A Trailside Guide to Mosses and Liverworts of the Cherokee National Forest

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with contributions from Mark J. Pistrang

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Acknowledgments

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Introduction

While the title of this book is "A Trailside Guide to Mosses and Liverworts of the Cherokee National Forest," we have made no attempt to catalogue or recommend specific trails. With over 600 miles of trails on the Forest, including 150 miles of the famed Appalachian Trail, hiking opportunities are seemingly endless. Covering over 640,000 acres in 10 east Tennessee counties the Cherokee National Forest is the largest single tract of public land in Tennessee. The Forest lies in a region renowned for its biological diversity and natural beauty. An attempt to describe this diversity in terms of specific trails where certain species can be found may only detract from the overall mystique and grandeur of the region. Rather, the reader should arm themselves with this book and the knowledge that "cool and moist" generally trumps "hot and dry" when it comes to moss and liverwort diversity! Seek out trails that meander though shaded cove forests, bottomlands, and steep ravines. Streamside trails are always a good bet and these will likely lead you to small waterfalls, seeps and springs, where if you take the time to look, you'll be amazed at what you can find. Keep in mind, when enjoying mosses and liverworts distance becomes a relative term. In an hours time you may have walked less than 100 feet from the trailhead—all the while encountering a great diversity of liverwort and moss species. On your next hike remind yourself to take time to pause, rest, and look closely at a moss. You may find in the moment that there is grandness in mosses that surpasses their small size.

This work of 52 genera of mosses and liverworts is for everyone interested in these abundant and common plants. Seventy-five species are illustrated. It should be noted that there are many other genera and species known to occur in the Cherokee National Forest; however many of these require examination with a compound microscope in order to be identified.

Patches of mosses are frequently referred to as just "moss." The small size of mosses and liverworts is an obstacle to overcome if we are to identify them. While many wildflowers and tree species provide the naturalist with relatively large shapes easy to recognize, mosses and liverworts require close attention to the smallest details visible to the unaided human eye. Learning to see the characters in mosses can be likened to learning to read a new alphabet. The individual characters in print may be only a millimeter in size, yet once learned, we read print with ease. So, if you can read these words and see the dot over this i you have the ability to see closely the defining shapes—often smaller than a millimeter—that distinguish many kinds of mosses and liverworts.

Moss or Liverwort?

You can get a feel for liverworts by looking at the pictures in the front half of the book. Liverworts that are thalloid (lacking stems and leaves) are not likely to be confused with mosses. Most liverworts however bear leaves upon stems and these so-called leafy liverworts resemble mosses in many respects. Several features characterize leafy liverworts apart from mosses: leaves arranged in two rows (spirally arranged leaves in mosses), leaves are often lobed (unlobed in mosses), and sporophytes are ephemeral (sporophytes persistent in mosses). Nothing is that simple, so it must be said that many liverworts have a third row of leaves hidden beneath the stem and some liverworts have unlobed leaves. Furthermore, the moss *Fissidens* has leaves in two rows. Nonetheless, leafy liverworts do have a different look and some have referred to them as "scale mosses" in reference to the two rows of overlapping leaves as seen from above.

Mosses and liverworts often occur in a mosaic patchwork of interlaced species falsely appearing as "one moss." The images above show the importance of looking closely. What appears as just a patch of moss (right side of photo) is in fact several species shown more closely on the left: *Bryoandersonia illicebra* (black arrow), *Ctenidium malacodes* (red arrow), *Mnium ciliare* (yellow arrow), and *Thuidium delicatulum* (blue arrow).

Format and Explanation of Terms.

In preparing the descriptions great use was made of Crum and Anderson's (1981) *Mosses of Eastern North America* and Schuster's (1966-1992) *The Hepaticae and Anthocerotae of North America*. The phonetic spellings under genus names are original creations and offered as suggested pronunciations. It is hoped that the combination of characters provided together with the photographs will allow confident identification of at least a few of the many kinds of mosses and liverworts inhabiting the southern Appalachians. Every attempt has been made to use non-technical descriptive terminology. A short glossary is provided on the next page. Liverworts are presented before mosses. An index to genera and species is at the end of the book. Brief introductory comments follow the genus header.

Habitat. Lists the substrates on which the plant grows and general field requirements or circumstances where found.

Size. Gives an approximate measure in millimeters or centimeters for individual leafy shoot width, shoot height, or branching complex.

Distinguishing characters. Lists features of the plant that should be seen for confident identification.

Reproduction and Sporophytes. Reproductive structures are clues aiding identification. For liverworts, structures associated with sexual and asexual reproduction are listed and sometimes described. For mosses, a description of the spore producing structure (sporophyte stage) is given.

In both mosses and liverworts sporophytes result from successful sexual reproduction in which flagellated sperm fertilize non-motile eggs. Sporophytes remain attached to the maternal plant. Sporophytes have no leaves but rather consist simply of an unbranched stalk called a seta and a swollen capsule that forms at the top of the seta. The seta in liverworts is translucent and very delicate and ephemeral. Liverwort capsules split into four petal-like segments exposing all spores at once for dispersal. The seta of mosses is durable and a capsule swells at its tip. A moss seta that is very young is just a spear without a capsule yet formed. The moss capsule when young may be partially covered by a calyptra (hood that covers the capsule). The capsule has a lid (operculum) that may be long-beaked or not (useful in some moss identifications). The lid to the capsule falls off when mature revealing teeth-like structures around the opening to the capsule (peristome teeth, or collectively the peristome). The peristome aids in spore dispersal. The capsule produces many microscopic spores. Once dispersed, a spore may germinate and grow forming a new plant.

Most leafy liverworts have a perianth (a structure that surrounds the female organs and the base of the sporophyte). As a means of asexual reproduction many liverworts and mosses produce gemmae (variously shaped, often naked spore-like masses of cells that disperse and vegetatively propagate the species); gemmae are at times useful when identifying species (see p. 29).

Approximate No. of Species in the southern Appalachians. The number of species in the genus occurring in the region occupying parts of Alabama, Georgia, North Carolina, South Carolina, Tennessee, and Virginia.

Eastern North American Distribution. The designation "throughout" means the genus occurs from Canada to northern Florida.

Calyptra indicated by arrow.

Operculum with long beak.
Seta=stalk below curved capsule.

Small peristome teeth are visible at the top of the capsule.

Photos

The photos try to capture detail needed for identification. To give an impression for field recognition, both habit and close-up images are included. Many details are visible to the unaided eye. Most images were taken with a Nikon D70 digital camera with a 60 mm lens.

Terms

bryophyte - a moss, liverwort, or hornwort.

bryology - the study of mosses, liverworts and hornworts.

calyptra - a hood that wholly or partially covers a young capsule; falls off as capsule matures.

capsule - the spore containing structure, usually elevated by the seta.

gemmae - single to many celled reproductive units; a form of asexual reproduction

operculum - the lid to a moss capsule; eventually falls off allowing the release of spores from the capsule.

perianth - in liverworts, leaf-like protective tissue that surrounds female reproductive organs.

peristome - in moss capsules, teeth-like projections that surround the capsule opening and aid in spore release; the peristome is not visible until after the operculum has fallen from the capsule.

seta - unbranched stalk that supports the capsule.

spore - produced in the capsule by the hundreds to thousands and behaves like a seed by germinating and forming new plants.

sporophyte - consists of a capsule and a seta; when present it is attached to the leafy or thalloid plant.

The three pictures on this page are of the moss *Dicranum scoparium* (see page 61 for more).

Bazzania — Liverwort

(Buh zae' knee uh)

The following account is for the leafy liverwort *Bazzania trilobata*, our largest and most widely distributed *Bazzania*. Allen Risk of Morehead State University, KY, has called *B. trilobata* "millipede weed." A similar species in New Zealand is called eagle-wort (leaves resemble spreading wings).

Habitat. Wide ranging but limited to areas of high humidity and moisture; from mountain summits to low elevation stream ravines; on rock, soil, tree bases, and logs.

Size. Robust, leafy shoots to 5 mm wide, forming large mats.

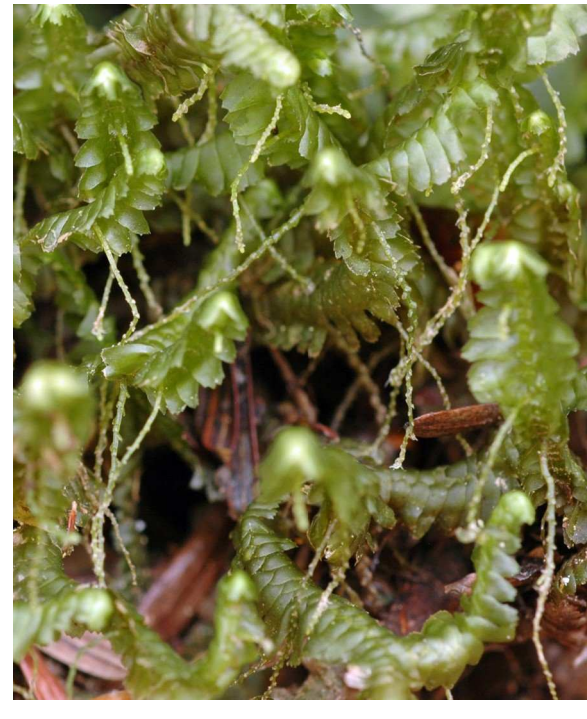
Distinguishing characters. Leaves noticeably shingled forming a tent-like roof hiding the stem. Leaf apex with three teeth.

Reproduction. Sporophytes rare, ca. 1 cm tall; capsule black, oblong-rounded, splitting into four valves. Gemmae not produced.

Approximate No. of Species in the southern Appalachians. Four.

Eastern North American Distribution. Throughout.

Bazzania trilobata overtopping *Odontoschisma prostratum*.



Root-like ventral branches hang down beneath the main shoots of *Bazzania trilobata*.

Bazzania trilobata. To some, these shoots resemble millipedes, to others the arching leaves remind them of eagle's wings.

Bazzania trilobata atop the cut end of a log. The inset shows the tooth-like lobes at the leaf tips.

Conocephalum — Liverwort

(Con o seph' uh lum)

Resembling snakeskin in its patterned upper surface, *Conocephalum*—literally translated "cone head"—is a liverwort known by many field botanists.

Habitat. Rock and soil along streams and wet cliffs.

Size. Robust, 1-2 cm wide, often covering extensive areas.

Distinguishing characters. Polygonal pattern on upper surface; fragrant when crushed or torn.

Reproduction. Sporophytes rare, several positioned under a cone-shaped structure elevated above the flat plant. Gemmae not produced in our species.

Approximate No. of Species in the southern Appalachians. One, *C. salebrosum* (our plants were until recently known as *C. conicum*).

Eastern North American Distribution. Throughout.

Polygonal patterns mark areas containing air chambers within the body of the plant. Each polygon has an air pore at its center.

Plants become darker with age and eventually die as the are overtopped by new growth.

Bright green new growth appearing in March.

Large mat of *Conocephalum salebrosum* over a streamside rock.

Dumortiera — Liverwort

(Dew more tea err' uh)

This and the preceding *Conocephalum* are our largest liverworts.

Habitat. Shaded wet rock and soil, creek banks and recessed rock faces under dripping water.

Size. Robust, 1-2 cm wide, often covering extensive areas.

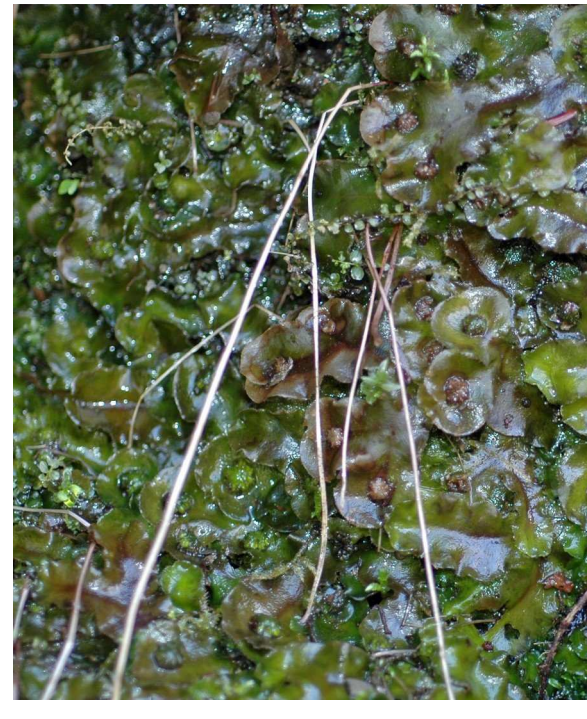
Distinguishing characters. Dark green, often translucent, large plants; disc-shaped reproductive structures bear stiff hairs.

