

Field Notes—February 4, 2023
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COLORS OF MIDWINTER

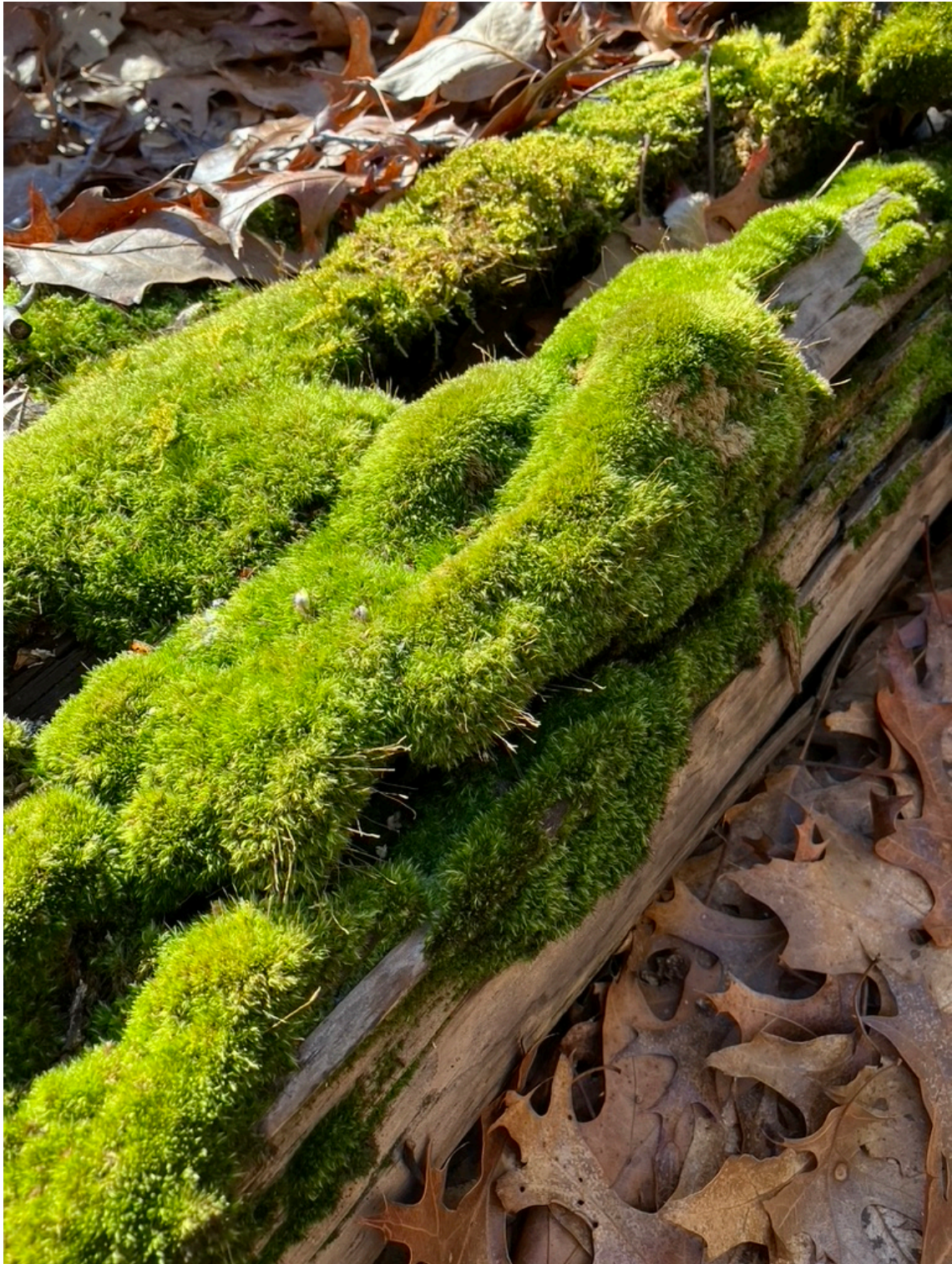
We are forty-five days past the winter solstice – exactly halfway to the spring equinox. The world is like a sepia photo. So many of the colors of the spectrum are absorbed by tree trunks and rocks and fallen leaves, they reflect mostly gray and brown light.



Our back woods, February 4, 2023

Thank goodness for the conifers and other evergreen plants that bounce green light! The mosses are having a great winter. They shine on rocks, tree trunks, and paths – wherever there is no leaf cover. They don't mind the cold, because they're able to produce antifreeze proteins in their cells and keep on photosynthesizing. They do mind dryness, but it's a wet winter, so they're happy.

