

Wild Haven Nature Area



Self-guided Moss Walk

February 2023 (v. 1.2)

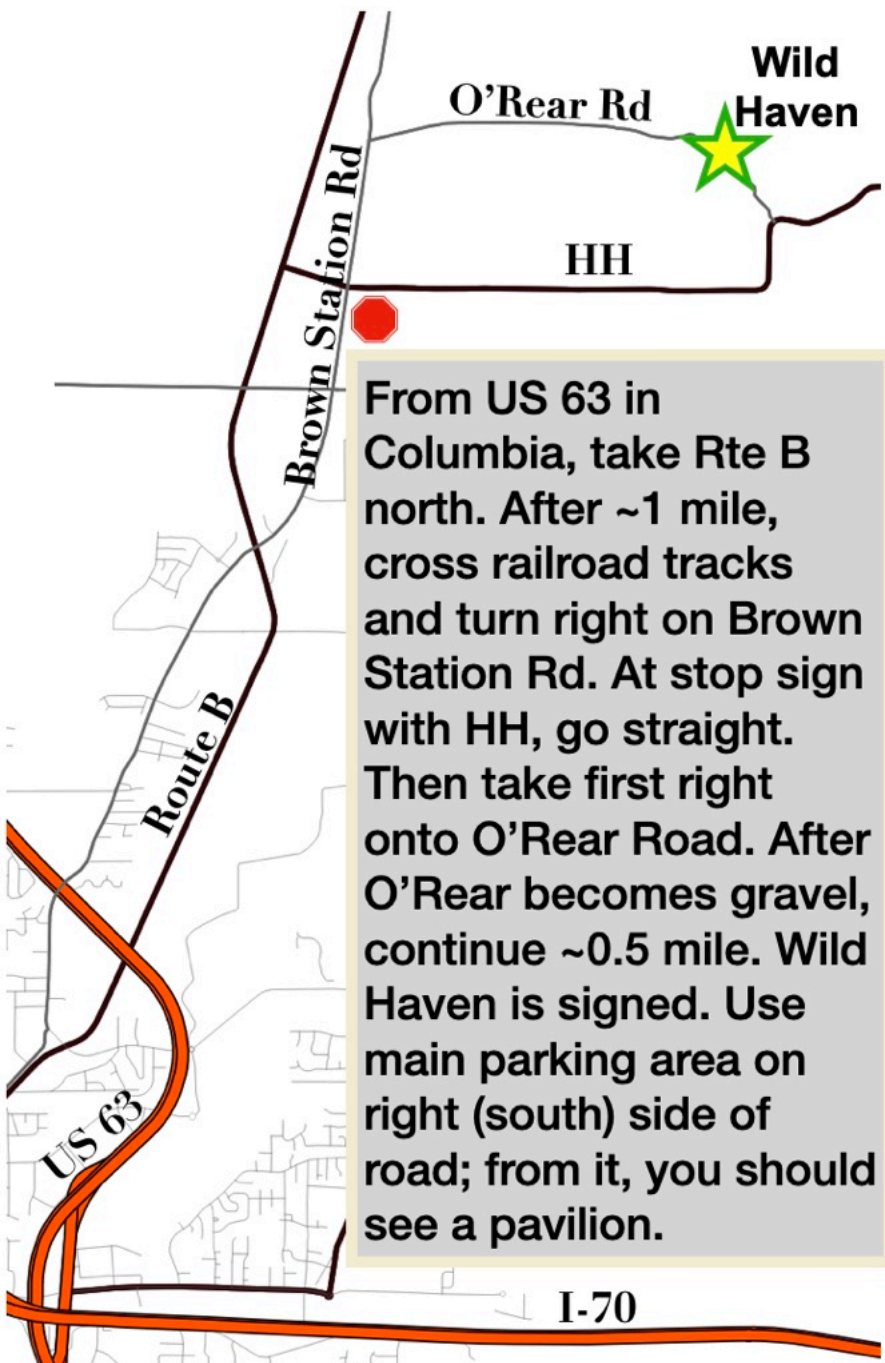
by Louise Flenner

Maps, photos, digital layout, & editing by
Joanna and Eric Reuter, ozarkoutsider.com