Reproduction. Sporophytes occasional in spring, several to a dozen projecting under a hairy disc elevated above the flat plant. Gemmae not produced.

Approximate No. of Species in the southern Appalachians. One, *D. hirsuta*.

Eastern North American Distribution. Virginia south to Florida.

Hairy margins of reproductive structures are visible above.



Nearly always wet, *Dumortiera* can be as wide as your thumb.

A bit of the moss *Mnium* is growing with *Dumortiera*.

Dumortiera hirsuta typically covers large, wet areas.

Frullania — Liverwort

(Fru lay' knee uh)

The most common liverwort in the southeastern U.S. where it is found on trees even in cities. Due to its small size it is rarely seen in cities except by those who seek it.

Habitat. On bark of trees and shrubs wherever there is adequate humidity and light; less commonly on rocks.

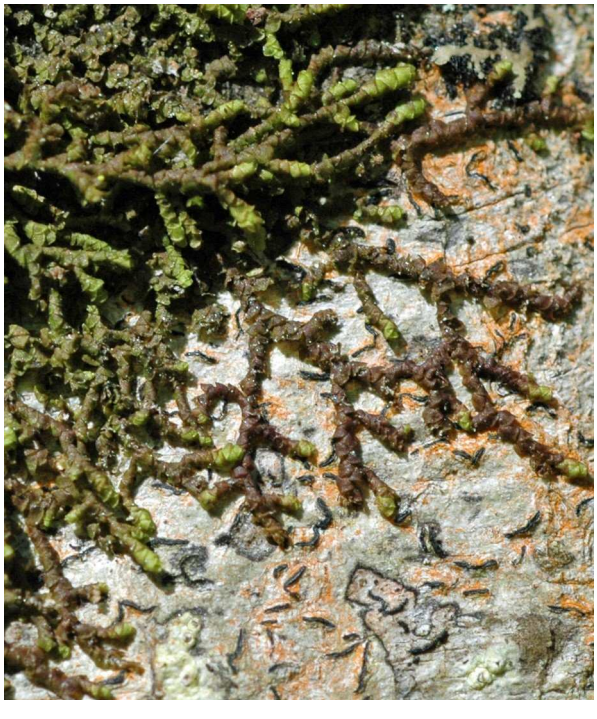
Size. Leafy shoots 0.5 to 1.5 mm wide. Colonies in patches 1-20 cm or larger in diameter.

Distinguishing characters. Small, dark plants (reddish to dark green to blackish) on bark; closely overlapping, circular leaves seen with a hand lens.

Reproduction. Sporophytes occasional, small (ca. 1 mm long), scarcely noticeable, capsule spherical, splitting into four valves. Perianth ending in a short, tubular beak as seen with a hand lens. Gemmae generally not produced; some species shed leaf lobes.

Approximate No. of Species in the southern Appalachians. 11.

Eastern North American Distribution. Throughout.



Frullania ericoides growing over a crustose lichen. When dry the leaves tend to wrap around the stem in this species.

Frullania typically forms dark patches on trees as in these young yellow poplars. Inset shows a male plant of *F. eboracensis*.

Frullania asagrayana. Left image from hemlock log, right image from horizontal limb of evergreen rhododendron over a stream.

Frullania kunzei on rock at Starr Mountain. Numerous perianths with minute beaks are shown as well as several tan colored, opened capsules.

Jubula — Liverwort

(Jub' ya luh)

Our single species is *Jubula pennsylvanica*, a shade loving, wet leafy liverwort.

Habitat. Wet rock, usually in deep shade; exceptionally and rare on trees along streams. Occasionally dry patches of *Jubula* may be found in intermittent streams and on dry bluff bases.

Size. Leafy shoots ca. 1 mm wide. Capable of forming extensive mats.

Distinguishing characters. Ecological restriction to streams and seeps. Leaves usually with a pointed apex as seen from the ventral surface. Except for ecology and greasy green color, *Jubula i*s similar in form to its close relative *Frullania*.

Reproduction. Sporophytes occasional, ca. 1-2 mm long. Capsule spherical, splitting into four valves. Perianth ending in a short, tubular beak. Gemmae not produced.

Approximate No. of Species in the southern Appalachians. One, *J. pennsylvanica*.

Eastern North American Distribution. Throughout.

Jubula often grows intermingled with wet-loving mosses.

Jubula's color can vary from green (above) to dark and blackish (left).

Black arrows on the left half of the photo indicate ruptured capsules.

Jubula forms the greasy green mat along the lower edge of this rock lying in a stream.

Lejeunea — Liverwort

(Luh jew' knee uh)

The Southern Appalachians have a rich lejeuneacous flora that includes at least six genera difficult to distinguish without microscopic study (*Cheilolejeunea, Cololejeunea, Drepanolejeunea, Harpalejeunea, Lejeunea,* and *Rectolejeunea).*

Habitat. Bark of trees and shrubs, rocks, rarely on evergreen leaves of *Rhododendron maximum* and the filmy fern *Trichomanes petersii*.

Size. Leafy shoots usually less than 1 mm wide; scattered or in patches a few centimeters in diameter; sometimes in extensive patches covering large areas.

Distinguishing characters. Pale greenish color (never with the dark pigments seen in *Frullania*). Small plants requiring microscopic study to see distinguishing leaf characters.

Reproduction. Sporophytes occasional; less than 1 mm long; capsule spherical, splitting into four valves. Perianth ending in a short tubular beak. Gemmae not produced.

Approximate No. of Species in the southern Appalachians. Eight.

Eastern North American Distribution. Throughout.

Lejeunea on rock along Tellico River.

Cololejeunea biddlecomiae on partly sunny rock along a creek.

Lejeunea sharpii on man-laid stone wall bordering a creek.

Lejeunea ruthii on tree bark. The black arrows on right side indicate the smaller, bead-like *Lejeunea ulicina*.

Leucolejeunea — Liverwort

(Lew co' luh jew' knee uh)

A prominent leafy liverwort common on tree trunks in humid woods.

Habitat. Rock and bark of trees and shrubs.

Size. Leafy shoots <1-2 mm wide. Colonies in patches 1-20 cm or larger in diameter.

Distinguishing characters. Pale color (never with dark pigments seen in *Frullania*). Small, circular underleaves attached to the ventral side of the stem (observation requires removing plant from its substrate and use of a hand lens).

Reproduction. Sporophytes frequent, less than 1 mm long; capsule spherical, splitting into four valves. Perianth ending in a short tubular beak. Gemmae not produced.

Approximate No. of Species in the southern Appalachians. Three.

Eastern North American Distribution. Rare in the northeast, common south of Virginia.

Leucolejeunea unciloba on a piece of bark (above). *Leucolejeunea clypeata* covering a boulder along the Tellico River.

Leucolejeunea and other leujeuneacous liverworts on trunk of an ironwood tree.

Leucolejeunea unciloba above the much smaller *L. conchifolia* on bark of hemlock tree.
Inset shows the ventral side bearing circular underleaves.

Tree with blotches of *Leucolejeunea* (green) and *Frullania asagrayana* (reddish brown).

Lophocolea — Liverwort

(Low fo co' lee uh)

A delicate liverwort that is quite attractive when viewed with a hand lens.

Habitat. Dry to wet soil, rock, tree bases, logs; along dry trails and wet rocks in creeks.

Size. Leafy shoots 1-3 mm wide, usually in patches 1-10 cm in diameter.

Distinguishing characters. Delicate translucent leaves; leaves bilobed (in L. heterophylla many leaves often entire).

Reproduction. Sporophytes frequent in spring, to 2 cm long; capsule spherical, splitting into four valves. Gemmae not produced in most species. Perianth tubular to three-sided with wide mouth, rather leaf-like.

Approximate No. of Species in the southern Appalachians. Three.

Eastern North American Distribution. Throughout.

Lophocolea heterophylla on pine bark on forest floor.

Lophocolea heterophylla with *Nowellia* and algae on a log.

Lophocolea heterophylla over dark log.

Lophocolea cuspidata, moist rock in stream.

Metzgeria — Liverwort

(Mets gair' ee uh)

The only thalloid (lacking stems and leaves) liverwort to grow on standing tree trunks.

Habitat. On tree trunks, tree bases, and rocks; wet or dry habitats.

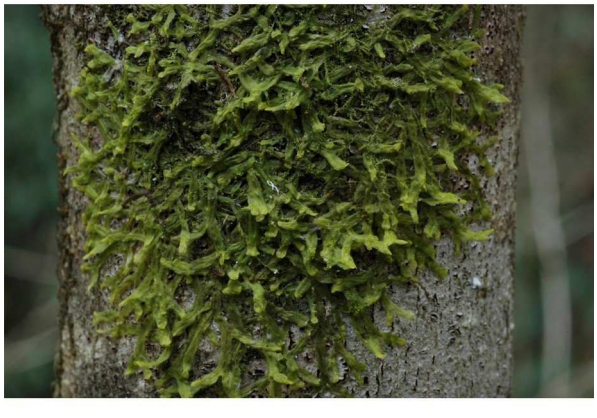
Size. Plants <1-2 mm wide, scattered or in thin patches 1-10 cm in diameter.

Distinguishing characters. Ribbon-shaped plants without leaves; branching is dichotomous (forked); plant margins and midrib bear short hairs (rhizoids) on their ventral side.

Reproduction. Sporophytes occasional to never depending on the species. Disc or strap-shaped gemmae produced often in abundance in some species, absent or rare in others.

Approximate No. of Species in the southern Appalachians. Seven.

Eastern North American Distribution. Throughout.



Metzgeria crassipilis on a small tree.

Closer view of *Metzgeria crassipilis* on a small tree.

Metzgeria crassipilis with diagnostic discoid gemmae on the upper surface.

Metzgeria conjugata, from shaded tree base. This species is without gemmae.

Nowellia — Liverwort

(No well' ee uh)

This small leafy liverwort often completely covers exposed surfaces of pine and hemlock logs.

Habitat. Logs, especially logs without bark.

Size. Leafy shoots less than 1 mm wide, but plants typically forming robust mats.

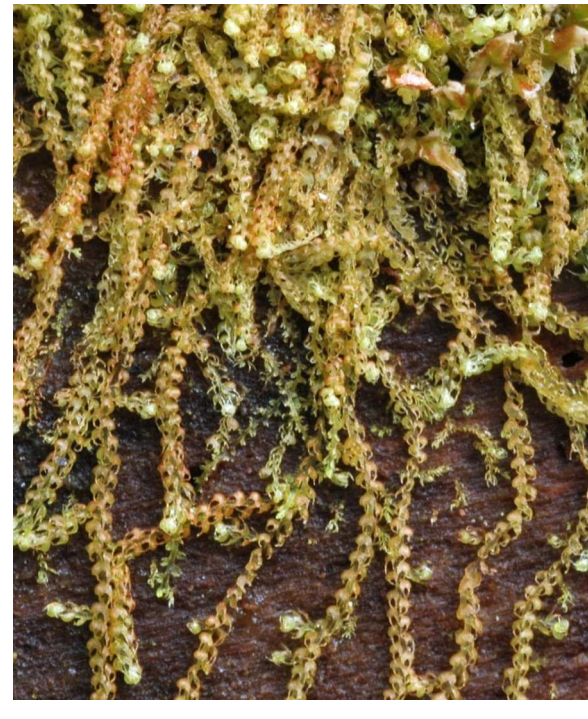
Distinguishing characters. Leaves concave, appearing inflated, each leaf with two long drawn out narrow tips. Plants often red, shade forms green.

Reproduction. Sporophytes frequent in spring, to 1 cm long; capsule oblong rounded, splitting into four valves. Pale masses of gemmae sometimes produced from leaf margins of young plants.

Approximate No. of Species in the southern Appalachians. One, *N. curvifolia*.

Eastern North American Distribution. Canada south to central Alabama.

Green form on shaded rotten log.