A large patch of moss is a miniature world. There can be millions of individuals in a clump of moss on a single log or an exposed rockface.



Pincushion moss (*Leucobryum glaucum*) on a log, Bolton Notch, Feb. 1



Broom moss (*Dicranum sp.*) on a rock in Staddle Brook, Andover



Carpet of Slender starburst moss (*Atrichum angustatum*) on a gently raked path in our back woods, February 1, 2023

In order to see the plants as individuals, one has to get very, very close to them. There's a moment as you kneel or crouch to look at them when it seems that the wind has died down – but it's just that you've dropped below the level of the wind, where the mosses live.



Slender starburst moss, *Atrichum angustatum*, our woods, Feb. 2023

The slender starburst moss shown on the path above is putting on new growth, and it's all red! I expect that it manufactures anthocyanins to protect its new chlorophyll molecules from UV damage, just as red maple leaves do. At the center of the photo above, you can see a male "splash cup," in which sperm are produced. Any drops of water that splash into these cups will splatter the sperm, perhaps as far as a receptive female archegonium (nearly invisible), which will then be fertilized and put up a capsule filled with spores. This is the moss equivalent of the fertilization process in flowering plants – but it depends on neither insects nor wind, just rain.

Here is a close-up on a bunch of male plants with splash cups. They tend to retain a bit of unsplashed water in them:



Slender starburst moss (*Atrichum angustatum*) male "splash cups"

And here are the nearby female plants, with their crimson capsules and neon-red calyptrae (the pointy hats). These capsules appear to be fresh – all hats securely fastened down. Once the spores are ripe, the hats will dry out and fall off, leaving the capsules open. Air movement, animal footsteps, or raindrops will jostle the capsules into releasing and dispersing the spores. I read that each capsule of *A. angustatum* can produce from 280,000 to 700,000 spores.¹ If I brush my hand gently over a bunch of dry capsules, I see a fine yellow dust drift on the air above the mosses for just a second; then it disappears.



Female slender starburst moss plants with fresh capsules

Keeping an eye open for tiny green plants in this midwinter landscape, I find them everywhere. Along Lake Road, the bonfire moss is producing beautiful chartreuse capsules for its next generation:

¹ Anne Stoneburner et al., Spore dispersal distances in *Atrichum angustatum* (Polytrichaceae), *The Bryologist* 95(3), 1992, 324-328.



Bonfire Moss (*Funaria hygrometrica*) capsules, February 1, 2023

The *Entodon* capsules that were fresh in October . . .



Fresh *Entodon seductrix* capsules, October 1, 2022

. . . are open now, shedding spores. They've lost their pointy hats, and in the right light, you can see the spores within.



Mature *Entodon seductrix* capsules on the same rock – now open – February 2, 2023



Mature *Entodon seductrix* capsules up close

My eyes are starved for color, and so I rejoice in the reds, oranges, yellows, and greens of mosses in winter.

Some of the twigs of the native shrubs and trees in the garden also have color all winter.



Silky Dogwood (*Cornus amomum*) buds



Gray Dogwood (*Cornus racemosa*) bud

And then there's glorious color in the emerging skunk cabbage! I don't consider these flowers to be signs of spring when they emerge in January and February, but their painterly spathes in mauve and chartreuse are a sight for sore eyes, as are their freshly emerging leaves. These plants are able to reproduce in winter because they can temporarily switch over to a respiratory pathway that generates heat rather than energy.²



Skunk cabbage in bloom and leaf, January 24, 2023, our back woods

² Dean Campbell, Hot Topic for Early Spring: Thermogenesis of Early Skunk Cabbage, *Chem Ed Xchange*, 3/06/202.

INVISIBLE TO ME

Well, almost everything that lives outdoors is invisible at this time of year, except for the birds, deer, and squirrels, trees, shrubs, and mosses. It takes an effort of imagination to remember that there are millions of seeds, eggs, and spores resting in the soil; the rootstocks of wildflowers and ferns are alive underground; that fungal mycelia are still there in huge, invisible masses, still in slow, quiet communication with tree roots below the frost layer.

Native bees are in hibernating in their nests in our yards – under the soil, under rocks, under fallen logs, in tree cavities, in the hollow stems of goldenrod and Joe-pye-weed. Millions of insect larvae are curled up in the leaf litter under the trees. (Some even spend the winter in suspended motion exposed on tree branches, where they are invisible to us, but quite visible to birds.)³ Reptiles and amphibians are tucked into the mud in vernal pools, fish are resting quietly on the bottom of Andover Lake.

Six more weeks of rest as we await the vernal equinox, and the great awakening.

³ Douglas Tallamy, *The Nature of Oaks*, 2022.