Suggested things to bring:

- A hand lens or magnifying glass. This will help you appreciate the miniature world of mosses.
- A spray bottle with water (but no chemical residues). Use to rehydrate mosses when conditions are dry; watch the leaves swell with water in front of your eyes.
- A water bottle for yourself, plus snacks and standard hiking gear.

Driving Directions



From US 63 in Columbia, take Rte B north. After ~1 mile, cross railroad tracks and turn right on Brown Station Rd. At stop sign with HH, go straight. Then take first right onto O'Rear Road. After O'Rear becomes gravel, continue ~0.5 mile. Wild Haven is signed. Use main parking area on right (south) side of road; from it, you should see a pavilion.

Wild Haven Nature Area



Welcome to Wild Haven Nature Area, a ~100-acre property that is owned and managed by the Columbia Audubon Society. The area has an extensive trail system and features high-quality habitats, primarily mature forest, along a mile-long reach of Hinkson Creek.

This self-guided moss hike will cover parts of the white and yellow trails. The total length of the hike is under a mile, but it's easy for time to fly when examining mosses, so allow for a couple of hours to do the hike.

Audubon societies are known for bird watching, and this is indeed a good birding spot. Birds interact with many components of the ecosystem, including mosses. This walk will explore this relationship between birds and mosses, guiding you to 10 mosses that have been identified to species level.

Along with the navigation directions, you'll find a series of photos showing a person looking at the moss under discussion. Use these to hone in on the location. Other examples of the featured moss can be often be found in the vicinity. Look around, take your time, and have fun exploring!

Navigation directions: From the parking lot, walk toward the pavilion and find the white trail marker with an arrow pointing to the right. Follow the white trail toward a pond and along its bank.



What is a moss?

This path is covered in moss. Most of us learn at an early age what a bird is, but what is a moss? Mosses are plants: They contain green chlorophyll and can make use of photosynthesis to make the sugars that are used for metabolism and to build their stems, leaves, and reproductive structures. Mosses attach to the ground with rhizoids rather than roots. As you walk on this path you are helping these mosses adhere to the ground so they do not blow away. Mosses such as these that grow in trails appreciate your light tread.

Navigation directions: Continue to the far edge of the pond; you should see another white trail maker with an arrow. The first featured moss species is the one you're probably standing on.



Moss 1: Kneel, and look closely at a leaf. Does the branching pattern remind you of something? The resemblance to ferns is the source of this moss's common name: delicate fern moss (*Thuidium delicatulum*). But the resemblance is superficial. True ferns are vascular plants, as are trees, shrubs, wildflowers, and grasses: all of these have tissues that can transport water and nutrients from their roots to their leaves. In contrast, this “fern” moss, like other mosses, is nonvascular. Mosses must receive their nutrients directly from water and air. This results in an enforced smallness, but as you'll see today, small doesn't mean boring.



Navigation directions: Follow the white trail markers down the hill to the creek crossing. Stop before you cross the creek. Notice the large stand of moss covering the hill to your right. This is the first of three species we'll look at near the creek crossing. Take a look!

Safety notes:

- This stream only rarely floods, but crossing during high water is dangerous. The secondary parking site (see trail map) provides access to the western portion of trail when the stream is too high to cross.
- Beware of uneven and slippery footing when navigating the creek bed.



Moss 2: This moss forms a dense mat that looks like a short pile carpet; it attaches to soil and rocks. Several other mosses grow with it here; mosses often mix together. Can you find the one that looks like the photo? Usually found on the base of tree trunks or calcium-enriched rocks, it's also found in wet places, like this location, where there is moist limestone with a little soil. Daddy longlegs like to walk through the lush carpet. Moss harbors insects that provide food for birds. This is yellow yarn moss (*Claopodium rostratum*, formerly known as *Anomodon rostratus*).



