On The Fringe

Journal of the Native Plant Society of Northeastern Ohio

Program Schedule – Fall 2019

Saturday, September 28, Noon – 3:00 pm – Monarch Tagging at North Kingsville Sand Barrens. Judy Semroc, naturalist with Cleveland Museum of Natural History, will lead this hike to explore meadow insects and tag monarch butterflies. Weather dependent, check website for weather cancellation: www.nativeplantsocietyNEO.org

Saturday, October 5, 9:00 – noon – Old Growth Forest in North Chagrin Reservation.
Join NPS member Fred Losi on this autumn exploration of old growth forest in North Chagrin Reservation of the Cleveland Metroparks. There will be two separate hikes, one immediately following the other. **Hike 1**; we will meet at the Strawberry Picnic Area. We will traverse the one-mile White Pine Loop Trail, where towering White Pines and Eastern Hemlocks grow along a deep ravine. **Directions:** Exit Route 271 at Wilson Mills Road and head east. Turn left onto 91 and head north. Turn right onto Sunset Lane and head east. Turn left onto Strawberry Lane and head north. Park at Strawberry Picnic Area on left side
Hike 2 requires driving 1.5 miles to a new location: A.B. Williams Memorial Woods. We will hike the Sylvan Trail, which starts at the site of the old Trailside Museum. We will visit an old growth beech-maple forest known to be studied extensively by A.B. Williams, the park system's first naturalist. This location is both a National Natural Landmark and a member of the Old Growth Forest Network. Be prepared to be wowed by both the humongous trees and the beautiful fall color. **Directions:** Backtrack on Strawberry Lane heading south. Continue as it turns into Buttermilk Falls Parkway at Sunset Lane. Park at A.B. Williams Memorial Woods.
Terrain: Dirt Trails and boardwalk; 1 mile each part; some hills.

Saturday, November 9, 5:30 pm – 8:30 pm – Annual Meeting.
The Annual Meeting of the Native Plant Society of Northeastern Ohio will be at the Pine Lake Trout Club, 17021 Chillicothe Rd., Chagrin Falls, OH 44023. Our guest speaker this year will be Sara Fitzsimmons. She is the Director of Restoration with The American Chestnut Foundation and will give us an update on restoring the American Chestnut, *Castanea dentata*, a primary component of eastern Ohio's forests. In the 1800s, plant importation brought with it a devastating fungal disease that all but eliminated the American Chestnut from its original range. Researchers and partners across the eastern US, have been on the forefront to restore this species, exploring the many facets required for reintroduction of disease-resistant populations. Luckily, current research suggests populations of American chestnut could be self-sustainable, despite changing pressures, within the next 50 – 100 years. In the fall members will be sent an invitation to attend.



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On The Fringe

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The Mission of the Native Plant Society of Northeastern Ohio is to promote the study, appreciation and conservation of the native plants and plant communities of Ohio.

Message from the President

Dear members,

Thank you for your continued support of the Native Plant Society of Northeast Ohio. I just wanted to give you a board update after the passing of Jane McCullam on April 25th of this year. Current board member John Senderak has graciously stepped up to handle membership. With his background in spread sheets he has organized the membership into a usable format. You will be receiving your renewal notice from John on your anniversary date.

Diane is still looking for someone proficient with English to help proof and edit the articles for the Journal, *On The Fringe*. Please contact her at dbpolice@roadrunner.com.

Contact me if you would like to be more active with the Society at judysbarnhart@gmail.com.

Judy Barnhart, President, NPSNEO

Request for Proposals for 2019 Annual Grant

The Native Plant Society of Northeastern Ohio is accepting applications for our 2019 Grant(s). We will consider projects that demonstrate excellence in research, conservation, or education that clearly support the mission of the Native Plant Society of Northeastern Ohio. The amount of each grant will be up to $500. The number of grants available will be dependent on funding. Submissions must be received by 5:00 PM Friday, September 20, 2019. The grant(s) will be awarded at the Annual Meeting of the Society November 9, 2019. For more information on the grant and how to apply, please see our website www.NativePlantSocietyNEO.org or contact Kathy Hanratty at nativeplantsocietyneo@gmail.com.

Will Global Climate Change Affect Fall Foliage Colors?

By Howie Neufeld



In this essay I briefly address how could global climate change affect fall foliage color? To paraphrase the Bard, let me count the ways: (1) higher temperatures, (2) altered timing and/or amounts of precipitation, (3) higher levels of carbon dioxide, (4) changes in cloud cover, (5) higher levels of nitrogen inputs and acidic deposition to ecosystems, (6) higher levels of air pollutants such as ozone, and (7) changes in competition due to greater pest loads or invasive exotic species.

This reads a lot like a Letterman Top 10 list (well, 7) for how to screw up future fall foliage displays! I will briefly run through a variety of scenarios we might expect to see, especially in the next two decades.

First, let's group several of these factors together because they will have the same effects. Higher temperatures, precipitation, cloud cover, nitrogen deposition and pollution should all act together to mute fall colors. Trees cue in primarily on day-length and temperature to determine the timing of fall foliage color display. As the days get shorter in August and September, trees begin an orderly process of leaf senescence. This involves the loss of chlorophyll, which reveals the underlying carotenoid and xanthophyll pigments that are responsible for our orange and yellow colored leaves. The subsequent synthesis of anthocyanins in other trees is what gives those leaves their red color.

Some trees such as Norway spruce use day-length as their main cue because it is a good proxy for the coming cold weather. Others, like beech and oaks, rely on day-length but use temperature as a secondary cue; a cool fall will hasten development of fall leaf color, while a warm fall will delay it. Early successional trees, like birch and poplars, rely solely on temperature, so if it warms up, they will delay turning color and vice-versa if it turns cool. Some recent studies suggest that elevated night temperatures might accelerate growth cessation in the fall, and climate models show daily minimum temperatures rising faster than daily maximum ones. This could hasten rather than delay the onset of fall foliage color.