Pale reddish form on log.

Perianths protruding upwards are common in the image above.

Bright red form on a pine log.

Odontoschisma — Liverwort

(O don toe' skez muh)

While common in our mountains, *Odontoschisma* is also very characteristic of swampy woods in the outer Coastal Plain of the southeast.

Habitat. Logs, soil banks and rock.

Size. Leafy shoots 1-2 mm wide, scattered or in mats 5-20 cm or more in diameter.

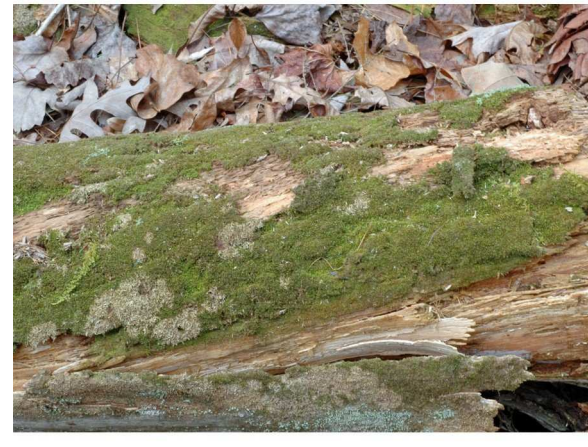
Distinguishing characters. Rounded leaves without lobes. Adjacent leaves on the same side of the stem overlap such that a leaf nearer the shoot tip rests atop the adjacent leaf further from the shoot tip. Characters may require a hand lens to see.

Reproduction. Sporophytes occasional in spring, up to 1 cm long; capsule ovoid, splitting into four valves. Gemmae produced on erect shoot tips of one regional species.

Approximate No. of Species in the southern Appalachians. Two.

Eastern North American Distribution. Throughout.

Odontoschisma prostratum over humus along creek bank.



Odontoschisma denudatum on log.

Odontoschisma prostratum, a species lacking gemmae.

Odontoschisma denudatum, a species producing light colored gemmae at the tips of small erect shoots.

Pallavicinia — Liverwort

(Pal uh vuh sin' ee uh)

Like the preceding *Odontoschisma, Pallavicinia* is common in swamps of the outer Coastal Plain.

Habitat. Rotten wood, humus, and moist rock along streams and seeps.

Size. Plants 3-8 mm wide in mats 2-20 cm wide.

Distinguishing characters. Translucent plants rarely branched; a midrib runs down center of plant. Male plants with two rows of lobed flaps on either side of midrib; female plants with reproductive structure on midline of midrib.

Reproduction. Sporophytes frequent in spring, to 2 cm long; capsule cylindrical, splitting into four valves adhering in pairs. Gemmae not produced.

Approximate No. of Species in the southern Appalachians. One, *P. lyellii*.

Eastern North American Distribution. Throughout.

Capsule before and after splitting open.

On the rotten butt of a log with presumably collar-door spider burrows above.

Female plant with maturing sporophytes.

Male plant with two rows of structures; also a female plant with green, immature capsule.

On humus along a shaded creek bank.

Pellia — Liverwort

(Pel' ee uh)

Pellia is green in shade forms and becomes darker and reddish with age and exposure to sunlight.

Habitat. Moist soil and rock along shaded streams and seeps.

Size. Plants ca. 1 cm wide, in mats 5-20 cm or larger in diameter.

Distinguishing characters. Flat plants with broadly thickened mid-region.

Reproduction. Sporophytes frequent in early spring (late March), to 2 cm tall; capsule spherical, splitting into four valves. Gemmae not produced.

Approximate No. of Species in the southern Appalachians. Three.

Eastern North American Distribution. Canada to south Alabama.

Pellia epiphylla on shaded roadside bank under rock ledge. Inset shows elongated sporophytes.

Capsules beginning to emerge (*Pellia epiphylla*).

Pellia epiphylla in late March. Note capsules and new, green growth.

Pellia epiphylla also in late March.

Plagiochila — Liverwort

(Play gee o kigh' luh)

The southern Appalachian region is home to a number of rare species of *Plagiochila*.

Habitat. Soil, rock, tree bases, along streams, and rock underledges.

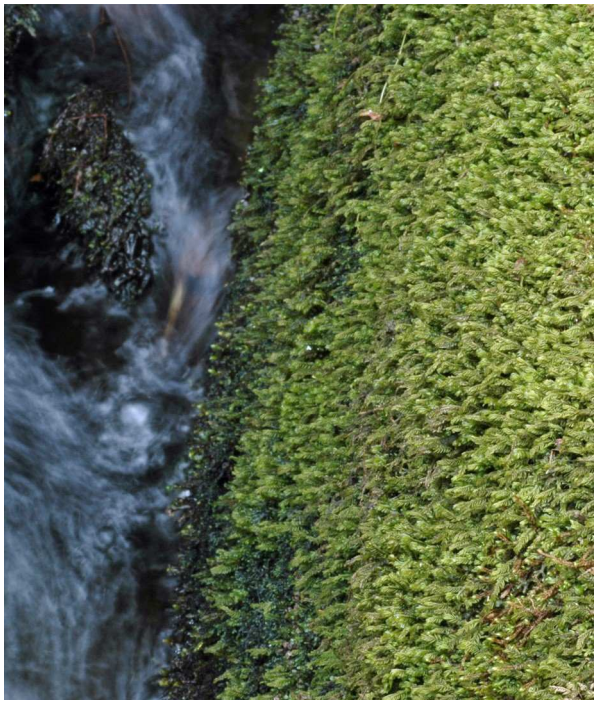
Size. Leafy shoots 1-5 mm wide, scattered or in extensive mats covering large areas.

Distinguishing characters. Leaves clearly in two rows; leaves horizontal or bent downward.

Reproduction. Sporophytes occasional in *P. porelloides*, rare or absent in other species, to 4 cm tall; capsule splitting into four valves. Perianth leaf-like with a wide apex. Gemmae in the form of plantlets arise from leaf surfaces of some species.

Approximate No. of Species in the southern Appalachians. 11.

Eastern North American Distribution. Throughout.



Plagiochila porelloides covering a streamside rock.

Plagiochila virginica.

Male plants of *Plagiochila porelloides*.

Sterile plants of *Plagiochila porelloides*.

Porella — Liverwort

(Por' el uh)

Porella is one of our largest leafy liverworts. The two locally common species are *P. pinnata,* which is usually found near or in water, and *P. platyphylla,* found in drier sites but best developed in shaded moist woods often near streams.

Habitat. Low to high elevations, on trunks of hardwood trees and shrubs, on rocks and logs; submerged in streams.

Size. Leafy shoots 2-4 mm wide, in robust patches 5-20 cm or larger in diameter.

Distinguishing characters. Large size, often pinnately branched frondose plants with aerial shoots arching away from substrate; tongue-shaped underleaves and lobules visible with a hand lens.

Reproduction. Sporophytes occasional in winter and spring, very short (ca. 1 mm long), capsule splitting into numerous valves. Perianth projects ventrally, mouth collapsed (requires a hand lens to see). Gemmae not produced.

Approximate No. of Species in the southern Appalachians. Three

Eastern North American Distribution. Throughout.

Porella platyphylla on bark of log.

Porella pinnata on rock along Tellico River.

Porella platyphylla. Inset shows ventral side with tongue-shaped underleaves along the stem.

Porella pinnata on exposed root along stream. Inset shows sporophytes *P. pinnata*.

Radula — Liverwort

(Rad' ju luh)

The genus name is shared with the name of the rasping tongue (radula) of a snail. In Latin *radula* is a scraper. *Radula* the liverwort was named for the shape of the perianth that resembles a putty knife or scraper.

Habitat. On trees, stones and rock bluffs, dripping wet or shaded and dry. Humid woods and stream ravines.

Size. Leafy shoots 1 mm wide, scattered or in thin patches 1-20 cm or larger in diameter.

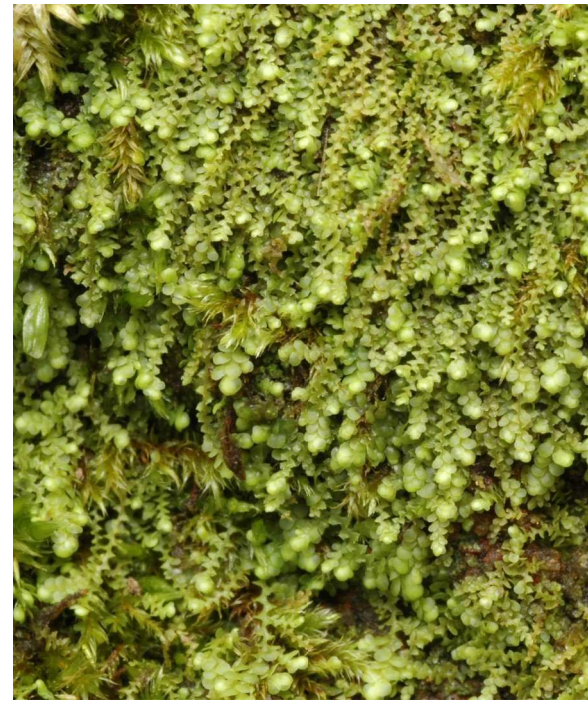
Distinguishing characters. Rounded, overlapping leaf lobes; common species with either discoid gemmae on leaf margins or with few to many leaf lobes broken off.

Reproduction. Sporophytes occassional, 1 mm tall; capsule ovoid, splitting into four valves. Perianth flattened with a wide mouth. Discoid gemmae present on leaf margins of some species.

Approximate No. of Species in the southern Appalachians. Seven.

Eastern North American Distribution. Throughout.

Radula obconica from a wet seepy bank.



Radula obconica with many leaf lobes broken off leaving only stubby leaf bases.

Radula obconica on rock. The black arrow at right points to a perianth.

Radula obconica on seepy bank (left) and covering shaded rock face (right).

Scapania — Liverwort

(Scuh pay' knee' uh)

Scapania is quite variable in size and color. Shade forms are green while plants exposed to sun are reddish purple.

Habitat. Soil banks, moist rock bluffs, creek banks, and submerged in streams.

Size. Leafy shoots 1-5 mm wide, scattered or in large mats covering extensive areas.

Distinguishing characters. Rounded leaves with a smaller dorsal lobe lying atop a larger ventral lobe.

Reproduction. Sporophytes occasional, to 1 cm long; capsule splitting into four valves. Perianth leaf-like with broad apex. Gemmae in green to brown masses at margins of young leaves at shoot tip.

Approximate No. of Species in the southern Appalachians. Two.

Eastern North American Distribution. Throughout.

Scapania nemorea with masses of brown gemmae at shoot tips.

Scapania nemorea over a vertical, moist rock face.

Scapania nemorea (dark expression) on moist rock face with *Diphyscium foliosum* (see p. 62)

A few black capsules of *Scapania nemorea* and Plagiochila in upper and lower left corners.

Scapania undulata under clear, flowing water, attached to rock.

Trichocolea — Liverwort

(Tre cuh cole' lee uh)

Trichocolea has been called the woolly hepatic and indeed a close look reveals a meshwork of hair-like filaments reminiscent of woolen fibers.

Habitat. Moist soil and humus along shaded streams and seeps.

Size. Robust, to 2 cm wide forming soft mats 5-20 cm or larger in diameter.

Distinguishing characters. Frondose plant with many small branches. Leaf blade divided into numerous hair-like filaments.

Reproduction. Sporophytes rare, to 3 cm tall; capsule short cylindrical splitting into four valves. Gemmae not produced.

Approximate No. of Species in the southern Appalachians. One, *T. tomentella*.

Eastern North American Distribution. Throughout.

Pinnately branched shoot.

Leaves are hardly visible as each leaf is finely divided into hair-like parts.

A soft mat on the face of a shaded boulder along a small stream.

Individual leaves are just discernable on the large stem in the center of the photo above.

Anomodon

Moss

(Uh nahm' o don)

Anomodon is often abundant on tree bases where it forms a lush skirt or apron that may nearly encircle the tree.

Habitat. On tree bases and rock outcrops at low and high elevations.

Size. Leafy shoots <1-3 mm wide, scattered or in robust mats frequently more than 20 cm in diameter.