Geologic Note, Moss Origins, & Water

Look at the rocks in the stream. Many are a grayish limestone derived from local bedrock. You may find some fossils that provide evidence of the shallow seas that covered Missouri several hundred million years ago, when these rocks were deposited. Interestingly, some of the oldest mosses discovered so far in the fossil record (from Germany) are about as old as the rocks you see here. But there weren't mosses in proto-Missouri at that time. Why? Missouri was under water, and mosses are land plants. But mosses do need *some* water. As you examine mosses today, give them a little spray or splash of water, especially if they look dry, and watch as the leaves swell with water in front of your eyes. Some details are easier to see when the plants are dry; others when the plants are wet.



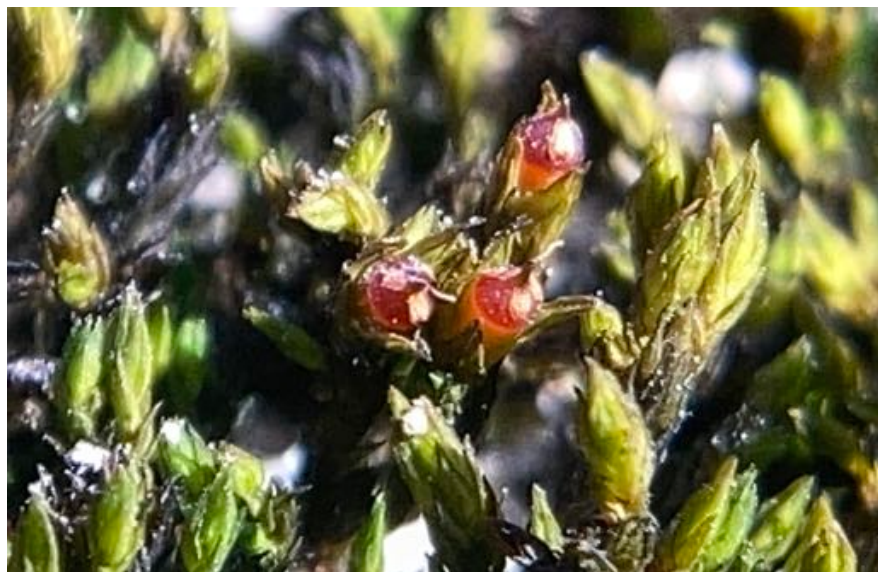
Navigation directions: From the location where you examined the previous moss, look downstream for the rock shown in this photo.



Moss 3: When dry, the moss on this rock looks very scruffy, dark green, almost black. If the weather has been wet, it is bright green. Brook cannikin moss (*Schistidium rivulare*) is often found on rocks, including wet rocks in streams, or dry rocks in seasonally wet habitats.

This ability of moss to retain moisture yet dry out quickly makes it suitable for bird nests. The moisture retention increases the humidity in the nest cavity, which can prevent egg desiccation and increase hatching success.

Look closely at the moss; do you see structures other than leaves?



Spectacular Sporophytes

Did you see small, reddish balloon-like structures tucked into the top of the *Schistidium* leaves (as seen in photo above)? These are sporophytes, which are structures that are involved in the reproduction of mosses. If present, sporophytes are helpful for identification, as their forms are diverse, but you have to be there at the right time. In these ways, they're analogous to flowers. But the flower analogy does not hold up regarding details of moss reproduction, a topic that is challenging to explain succinctly. If you're inspired to learn more, Robin Wall Kimmerer's book, *Gathering Moss*, is a wonderful resource. Sporophyte examples (not all from Wild Haven):

