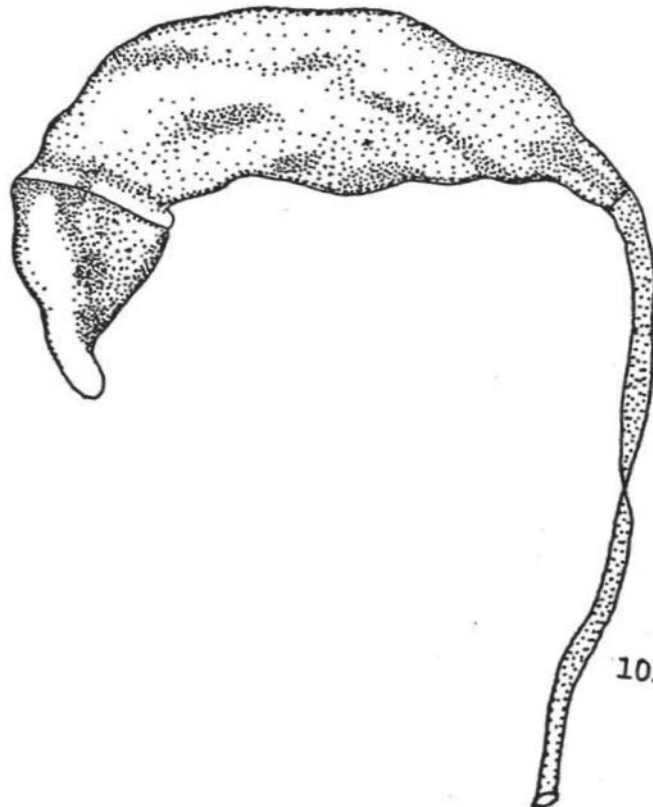
Thuidium virginianum (Brid.) Lindb.

104. Branch, 15 X

105. Capsule, 10 X



104



105

FAMILY: LESKEACEAE

Thelia asperella Sull.

Plants small, in densely interwoven mats, glaucous-green or grayish green; stems prostrate, 5 cm. or more in length, irregularly pinnately divided; branches numerous, close, short, julaceous; paraphyllia various; leaves of stems broadly ovate to subcircular, very concave, decurrent, costa extending to middle of leaf, apices abruptly and narrowly acuminate, margins bordered throughout with long cilia; cells of leaves usually papillose, median cells pelucid, rhomboid-elliptic, each with a long, 2-3 pointed papilla on lower surface, the apical linear, the alar quadrate to rectangular, almost smooth.

Dioicous; calyptra cucullate; seta red, 5-10 mm. long; capsule erect, symmetric; operculum conic-rostrate; urn oblong-cylindric, 2-2.5 mm. long, annulus absent; peristome whitish, teeth 16, very slender, finely papillose, linear-lanceolate, inner peristome papillose, consisting of basal membrane about 1/3 height of teeth, segments and cilia lacking; spores pale yellow, smooth, 12-15 $\mu$  in diameter, mature in autumn.

Comments:

Thelia asperella Sull. nearly always grows on bark at the base of living trees. It has creeping radiculose, pinnately branched stems and the dwarf males are not only very small but also few and hard to find.

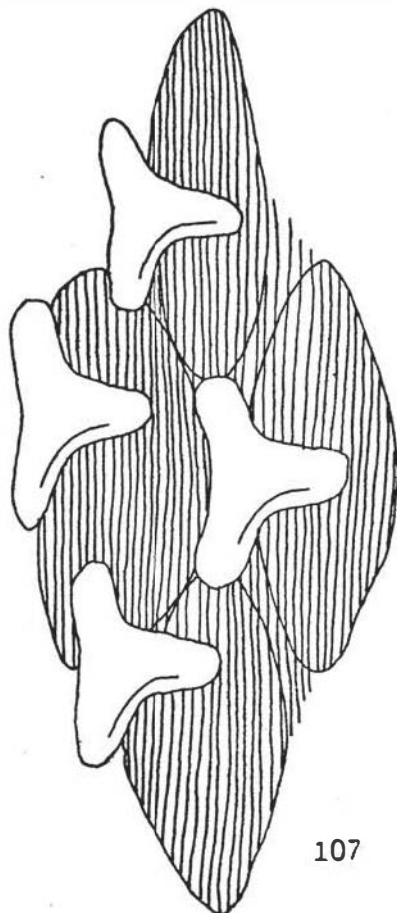
Thelia asperella Sull.