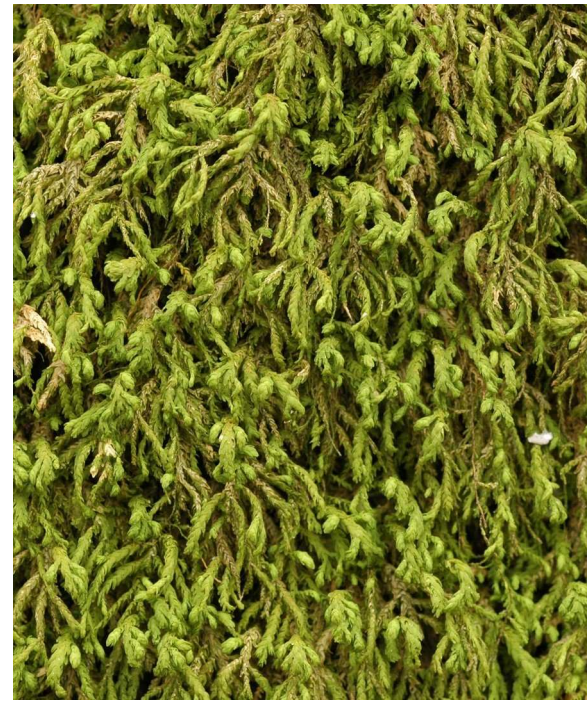
Distinguishing characters. Leaves have a rather dull texture and are never translucent green. As a whole, the genus isn't easy to characterize, yet most species are easily distinguished in the field without microscopic study.

Sporophytes. Rare, 1-2 cm long; capsules cylindrical, erect.

Approximate No. of Species in the southern Appalachians. Five.

Eastern North American Distribution. Throughout.

Anomodon attenuatus around tree base.



Anomodon attenuatus.

Anomodon rugelii when dry.
Anomodon attenuatus surrounds this patch of *A. rugelii*.

Anomodon rugelii when wet.

Anomodon rostratus

Over rock face in bank with *Hylocomnium*.

Above with erect capsules.

Atrichum

Moss

(A' tri cum)

Favoring disturbed soil, *Atrichum* is common along hiking trails.

Habitat. On mineral or peaty soil, sometimes over rock. In dry forests and along wet stream banks.

Size. 1-5 cm tall, often in robust tufts covering extensive areas.

Distinguishing characters. Erect, unbranched stems with slender leaves; midrib covered by erect, green lamellae as seen by a hand lens. Leaves strongly twisted and contorted when dry.

Sporophytes. Frequent, 1-4 cm tall; capsule long-cylindrical, operculum with a long beak.

Approximate No. of Species in the southern Appalachians. Three.

Eastern North American Distribution. Throughout.

Atrichum beginning to dry. Upper right side has contorted leaves typical of dry plants.

Atrichum angustatum on a soil mound.

Atrichum angustatum, the common species in dryer sites. Inset shows capsule supporting a thin calyptra.

Atrichum on creek bank.

Aulacomnium — Moss

(Ah la comb' knee um)

The following description refers to *A. heterostichum,* the species most likely encountered along woodland trails.

Habitat. On soil banks and tree bases.

Size. Leafy shoots to 5 mm wide forming tufted colonies 5-20 cm in diameter.

Distinguishing characters. Broad leaves with strong midrib; leaves similar when wet or dry.

Sporophytes. Frequent, 1-2 cm tall; capsules cylindrical, leaning, with length-wise ribs when dry.

Approximate No. of Species in the southern Appalachians. Two.

Eastern North American Distribution. Throughout.

Fresh, dried capsules.

With sporophytes in the "spear" stage.

This clump of *Aulacomnium heterostichum* was at the base of a tree on a wooded slope.

The relatively broad leaves of *Aulacomnium heterostichum* are little altered when dry.

Bartramia

Moss

(Bar tray' me uh)

Named for John Bartram, an 18th century American naturalist.

Habitat. On soil banks and partially shaded rock outcrops.

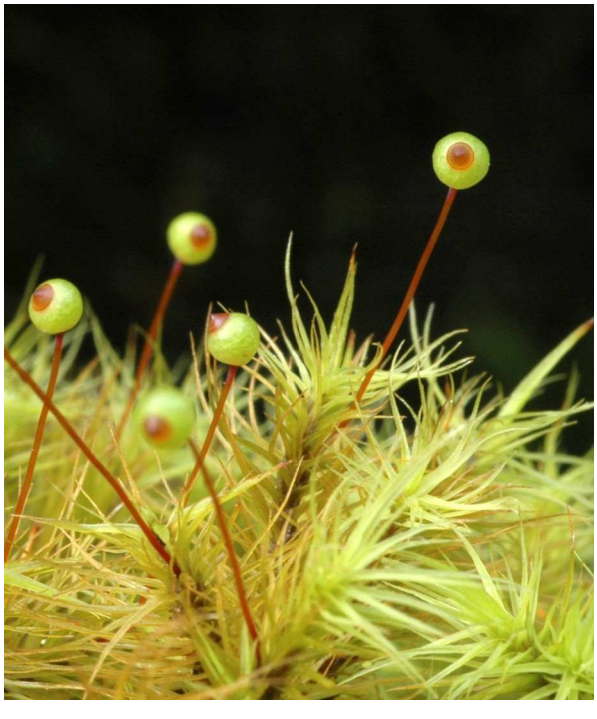
Size. Leafy shoots to 5 mm wide, erect in rounded colonies 5-20 cm or larger in diameter.

Distinguishing characters. Narrow leaves widely spreading; fresh capsules globose.

Sporophytes. Frequent, 1-2 cm tall; capsules globose with length-wise ribs when dry.

Approximate No. of Species in the southern Appalachians. One, *B. pomiformis*.

Eastern North American Distribution. Throughout.



The operculum to these fresh capsules is brownish while the urn of the capsule is green.

When dry, the slender leaves do contort.

A central clump of *Bartramia* in a rock crevice.

The leaves of Bartramia pomiformis are quite slender and rather long. The species is commonly called the apple moss for the shape of its capsule.

Brotherella

Moss

(Broth' er ell uh)

A shiny moss that produces creeping stems usually adhering to bark or humus.

Habitat. Soil, humus, stumps, logs and tree bases; more frequent at higher elevations.

Size. Branching plant to 1 cm wide, leafy shoot 1-2 mm wide, forming mats 10-20 cm or larger in diameter.

Distinguishing characters. Slender leaf tips curving downward; similar to *Hypnum* but very shiny and with somewhat flattened foliage.

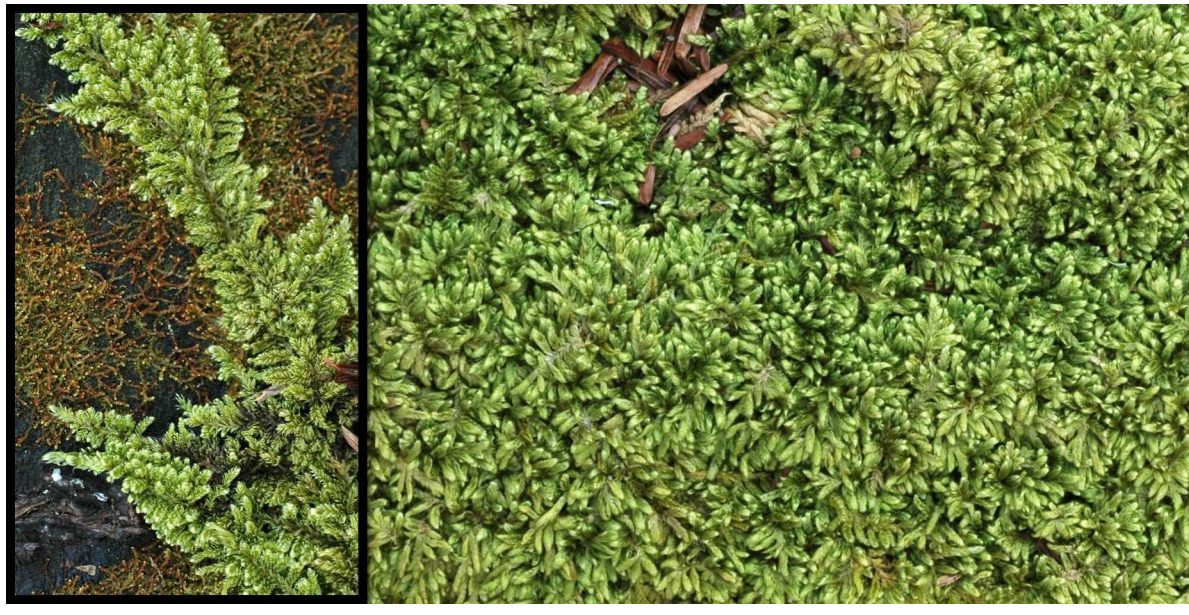
Sporophytes. Occasional, ca. 1 cm tall; capsule cylindrical, leaning; operculum with a long beak.

Approximate No. of Species in the southern Appalachians. One, *B. recurvans*.

Eastern North American Distribution. Canada to northern Alabama.

Notice the shiny and somewhat flattened nature with relatively short side branches.

Each of these old capsules has lost its lid, or operculum.



In the left image, *Brotherella* is growing with *Nowellia* (p. 24) on the top of a cut stump.

On a very rotten log.

Bryoandersonia

Moss

(Bry oh an der sew' knee uh)

The genus *Bryoandersonia* has but a single species, *B. illecebra*, and is endemic to eastern North America. Named in honor of Dr. Lewis E. Anderson (1912-2007), Professor of Botany, Duke University, whose active career in bryology spanned over 70 years.

Habitat. On soil, rock, and tree bases in many forest types.

Size. Leafy shoots to 4 mm wide, scattered or in mats 5-20 cm or larger in diameter.

Distinguishing characters. Shoots plump and cylindrical. Leaves wide and concave. Leaf apex abruptly narrows to a slender tip as seen with a hand lens. Leaf tips point towards the stem tip.

Sporophytes. Rare, 2 cm tall; seta reddish; capsule cylindrical, leaning, and with a long-beaked operculum.

Approximate No. of Species in the southern Appalachians. One, *B. illecebra*.

Eastern North American Distribution. Throughout, more common in the south.

Bryoandersonia

To some, each leaf looks like a spoon, hence the name "spoon-leaved moss."

Bryoandersonia is truly a common moss in much of southeastern U.S.

The spiral leaf arrangment of each shoot should be fairly obvious in *Bryoandersonia*. Spirally arranged leaves are difficult to perceive in mosses that have leaves flattened over the stem.

Climacium — Moss

(Cli may' see um)

The resemblance to miniature trees is striking; however, plants that grow in wet seeps may lose their erect stance.

Habitat. Soil and humus; common in grassy lawns and wet places along creeks.

Size. Plants to 7 cm tall, scattered or in colonies well over 20 cm in diameter.

Distinguishing characters. Dendroid growth form; leaves with longitudinal pleats as seen with a hand lens.

Sporophytes. Infrequent, 2-4 cm tall; seta red to brown; capsule cylindrical.

Approximate No. of Species in the southern Appalachians. One, *C. americanum*.

Eastern North American Distribution. Throughout.

Found abundantly around the lawn at the Tellico Ranger Station.

Capable of forming tall, lush carpets.

The tree-like form is best seen by looking at the plants on their level.

As seen from directly above.

Ctenidium — Moss

(Tuh neh' dee um)

Among the mosses on the floor of wooded slopes and banks, *Ctenidium* stands out as soft mats light in color.

Habitat. On soil banks and humus.

Size. Branching plant 1 cm wide, leafy shoot 1 mm wide, scattered or in mats 5-20 cm or larger in diameter.

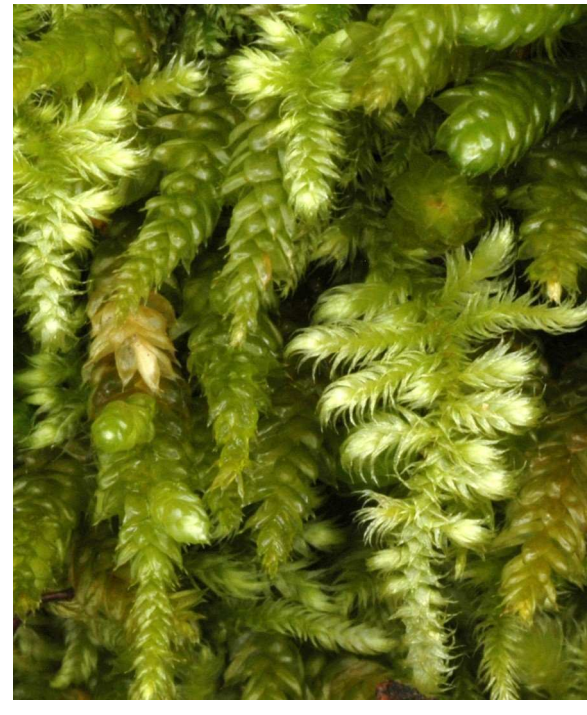
Distinguishing characters. Leaves with gradually narrowed, long tips; leaves gently curled downward; soft yellowish color with whitish shoot tips.