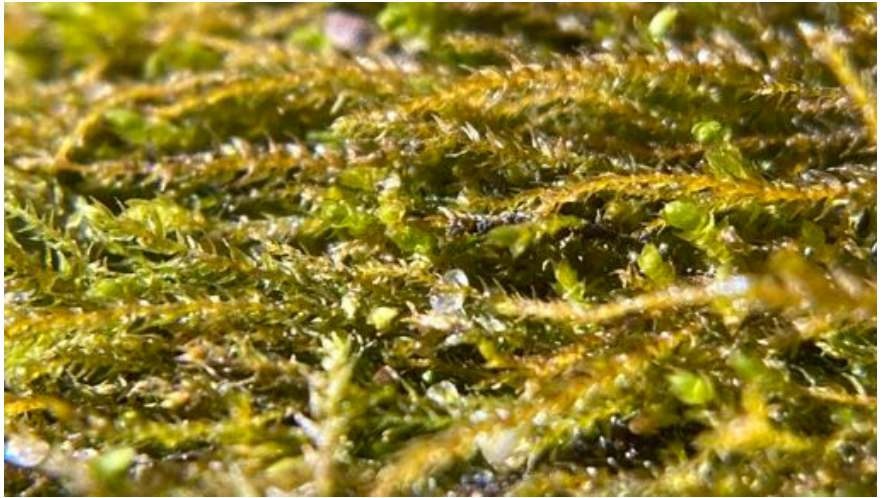


Navigation directions: On the far side of the creek, look for a piece of concrete (perhaps an old foundation) that is full of pebbles. It's on your left at the base of the creek bank and is covered in moss.



Moss 4: The moss is so soft looking, you can't help but pet it. This is a moss often found in creek bottoms. There are several mosses here, but focus on the one that looks like fine hair combed out on the rock face. There are other examples of this on rocks in the stream bed.

This is tangled thread moss
(*Hygroamblystegium varium*).



Identification 101:

Acrocarp vs. Pleurocarp

The mosses on this trail fall into one of two categories of growth forms: acrocarp or pleurocarp.

- **Acrocarps** have many stems that do not branch, for the most part. Sporophytes emerge from the top of these stems.
- **Pleurocarps** have stems that branch freely and trail along the ground, creeping horizontally. Plants twine together to form mats. Sporophytes on pleurocarps are produced from modified branches off of the main stem.

Of the mosses observed so far, can you tell which are acrocarps and which are pleurocarps? Answer on the next page.



Acrocarp



Pleurocarp

Three are pleurocarps:

- Delicate fern moss (*Thuidium delicatulum*)
- Yellow yarn moss (*Cladopodium rostratum*)
- Tangled thread moss (*Hygroamblystegium varium*)

One is an acrocarp:

- Brook cannikin moss (*Schistidium rivulare*)

Differentiating between pleurocarps and acrocarps can be a little tricky at times, especially if sporophytes aren't present. When did nature ever fall neatly into human-imposed categories?

Nonetheless, learning to differentiate between pleurocarps and acrocarps is a good starting point for moss identification.

Navigation directions: Follow the white trail markers part way up the hill. Look for a large oak tree with a double trunk. The next moss is at the base of this tree.



Moss 5: The glossy clump is baby tooth moss (*Plagiomnium cuspidatum*). This species has two growth forms that are often intermingled and can fool you into thinking you're looking at two species. One growth form consists of leaves growing in two rows along stems that trail along the ground, reminiscent of a thyme plant (thus an alternative name: woodsy thyme moss). The whorled leaves with sporophytes coming out of them in the photo below are also *P. cuspidatum*. So, is it an acrocarp or a pleurocarp? Answer on the next page.



The vine-like stems might misleadingly suggest pleurocarp, but the sporophyte location is the key to the correct answer: acrocarp.

This moss is pretty recognizable, with relatively big leaves (for a moss). But it has a look-alike in the same genus that requires a close look (with magnification) to differentiate. Baby tooth moss can be confused with saber tooth moss (*P. ciliare*). The “teeth” that line the edge of the leaf only go halfway down on baby tooth, but all the way from tip to base on saber tooth.