106. Branch showing leaf arrangement

107. Cells with papillae, 420 X



106



204

107

FAMILY: FABRONIACEAE

Fabronia ravenelii Sull.

Plants small, in thinly cespitose mats or patches; branch leaves symmetrically erect-spreading when moist, ovate-lanceolate, coarsely and irregularly serrate-dentate by single marginal cells of varying length, 0.6-1 mm. long, costa about 1/2 length of leaf, rather thin in vanishing in elongated cells; leaf cells linear rhombic to oblong-hexagonal, 8-10 $\mu$  wide; basal cells quadrate to short-hexagonal.

Monoicous; seta 4-7 mm. long; capsule ovoid to urn-shaped when empty, with a thick neck, about 1 mm. long, operculum mammillate; peristome single, teeth 16, at first united in pairs, broad, obtuse, in folded when wet, spreading to reflexed when dry; calyptra cucullate, small deciduous; spores 17 $\mu$  in diameter, maturing in spring.

Comments:

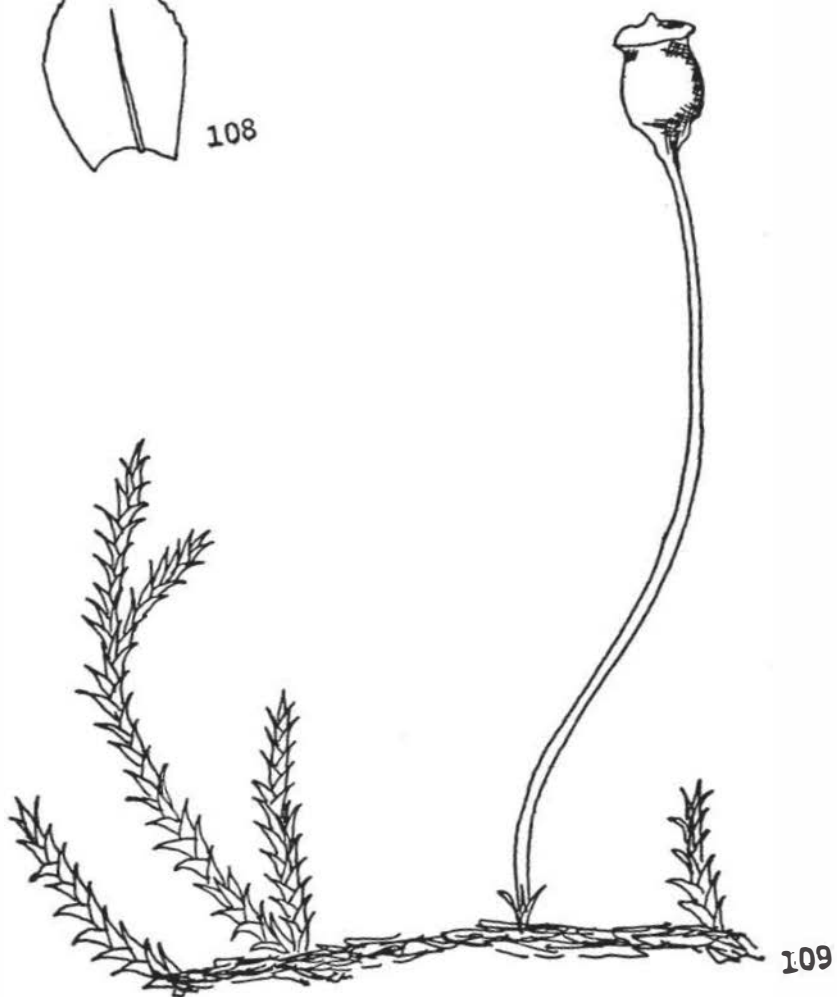
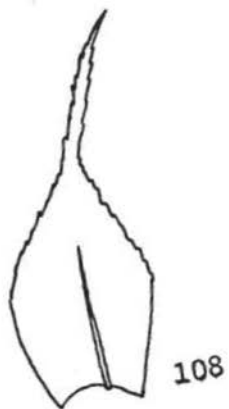
Fabronia ravenelii Sull. occurs in very small pale green mats on the bark of Quercus alba (and occasionally on rocks). The leaves of this species are nearly entire as opposed to Fabronia ciliaris which are serrate in the upper 1/2.