Sporophytes. Infrequent, 1-2 cm tall; seta red to yellow; capsule leaning.

Approximate No. of Species in the southern Appalachians. One, *C. malacodes*.

Eastern North American Distribution. Throughout.

The light colored branch tips aid in recognition.



A pinnately branched *Ctendium* at right surrounded by *Bryoandersonia*.

Scattered over soil and forest litter along a trailbank.

Pure mats are easiest to recongize.

Dicranum

Moss

(Dye' cray num)

The broom moss, *Dicranum scoparium,* is the most familiar species in the genus.

Habitat. Soil, rock, humus, logs, and tree trunks.

Size. Leafy shoots 1-10 mm wide in cushions 2-20 cm or larger in diameter.

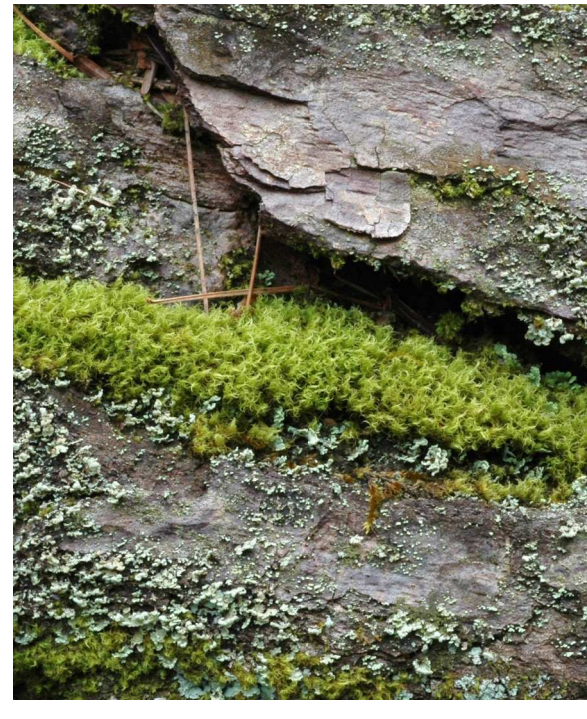
Distinguishing characters. All species have long, slender leaves and erect stems.

Sporophytes. Rare to frequent, to 3 cm tall; capsule cylindrical, erect or leaning; operculum with a long beak.

Approximate No. of Species in the southern Appalachians. Nine.

Eastern North American Distribution. Throughout.

Dicranum fulvum on rock outcrop.



Dicranum montanum in crevice of bark on a log.

Dicranum scoparium, the common "broom moss" named for the swept look of the leaves.

Dicranum flagellare on old log. Red arrow indicates a cluster of slender branches that is the key field character for identificaition to species.

Diphyscium

Moss

(Dye fiss' ee um)

The shape of the spore-producing capsule gives this moss its common name wheat grain moss.

Habitat. Soil, peaty banks, shaded rock along creeks and dry trails.

Size. Leafy shoots 2-5 mm wide, in low tufts 5-20 cm or larger in diameter.

Distinguishing characters. Vegetative leaves are dark green to blackish and curl strongly when dry.

Sporophytes. Frequent, capsule sessile, 2-3 mm wide, with sloping sides and leathery walls that puff clouds of spores through the white peristome when thumped.

Approximate No. of Species in the southern Appalachians. Two.

Eastern North American Distribution. Canada to central Alabama.

Diphyscium foliosum, our most common species. The peristome is white.

Diphyscium mucronifolium (a.k.a. *D. cumberlandianum*), shaded rock face on creek.

Diphyscium foliosum on relatively dry soil along trail bank. Right image is closeup of sporophytes found around the dark hole of the left image.

Diphysium foliosum with dark green leaves and brown capsules. Growing with *Leucobryum* on trail bank.

Ditrichum

Moss

(Dih' truh cum)

In the field *Ditrichum* is recognized by its slender sporophytes and near restriction to open, disturbed soil. The leafy shoots offer little distinction beyond the individual shoots being upright and usually crowded thus forming low tufts.

Habitat. Bare soil, road-cuts, and dry woods.

Size. Individual shoots only a few millimeters wide and a few millimeters tall, forming tufts 2-10 cm in diameter.

Distinguishing characters. Usually found on disturbed soil with some sun exposure; small linear leaves; tall slender sporophytes with cylindrical capsules.

Sporophytes. Frequent, 1-4 cm tall; capsule cylindrical erect or leaning.

Approximate No. of Species in the southern Appalachians. Five.

Eastern North American Distribution. Throughout.

Many mosses not treated here have small narrow leaves similar to *Ditrichum* leaves.

Ditrichum on a soil mound along woodland trail.

Clumps of *Ditrichum* are best recognized by their cluster of tall sporophytes.

Scattered clumps of *Ditrichum* under pines at Starr Mountain.

Fissidens

Moss

(Fis' uh dens)

Species of *Fissidens* vary from minute to robust in size, but all have the same generic look. For reasons explained below, *Fissidens* is commonly called the pocket moss.

Habitat. Soil, rock, tree bark, a few are aquatic in small creeks, large rivers, and still waters.

Size. Leafy shoots <1 – 5 mm wide, scattered or in patches 1-20 cm or larger in diameter.

Distinguishing characters: Leaves in two rows, on either side of the stem. Most species have a strong midrib in each leaf. When very dry, the leaves tend to shrivel and curl at their tips. As seen with a hand lens and transmitted light, each leaf base has two blades of leaf tissue (the pocket) that clasp the stem and sometimes the base of leaf above.

Sporophytes. 1-10 mm tall; capsule short-cylindrical, erect or leaning; seta red to yellow. Peristome teeth often bright red.

Approximate No. of Species in the southern Appalachians: 16.

Eastern North American Distribution. Throughout.

Fissidens subbasilaris is common on tree trunks.

Fissidens subbasilaris.

Fissidens dubius on moist rock along a road bank. This species is also common at tree bases near ground level.

A small *Fissidens* on soil along a woodland trail.

Forrstroemia — Moss

(For stree' me uh)

A soft moss found on tree trunks, often with *Leucodon* with which it shares a similar growth habit. *Leucodon,* however rarely branches in its aerial shoots while *Forrstroemia* bears a number of branches in fan-like fashion.

Habitat. On bark of hardwood trees.

Size. Leafy shoots ca. 1 mm wide; branches extend several centimeters away from tree trunk and form extensive patches.

Distinguishing characters. Branching stems arch away from the tree trunk. Leaves narrow to a pointed tip.

Sporophytes. Usually present, short (up to 5 mm long), capsule light brown, extending just beyond the subtending leaves.

Approximate No. of Species in the southern Appalachians. One, *F. trichomitria.*

Eastern North American Distribution. Throughout, very common in the south.

Forrstroemia on a small tree.

As seen from above with a few mature capsules.

The closeup at right maturing and mature sporophtes.

The calyptra is light in color as seen in the lower mid portion of the photo above.

Grimmia

Moss

(Grim' me uh)

A dark moss with upright shoots growing on rock.

Habitat. Rock, including man-laid stone, large boulders in open areas along streams, and rock exposures on mountain summits.

Size. Leafy shoots 1-3 mm wide, in tufts 1-10 cm in diameter, coalescing to cover extensive areas.

Distinguishing characters. Dark color (deep green, brown, or blackish), erect shoots growing on rock; some species with a silvery gray sheen.

Sporophytes. Frequent, 2-4 mm tall, often hidden by leaves; capsule cylindrical or cup-shaped, calyptra smooth.

Approximate No. of Species in the southern Appalachians. Five.

Eastern North American Distribution. Throughout.

Grimmia on stone along the side of a bridge.

A closer view of the *Grimmia* (left) showing peristome and masses of yellow spores.

Grimmia covering large areas of rock along the Tellico River.

The white tips of many leaves impart a gray surface to this otherwise dark *Grimmia*.

Haplohymenium — Moss

(Hap low high' men ee um)

Of the many mosses that occur on tree trunks, *Haplohymenium* stands out in loose patches that are dull and composed of many small, wiry shoots when dry.

Habitat. On bark of hardwood trees.

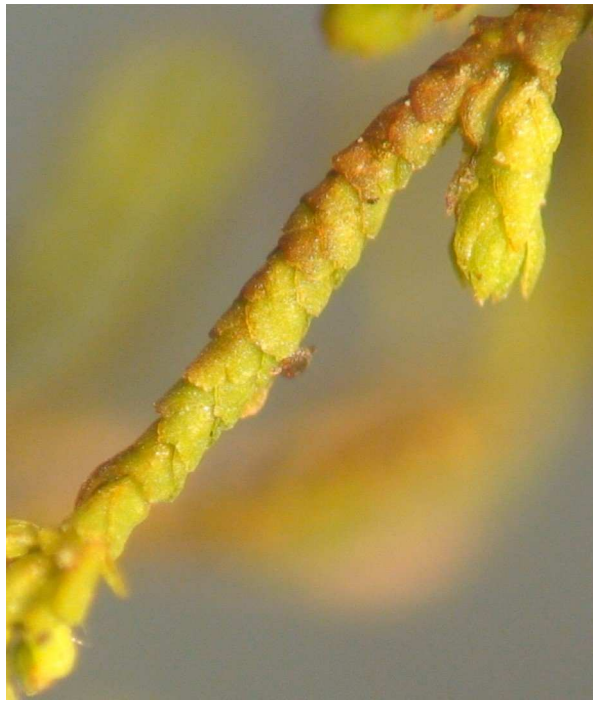
Size. Leafy shoots <1 mm wide, scattered or in patches 1-10 cm in diameter.

Distinguishing characters. Wiry plants when dry in loose mats on tree trunks. As seen with a hand lens, many leaf tips are broken off and the remaining leaf base is squared off at the line of fracture. The broken leaf tips function as gemmae (clonal reproduction).

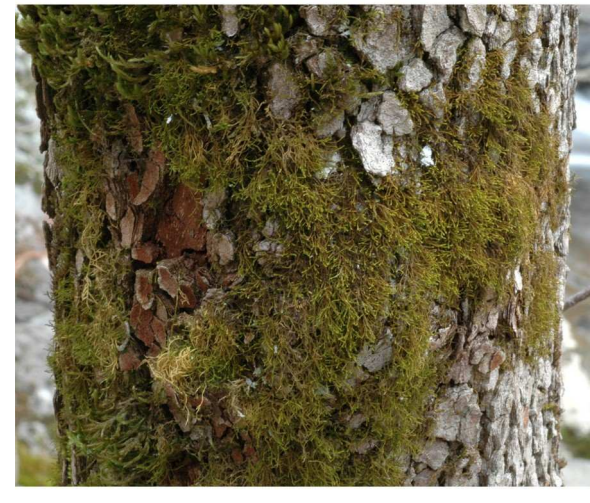
Sporophytes. Not known to occur regionally.

Approximate No. of Species in the southern Appalachians. One, *H. triste*.

Eastern North American Distribution. Throughout.



A magnified view showing appressed leaves, each with a broken tip.



On dogwood along the Tellico River.

Haplohymenium when dry.

Haplohymenium when wet.

Hedwigia

Moss

(Head wig' ee ah)

The genus *Hedwigia* has but a single species, *H. ciliata,* and occurs throughout much of the world, i.e. it is cosmopolitan in distribution. *Hedwigia* is named for Johannes Hedwig (1730-1799), German bryologist who created the first standard reference for the scientific names of mosses.

Habitat. Rock outcrops, man-made rock walls and rooftops.

Size. Leafy shoots 1 mm wide, spreading to 2 mm wide when wet; in isolated rounded mats a few centimeters in diameter or forming extensive cover over exposed rock.

