

Learning our Mosses

At Crockett Cove Woods, Barred Island Preserve and Shore Acres these common in Maine mosses can be found without leaving the trail. A 10x hand lens or a smart phone with or without a snap-on macro lens is handy, but a microscope is not necessary. When you have identified the moss specimen close up, you will soon develop a knack for recognizing the moss from as far away as you can see it, once you” get your eye in” as the Brits call it. You become conscious of the appearance of a patch of moss according to its color and texture and the look of wet or dry moss which can differ. Bryologists have traditionally often settled for identifying a moss to genus so we here do not always go to species. Learning the Latinized names is a challenge and there is not universal agreement on common names in English for many of our mosses. To help you remember what you have learned, we offer information on the Latin and Greek derivation of scientific names as well as common and personal “nicknames.”

Princeton Field Guide Series: *Common Mosses of the Northeast and Appalachians*, by Karl McKnight *et al.*

Cornell University Press: *Mosses, Liverworts and Hornworts, A Field Guide to Common Bryophytes of the Northeast* by Ralph Pope.

Books on bryophytes divide the mosses into three groups- Acrocarps, Pleurocarps and Sphagnum. (Pope also includes in his field guide some liverworts and a hornwort, which are also included in the term “bryophyte”.) To determine structure, you would probably have to pull the moss up and we are aiming to identify just by looks after you initially learn and confirm easy identifying characteristics. While it may be helpful to know which half of the book to begin looking in, most moss photographs are not where you need to start.

Much of the prose which follows in this activity is not scientific, but rather it is intended to help you create your own mnemonic devices. You will need to learn the scientific name, some sort of common name, as well as any significant characteristics of color, texture, appearance wet or dry, and possible habitat clues and figure how to remember them as you are out for your walk around our Island. Wise is the would-be naturalist who uses time indoors with field guides to learn what to look for—and how to remember it.

Why wet or dry? You will come to be amazed at the amount of motion in mosses. They curl up when dry, close the mouth of their spore capsules, open up when the humidity is high enough—and all in a remarkably short time span. You may even want to carry a spray bottle with you when we have drought conditions so you can see what a given moss looks like when it is not desiccated. This also means that if you collect specimens and look at them later after they have dried up, you can wet the moss and almost before you can believe it the specimen will rehydrate, assuming a different color and posture. Try it!

Acrocarp: spore capsule at the upright tips. Picture a group of business executives packed

into an elevator. A gunman steps in and orders “hands up” and all the Starbucks cups are now aloft. These are mosses that form characteristic tufts.

Pleurocarp: spore capsule arising inconspicuously along side branches. Picture a gangly teen loafing on a couch with soft drink can in hand. These are mosses that form often extensive mats on our forest floors, covering logs, and rocks, even creeping up tree trunk bases.

And sphagnum: we might call these the Mop Heads. In other words, the densely clustered branch tips form a pom-pom-like capitulum. We have about 40 of more than a 100 sphagnum species in our area, but many are difficult to identify, even with a microscope.

The sphagnum group is recognizable by the shaggy mop-like clustered leaves which are often a translucent pale green due to their large water-filled cells. In winter or in full sun many of these mosses are characterized by red color. There are several species the beginner can fairly confidently identify just by walking by them, but the sphagnums are rather “intermediate level” so we leave them till last.

CARPETS

1. *Pleurozium schreberi* - Schreber’s (red feather) moss, pleur = side. This is a great moss to begin with. The species is named for Johann Christian Daniel von Schreber, German biologist, student and colleague of Linneaus. In her 1907 book *Mosses and Lichens*, Nina L. Marshall says of Schreber “In a quaint little pamphlet printed in 1770, he praises the invention of lenses which make it possible to see the tiny mosses as if they were of grater stature, and says that the ancients spoke well and wisely when they said “Nature is never more perfect than in small things.” Not only is common moss not to be under-appreciated, but the beginner learns from the start that though tiny, mosses are fascinating but a high power magnification is eventually going to be recommended. Mosses have very intricate and interesting cell structure but that is for a lab day, another time and place.