Fabronia ravenelli Sull.

108. Leaf, 10 X

109. Habit, 2 X





FAMILY: LEUCONDONTACEAE

Leucodon brachypus Brid.

Plants moderately robust, in loose tufts, green above, brownish below; primary stems usually 5-6 cm. long, irregularly divided, secondary stems with few to no branches, curved outwards from substratum; central strand absent; leaves of secondary stems close, in many rows, appressed and plicate when dry, spreading when moist, somewhat secund on portions of secondary stems, concave, ovate to ovate-lanceolate, 1.6-2 mm. long, costa lacking, apices acute to briefly acuminate, margins entire throughout or serrulate in apical portion; cells of leaves thick-walled, smooth, median cells linear-fusiform, 5-6 $\mu$  wide, 3-5:1, frequently chestnut-brown and pellucid in basal portion, cells in middle of blade rhombic, gradually changing to oval in apex, several rows of basal marginal cells rounded quadrate to transversely oblong.

Dioicous; perichaetial leaves loosely appressed-sheathing, inner extending beyond capsule; calyptra smooth, cucullate, sometimes united at base beneath capsule; seta enclosed by perichaetial leaves, 2-4 mm. long; capsule chestnut-brown, emergent; operculum conic, obliquely and briefly rostrate; urn oblong-ovoid, 1.2-2 mm. long, about 2:1, mouth small; annulus present; peristome teeth 16, pale to whitish, irregular, papillose, often bifid at apex; spores pale 25-35 $\mu$  in diameter, mature in late autumn or winter.

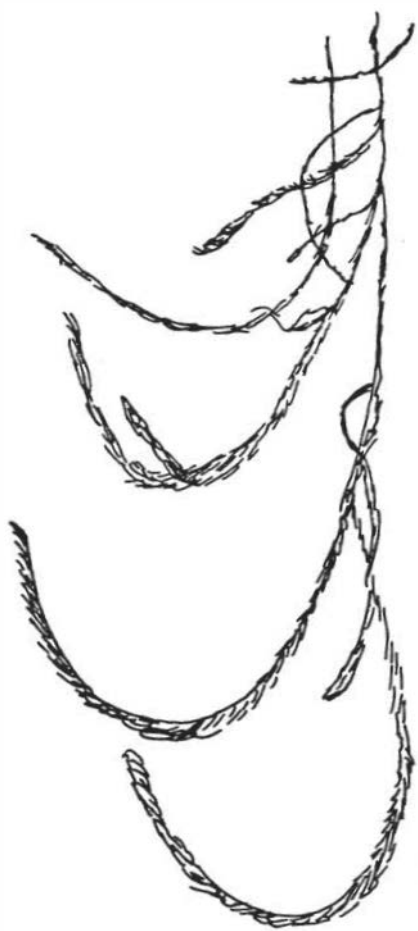
Comments:

Leucodon brachypus Brid. is found almost exclusively on the bark of living trees. The branches are julaceous, hard and smooth when dry, and make large, harsh, curly tufts and sheets 2' to 4 cm. deep.