Warming might also extend the growing season into parts of the year when light levels are low because of the low zenith angle of the sun and because shorter days allow less time for trees to photosynthesize. This would lower their sugar reserves, and since sugars are necessary for the

synthesis of anthocyanins, we might see more muted red foliage.

Higher precipitation would lower the intensity of fall color, not because it washes out the colors (a wives' tale) but rather, because photosynthesis is reduced during cloudy/rainy weather. Higher pollution levels cause premature leaf senescence, which would lower seasonal carbon gain, thereby contributing to reduced fall color quality.

Surprisingly, increased nitrogen might reduce fall colors. Paul Schaberg and his associates in the U.S. Forest Service in Vermont have shown that nitrogen deficient sugar maples have enhanced red fall color. They reason that when trees are stressed by low nitrogen, sugars accumulate in their leaves which in turn triggers anthocyanin production. But in a future high nitrogen world, trees would be less stressed and perhaps less red too. Conversely, if acidic deposition leaches nitrogen from soils, then this might counteract the effects of elevated nitrogen with the result that a stand-off could occur between leaching and deposition, leading to perhaps to no change in fall red coloration.

A recent study by Taylor and her associates has shown that high CO2 in the absence of warming can delay the onset of fall color in *Populus* seedlings. Leaves of trees exposed to elevated CO2 in free-air exposure systems also had delayed senescence. Rising CO2 might result in a compression of the length of the fall color season even without concomitant increases in air temperatures.

The biggest unknown will be how global change will affect tree distributions. Hardwood trees in Vermont, where mean temperatures have risen 1.5 degrees C in just the past 40 years, have been documented migrating upslope approximately 100 m. Trees on flatter terrain will have to migrate north. How far north is still an active area of investigation. Louis Iverson and his colleagues at the U.S. Forest Service in Pennsylvania have generated maps of the present and predicted future distributions of our major tree species. Sugar maple is predicted to migrate north into Canada, leaving fewer individuals in the U.S., and possibly decimating the maple syrup industry in Vermont, New Hampshire and Maine. If this species leaves the U.S. for our northern neighbor, what will give us our brilliant red colors in the fall in New England? Migrations such as this will forever alter the composition of our forests, and a new color balance will have to emerge.

A more dramatic change could occur if global warming allows exotic pest species to invade our forests. Right now, we are seeing the deleterious impacts of the exotic hemlock woolly adelgid, which is killing off our beloved hemlocks, including our own native Carolina hemlock. Large blotches of dead, gray hemlock trunks dot the Smokies and surrounding hillsides, showing the destructive power of an insect only slightly larger than the periods on this page. In the upper mid-west, the Asian longhorn beetle is killing hardwoods and causing great concern as it spreads ominously east and south.

To sum up, I predict that global climate change will generally exert more deleterious effects than beneficial ones. Although less brilliant fall foliage displays may not rank high on the list of concerns about global change, those muted colors could be the canary in the mine shaft; a warning of potentially consequential changes to come in our world.

Reprinted from Chinquapin, the Newsletter of the Southern Appalachian Botanical Society, Vol 19-3, 2011.

Picture taken from http://www.nytimes.com/2016/10/26/science/leaves-fall-foliage-colors-red.html

Who Let the Plants Out?
When Rare Species Show Up in Strange Places

By Jane Roy Brown

"Rare plants keep getting rarer, and some are going extinct. With all the threats they're facing, shouldn't we be growing and planting them in the wild?"

With the recent uptick in awareness about extinction, people are more frequently posing variations of this question to the Society's horticulture and conservation staff. "It seems like common sense," replies Director of

Conservation Bill Brumback. "A species is rare or endangered, we know how to grow it, so, why not just plant more? And if the solution were that simple, believe me, we would be doing that."

What makes the issue so complex? Mary Parkin, the endangered species recovery coordinator in the U.S. Fish and Wildlife Service's Northeast Region, lists eleven specific risks in her *Reintroducing Native Plants into the Wild*, a document that outlines guiding principles for the 100 botanists and conservation professionals in the Society's New England Plant Conservation Program (NEPCoP).

The risks, both for the plants being introduced and for existing populations in the wild, include choosing unsuitable habitat for the reintroduced plants, genetic mixing among the introduced and wild populations that potentially weakens one or both, the introduction of disease, and the possibility that even a native rare species may become invasive in its new location. And, Parkin cautions, "the overall success rate for reintroduction projects is low." In part, this is because many rare plants got that way by developing specialized adaptations to particular conditions over tens of thousands of years, and they cannot adapt quickly to new environments. Sometimes the unique characteristics or needs that propel a species toward extinction are not evident, even to scientists who have studied the species for years. Her advice to conservation botanists: "It is far better to conserve existing populations and communities than to attempt the difficult and imperfect task of creating new ones."

To emphasize the point, Brumback cites his multi-year, multi-partner project with the globally endangered Jesup's milk-vetch, *Astragalus robbinsii var. jesupii*, whose only three populations live on flood-scoured ledges along the northern Connecticut River. For several years—with permission from landowners and appropriate federal and state permits—he has been augmenting two of the existing Astragalus colonies with seedlings grown from seed collected at each of the sites. This has produced some success, despite drought and inopportune flooding. But introducing plants to new areas that appear to be suitable habitat has not been as successful.



Goldenseal, *Hydrastis canadensis*
http://my.chicagobotanic.org/science_conservation/the-goldenseal-dilemma

"In each year's transplant group, some of these healthy seedlings do not survive," Brumback says. "In the new areas, the percentage of failed seedlings is higher, and we don't know why. It's really difficult to determine what constitutes suitable habitat for this and many other species."