Schreber’s moss covers any reasonably dry forest floor here. At Crocket Cove Woods, just before you enter the preserve, cross the road and see the carpet of Shreber’s. Light green somewhat golden branch tips, prominent red center stems. This moss forms impressive sheets at Barred Island.



Pleurozium schreberi

2. *Hylocomium splendens* – *hyle* = forest, *kommotes* = beautifier, *splendens* = glittering. Stair-step moss is a great second moss species to learn, recognizable by its fluffy, upright texture. Stem shoots step up from the base layer of shoots. Doubly and triply pinnate fronds are feathery, only roughly triangular in outline, as opposed to the neat shapes of *Thuidium* and *Ptilium* (see below). Very plentiful at Shore Acres where it may share boulders, logs and forest floor with either or both Schreber's or Brocade.



Hylocomium splendens

Thuidium delicatulum could be mistaken for a *Hylocomium* as it also has doubly-pinnate

branches (the branches have branches) but it does not have any stair-stepping branches ascending vertically. *Thuja*= cedar tree, commonly called Delicate Fern Moss. You can see the neat flat triangle shapes as tiny cedars or ferns.

Ptilium crista-castrensis- The common name Knight's Plume is a straight translation of the name that Linnaeus gave this lovely moss. Upright but not stair-stepped plumes are diamond shaped, neatly tapering at both top and bottom of the frond. *Thuidium delicatulum* tapers in a triangle.

3. *Hypnum imponens*- *Hypnum* = a Greek word for a moss, possibly related to pillow stuffing, dreaming, same root as gives us the word hypnosis. Brocade moss is the next logical moss to learn, recognizable by its silky sheen and slightly golden-orange cast. Individual strands of slightly overlapping leaves on reddish stems look like tightly braided embroidery floss. Note that the pinnate branching stops well short of the stem tip giving the overall triangles a rather scrawny top.



Hypnum imponens

Hypnum pallescens- *pallescens* = pale. Treeskirt or Lesser Brocade glossy light green satin strings hanging on tree bases.

TUFTS

1. *Leucobryum glaucum*- *leuco* = white, *glaucum* = white. Pincushion moss is recognizable by its pale color. Usually it forms neat raised circular tufts. Red squirrels often tear them apart.

2. *Dicranum scoparium* – *dicranum* two-tined fork (the teeth on the capsule), *scoparium* broom. Windswept moss is a dark green and looks as if it was swept in one direction with a broom or bush. If there are new spore capsules that still have their protective coverings, they may look like bills of ducks, perhaps all headed one way.



Dicranum scoparium

Dicranella = little *Dicranum*. Very common on the sides of our trails, this looks like a miniature version of *Dicranum*.



Dicranella

3. *Polytrichum commune*- *poly* = many, *trichum* = hair. Common Hair-cap spore capsules are common and distinctively covered with a dense layer of silvery hairs. It is most satisfying to pluck one and carefully pluck off the shaggy veil of hairs covering the capsule. This is perhaps our most common Hair-cap but it is not the only one we have here. It has no rusty leaf tips and no white awns at the end of its leaves.

P. juniperinum Juniper Hair-cap. The leaves are identifiable by tiny rusty-colored tips. If you are fortunate enough to see capsules, they are hairy of course, but if you pluck that off, the capsules look as if they have a matching yellow neck scarf and jaunty acorn-like elfin cap.

P. piliferum- *pili*= hair, *ferum*= bearing (the tips have white awns so 'Little Hoary Harry'!) Bristly Hair-cap moss. Smaller than the above hair-caps, this look is a bit different as it may be on drier habitats and the leaf edges fold in giving the rosettes a starry look, appearing a bit more diffusely spread than the other two *Polytrichums*.

And when you are confident with the above, try these which are also common in Maine:

Callicladium haldanianum- *kalli* = beauty, *klados* = branch. Type specimen collected by D. Haldane in Canada in 1825. Sword moss. Bright green, yellowish untidy carpets of tapered upright spears or shaggy hanging strings on tree bases, mats covering humus, rotten wood, stumps.