Leucodon brachypus Brid.

110. Habit, 1 X

111. Stem tip with capsule, 10 X



110



111

211

FAMILY: LEUDODONTACEAE

Leucodon brachypus Brid. var. andrewsianus Crum & Anders.

Plants variable in size but usually moderately coarse and robust, green above, brownish below, secondary stems terete and usually curved when dry; stoloniform branches often present; brood-branchlets few to numerous in leaf axils. Leaves crowded, appressed, and sometimes slightly secund when dry, erect-spreading when moist, plicate wet or dry, 1.4-2.2 mm. long, ovate-lanceolate, acuminate, subentire or slightly serrulate at the extreme apex; upper cells narrowly oblong-linear, more or less flexuose, thick-walled and somewhat pitted, without irregularly thickened walls at the back of the leaf tip.

Inflorescences and sporophytes unknown.

Comments:

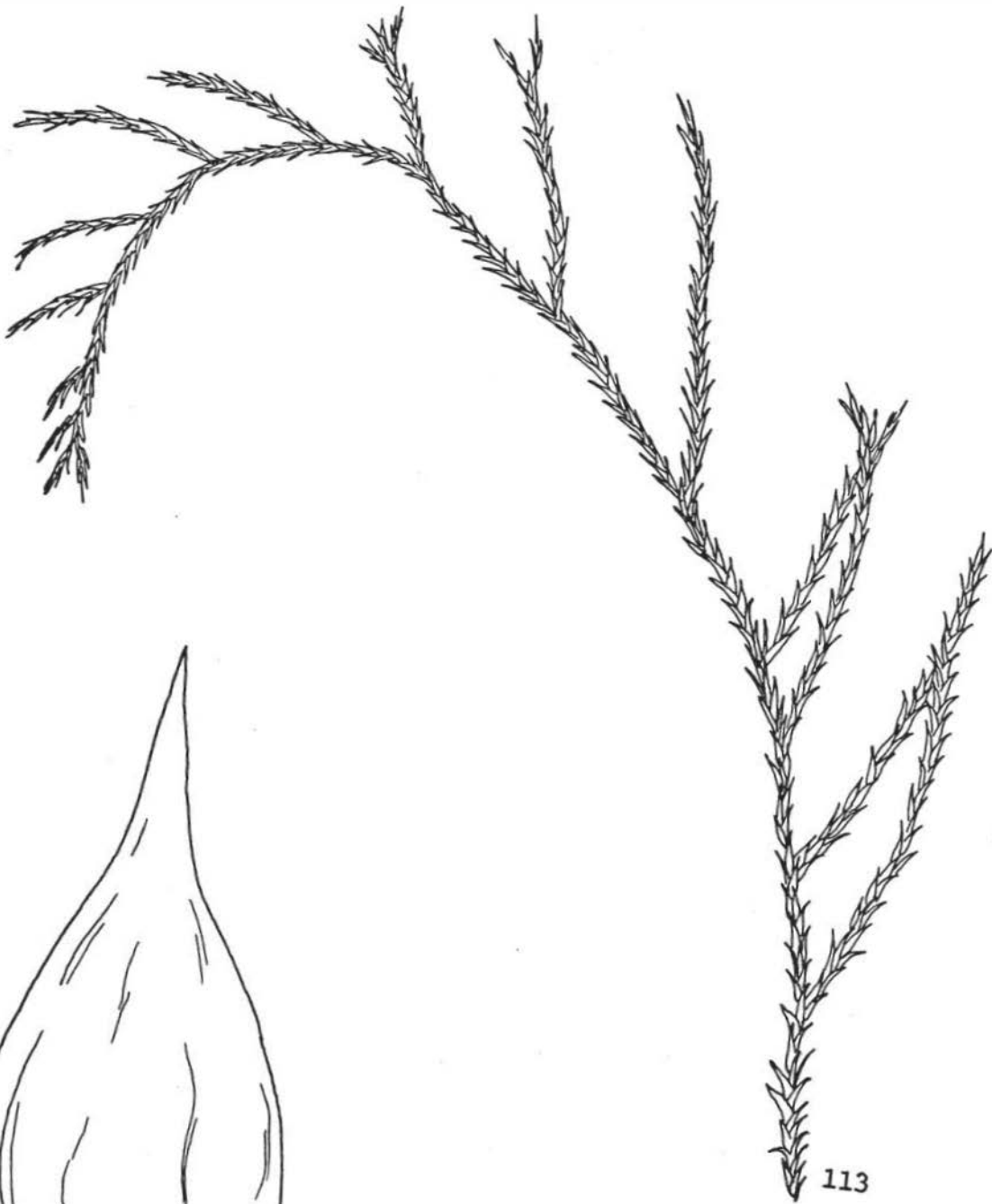
Leucodon brachypus Brid. var. andrewsianus Crum & Anders.