Navigation directions: Step back onto the path and walk past the tree. On the ground just beyond it, you will see a dead limb.



Moss 6: The dead limb hosts a stand of cord glaze moss (*Entodon seductrix*). This is a green or yellowish, wormlike moss that creeps horizontally. This is another pleurocarp; can you find sporophytes growing off of the branches?

Nearly all North American passerine birds (commonly known as songbirds or perching birds) use mosses in their nests. Birds prefer pleurocarps for this. Why? The trailing nature of their stems allows birds to weave these into the nest more easily, and birds can carry a large piece as it's like a strand of rope or thread.



Navigation directions: Continue up the trail. On your left along the trail, look for a tree with a hollow cavity at its base; there are actually two example trees. A similar type of cavity is created by woodpeckers higher up in tree trunks. Small birds will use these woodpecker holes as nesting cavities. If the cavity is too deep, small birds will use moss that they carry to the hole in order to elevate the nest to the right height, so they can build their nest on top of it and fly directly into the nest to feed their young. Birds would not build a nest in a cavity this close to the ground, but looking into this low cavity helps you imagine the moss-based solution birds have devised to overly deep holes.



Navigation directions: Continue to follow the white trail as it bears left (the yellow trail will merge from the right). Notice the fern moss (*Thuidium*) at your feet near the trail junction. Continue along the trail, following the yellow/white trail markers. As you do, take a break from looking down to also look up and listen for birds.

After you pass a bench on the left and start down a hill, look for a large tree with a gnarly base. Acorn shells suggest that small animals snack on nuts here. Perhaps you'd like to rest and have a snack here, too; just please don't leave evidence that you did! There is a moss growing in the bark of the trunk, just above the gnarl. Do you recognize it as cord glaze moss (*Entodon seductrix*), a pleurocarp we've seen already (Moss 6)?



Navigation directions: Go straight on the yellow trail at the trail junction where the white trail turns left down the hill (our eventual route of return).

Safety note: The trail has suffered some erosion in places. While watching birds and mosses, don't forget to also watch your feet.

Red-headed Woodpeckers are common along this part of the trail throughout the year. Keep a look out for these boldly colored birds and listen for their rattle-like call.



Red-headed woodpecker.

Photo credit: McClarren & Reago

Lichen Interlude

Along the yellow trail, notice that multiple trees have lichens on their trunks. Lichens are not mosses, nor even plants, but they are used by some birds to build nests, so let's delve a little deeper.

Lichens are fungi that symbiotically partner with photosynthetic microorganisms, that in turn produce food for the fungi that house them. This partnership makes lichens largely self-sufficient, meaning that they don't harm their host trees. In fact, finding lichens on trees is a good thing, as lichens can be sensitive to air quality.

This one has a foliose (leafy) growth form:



Loose tips of these lichens are used by Blue-gray Gnatcatchers and Ruby-throated Hummingbirds to coat the nest exterior.

Why? There are several possibilities: Certain nest components (including mosses and lichens) may have antibiotic properties that might lessen parasite loads in nests. In addition, the pale grayish-green appearance of the lichens may help to make the nest less detectable to predators. This could happen in one of two ways:

- Predators may see the nest but think it is something else, such as a knot on a tree branch; this form of concealment is known as masquerade. And/or:
- The nest may blend into the sky in the eyes of a predator below, so that the predator doesn't perceive the nest at all; this is concealment through crypsis.