Pohlia nutans – *nutans* = nodding, the capsules. Johann Ehrenfried Pohl (1746-1800) Dresden physician and professor. Copper Wire moss. Commonly covers stumps along with *Tetraphis pellucida*, *tetra*=four, *fissus* = slit, *the unique four capsule teeth*, *pellucid*= translucent. These two mosses can engulf a stump with their rusty tufts. *P.nutans* often grows on sphagnum mounds; *T.pellucida* often produces distinctive "bird-nest like" gemmae cups on the ends of the branches.

Platygyrium repens- *platy* = broad, *gyr*= circle for capsule covering shape, *repens* = creeping. Oil Spill moss. Silky, oily-looking olive green or golden brownish patches on tree bark. Short upright branches with tiny leaves. Branch tips often have dense clusters of tiny fuzzy leaves.

Ulota hutchinsiae- *oulos* = twisted, Ellen Hutchins (1785-1815) astute and prolific Irish botanist and watercolorist. Rock Tuft moss or Hutchins' Pincushion. Common on rocks; the dark blackish base of tuft shows beneath the green leaves and blond haired capsules.



Ulota hutchinsiae

Ulota crispa. crispa= curly. Crispy Tuft moss. On tree bark and shows umbrella-like open and closed positions when wet or dry, the wet stage quite starry looking; dry leaves very twisted and contorted, topped by light-colored hairy calyptras.

It is quite amazing how different your environment looks to you once you recognize a few old friend mosses!

Now that you are no longer a rank beginner, here are some additional mosses from a decades-old list of mosses at Crockett Cove Woods, compiled by Barbara Vickery when The Nature Conservancy owned the property:

Mnium hornum- *mnium* = moss, *hornum* = edge (the rather long slender leaves have 2-toothed margins but you need a good lens to see that!) Carpet moss or McKnight calls this streamside moss Lipstick Thyme moss, presumably because the overlapping pale green leaves top a rusty red unbranched stem that is fuzzy brown at its base.

Brachythecium sp. *Brachy* = short, *thec* = case, i.e. very short spore case. Foxtail moss forms extensive loose goldenish weedy mats on tree bases, disturbed soils, lawns, etc. Stems are brushy like a fox tail.

Tortella = *twisted*. Small yellow brown plants on red stems look like little twisted pinwheels and form tufts on tree bases. Rippled, curved propeller-like olive colored leaves give this the name Tiny Torpedo moss. Even the capsule teeth are twisted helically. Unusual for this habitat.

Atrichum undulatum- *a trichum*= without hair, *undulatum*= wavy. Common name Wavy

Catherinea reflects the fact that this genus was once named in honor of Catherine the Great. The distinctive wrinkling of the wet leaves shares the look of fabric that has wrinkled under an iron that is a bit too hot. Dry *Atrichum* leaves are very twisted and contorted, in contrast to *Polytrichum* genus plants in the same family where the leaves fold up along the stem when dry.



Atrichum undulatum

LIVERWORTS

While most mosses have leaves which spiral around the stem, liverworts usually have pairs of small leaves opposite one another. The leaf shapes and edges of various species can be quite distinctive. Liverwort leaves lack a costa, a midrib.

Conspicuous for its emerald, slightly bluish translucent color among our mosses is *Bazannia*, which is a bryophyte, but of the liverwort group. We used to give preserve walks entitled “Six Mosses You Can Identify from Your Car Window” although we do not recommend relegating your nature watching to automobiles nor is *Bazannia* a moss. But the challenge worked: people came out of curiosity.



Bazzania tridentata

1. *Bazzania tridentata* and *B. denudata* = honoring Matteo Bazzani, 1698-1749, professor of medicine at University of Bologna, Italy, *tridentata*=three toothed. It is quite characteristic of many liverworts that the leaves are paired opposite one another and are variously toothed, notched and interestingly shaped. *B. tridentata* shows all these characteristics to the naked eye. And naked is the clue to identifying the other species of *Bazzania* which we often find intertwined in patches of *B. tridentata*. *B. denudata* can be found among the *B. tridentata* on the big vertical boulder faces at the beginning of the Crockett Cove Woods trail and you do not even have to bend over!



Can you pick out *Schreber's* on the left, *Bazzania* in the center, and *Hylocomium* on the right?