(L. sciuroides sensu American authors) occurs on the bark of living trees in open woods.

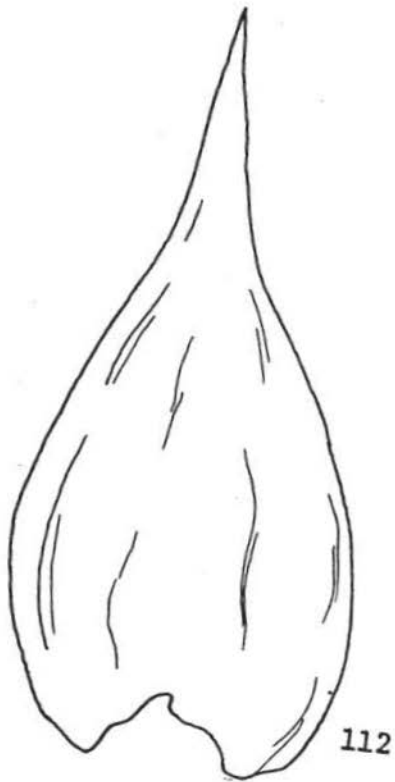
Leucodon brachypus Brid. var. andrewsianus  
Crum & Anders.

112. Leaf, 200 X

113. Habit, 3 X



113



112



FAMILY: LEUCODONTACEAE

Leucodon julaceus (Hedw.) Sull.

Plants moderately robust, in loose tufts, green above, brownish below; primary stem usually 5-6 cm. long, irregularly divided, secondary stems terete-foliate, julaceous when dry, often stoloniferous at tips; leaves of secondary stems close, in many rows, appressed-imbricate when dry, scarcely plicate, not at all secund, very concave, ovate-elliptic, about 1.5 mm. in length, costa none, apices mammillose on lower surface, rather abruptly and briefly acuminate, margins reflexed except at apex, often incurved in apical portion, entire except serrulate at apex; cells of leaves thick-walled, smooth, median cells linear-fusiform, marginal cells rounded-hexagonal, becoming transversely oblong-hexagonal toward leaf at base, basal median cells linear-sinuose.

Dioicous; perichaetical leaves filiform-acuminate, not extending to base beneath capsule; seta partially exserted; capsule exserted, chestnut brown; operculum conic, obliquely and briefly rostrate; urn suboval, 0.5-0.7 mm. in diameter, approximately 1 mm. long; peristome teeth 16, pale to whitish, irregular, papillose, often bifid at apex; spores pale, 25-35 $\mu$  in diameter, mature in autumn.

Comments:

Leucodon julaceus (Hedw.) Sull. is typically found on the trunks of trees (but sometimes on the bases or on exposed roots), and occasionally on well-decayed logs or stumps. This species is

smaller than L. brachyphus var. andrewsianus and differs also in the absence of axillary branchlets and in abruptly short-acuminate leaves with upper cells somewhat bulging at back.

Leucodon julaceus (Hedw.) Sull.