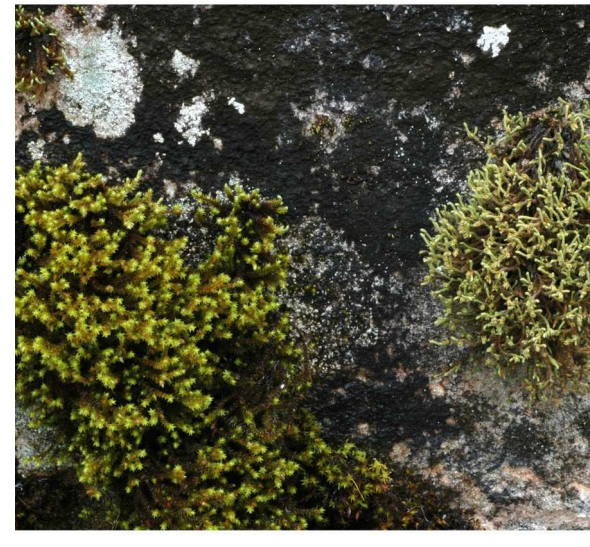
Distinguishing characters. Leaf tips end in a long, clear point as seen with a hand lens; shoots appear dramatically different when wet versus when dry.

Sporophytes. Usually present, very small (ca. 1 mm) and concealed by surrounding leaves.

Approximate No. of Species in the southern Appalachians. One, *H. ciliata.*

Eastern North American Distribution. Throughout.

A capsule hidden by leaves at red arrow.



The left clump on the face of this vertical rock wall was sprayed with water.

The top lip of this rock wall is nearly pure *Hedwigia*. The right image is partially hydrated.

Hedwigia when dry.

Same clump when wet.

Heterophyllium — Moss

(H'eh ter o fill' ee um)

Heterophyllium is a pretty moss most commonly found in moist, shady hemlock coves heavy with evergreen rhododendron.

Habitat. Rotten wood, tree bases and especially large trunks of *Rhododendron maximum* in stream ravines.

Size. Leafy shoots 1-2 mm wide, forming mats 10-20 cm or larger in diameter.

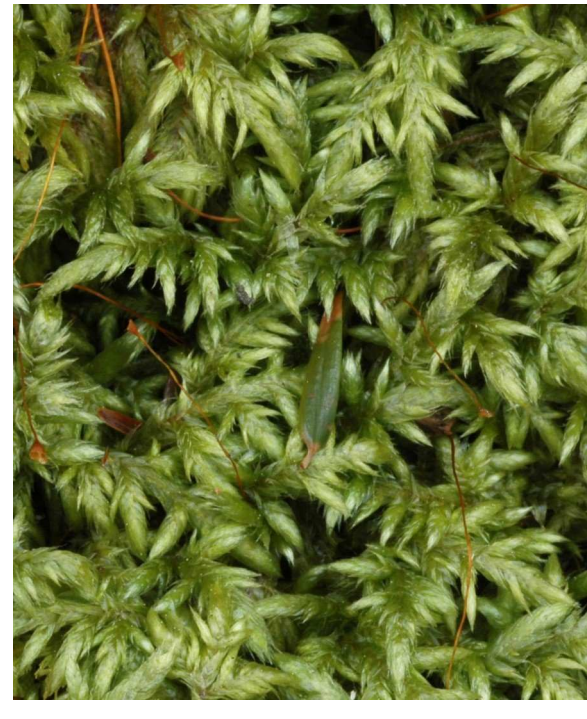
Distinguishing characters. Shiny, yellow-brown color; restriction to moist, shady sites.

Sporophytes. Frequent, 2.5-4.5 cm tall; capsule cylindrical, curved and leaning with a conic operculum (shaped like a Hershey's Kiss chocolate).

Approximate No. of Species in the southern Appalachians. One, *H. affine*.

Eastern North American Distribution. Mountains of Virginia to northern Georgia.

On log under rhododendron.



Notice the shiny foliage with tapering, pointed branches.

Heterophyllium atop a limb of *Rhododendron*.

Large mat of *Heterophyllium* on very rotten log along trail. Inset shows mature sporophytes.

Hookeria

Moss

(Hook err' ee uh)

You are not likely to see this distinctive moss unless you peer into the crevices of rock overhangs or scramble and stoop through tangled vegetation to examine the banks of shaded streamlets.

Habitat. Wet rock and soil in shaded crevices and deeply shaded creek banks.

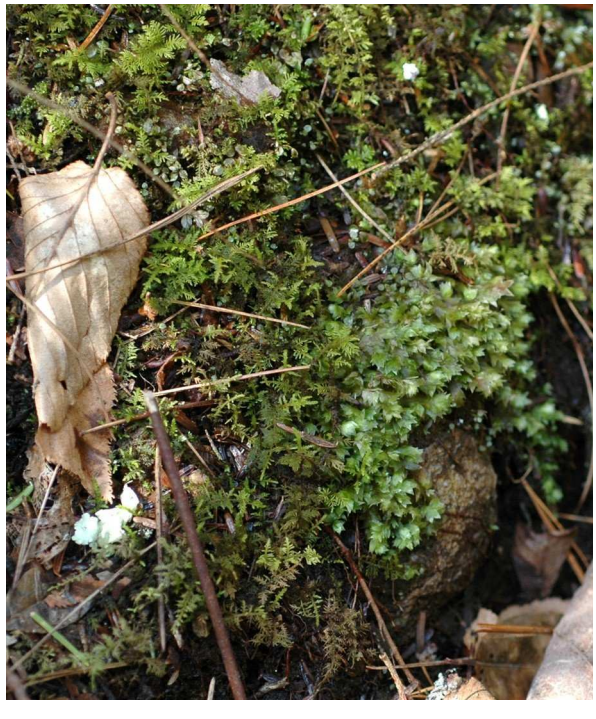
Size. Leafy shoots to 7 mm wide, scattered or in mats 2-10 cm in diameter.

Distinguishing characters. Flattened shoots with broad leaves tapering to a point; cells of leaves large and easily seen with a hand lens.

Sporophytes. Rare, not seen, to 1.5 cm tall, seta reddish, curvy; capsule leaning to pendent.

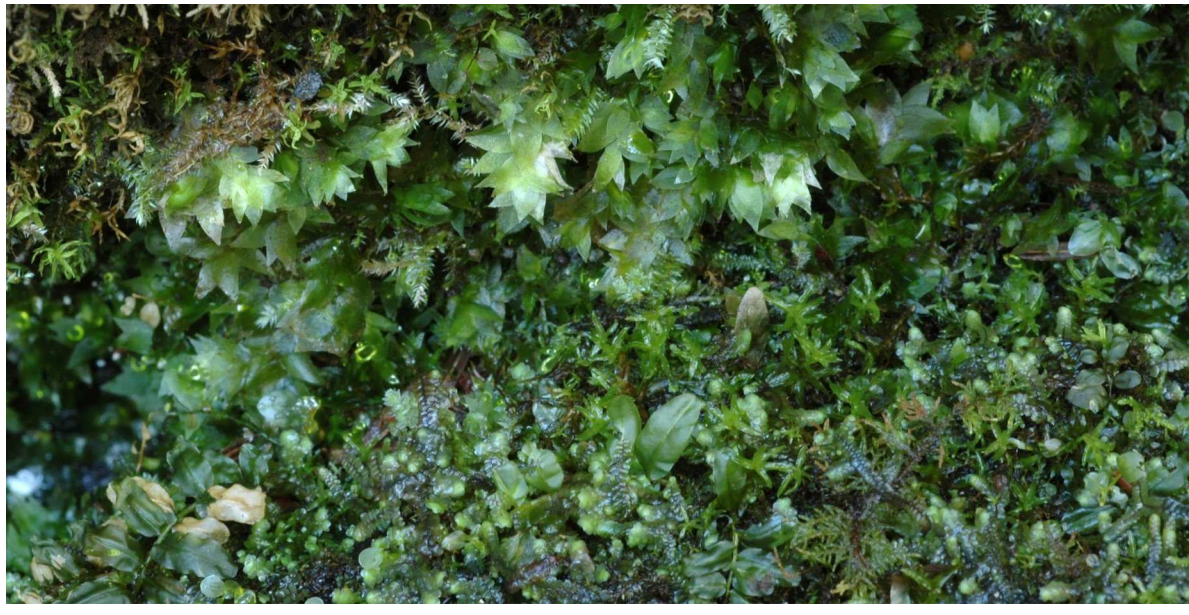
Approximate No. of Species in the southern Appalachians. One, *H. acutifolia*.

Eastern North American Distribution. Connecticut to Alabama, chiefly in the mountains.



Hookeria is located in the right half of the image above. Creek bank.

Closeup showing distinctive foliage.



Hookeria is the large moss in the upper part of the image. *Jubula* (p. 16) is abundant in the lower portion of the image. Wet crevice of large rock outcrop in creek bank.

Hookeria with a bit of *Thuidium*.

Hylocomium — Moss

(High low comb' me um)

The following account is for *Hylocomnium brevirostre,* the most regionally abundant species in the genus.

Habitat. Covering rock, humus, soil, and logs .

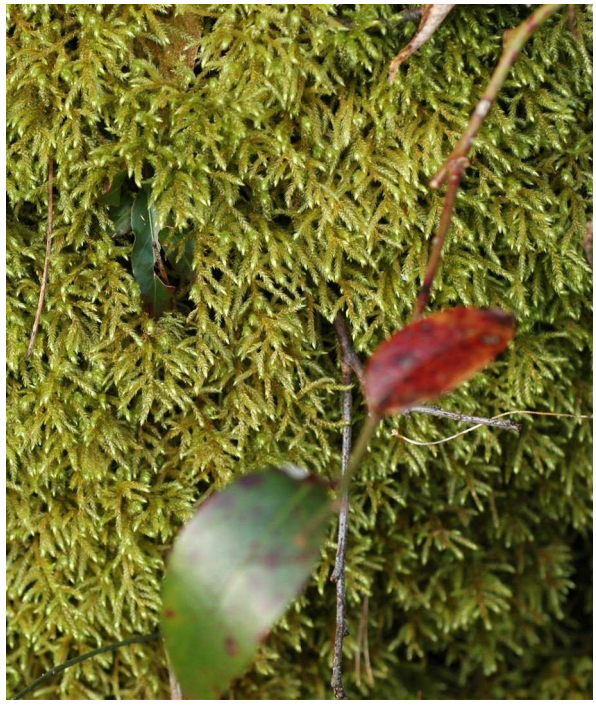
Size. Branching plant to 4 cm wide, leafy shoots 1-2 mm wide, often covering extensive areas.

Distinguishing characters. Large, coarse moss, with reddish stems, irregularly pinnately branched. Leaf tips are slender and pointed.

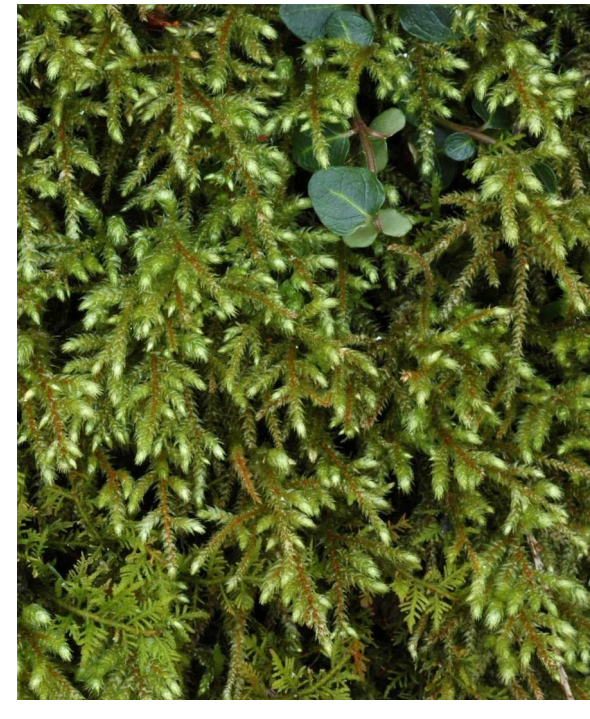
Sporophytes. Occasional, 2-3 cm long; capsule cylindrical and leaning.