2. *Ptilidium ciliare*. *Ptilion* = feather-like, *cilium* = hair, (note that *Ptilidium* has one more syllable than *Ptilium*, the Knight's Crest moss.) usually on rock, larger

P. pulcherrimum. *pulcherimum* = very beautiful, usually on bark, woody substrates, smaller, flatter

These two liverworts give the impression of a hooked rug, but the slightly hairy, slightly rusty coloring can make it seem liked someone has wiped their feet on the rug. You can find *Ptilidium* carpeting the forest floor at Crockett Cove Woods just as the trail divides with a sign honoring donor Emily Muir.

3. *Frullania asagrayana*. Leonardi Frullani (1756-1824), Tuscany. Asa Gray (1810-1888) Harvard professor of natural history. These reddish brown strings of opposite leaves turn darker, almost black, in winter and can be seen tracing their lines rather high up on tree trunks. And when you wish further challenges, see if you can find these from The Nature Conservancy inventory:

Trichocolea tomentella. *Thrix* = hair, *tomentum* = wooly. Large light yellow-green felted-looking; main stems doubly or triple pinnate, ie, opposite fern-like or Christmas tree-like patterns of very hairy-margined tiny leaves on the forest floor, in the cedar swamp at the far end of the Crockett Cove trail.

Nowellia curvifolia. John Nowell (1802-1867) Yorkshire mill worker, amateur botanist, *curvifolia* = curved leaves. Very small loose bead-like strings of nearly balled leaves, always found on rotten wood.

Lophocolea heterophylla. *Lophos* = crest, *koleos* = sheath, *hetero* = different, *phyll* = leaf. These strings of liverwort look as if someone took pinking shears to the edges of the flat little opposite leaves.

Now to take a look at the **SPHAGNUM MOSSES**. Of the forty or so species known in our region, perhaps only half of those are species that we likely to encounter. Most of that number live in bogs and we do not encourage a casual bog slog. Ralph Pope has kindly suggested four species which we are likely to encounter along the trails of our preserves. Without a microscope, we might make a correct identification most of the time. Humility, flexibility and a willingness to learn a special vocabulary are required for becoming expert in identifying the sphagnum mosses, but here are the species to introduce you to the wonderful world of sphagnum.

A word about words: as with the words *mnium*, *hypnum* and *bryum*, we do not really know what moss the Greeks and Romans were referring to with the word *sphagnum*.

1. *Sphagnum girgensohnii*- Picture lanky bryologist Gustav Karl Girgensohn (1786-1872)

striding through the taiga forests, skirting the many bogs of his native Estonia. Was he really tall, as many Estonians are? Don't know, but the moss that bears his name is characterized by long graceful stellate (starry) fronds surrounding a rather flat-topped capitulum, that mop-like head. This fairly common moss is green and a stalk will snap like celery. Remember that unlike the green of other mosses and liverworts, sphagnum mosses have a somewhat translucent chalky look due to their large water-storing cells.



Sphagnum girgensohnii

2. *Sphagnum compactum*- As the name suggests, these plants are closely packed in green to yellow ochre/brownish crowded groups. Looks a bit like someone spilled a puddle of bleach.



Sphagnum compactum

3. *Sphagnum palustre*- *Palustre* is poetic-sounding word meaning marsh, unfortunately not a helpful mnemonic in this case as this species does not grow in marshes. Green in spring and turning golden brown as summer progresses, this moss is characterized by its cucullate leaves. That term means the blunt leaves are hooded - like a kid wearing a sweatshirt hoodie. The

overall impression is of fat fingers, not very flattering images to go with the pretty name.

4. *Sphagnum subtile*- takes its name from the Latin *sub tela*, off the loom, indicating its slender, delicately woven look. Here the reminding image might be of a blushing bride's bouquet with its dome of rounded capitulum and long, spreading branches like ribbon streamers. The moss might be green, but the tightly packed capitulum bouquet will likely turn red, a color quite frequently encountered as mosses spend time exposed to the sun, or as the summer progresses.

This brings us to a helpful list of list of what does NOT apply to *S. subtile*, to eliminate confusing look-alikes: It is red, NOT magenta/maroon. It is NOT speckled with red interruptions. It is NOT in bogs.

So there you have a list of sphagnum friends to enhance your woods walks.