- 114. Capsule, 10 X
- 115. Leaf apex, 100 X
- 116. Stem tip showing capsule, 15 X



114



115



218

116

FAMILY: LEUCODONTACEAE

Leptodon trichomitrium (Hedw.) Mohr.

Plants dark to yellowish green, in wide, loose tufts; primary stems prostrate, filiform, secondary stems numerous, outwardly curved, abundantly and subpinnately branched, densely foliate; leaves of secondary stems close, loosely erect-spreading, subplicate when dry, concave at base, ovate to ovate-lanceolate, 1.5-2 mm. long, slightly decurrent, costa single, thin, extending to middle of blade, or short and double, apices rather short acuminate to acute, margins reflexed, entire or nearly so; median cells of leaves oblong fusiform, about  $8\mu$  wide and  $30\mu$  long, median basal cells  $45-50\mu$  long apical and upper marginal cells oval, oblong, or rhomboidal, 2-3:1; leaves of branches smaller, apical margins frequently serrulate.

Autoicous; perichaetial leaves as long as seta or longer, sheathing, slenderly acuminate; calyptra cucullate, extending to below middle capsule; seta short, slightly longer than the capsule; the capsule emergent; operculum short rostrate, extending about 1/2 length of capsule; urn ovoid-cylindric to oblong-ovoid, slightly narrowed below, approximately 1.5 mm. long; peristome teeth 16, whitish, tips very slender, inner peristome a membrane, commonly adhering to teeth; spores orange, almost smooth, about  $23-25\mu$  in diameter, mature in late autumn to winter.

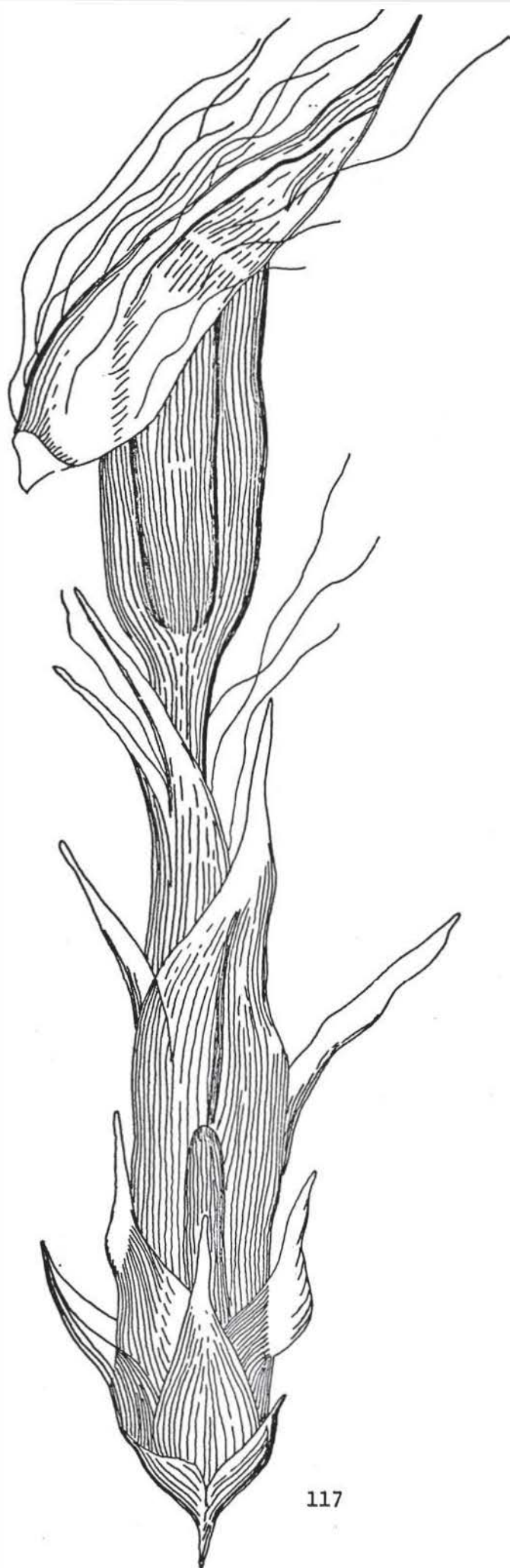
Comments:

Leptodon trichomitrium (Hedw.) Mohr. is sometimes found on

rocks but more commonly on the bark of living trees. The hairy calyptra and the rudimentary or lacking inner peristome make this species unique.