The Society also carefully documents its work and findings. The data gathered by Society botanists and the NEPCoP network on all the globally and regionally rare plants in New England often constitute the only current scientific documentation of endangered species.

People who are not conservation botanists are unlikely to be aware of the crucial importance of record keeping in conservation, or of the nuances of plant genetics. Driven by a sense of urgency, and perhaps by the perception that scientists are simply studying species and not doing enough to save them, well-meaning citizens sometimes take matters into their own hands and plant rare species in the wild.

"We consider this not to be wise practice," Parkin says. "It can make it difficult to track the populations that constitute the evolutionary history of a species."

Because botanists and federal biologists regularly visit the field to track plant populations, they tend to recognize illicit reintroductions on sight.

"They show up suddenly, have not been recorded in that place before, and the habitat is often inappropriate for the species' long-term survival," says Parkin.

In New England, for example, Parkin and her colleagues believe that someone has illegally transplanted specimens of endangered sandplain gerardia, *Agalinis acuta*, in experimental habitat.

"We've come across this plant in places that we wouldn't have

recommended or condoned," she says, "and there is no previous record of it being there."

Vermont state botanist Bob Popp reports another case: "We recently discovered a very rare alpine plant growing in an area where it had never been known previously, and this area has been botanically well documented. The plant is growing in five discrete patches with some separation between them, making it unlikely it was overlooked." To further complicate the issue, Popp adds, "another alpine species is present in two of the clumps, and this plant has never before been observed anywhere in Vermont. We are still trying to figure out how they may have gotten there. Initially, our thought was that they had to be purposely planted, but our evidence has been mixed."

Popp's concerns focus on the provenance of plants put into the wild by unknown people. "Even if they are grown locally, what is the original source of the seed?" he asks. "These introduced plants could potentially interbreed with our native plants and result in offspring that are less well adapted to the local environment." Such specimens, which may do well in a garden setting, may not persist in the wild over the long term, he says.

Clandestine plantings can also have unintended consequences for the protected species. "If a rare plant suddenly becomes more abundant, it skews our assessment of its current status," Popp notes. In such a case, a species could potentially lose its legal protection. Or, a previously undocumented population—even a single plant—can require the agency responsible for protecting the species to conserve it, which diverts already scant government funds and staffing.

In a case that might read as a parable of this conflict, a single specimen of Leedy's roseroot, *Rhodiola integrifolia ssp.leedyi*, a species federally listed as threatened, is growing in a New York state park, a few miles away from the nearest substantial population. John Wiley, fish and wildlife biologist with the U.S. Fish and Wildlife Service's New York field office, says that the plant is the last survivor of a small population that, for decades, has grown near a public parking lot, in less-than-ideal habitat.



Leedy's roseroot, Rhodiola integrifolia
www.minnesotawildflowers.info

"Because of the location, there has always been some suspicion that someone may have planted the original plants," says Wiley. "It seems likely, but it has never been confirmed." The question hangs in the air more heavily than ever, now that a lone Leedy's roseroot remains standing. "The species recovery plan calls for augmenting the existing populations," says Wiley, "so, should we invest resources in augmenting this population of one, in marginal habitat?"

The questions are not easily answered, as they mix science, money, and genuine concern for species diversity. What the professional botanists and the advocates for more reintroductions both want is for populations of rare plants to continue to exist in the wild.


Sandplain acuta, *Agalinis acuta*
https://clminternship.org/blog

"With climate change and other threats affecting the region," the Society's Brumback notes, "habitat for many of these species will be even more limited in the near future. We not only have to protect as much complex and diverse rare-plant habitat as possible, but also have to figure out how to augment existing populations to help them sustain themselves where they are."

This is why seed banking and keeping clear records of the seeds' origins are so important. "It's the backup plan," says Brumback. "It preserves the genetic variation of these plants and gives us the material from which to do controlled experiments and take appropriate conservation action, without either scrambling the scientific record or causing unintended harm.

Reprinted from the *Native Plant News*, the newsletter of the New England Wildflower Society. Fall Winter 2017, Vol 4, No 2.

Cardinal Flower, *Lobelia Cardinalis*

By Bob Edelen

Natural History

In mid-summer the brilliant scarlet color of the Cardinal Flower flashes from the marshes, stream banks and low woods across the Eastern United States from Southern Canada to Texas. Often called "America's favorite" and "spectacular", it's extremely showy blossoms can be recognized at considerable distance. Few native plants have flowers of such intense color as this common herbaceous perennial. The blossoms are delicate, gradually opening from bottom to top in groups of 2 to 8 brilliant crimson flowers. Though a mature Lobelia cardinalis may ultimately support over a hundred flowers, the sequential blossoming habit of this spectacular native plant will prolong blooming time from summer into early fall. A moderately tall plant, (2 to 4 feet) stout and erect, it is a favorite of our ruby throated hummingbird, numerous butterflies and some bees who oblige as pollinators. The sexual tube of the cardinal flower is at first male, displaying pollen-bearing stamens at the tube tip. Pollinators collect the pollen by brushing their foreheads against the tube tip as they forage for nectar. As the stamens decline, the Y-shaped pistils extend from the tube, becoming the female and ready to receive pollen from flowers still in the pollen stage.



Where to Grow

Though primarily a wetland plant, Lobelia cardinalis is adaptable to a wide range of soil and light conditions. Cardinal flowers can be grown in full sun or shade but probably grow best in filtered light. They can be grown in the water garden under partially submerged conditions in heavy soils along stream and pond banks that are occasionally flooded or can be grown in a well-drained perennial garden if sufficient moisture can be provided and mulch is used to keep the roots moist.