Approximate No. of Species in the southern Appalachians. Three.

Eastern North American Distribution. Canada to Tennessee.



Found along shaded rock outcrops along the Tellico River.



A bit of admixed *Thuidium* is in the lower left corner.

Hylocomium concealing a rock in a trailbank.

Closeup showing the reddish stems that are mostly hidden by the leaves.

Hypnum — Moss

(Hip' numb)

The following account is for *H. curvifolium* and *H. imponens,* both species are common log mosses harvested for use in the florist industry.

Habitat. Soil, rock, logs and tree trunks.

Size. Branching plant 1 cm wide, leafy shoots 1-2 mm wide, often covering extensive areas.

Distinguishing characters. Leaves are strongly curved in the same direction; leaf tips are narrow. Branching is pinnate.

Sporophytes. Frequent, 1-4 cm tall; capsule cylindrical curved and leaning or nearly straight and erect.

Approximate No. of Species in the southern Appalachians. Six.

Eastern North American Distribution. Throughout.

Hypnum imponens. Note erect capsule in the inset.

Hypnum curvifolium. Note the leaning capsule in the inset.

A mat of *H. imponens* (left) artificially placed next to *H. curvifolium*. *Hypnum imponens* forms denser cushions than *H. curvifolium* and with practice can be readily distinguished vegetatively.

Hypnum, the classic "log moss" of the southern Appalachains.

Leucobryum — Moss

(Lew co' bry um)

As the name suggests, *Leucobryum* is a whitish moss. It is commonly called the pincushion moss due to its growth form.

Habitat. Soil, rock, tree bases (including pines), rotten wood in dry or wet places; common along trail banks.

Size. Leafy shoots 2-8 mm wide, forming small to robust cushions 3-10 cm or larger in diameter.

Distinguishing characters. Cushion growth form; leaf margins broadly inrolled nearly forming a tube in the upper half of each leaf as seen with a hand lens.

Sporophytes. Occasional, 10-15 mm tall; capsule leaning and curved when mature; operculum with a long beak.

Approximate No. of Species in the southern Appalachians. Two.

Eastern North American Distribution. Throughout.

Leucobryum glaucum (above) is a larger species than *L. albidum* (facing page).

Leucobryum glaucum (above) occurs in wetter sites than *L. albidum* (facing page).

Leucobryum albidum on trail bank. Young sporophytes (right) as appearing in December.

Often over dry soil, *Leucobryum albidum* form distinctive "pin cushions."

Leucodon

Moss

(Lew' co don)

An easy genus to recognize. Our two common species are similar. *Leucodon brachypus* is most common at higher elevations 4000-5000 ft.; *Leucodon julaceus* is the common lowland species.

Habitat. Tree trunks and logs with bark, rarely on rock; often in drier woods.

Size. Leafy shoots 1 mm wide spreading to 3 mm wide when wet; in small to robust patches 1-20 cm or larger in diameter.

Distinguishing characters. Aerial shoots mostly unbranched, curved upward when dry.

Sporophytes. Occasional, short, <10 mm long; capsule oblong-rounded, often hidden or barely projecting beyond the leaves.

Approximate No. of Species in the southern Appalachians. Three.

Eastern North American Distribution. Throughout.

Leucodon julaceus when dry.

Same *Leucodon julaceus* sprayed with water.

Leucodon brachypus with capsules. Capsule at lower left has lost its operculum revealing the small capsule opening through which spores must exit. The upper-most capsule has a calyptra.

Leucodon with typical curling form of leafy shoots.

Mnium

Moss

(Nigh' um)

The genus as treated here has been divided into several different genera by modern taxonomists (*Mnium, Plagiomnium, & Rhizomnium*).

Habitat. Soil, rock, tree bases, logs, lawns, creek banks, and wet seeps.

Size. Leafy shoots 2-10 mm wide, scattered or in mats 5-10 cm or larger in diameter.

Distinguishing characters. Broad leaves with strong midrib; most species have teeth along the leaf margin as seen with a hand lens. Leaves shrivel and contort when dry. Stems may be erect or horizontal.

Sporophytes. Frequent, 1-5 cm tall; capsules cylindrical, pendent.

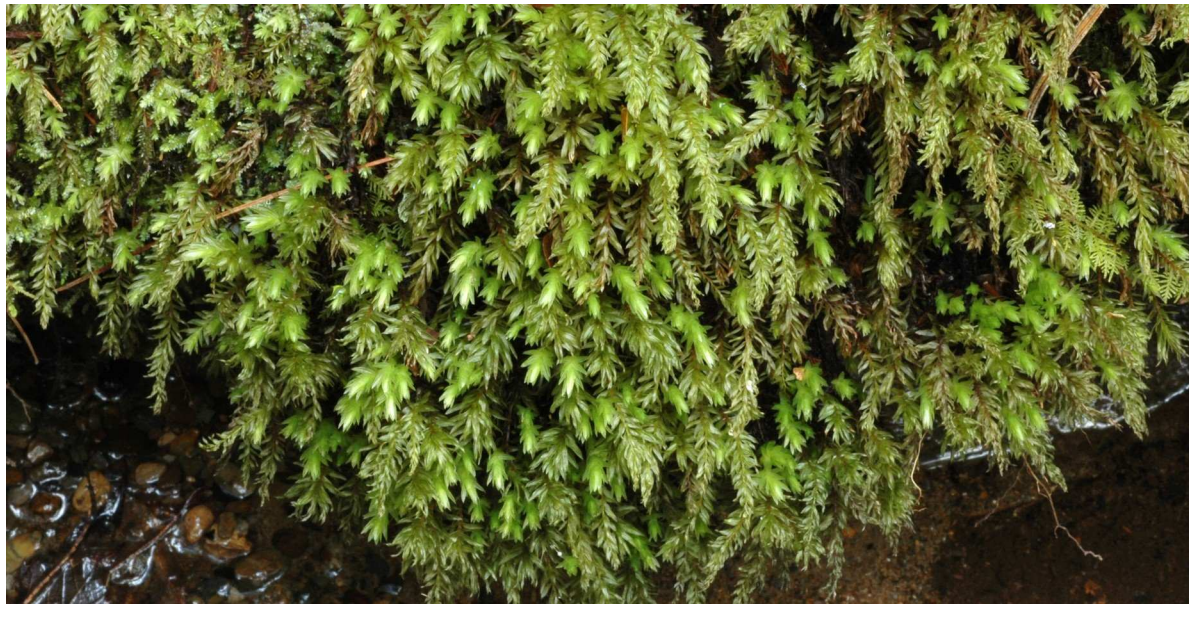
Approximate No. of Species in the southern Appalachians. 10.

Eastern North American Distribution. Throughout.

Mnium (Plgiomnium) ciliare, on soil in moist, shaded bank.

Mnium (Rhizomnium) punctatum, wet rock in creek.

Mnium (Plagiomnium) cuspidatum on soil. As in all Mniums the capsules are pendent.



Mnium (Mnium) hornum on soil at margin of creek.

Neckera

Moss

(Neck’ er uh)

The following account is for our common species *Neckera pennata*.

Habitat. Tree trunks, especially at higher elevations.

Size. Leafy shoots 2-4 mm wide, scattered or in mats 5-20 cm or larger in diameter.

Distinguishing characters. Flattened, shiny shoots in tiered shelves; leaves undulate.

Sporophytes. Frequent, but inconspicuous, ca. 2 mm long; capsule hidden by surrounding leaves.

Approximate No. of Species in the southern Appalachians. Two.

Eastern North American Distribution. Canada south to Tennessee.

Notice the undulations or washboarding across the shiny leaves.

A capsule nearly concealed by leaves is near the center of the image above.

The large, flat, frondose shoots are distinctive.

Neckera pennata on trunk of large buckeye tree.

Philonotis

Moss

(Fill uh no' tus)

A moisture loving moss that sheds water like the feathers of a duck.

Habitat. On rock and soil in wet places, seepy outcrops and soil banks.

Size. Leafy shoots 1 mm wide, scattered or in extensive patches.

Distinguishing characters. Leaves reluctant to get wet, shedding water. Relatively long, narrow, pointed leaves. Stems often reddish.

Sporophytes. Infrequent, to 5 cm tall; capsule globose, leaning.

Approximate No. of Species in the southern Appalachians. Five.

Eastern North American Distribution. Throughout.

Water beading on the plants above attest to water shedding properties.

Reddish stems show through in places in the image above.

A mat growing over very wet rock in a recessed bluff base.

Large mats of *Philonotis* over wet rock along a steep bank.

Platygyrium — Moss

(Pla dee jeer' ee um)

This nondescript moss is one of the most common mosses on dry trees and logs. It has been called the dirty-green moss. Its color and growth form make it recognizable from a distance.

Habitat. On tree trunks, fallen limbs and logs; dry ridges to moist ravines.

Size. Leafy shoots 1 mm wide, scattered or in mats 5-10 cm or larger in diameter.

Distinguishing characters. Dirty-green color in older portions of mat, shoots around the perimeter often shiny; clusters of minute branchlets borne on erect shoots are diagnostic but require a hand lens to see.

Sporophytes. Frequent, 1-2 cm tall; seta reddish; capsule cylindrical, erect.

Approximate No. of Species in the southern Appalachians. One, *P. repens*.

Eastern North American Distribution. Throughout.

Platygerium above a mat of the liverwort *Lophocolea*.

Platygerium on bark of a log.

The inset at lower right attempts to show the numerous minute branchlets that function for asexual reproduction.

The dirty green color is distinctive for this common moss seen above on bark of rotting pine limb.

Pogonatum

Moss

(Poe go nay' tum)

The following account is for *Pogonatum pensilvanicum*—the common species in the southern Appalachains. Though the leafy part of the moss is hardly ever seen, microscopic green filaments cover extensive areas of soil making *P. pensilvanicum* one of the easier mosses to find and recognize.

Habitat. Exposed mineral soil on steep banks, soil mounds, and trail-sides.

Size. Leafy shoots inconspicuous, scattered, only a few millimeters tall. Microscopic green filaments cover patches of soil 10-20 cm and much larger in diameter.

Distinguishing characters. Extensive cover over soil of velvety green microscopic filaments.

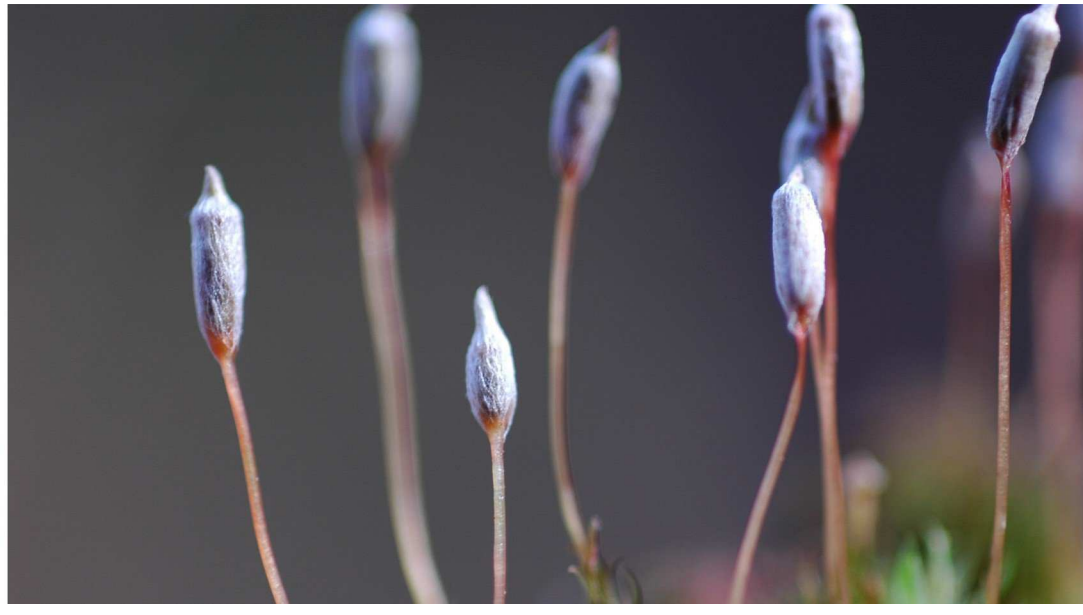
Sporophytes. Frequent, 1-4 cm tall; capsule cylindrical, maturing capsule completely covered by a hairy calyptra.