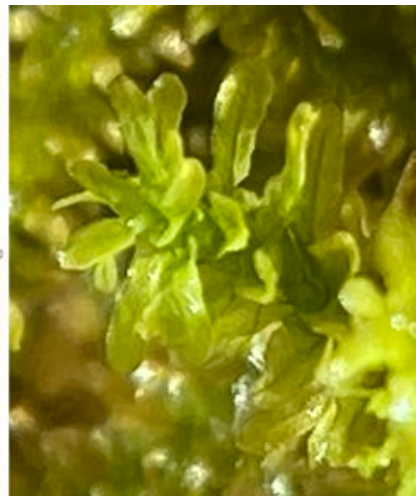
Lichen-covered
nest of a
Ruby-throated
Hummingbird

Navigation directions: The trail eventually makes a sharp turn to the left. The tree with the trail marker indicating the turn is our next stop. Look at the moss growing on the lower part of its trunk.



Moss 7: This moss forms an apron that clings to the tree and grows out into the soil. If it's dry the day you see it, spray or pour a little water on it and it will completely change its shape to a lush, glossy moss in a matter of seconds. This is tree apron moss, *Pseudanomodon attenuatus* (formerly known as *Anomodon attenuatus*) or the visually similar *Anomodon minor*. Both are pleurocarps, and both are present on trees in the vicinity. The photos below show appearance when dry (left) and moist (right).

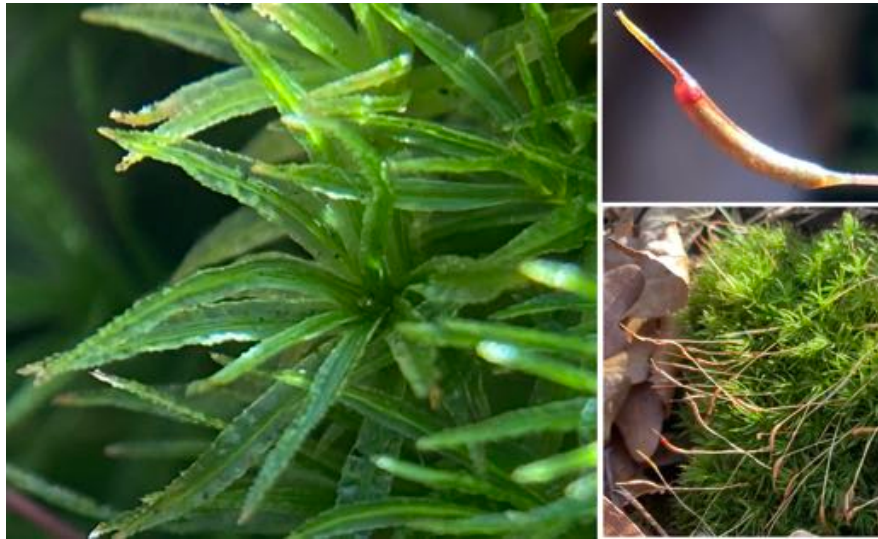
The water-absorptive properties of mosses persist even after fragments are incorporated into the nests of birds. It's almost as if birds line their nests with all-natural, super-absorptive micro towels. Neat!



Navigation directions: Look ahead; you will see a large oak tree with two fallen trunks. The path proceeds between the two fallen trunks, but this is the turn-around point for the self-guided walk. The next two mosses are associated with this tree: Moss 8 is on soil (upper photo), and Moss 9 is on the fallen trunk to the right (relative to your approach). Beware of the prickly gooseberry plants!



Moss 8: Bright green patches of slender starburst moss (*Atrichum angustatum*) grow on soil near the root mass of this fallen tree. The common name comes from the star-shaped pattern of the leaves when wet. Some patches may have tall sporophytes emerging from the apex of the upright, branched stems, especially in the fall and early winter. A slight tap of a finger will release the spores in a puff, if you're there at the right time. As an acrocarp, this is less likely to be used in bird nests. However, its thick mound surely harbors insects that provide birds with food.



Moss 9: Growing along the massive trunk of the fallen tree is a colony of oil-spill moss (*Platygyrium repens*). It typically has a patina-like golden brown and green coloration, reminiscent of spilled oil. It is epiphytic, meaning it grows on plants and is often seen on dead wood. This pleurocarp moss is often used as insulation in bird nests.