Propagation and Care

Lobelia cardinalis will re-seed itself readily. The near microscopic seeds can be collected in the late fall once the seed capsules have thoroughly dried. Seeds may be saved over the winter in an envelope stored in a dry location. In the early spring seeds may be direct seeded into the flowerbed. Do not allow the soil to dry until the plants are well established. Seeds may also be sprinkled onto a rich potting media in a pot or flat (do not cover) and watered from the bottom until seedlings are well established. Once the plants have emerged and formed two sets of true leaves, transplant the seedlings into individual pots. Continue to provide ample moisture until a strong root system is established, then plant the individual seedlings into the flowerbed, water garden or any natural habitat where sufficient moisture is assured. Seeds planted in the summer form rosettes of foliage in the fall. Be careful to keep leaves and debris from smothering these rosettes.

Reprinted from *The Turk's Cap*, a newsletter of the Delaware Native Plant Society, Summer 2012, Vol 15, No 2.

Picture take from http://www.fs.fed.us/wildflowers/plant-of-the-week/lobelia_cardinalis.shtml

Wildflowers of the Upper Midwest
The Watercolor Collection of Lydia E. Curtis

By Andrew C. Hayes

Lydia Curtis was born in 1886 on a farm about 6 miles west of Charles City, Iowa, the second of four daughters of Fred and Sophia Krueger. Her grandfather was the first to farm this land in the 1850's, breaking the native prairie. The property included the prairie, timber and wetland areas typical of the landscape so valued by the people moving in from the East. Lydia's older sister wrote a family history in 1963, which included the following:

> *The near-by timber was an ideal locale for little girls to grow up and learn to know birds, flowers and trees. Our parents knew and loved wildlife. Our father was a born naturalist. No plant, stone, tree or bird escaped his notice. A tramp through the woods was fun and we always learned something new from his knowledge about nature. In the spring, we strolled along the creek into the woods where bloodroots, bluebells, Dutchmen breeches and violets grew in profusion. Sometimes we picked flowers until we could carry no more. Our mother patiently untangled our armfuls and showed how they must be put into water. She told us not to pick so many because some must be left for seed …*

Fred recognized his 2nd daughter had a gift for art, so he arranged for her to have private lessons while attending high school. She subsequently went to Highland Park College, in Des Moines, Iowa. Not only did she graduate in 4-years, but she also was a faculty member during that same time, teaching classes on 'pen arts' to her fellow students. One of her students, James Hubert Curtis, later became her husband.



Rudbeckia hirta species. Dodecatheon meadia, Dalea candida, and Dalea purpurea

Over the next 30 years, she managed the home and raised five children. Hubert was a civil engineer, holding positions in several Iowa counties and cities. Lydia found some time to continue working on her art, focusing on oil and watercolor paintings. Hubert died in 1944, so Lydia went to work for the Army Corps of Engineers. One of her responsibilities was to hand draw snow pack maps of the upper Missouri River watershed. These maps helped predict run-off and flood risks for the coming spring. Finally, at age 72, Lydia retired from work in 1958 and began a 15-year project to paint in watercolors the wildflowers indigenous to the upper Midwest. Most of her specimens were found in Minnesota, where she first lived in St. Paul and later Morris. She always had her own wildflower garden in the yard. The Eloise Butler Garden in Minneapolis was a favorite haunt. And she would enjoy drives in the countryside around Morris, finding wildflowers along the road, the railway embankments and near steams or lake shores. She kept copious notes on the individual specimens to later develop narratives about them. Initially she sketched in pencil the flowers and used the notes to paint later. She then developed a technique to freeze the flowers. This allowed her to paint them at her leisure while still having their true colors as a subject to capture.

Over 13 years she produced about 250 plates of wildflower Species. At age 85, she felt she no longer could "do justice to the beauty of the wildflowers" due to failing vision and an unsteady hand. She continued to research each specimen and completed narratives on their lore.

A year before her death, Lydia created an introduction for her work:

In presenting these sketches of wildflowers, I have not attempted to show all plant structures in scientific detail. I have tried to show the coloring and beauty of these flowers so even a child may recognize them and enjoy them when found. With the rare, hard to find flowers I hope to help preserve the memory of their beauty.

Even during the span of my lifetime vast prairies of the Midwest have been subdivided into farm tracts and are now cultivated. Many swampy, marshy areas have been tiled and drained, so are now making up the fertile acres that produce America's fabulous yields of corn, wheat and other grains. Woodlands, too, have been cut over, cleared and either cultivated or pastured.

All of this has helped build up our material prosperity and our culture as we know it. However, there has also been a loss. Our unexploited woodlands, prairies and swamps had a wealth of plant growth which has been replaced with cultivated crops. Among these plants are many of our choicest wildflowers. To simplify travel conditions even roadsides are mowed at regular intervals, too often cutting down any chance wildflowers before they have had time to form and ripen seed. Hence our wildflowers are becoming less abundant; many varieties are rare. Only the more hardy ones remain with us in appreciable numbers.

Flowers in all of their varying color and form have always intrigued me. Thus, in humble reverence I offer these sketches fully aware they do not show the glow and glory of the flowers themselves, but in the hope that they may help others to experience the joy I have known because of our native wildflowers.

Lydia E. Curtis 1973, Morris, Minnesota



Anemone patens and Viola conspersa



Dodecatheon meadia, Dalea candida, and Dalea purpurea

Reprinted from the *Minnesota Plant Press*, a newsletter of the Minnesota Native Plant Society, Winter 2018-2019, Volume 37, No 1.

Andrew Hayes is Lydia's grandson. Along with Cora Curtis Hayes and 12 first cousins, the family has established the Lydia E. Curtis Wildflower Collection. An exhibition of a larger collection of these paintings will be displayed at Geauga Parks in 2021. Information at that time will be communicated.