Leptodon trichomitrium (Hedw.) Mohr.

117. Stem tip showing capsule and calyptra, 20 X





## DISCUSSION

Acrocarpus mosses represented far fewer species than pleurocarpus mosses collected on living trees. All species reported were collected from various species of Oak, Ash, Beech, and Maple. The acrocarpi collected on living trees were: Drummondia prorepens (Hedw.) Schimp., Fissidens cristatus Wils., Fissidens subassilaris Hedw., Hedwigia ciliata Hedw., Orthotrichum ohioense Sull. & Lesq., Orthotrichum pumilum Siv., Rhodobryum roseum (BSG) Limpr. and Tortella humilllis (Hedw.) Jennings. Of the species that were acrocarpus Orthotrichum ohioense Sull. & Lesq. was the most frequent. Pleurocarpus mosses collected were: Anomodon attenuatus (Hedw.) Hueben., Anomodon minor (Hedw.) F  rn  r., Anomodon rostratus (Hedw.) Schimp., Brachythecium acutum (Mitt.) Sull., Brachythecium oxycladon (Brid.) Jaeger & Sauerb., Brachythecium salebrosum (Web. & Mohr.) BSG, Brotherella recurvans (Mx.) Fleisch, Campylium chrysophyllum (Brid.) J. Lange, Entodon cladorrhizans (Hedw.) C.M., Entodon seductrix (Hedw.) C.M., Eurhynchium serrulatum (Hedw.) Kindb., Homomallium adnatum (Hedw.) Broth., Hypnum curvifolium Hedw., Hypnum imponens Hedw., Leptodon trichomitrium (Hedw.) Mohr., Leucodon brachypus Brid., Leucodon brachypus Brid. var. andrewsianus Crum. & Anders., Leucodon julaceus (Hedw.) Sull., Leskea gracilescens Hedw., Leskea obscura Hedw., Leskea polycarpa Hedw., Lindbergia brachyp-tera (Mitt.) Kindb., var. austini (Sull.) Grout, Plagiothecium denticulatum (Hedw.) BSG, Platygyrium repens (Brid.) BSG, and Thuidium

virginianum (Brid.) Lindb. Of the pleurocarpus species collected from living trees, Anomodon attenuatus (Hedw.) Hueben., Entodon seductrix (Hedw.) C.M., Leskea gracilescens Hedw., and Platygyrium repens (Brid.) BSG were most frequently observed. The most infrequent pleurocarpus species on living trees were: Brotherella recurvans (Ms.) Fleisch, Fabronia ravenelli Sull., Leskea polycarpa Hedw., and Plagiothecium denticulatum (Hedw.) BSG.

A few species of mosses were collected on fallen logs not yet decorticated. One of the species (Hypnum reptile Mx.) was different from those which were reported on the bark of living trees. The species collected on fallen logs not yet decorticated were: Eurhynchium serrulatum (Hedw.) Kindb., Hypnum curvifolium Hedw., Hypnum reptile Mx., Rhodobryum roseum (BSG) Limpr., Thuidium virginianum (Brid.) Lindb., and Tortella humilllis (Hedw.) Jennings. Of all species collected on fallen logs not yet decorticated, Eurhynchium serrulatum (Hedw.) Kindb. was the most frequent.