Approximate No. of Species in the southern Appalachians. Two.

Eastern North American Distribution. Throughout.

The dense covering of microscopic green filaments has a distinctive look (green felt?).

A pine needle for scale shows the small size of the erect leafy shoots (5 shoots visible).



In *Pogonatum*, the hairy calyptra covering the capsule attests to its family relationship with *Polytrichum*, the hair-cap moss.

Exposed roots in this trail bank are a sign of recent disturbance to the soil. At this scale, *Pogonatum* is a successful colonizer of newly exposed soil.

Polytrichum

Moss

(Puh li' truh cum)

Polytrichum is a close relative of *Atrichum.* Both have rather long, narrow leaves and tall erect stems. The leaves of *Polytrichum* are thicker and reminiscent of juvenile red cedar foliage. *Polytrichum* leaves don't twist and contort so strongly when dry as do the leaves of *Atrichum.*

Habitat. Dry or wet places, on mineral or organic soil, rocky cliffs, low flat woods, and fields.

Size. Leafy shoots 1-2 cm wide, scattered or in patches over 20 cm in diameter.

Distinguishing characters. Long, slender leaves with pointed tips on tall, unbranched stems; leaves with midrib covered by erect and densely-packed green lamellae as seen with a hand lens.

Sporophytes. Frequent, 2-10 cm tall; capsule elongate, somewhat to strongly box-shaped with flat sides, covered by a hairy calyptra while maturing, nearly erect or strongly leaning.

Approximate No. of Species in the southern Appalachians. Six.

Eastern North American Distribution. Throughout.

In late March, a *Polytrichum* with juvenile sporophytes, capsules not yet formed.

Shoots in the upper part of the above photo have dried and repositioned their leaves.

Polytrichum commune. Hairy calyptrae cover most capsules on the left. The capsule on the right (inset) had the calyptra removed.

A little forest of pine-like *Polytrichum* growing on soil along a woodland trail.

Rhodobryum

Moss

(Row doe bry' um)

Commonly called the "rose moss."

Habitat. Base of trees, humus, and humus over rock.

Size. Leafy shoots 1-2 cm wide, usually in patches 10 cm or more in diameter.

Distinguishing characters. The large rose-like, green leafy heads atop leafless stalks are highly distinctive. Leaves have a strong midrib.

Sporophytes. Occasional, 2-4 cm tall; capsules cylindrical, pendent.

Approximate No. of Species in the southern Appalachians. One, *R. ontariense*.

Eastern North American Distribution. Canada to northern Alabama.

The spiral leaf arrangement typical of mosses is clearly visible in the photo above.

At tree bases, the smaller moss *Anomodon attenuatus* is a common associate.

The oak leaves give a perspective on size. *Rhodobryum* is a large moss.

The broad leaves visible above will darken and shrivel during droughts.

Sphagnum

Moss

(Sphag' num)

Sphagnum is a distinctive moss singular in its economic importance as peat moss.

Habitat. Creek banks, wet seeps, bogs.

Size. Main shoots 1-3 cm wide, in mats 10-20 cm and much larger in diameter.

Distinguishing characters. Terminal clusters of branchlets create a distinctive head atop each main shoot.

Sporophytes. Occasional; capsule globose, elevated a few millimeters above leaves; no peristome.

Approximate No. of Species in the southern Appalachians. 20.

Eastern North American Distribution. Throughout.

Tetraphis

Moss

(Teh' tra fiss)

A small moss that, once the habitat is appreciated, is easily recognized.

Habitat. Rotten logs, stumps, peaty soil, and rock in deep shade.

Size. Leafy shoots 1 mm wide, scattered or in patches 10-20 cm or more in diameter.

Distinguishing characters. The near restriction to rotten wood combined with the erect growth form in dull green to brownish tufts.

Sporophytes. Frequent, <2 cm tall; capsule cylindrical, erect, bearing four peristome teeth as seen with a handlens.

Approximate No. of Species in the southern Appalachians. One, *T. pellucida*.

Eastern North American Distribution. Canada to northern Alabama.

Capsule still covered by calyptra. Inset of an older capsule without calyptra and operculum.

Note the midrib in the leaves. Inset of a gemmae cup with bright green gemmae.

Younger light green *Tetraphis* visible at very top middle of image above. Older plants are darker and bear abundant brown sporophytes.

Large masses of *Tetraphis* on the shady sides of a rotten log.

Thelia

Moss

(Thee' lee uh)

Thelia is unique in its short, uniform branches arising at right angles from the main stem.

Habitat. On tree trunks and tree bases.

Size. Branching plants ca. 5 mm wide, scattered or in mats 10-20 cm or more in diameter.

Distinguishing characters. Once pinnately branched with uniform side branches. Though small the branches are plump and cylindrical.

Sporophytes. Occasional, 1-3 cm tall; capsules cylindrical, erect.

Approximate No. of Species in the southern Appalachians. Two.

Eastern North American Distribution. Throughout.

Note the cylindrical side branches and prostrate main stem.

Thelia on a tree trunk.

Running horizontally across a tree trunk.

Thelia often runs vertically up tree trunks from the base of the tree.

Thuidium

Moss

(Thu id' ee um)

The following account is for *Thuidium delicatulum,* by far the most locally common species in the genus.

Habitat. Soil, rocks, logs, and tree bases; along creeks, trails, and in lawns.

Size. Branching plants to 1 cm wide, scattered or in mats 20 cm or larger in diameter.

Distinguishing characters. Fern-like shoots, twice pinnate branching, with individual leaves scarcely visible to the naked eye.

Sporophytes. Frequent, 2-5 cm tall; capsule cylindrical, leaning (inclined).

Approximate No. of Species in the southern Appalachians. Three.

Eastern North American Distribution. Throughout.

Thuidium with a bit of dark green and pine-like *Polytrichum*.

Leaves are so small as to be hardly visible. The fine divisions above are branchlets.

The fern-like *Thuidium* growing with the "tree moss" *Climaceum*.

Wet *Thuidium* along a stream. The twice pinnate branching is nicely illustrated.

Ulota

Moss

(You low' tuh)

Ulota crispa is our common species and one of the easiest mosses to recognize.

Habitat. On tree trunks and tree limbs.

Size. Leafy shoots 1-2 mm wide forming rounded tufts 1 – 4 cm in diameter.

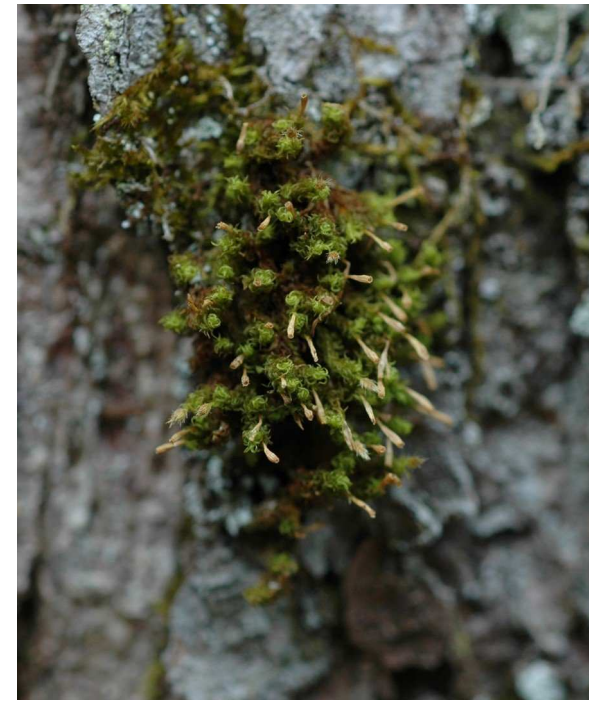
Distinguishing characters. Leaves strongly curled; rounded tufts on bark, almost always with capsules.

Sporophytes. Usually present, short (< 5 mm long); capsules cylindrical with length-wise ribs when dry, covered by a hairy calyptra when young.

Approximate No. of Species in the southern Appalachians. Three.

Eastern North American Distribution. Canada to northern Alabama, mostly in the mountains.

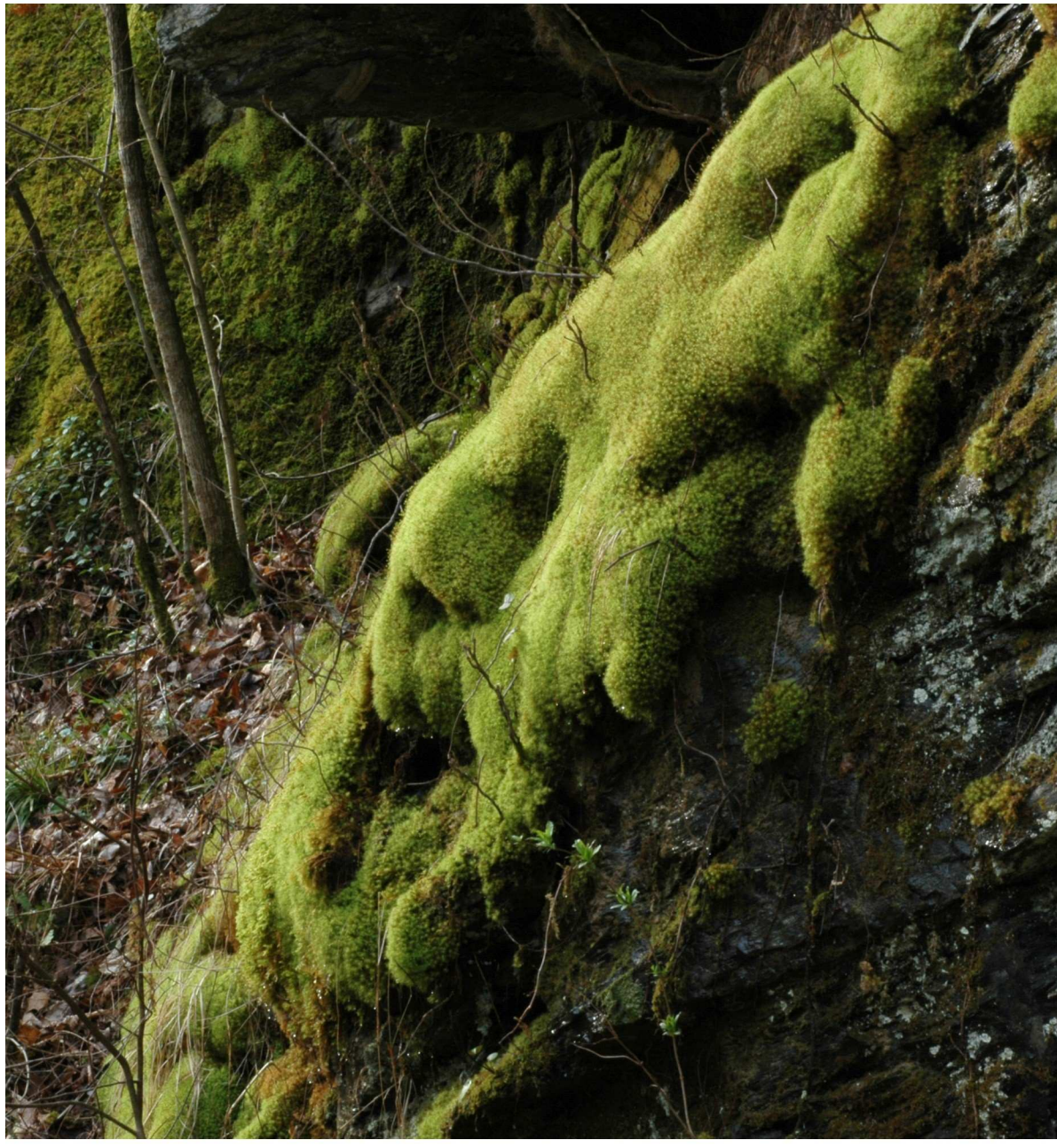
Small clumps of *Ulota crispa* on a tree.



A typical, though not very photogenic, expression.

Inset at left shows crisped leaves, hairy calyptra, and old capsule with length-wise ribs.

Young capsules partially obscured by hairy calyptrae.




blurb

Front Cover: The "pocket moss" *Fissidens.*

Below: The liverwort *Conocephalum.*

Front and back cover photographs by Mark J. Pistrang