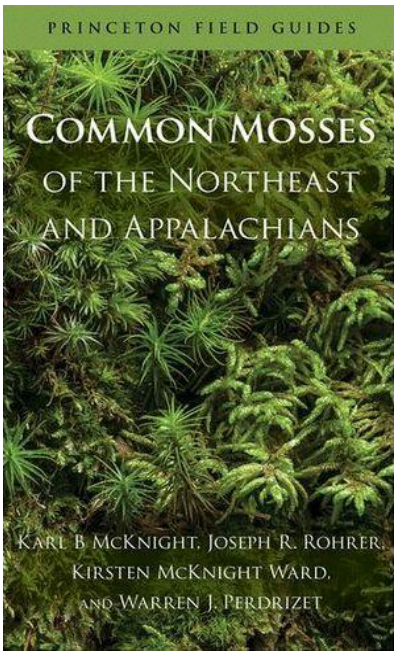
The family welcomes additional opportunities to present these works to the public. You can contact the author with your interest. ach_igh@hotmail.com.

© 2019 Lydia E. Curtis Wildflower Collection

Book Review:

Common Mosses of the Northeast and Appalacians

By Karl B. Knight, Joseph R. Rohrer, Kirsten McKnight, and Warren Perdrizet



Publisher: Princeton University Press, 2013
Pages: 392 pages; 400+ color photos. 600+ line illus.
ISBN-10: 9780691156965
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Book Dimensions: 4.5 x 7.5 inches
Price: $28.95

Review by Tom Phillips

Mosses are a significant part of the flora of many ecosystems. Many naturalists show an interest in them but the need for microscopic study seems to discourage some from pursuing further study. We now have a new field guide that helps identify up to 200 of the most common mosses of the Northeast and Appalachians. The authors use three major key features to help identify each specimen. First: growth form; is it an acrocarp with stems simple or sparingly forked (packed in tufts), a pleurocarp with stems branched freely and twined together in mats, or a peat moss with stems vertical with pendant branches in clusters of three or more. The second key feature is leaf shape, with a variety of shapes diagramed. The third key feature is the presence or absence of a leaf midrib. All features are clearly diagramed, and the authors developed a very nice color code which shows as color tabs on the pages that describe the different species. There is a helpful page with a flow chart incorporating all three features that will lead you to either a group of color tabbed pages that you can browse to identify your specimen or to additional dichotomous keys that will further refine your search.

You will need to have a good hand lens to identify leaf characteristics. I feel one of the goals of the authors has been to provide a guide that most naturalists can use to observe and learn about mosses without the need for microscopes. They have done a remarkably good job in accomplishing that goal and for the most part leaf shape and midrib can be identified with a hand lens. There are some specimens that a good microscope will be needed to render better images with more detail. Each species description is concise with very good color photographs of the moss's general appearance. They also included drawings from the monumental work of Crum & Anderson's *Mosses of Eastern North America* to better demonstrate significant features. Together the images provide very clear representations of the different mosses.

Sphagnum seem to bedevil many botanists and the Guide provides identification for a few but not all the common Sphagnum of the Northeast. This is a section that I feel could be expanded with more species included. For those naturalists interested in learning more about Sphagnum, unfortunately a compound microscope will be needed since microscopic characteristics are important features to make a positive identification for many species.

The Common Mosses of the Northeast and Appalachians is a very good, fairly inexpensive addition to anyone's library. The book is sized as a field guide, so it is easy to carry in the field and has a water-resistant cover. I think the authors have done a great job with bringing these Lilliputian plants into the realm of study for us all. Now, how about the liverworts?

Reprinted from the *NYFA,* a quarterly newsletter of the New York Floral Association. Summer 2013, Vol 24, No 2.

Folklore:

Gentians

By George Ellison

Thou waitest late and com'st alone,
When woods are bare and birds are flown,
And frosts and shortening days portend
The aged year is near his end.

By William Cullen Bryant

Aside from witch-hazel, which unfurls its yellow tassels into December or even early January, gentians are among our latest showy flowering plants. In damp or wet areas protected from hard frost, they can often be found blooming throughout November.

Because of their tardy nature and unsurpassed beauty, gentians have been justly celebrated in both American and European letters. In the lines quoted above, William Cullen Bryant was referencing the fringed gentian, which has in recent decades been reclassified into a closely related genus, *Gentianopsis crinita*.

Nevertheless, it is readily identified by the delicate fringe along its petal margins. Some consider it to be the most beautiful wildflower in North America. Thoreau described its color as "such a dark blue, surpassing that of the male bluebird's back! It is a transcendent blue!"

Unlike fringed gentian, which opens in sunlight, the seven or so species still classified in the original genus, *Gentiana*. have five petals that are closed or almost closed at the top so that the blossom has a bottle-like shape. One of the most common of these is the stiff gentian, *G. quinquefolia*, which displays narrow purplish flowers.

Happening upon these plants in the woods for the first time, you might wonder how they accomplish pollination since their sexual parts are encapsulated within a container of petals. Hang around long enough and the answer will come buzzing along. For reasons known only to themselves, bumblebees are during the fall months incurably attracted to purples and blues. (In spring they seem to prefer white-blooming flowers.) Bumblebees cannot resist gentians, the ultimate in blue. And they know, of course, the secret of gaining access to the sustenance inside the gentian containers.

Bumblebees are stronger than most other nectar-gathering insects. By pressing at the apex of the gentian blossom, they cause it to open like a door. If the bumblebee is a careful bumblebee, he'll push only the front end of his body into the bottle. But if he gets too excited and enters completely, the "door" closes, and the flower becomes a prison.

In *Wildflowers and Plant Communities: A Naturalist's Guide to the Carolinas, Virginia, Tennessee & Georgia*, biologist Timothy Spira notes that "the exclusive nature of the flower's pollination mechanism benefits the plant in that pollen and nectar aren't wasted on less efficient pollinators."

Bumblebees can fly at lower temperatures than other potential pollinators, including honeybees. They have longer tongues than honeybees, so they can pollinate flowers with long narrow corollas. And the branched hairs that cover their bodies are perfect for picking up and transferring pollen.