Rotting logs entirely decorticated and partly decayed provide a habitat that is characteristic for certain species. Those species collected on logs without bark were: Bryum pendulum (Hornsch.) Schimp., Campyllum chrysophyllum (Brid.) J. Lange, Campyllum hispidulum (Brid.) Mitt., Dicranella heteromalla (Hedw.) Schimp., and Dicranum scoparium Hedw. The most frequent of these species collected on decorticated logs was Campyllum hispidulum (Brid.) Mitt.

Another very common habitat for a large number of moss species is well-decayed logs or stumps. The following acrocarpus species were collected from well-decayed wood: Aulacommium palustre (Hedw.) Schwager,

Bryum pseudotriquitrum (Hedw.) Gartn., Meyer & Scherb., Climacium americanum Brid., Climacium kindbergii (Ren. & Card.) Grout, Dicranum flagellare Hedw., Dicranum scoparium Hedw., Mnium affine Bland., Mnium cuspidatum Hedw., Pohlia nutans (Hedw.) Lindb., Tetraphis pellucida Hedw., and Timmia megapolitana Hedw. Of the acrocarpus species collected on well-decayed logs and stumps, Aulacomnium palustre (Hedw.) Schwaeger, Mnium cuspidatum Hedw., and Tetraphis pellucida Hedw. were by far the most frequent. Pleurocarpus mosses represented nearly the same number of species as did the acrocarpus members collected on well-decayed wood. Those pleurocarpus species collected were: Amblystegium juratzkanum (Schimp.) Rau. & Herv., Amblystegium serpens (Hedw.) BSG, Chamberlania acuminata (Hedw.) Grout, Entodon compressus (Hedw.) C.M., Entodon seductrix (Hedw.) C.M., Heterophyllum haldanianum (Grev.) Kindb., Hypnum imponens Hedw., Hypnum reptile Mx., Lindbergia brachyptera (Mitt.) Kindb. var. austini (Sull.) Grout, Plagiothecium denticulatum (Hedw.) BSG, Thuidium delicatulum (Hedw.) BSG, and Thuidium recognitum (Hedw.) Lindb. The pleurocarpus species of the greatest frequency which inhabited well-decayed logs and stumps were: Entodon seductrix (Hedw.) C.M., and Thuidium delicatulum (Hedw.) BSG. The most infrequent species were Entodon compressus and Lindbergia brachyptera (Mitt.) Kindb. var. austini (Sull.) Grout.

Of the fifty-seven mosses collected in this survey, Mnium cuspidatum Hedw. was the most frequent acrocarpus species and the most frequent pleurocarpus species was Leskea gracilescens Hedw.

## CONCLUSION AND SUMMARY

A review of the literature indicates that no studies have been made on the corticolous Musci of East-Central Illinois. Of the ten county bryological studies and two state-wide bryological reports made in Illinois, none have made mention of the corticolous mosses of Coles, Clark, and Cumberland counties.

This research involves primarily a taxonomic survey of the corticolous mosses of Coles, Clark, and Cumberland counties, Illinois. Fifty-seven species of Musci were collected in these counties representing thirty-five genera. Collections were made from four different habitats: living trees, fallen logs not yet decorticated, fallen logs completely decorticated and partly decayed, and well-rotted stumps and logs. The collections were placed in standard bryological packets provided with standard data. The mosses were named and duplicated placed in the Ernest L. Stover Herbarium, Eastern Illinois University, Charleston, Illinois. Descriptions and illustrations were prepared for each specimen.

Of the fifty-seven mosses collected forty-eight were frequently reported in previous Illinois publications. Nine species were rare or considered to be rare. They are: Brachythecium acutum (Mitt.) Sull., Brotherella recurvans (Mx.) Fleisch., Bryum pseudotriquetrum (Hedw.) Gärtn., Meyer & Scherb., Fabronia ravenelli Sull., Leptodon trichomitrium (Hedw.) Mohr., Leucodon brachypus Brid. var. andrewsianus Crum & Anders., Orthotrichum ohioense Sull. & Lesq., Orthotrichum pumilum Sw., and

Timmia megapolitana Hedw.



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