Navigation directions: Retrace your steps along the yellow trail until you come back to the white trail. Watch for the white trail marker on a tree that grows left of the trail. Take the path downhill to the right; be sure to follow the arrows as the trail descends through switchbacks. Use caution as there are roots and rocks hidden under the leaves.

The trail crosses the creek bed; do you recognize any mosses you see? After crossing the creek, feel free to use the bench: a nice place to sit and listen for birds. Next, go up the wooden stairs and notice the cord glaze moss (*Entodon seductrix*) growing on and around them.

Navigation directions: Follow the white trail markers up the hill until the trail levels out a bit. As you proceed, keep an eye out for a big patch (~3x5 feet) of moss on the ground to your left, ~10–15 feet off the trail. Two logs on the ground to the left of the trail will help lead you to it. Look for signs of past fire, and you'll know you're close.



Moss 10: This is bonfire moss (*Funaria hygrometrica*), a moss that frequently grows where fire has occurred. This is a good example of how mosses are useful in reclaiming disturbed land. Spores or leaf fragments of mosses can be blown or washed into newly exposed areas to establish colonies. Because mosses can obtain their mineral nutrients from rain and splashed or running water, they don't always need previously developed soil to grow. In fact, this *Funaria* may be promoting soil formation. This moss may look especially different over time as sporophytes grow.



Navigation directions: Continue along the white trail, go past the bluebird house, and bear left on the red trail. Watch for mounds of starburst moss (*Atrichum angustatum*) decorating both sides of the trail.

You have arrived back at the pavilion.

We hope your walk has been both enjoyable and educational!

If you have feedback regarding this self-guided trail or your visit to Wild Haven, please be in touch.

- Louise Flenner, author of this moss trail guide: lflenner@hotmail.com
- John Besser, Nature Area Chair for the Columbia Audubon Society:
jbesser1@gmail.com

To receive newsletters and field trip notices from the Columbia Audubon Society, visit:
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Acknowledgments

Thank you to Lorie Hetrick-Volenberg for visiting Wild Haven and confirming identifications in person and by microscope. She is authoring a new field guide to Missouri mosses, an eagerly awaited resource!

About the photos

Close-up photos were taken using a smart phone and a Xenvo clip-on macro lens.

References and Resources

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- Bird Nests and Construction Behavior, by Mike Hansell, Cambridge University Press 2000.
- Common Mosses of the Northeast and Appalachians, by Carl McKnight, Joseph R. Rohrer, Kirsten McKnight Ward, and Warren J. Perdrizet, Princeton University Press 2013.
- Common Mosses, Liverworts, and Lichens of Ohio, by Robert Klips, Ohio University Press 2022.

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- Bryophyte Ecology Volume 2: Bryological Interaction, Chapter 16: Birds
<https://digitalcommons.mtu.edu/bryophyte-ecology2/>

Websites

- Moss terminology and life cycle:
<https://kids.britannica.com/students/assembly/view/162564>
- Illinois Wildflowers:
https://illinoiswildflowers.info/mosses/moss_index.html
- Ohio Moss & Lichen Association:
<https://ohiomosslichen.org/>
- iNaturalist has many great photos of mosses, but be aware that many mosses can be challenging to photograph and identify by photo alone, so beware of observations with incorrect IDs:
<https://www.inaturalist.org>
- Gnatcatcher building nest:
<https://youtu.be/N9pUgqFEFWw>
- Moss Musings – for all the buzz about your favorite fuzz. This site has interesting information about the use of moss in the nests of different species of birds:
<https://tinyurl.com/pfenaevf>
- Paleozoic mosses: Small, but no longer inconspicuous, by E.L. Taylor and T.N.

Taylor, Geology, 2012; an article on moss fossils: <https://pubs.geoscienceworld.org/gsa/geology/article/40/8/767/131015/Paleozoic-mosses-Small-but-no-longer-inconspicuous>

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