Greater fringed gentian, *Gentianopsis crinita*

According to Charles Skinner's *Myths and Legends of Flowers* (1911) the plant's scientific name—which was formally applied by Linnaeus, though its origins go back much further—references "Gentius, King of Illyria (circa 181- 68 BC) in the Balkans." The king's physicians

considered it to be a remedy for "indigestions, weariness, and dog bites." But in his *Highlands Botanical Garden: A Naturalist's Guide* (2012) Jim Costa—director of the Highlands Biological Station—notes that in more recent times the tonic properties in yellow gentian, *G. lutea*, a European species, are "being used today to make liqueurs, aperitif wines, and flavorful concoctions like Angostura bitters." ("Angostura" is a concentrated bitter, or botanically infused alcoholic mixture, made of water, 44.7% ethanol, gentian, herbs and spices.)

YIKES! … 44.7% ETHANOL?

Then, in Patrica Kyritsi Howell's *Medicinal Plants of the Southern Appalachians*, (2006)—the best book of its sort that I know of—gentian is credited with curing or alleviating chronic digestive problems with symptoms of bloating, gas, belching, constipation, assimilation, and elimination. The species Howell cites for use in place of the Eurasian yellow gentian is stiff gentian, *G. quinquefolia*.

Her recipe for "Gentian Digestive Bitters" calls, in part, for "three ounces of ground dry or five ounces of finely chopped fresh gentian root into a quart jar with the skins of two organic oranges (thinly sliced), one tablespoon of ground cardamom seed, one teaspoon of whole fennel seed and 16 ounces of quality brandy."

Now we're cooking! Brandy will beat ethanol any day of the year. But I don't have to ingest the plant to enjoy it—just seeing that "transcendent blue" makes me feel better.



Stiff Gentian,
Gentianella quinquefolia

Reprinted from *Chinquapin*, The Newsletter of the Southern Appalachian Botanical Society, Fall 2017, Vol 25, No 3.

Fringed gentian picture taken from http://ianadamsphotography.com/news/picture-ohio-lake-erie-bluffs-lake-county/comment-page-1/

Stiff gentian picture taken from http://www.lanarkflora.com/Rare_Plants/photos_GK.html

The Cleveland Museum of Natural History's 10,000-Acre Preservation Landmark

In 2018, the museum's natural areas preservation land grew to more than 10,000 acres under protection—itself a rare and remarkable achievement.

The museum's natural areas program has been led since 1976 by botanist Jim Bissell, whose tireless efforts to chronicle everything from rare grasses along Cleveland railroad tracks to endangered flowers in remote fens have been a driving force in the expansion of protected areas. The Natural Areas Program works to help people better understand and connect with nature.

The Museum preserves natural areas for science, education and enjoyment. They locate and acquire natural areas, care for existing properties with an active stewardship program, and assist other nonprofit conservation organizations with scientific assessments of their projects. The Museum believes strongly that it must protect properties as well as conduct ongoing stewardship necessary to preserve the sites and support their current and potential conservation value.

To read the entire article go to:
https://www.cleveland.com/opinion/index.ssf/2019/01/cleveland_museum_of_natural_hi.html

What is the Creepiest Plant or Fungus?

By Stephen G. Saupe

There are lots of good candidates including witch's butter, *Tremella mesenterica*, dead man's fingers, *Xylaria polymorpha*, Jack-O-Lantern mushrooms, *Omphalotus olearius*, and the ghost plant or Indian pipe, *Monotropa uniflora*. My vote is for a parasitic fungus with a benign name but a rather gruesome appearance, cedar-apple rust, *Gymnosporangium juniperi-virginianae*.

At its creepiest prime, cedar-apple rust reminds me of a brain that has exploded with tubes of orange gelatinous goo protruding in every direction.

The gelatinous tubes are actually one of the reproductive structures of the cedar-apple rust fungus. They produce tiny, seed-like structures called spores that are carried by the wind to an apple tree. The fungus emerges from the spores and infects the leaves, forming bright orange circular lesions on the upper side of the leaves.

The fungus eventually grows through the leaf and erupts through the bottom releasing another crop of spores. This time the wind carries the spores back to an eastern red-cedar tree, *Juniperus virginiana*.

The spores germinate on the eastern red-cedar, and then over the course of several months, the fungus that emerges grows into a structure, called a gall,



Gymnosporangium juniperi-virginianae

which looks like a reddish-brown brain. The surface is dimpled like a golf ball These brain-like galls can grow to the size of a ping-pong ball, though most are closer to grape size.

The fungus overwinters in the galls. Then, in early spring the gelatinous tubes erupt through the dimples and release spores to complete the life cycle.

Thus, cedar-apple rust infects two different plants—apples and eastern red-cedar. The fungus doesn't normally kill either of its hosts, but it can significantly reduce apple yields and cause misshapen cedar trees.

To minimize infection in your apple orchard, you can cut down nearby eastern red-cedar trees. This will disrupt the life cycle. Unfortunately, the spores can travel great distances, so it is not a particularly effective control method.

If you want to collect some of the galls to decorate for Halloween, you can find eastern red-cedars growing in old-fields, roadsides, and gravelly areas. The trees are particularly common in the southern half of Minnesota.

Eastern red-cedar produces a bluish, berry-like cone that is dispersed by birds. The ones that the birds don't eat can be harvested to flavor gin.

The wood is very aromatic. It is reminiscent of a hamster cage. That's because the shavings are often used for bedding.

The volatile chemicals that give the wood its odor, repel insects, and provide resistance to wood-rotting fungi. This explains why eastern red-cedar wood can be used to line blanket chests and dresser drawers and also why it is a very long-lived tree. In fact, one more than 475 years old has been reported in Virginia.

Reprinted from the *Minnesota Plant Press*, The Minnesota Native Plant Society Newsletter, Fall–Winter 2016, Vol 35, No 2&3.