Now that you have learned to recognize a number of bryophytes, do not feel limited to nature preserves. From a commercial plant nursery web site:

"Common Pleurocarps for moss garden are: *Thuidium delectatum*, *Plagiomnium cuspidatum*, *Climacium americanum*, *Bryoandersonia illecebra*, *Entodon seductrix*, *Hypnum cupressiforme*, and *Hypnum imponens*. Common Acrocarps for moss gardens are: *Polytrichum commune*, *Dicranum scoparium*, *Campylopus introflexus*, and *Luecobryum glaucum*." Recognize a few?

About that closer look:

If you have a hand lens, here is how to use it. Bring the lens close up to your eye and hold the moss up close to that. When you see the image come into focus, lean your middle moss-holding finger against your hand that holds the lens to steady the arrangement.



Another way to get a better look at mosses in the field is to use your smartphone. You might enjoy using an inexpensive snap on macro lens. Getting the best quality close-up photos, however, is a bit of a challenge. You just do not have enough hands to hold the phone steady, use the touch screen zoom and lighting options, and tap the shutter, all without any shaking.

So here is a simple way to use a 5-legged tripod which you always have with you—your hand and an elastic band. Hold the phone cantilevered out on the back of your hand. Your five fingers make a fully adjustable “quintpod”.

Wear the band on your wrist when you are not using it to hold the phone and bring along your earbuds since the volume control makes a great remote shutter release.



And more now that you are no longer a beginner...

Undaunted, urban, Armageddon—which term is the most suitable mnemonic for three of the mosses found at Pine Hill and/or Settlement Quarry: *Bryum argenteum*, *Ceratodon purpureus* and *Funaria hygrometrica*? All three tolerate or take advantage of polluted, burned over, or

what might euphemistically be called “disturbed” sites. Look for them wherever man has laid a heavy hand— on asphalt, roofs, cement, railroad beds, waste dumps, and chemically treated lawns—as well as at our granite and serpentine quarries.

Bryum argenteum, or Silver moss, spreads rapidly by fragments carried by footsteps or mowing and hence shows up world-wide in sidewalk cracks, lawns and golf courses, welcome or not. White or gray leaf tips on short, stout branches give its dense tufts the common name where exuberant mats are not too trampled.

Ceratodon purpureus, *Cerato*= horn, *don*=teeth, describing teeth on the capsule’s peristome, not much help without a microscope. *Purpureus* however does describe the dark purplish-red color of the seta, the stalks in early spring that hold the spore capsules above the starry rosettes of the leaves which form a velvety mat. Common world-wide, the European and memorable name Redshanks fits as well as our name, Purple ceratodon. Fire moss is another of its common names, indicating that it can often be found after a burn. Look for it where a brush pile has been burned, pioneering, with fireweed (*Epilobium angustifolium*) and pearly everlasting (*Anaphalis margaritacea*) following close behind.

Funaria hygrometrica, *funis*= rope, *hygro*=water, *metreo*=measuring, describing the way that capsules respond to changes in humidity by twisting and untwisting. As the names Cord moss, Bonfire moss, or Campfire moss suggest, this is another moss that rapidly colonizes burn spots. The leaves are translucent and form short bulb-shaped shoots in somewhat sparse carpets. The dry arching setae are even more distinctive, forming what some call swan necks. Pope describes the capsule response to wetting as upturning like so many helium-filled party balloons.

We are fortunate that experts have studied the bryophytes of Pine Hill and Settlement Quarry. An article in the journal of the New England Botanical Club, *Rhodora*, Vol.111, No.945, pp-1-20, 2009, reflects the work of half a dozen experts who inventoried the mosses and liverworts, took specimens to their microscopes, and published their results. The following excerpt may be useful for those of you who are now beyond the beginner stage and wish to pursue further your identification skills. It can help to know what others have found there.