Picture taken from www.wikipedia.org/wiki/Gymnosporangium_juniperi-virginianae

Invasive Plant:

More Invasive Wetland Plants

By Ray Stewart



European Frog-bit, *Hydrocharis morsus-ranae*
Picture taken from
www.invadingspecies.com/european-frog-bit/

I was on Kelly's Island for a botany workshop at North Pond State Nature Preserve, which is one of our richest field trip locations. In recent years, I have visited this site regularly, enjoying the unusually rich wetland plant diversity, assessing its condition and reporting to the Ohio Natural Areas and Preserves Association, ONAPA, regarding invasive species, trail conditions and visitor impacts. The condition of North Pond was different in a couple ways. First, the water level was much higher. Lake Erie water levels are near record highs. Though not directly connected with Lake Erie on the surface, it adjusts to lake water levels through a narrow sandy beach.

There have been invasive plants present before. New on the scene are more recent arrivals that are muscling in across northern Ohio coastal marshes: Flowering Rush, *Butomus umbellatus*, and European Frog-bit, *Hydrocharis morsus-ranae*.

Frog-bit, originally introduced about 80 years ago as a possible ornamental plant, has escaped into rivers and wetlands across the continent. This perennial plant grows rapidly to form dense floating mats in slow or still waters where it crowds out native plants. This dioecious plant normally forms stands of all either male or all female populations. Seed is therefore not the normal form of propagation. Instead, small buds form at the ends of stolons that lie dormant on the bottom, over the winter. In the spring, these buds rise to the surface and begin growing. Each plant can produce more than 100 buds, expanding into new habitats rapidly.

Frog-bit forms dense mats, blocking light that prevents growth of any submerged plant life. At season's end, the dying vegetation decomposes consuming oxygen from the water that restricts the activity of other aquatic life forms. In some locations, the living mat hinders boat traffic and clogs ditches.

The Frog-bit leaf is round or nearly so. Individual white flowers have a yellow center with 3 rounded petals. The cleft in the somewhat 'heart-shaped' 1-2-inch diameter leaf is much smaller than the White Water Lily, *Nymphaea odorata*. The bottom of the leaf is purplish-red with a spongy coating along the midvein.

North American frog-bit, *Limnobium spongia*, a native wetland plant, has a spongy coating across the entire underside, not just the midrib. Watershield, *Brasenia schreberi*, another native, does not form a rosette of leaves and the stems have a slimy coating.



Flowering Rush, *Butomus umbellatus*
Picture taken from www.thewildflowersocity.com/wfs_

Reprinted from the *Wetland Trumpeter,* a newsletter of the Ohio Wetlands Association. September 2017.

Governor DeWine Dedicates 118-Acre Lakeside Daisy Acquisition



Ohio Governor Mike DeWine and Ohio Department of Natural Resources, ODNR, Director Mary Mertz dedicated the purchase of 118 acres adjacent to the Lakeside Daisy State Nature Preserve in Marblehead.

"Adding over 100 acres to this state nature preserve will help protect an estimated 700,000 Lakeside Daisy plants," Governor DeWine said. "This is an investment in Ohio's public lands not only for us today, but for future generations as well."

Funding for this acquisition comes from both a sizable grant from the U.S. Fish and Wildlife Service and donations from Ohioans using their state income tax refunds to support Ohio State Nature Preserves. This purchase increased the size of the preserve from 19 acres to 137 acres.

"This purchase is an example of how people's state income tax refund donations have benefited Ohio's state nature preserves," said Mertz. "Through these donations, Ohioans are showing their support for the protection of the state's most precious natural resources for generations to come."

Lakeside Daisy State Nature Preserve is home to the only natural, protected population of the Lakeside Daisy in Ohio. With acquiring the additional 118 acres, this property will also protect valuable habitat for migratory bird species crossing Lake Erie, such as the federally endangered Kirtland's warbler, bald eagle and many more.

Lakeside Daisy was listed as endangered in Ohio in 1980 and was listed as federally threatened by the U.S. Fish and Wildlife Service in 1988. Acquiring this property will further enhance the ability of this species to survive in the future.

A public hike was scheduled at Lakeside Daisy State Nature Preserve on Mother's Day, Sunday, May 12. This is the best time of year to see this state endangered flower up close.

ODNR ensures a balance between wise use and protection of our natural resources for the benefit of all.

Article taken from http://ohiodnr.gov/news/post/governor-dewine-dedicates-118-acre-lakeside-daisy-acquisition, May 7, 2019.

Striped maple, *Acer pensylvanicum*

By Kathy Schlosser

Autumn Daybreak

Cold wind of autumn, blowing loud
At dawn, a fortnight overdue,
Jostling the doors, and tearing through
My bedroom to rejoin the cloud,
I know–for I can hear the hiss
And scrape of leaves along the floor–
How may boughs, lashed bare by this,
Will rake the cluttered sky once more.
Tardy, and somewhat south of east,
The sun will rise at length, made known
More by the meagre light increased
Than by a disk in splendour shown;
When, having but to turn my head,
Through the stripped maple I shall see,
Bleak and remembered, patched with red,
The hill all summer hid from me.

Edna St. Vincent Millay



Picture taken from www.omcseeds.com/acer-pensylvanicum



Picture from www.plants.usda.gov

Striped maple, *Acer pensylvanicum*, brings a bit of New England to the far western counties of North Carolina, its' lemon yellow leaves fading to gold as cool breezes arrive from the North.

This small tree (up to 40 feet at maturity, but usually 15-25 feet) is attractive throughout the seasons. Winter exposes pale vertical stripes along its' greenish bark, the signature stripes fading to reddish-brown as the tree matures. Spring brings dense panicles of green flowers, appearing after the leaves form, followed by winged samaras that whirl and spin their way to the ground.

Summers' dark green leaves have a shape, faintly recognizable as an *Acer*, sometimes called goosefoot, giving rise to another common name (along with moosewood, presumably because further north, moose are among the animals that eat the bark).

Striped maples grow in the shade of mixed hardwood/coniferous forests in slightly acidic, moist soil. Dense shade results in slow growth, sometimes as little as an inch per year, but when more light filters through, growth speeds up.

Striped maple is a great tree to encounter in the wild, but I can't say how it would perform outside its native range. Better to enjoy it where it is, taking in all the other plants that share space, and the vistas often nearby.

According to the USDA Plants Database, *Acer pensylvanicum* is native to the state of Ohio.

Reprinted from *Native Plant News*, a publication of the Natural Resources Conservation Service, February 2012.

Interesting Factoid:

Wood Wide Web

By Diane Christensen

Imagine you're walking through a forest. Everything might seem quiet but beneath your feet is a flurry of conversation. All the plants around you are actually talking to each other. The trees and the shrubs and the flowers are passing information back and forth, with serious life and death consequences. So, how are they communicating? They're using a giant network of fungi—one so pervasive and powerful that some scientists have started comparing it to the Internet. They're calling it the "Wood Wide Web."

The so-called Wood Wide Web is made up of what are called "mycorrhizal fungi." Mushrooms are the visible manifestations of microscopic, soil-dwelling fungi whose bodies are made up of a mass of thin threads, known as a mycelium. There are many different types of mycorrhizal fungi, but generally these little guys will grow on the roots of plants and provide them with water and nutrients—like nitrogen and phosphorus—in exchange for sugars. While they're incredibly thin, the threads of the fungi can be up to 1000 times the length of a tree root. This allows the fungi to connect together many different plants. Once connections are made, the fungi can act almost like the neurons in our brain, transporting signals from plant to plant. And these networks are everywhere. It's estimated that around 90% of land plants are connected to some kind of mycorrhizal network.



So, how can plants use these networks? Well, to begin with, they can help each other out in times of stress. For example, during the fall months, when paper birch trees lose their leaves and can't produce sugar, Douglas-fir trees may shuttle them nutrients through the fungal network. And in the summer, when paper birch trees have lots of leaves, they send sugars to young Douglas-fir saplings growing in their shadows.

Interesting Facts:

- Plants can warn each other of danger. Douglas-fir trees connected by a fungal network can alert their ponderosa pine neighbors if they're attacked by budworms. In response, the neighboring ponderosa pine trees will produce insect-repelling chemicals—even though they haven't been directly exposed to the insects themselves.
- Mycorrhizal fungi can also enable parental care among plants. Some adult trees will help out their younger relatives by sending those seedlings more nutrients through the fungal network than they send to strangers. The adults may even make more room for them in the soil by reducing the number of their own roots.
- Fungal networks also boost their host plants' immune systems. That's because, when a fungus colonizes the roots of a plant, it triggers the production of defense-related chemicals. These make later immune system responses quicker and more efficient, a phenomenon called "priming". Simply plugging into mycelial networks makes plants more resistant to disease.
- Fossil evidence supports the idea that these plant-fungal partnerships are as old as the emergence of terrestrial plants, about 500 million years ago. Indeed, some scientists believe that mycorrhizae may have been critical for the successful colonization of land by plants

But not everyone is so generous. Much like our internet, things can sometimes get a little nasty on the Wood Wide Web.

Take Black Walnut trees, for example. They can spread poison through the network, hindering the growth of their neighbors. And the fungi making up the network can be just as tricky. Mycorrhizal fungi tend to pick favorites. They may share resources with one species of tree, but bleed another species dry without giving anything back in return. The fungi may also judge a plant's health. If they think it's too weak or sick, they may not allow it to receive nutrients or danger signals from the network.

The fungal internet exemplifies one of the great lessons of ecology: seemingly separate organisms are often connected and may depend on each other. Ecologists have known for some time that organisms are more interconnected and interdependent. The wood wide web seems to be a crucial part of how these connections form.

Now, we're only beginning to understand how complex these relationships get. But imagine the possibilities for agriculture and forestry. If we find out certain species share well across the network, maybe we can plant them near each other to yield better harvests or grow healthier forests.

So next time you're walking through the woods or the park don't forget to thank the fungal web beneath your feet.

Information for this article taken from www.pbs.org/wgbh/nova/nature/wood-wide-web., www.howplantswork.com/2011/07/26/the-wood-wide-web-are-plants-inter-connected and www.bbc.com/news/science-environment-48257315. Picture taken from www.bibliotecapleyades.net.

'Shroom

By Howard Eskin

Oh Fungi are such useful Fare,
Wild Mushrooms here, old Toadstools there;
Mild Tree Ears, Oysters, Palates dare,
Morels, Shiitakes to prepare;
Though Caution rules, you must take Care,
Of Amanitas, just beware!

Midst darkened Woods, in silent Prayer,
On Stumps and Logs, like Flowers fair;
With Oaks or Firs, soft Moss Beds share,
Soon after Rains, no Time to spare,
Delicious though you'd best not err;
Most Mushrooms are beyond compare!

Green grungy Molds; white Truffles rare,
Caps' spongy Folds, toothed, scaled or bare;
Gills dense, Pores tight, around Stipes flare,
Dispense Spores light, abound through Air,
To spread with Ease, found Ev'rywhere;
Bake Bread, make Cheese, Vins-culinaire!

Rye Ergot Rots, blue Mildew, creep,
Dry Amadou to Chimney Sweep;
Why Penicillin, Compost Heap!
From Forays, beaucoup Harvests keep,
Come most Rewards, true Bounties reap;
In fruiting Forests, dark and deep!



Witch's Hat Mushroom, *Hygrocybe conica*
Picture taken from www.asergeev.com/

Poem taken from Howard Eskin's website: http://www.howardsview.com/shroom/shroom.html.



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