MOSESSES AND LIVERWORTS AT PINE HILL AND SETTLEMENT QUARRY

MARCHANTIOPHYTA

<i>Anastrophyllum minutum</i> (Schreb.) Schust	PH	
<i>Barbilophozia barbata</i> (Schreb. Loeske	PH	
<i>Cephaloziella hampeana</i> (Nees) Schiffn.	PH	SQ
<i>Colojeunea biddlecomiae</i> (Austin) Evans	PH	
<i>Frullania tamarisci</i> subsp <i>asagrayana</i> (Mont.) Hatt.	PH	
<i>Lejeunea lamacerina</i> subs. <i>geminata</i> R.M. Schust.	PH	

<i>L. caviflia</i> (Ehrh.) Lindb. <i>emend.</i> H. Buch	PH	
<i>Lophocolea heterophylla</i> (Schrad.) Dumort.	PH	
<i>Lophozia bicrenata</i> (Hoffm.) Dumort.		SQ
<i>L. ventricosa</i> (Dicks.) Dumort.		SQ
<i>Metzgeria conjugata</i> Lindb.	PH	
<i>M. furcata</i> (L.) Dumort.	PH	
<i>Ptilidium ciliare</i> (L.) Nees	PH	SQ
<i>P. pucherrimum</i> (Weber) Hampe		SQ
<i>Radula complanata</i> (L.) Dumort.	PH	SQ

BRYOPHYTA

<i>Amblystegium serpens</i> (Hedw.) Schimp.	PH	SQ
<i>Anomodon rostratus</i> (Hedwig.) Schimp.	PH	
<i>Aulacomnium androgynum</i> (Hedw.) Schwaegr.	PH	
<i>Bartramia pomiformis</i> Hedw.	PH	
<i>Brachythecium rutabulum</i> (Hedw.) Schimp	PH	
<i>B. velutinum</i> (Hedw.) Schimp.	PH	
<i>Bryum argenteum</i> Hedw.		SQ
<i>B. cyclophyllum</i> (Schwaegr.) Bruch & Schimp.		SQ
<i>B. muehlenbeckii</i> Bruch & Schimp.		SQ
<i>Callicladium haldanianum</i> (Grev.) Crum	PH	
<i>Campylium chrysophyllum</i> (Brid.) J. Lange	PH	
<i>Ceratodon purpureus</i> (Hedw.) Brid.	PH	SQ
<i>Dicranum montanum</i> Hedw.	PH	
<i>D. polysetum</i> Sw.	PH	SQ
<i>D. scoparium</i> Hedw.	PH	SQ
<i>D. spurium</i> Hedw.	PH	SQ
<i>Fissidens dubius</i> P. Beauv.		SQ
<i>Funaria hygrometrica</i> Hedw.	PH	
<i>Hedwigia ciliata</i> (Hedw.) P. Beauv.	PH	
<i>Herzogiella striatella</i> (Brid.) Z. Iwats	PH	
<i>Hypnum andoi</i> A.J.E. Sm.	PH	
<i>H. cupressiforme</i> Hedw.	PH	SQ
<i>H. imponens</i> Hedw.	PH	
<i>H. pallescens</i> (Hedw.) P. Beauv.	PH	
<i>Isothecium myosuroides</i> Brid.	PH	

<i>Leucobryum glaucum</i> (Hedw.) Angstr.	PH	SQ
<i>Playtygyrium repens</i> (Brid.) Schimp.	PH	
<i>Pleurozium schreberi</i> (Brid.) Mitt.	PH	
<i>Pogonatum pensylvanicum</i> (Hedw.) P. Beauv.		SQ
<i>Pohlia nutans</i> (Hedw.) Lindb.		SQ
<i>Polytrichum commune</i> Hedw.		SQ
<i>P. juniperinum</i> Hedw.	PH	SQ
<i>P. piliferum</i> Hedw.	PH	SQ
<i>Pterigynandrum filiforme</i> Hedw.	PH	
<i>Racomitrium affine</i> (Weber & Mohr) Lind.		SQ
<i>Rhytiadelphus triquetrus</i> (Hedw.) Warnst.	PH	
<i>Sanionia uncinata</i> (Hedw.) Loeske		SQ
<i>Thuidium recognitum</i> (Hedw.) Lindb.	PH	
<i>Ulota hutchinsiae</i> (Sm.) Hammar	PH	SQ
<i>Weissia controversa</i> Hedw.	PH	

Happy moss watching!



ISLAND
HERITAGE TRUST

By Dr Kenneth Crowell and Marnie Reed Crowell
With thanks to Ralph Pope