

On The Fringe

Journal of the Native Plant Society of Northeastern Ohio

Program Schedule – Spring 2016

Saturday, March 26, 2:00 pm – The West Woods Nature Center – Phenology: The Age-old Science of predicting blooming times and insect activity. Phenology is the study of recurring phenomena and their relationship to weather and climate. Bird migration, hunting and gathering seasons, plant blooming, insect appearance are examples of events that have been recorded for centuries. Denise Ellsworth of OSU Agricultural Research Center will share how phenology tells us what is blooming, and what insect activity is in the near future. With an easy-to-use web-based biological calendar, participants will learn how to customize this calendar for garden plants and insects. Presented in conjunction with the Geauga Park District. **Directions:** take Rt. 87 east from Rt. 306 in Russell Township approx. 2 miles to the park entrance on south side of the road. 9465 Kinsman Rd, Novelty, Ohio 44072. **No registration required.**

Spring Weekly Wildflower Walks – Wednesdays at 6:30 pm

No registration is required for these walks. All walks will take place rain or shine.

These easy walks will explore the parade of spring blooming woodland flowers from the first skunk cabbage to the final waterleaf and wild geranium. **Guests are always welcome.**

April 6 – Wilson Mills Trailhead, North Chagrin Reservation, Cleveland Metroparks. The trail climbs away from the parking lot into the forest. With both forest and wetland this will likely be an area with lively early spring life. **Directions:** The parking lot is located about 500 feet west of River Road on Wilson Mills Road. Leader Kent Scott. 41°33.043 N 81°25.105 W

April 13 – Brecksville Reservation, Cleveland Metroparks. Explore Brecksville's Wildflower Loop Trail with member Ellen Brown-Armstrong. We will discover woodland species along with emerging prairie plants in the Tall Grass Prairie, with brief stops at the Keeler Memorial and Wallin Creek. Walk is on wide groomed path, with two hills with steps. **Meet at:** Brecksville Nature Center parking lot. 9000 Chippewa Creek Drive, Brecksville 44141. 41°31.766 N 81°61.581 W

April 20 – Bedford Reservation, Cleveland Metroparks. Volunteer Naturalist Fred Losi will lead this walk as we explore, examine, and identify early spring wildflowers in eastern Bedford Reservation. Optionally bring your camera to help preserve the beauty of spring. Terrain is moderate. **Meet at:** Egbert Picnic Area. **Directions:** Egbert Picnic Area is located off Gorge Parkway in Bedford Reservation. 41°23.100 N 81°32.418 W

April 27 – The Rookery, Geauga Park District, Geauga County. Highlight will be the white trout lily, anemones, and other Chagrin River spring ephemerals. Flat walking on old railroad bed. **Directions:** From I-90 exit 200 (Painesville/Chardon), turn south onto Route 44, turning right at the first intersection (.3 mile) onto Auburn Road. Travel south approximately 9.7 miles, cross Route 322 (Mayfield Rd) and continue 2 miles to Cedar Rd. Turn west onto Cedar Rd, and travel approximately 1.9 miles to park entrance. 10110 Cedar Road, Munson, OH 44026. 41°29.986 N 81°16.692 W

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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.

May 4 – Shaw Woods, Ravenna Twp., Portage County. Diverse mix of forest, with nearly mature and floodplain forests containing an abundance of trails over rolling terrain. Fairly easy to navigate.

Directions: Entrance is just north of 7051 Beery Rd. between Beechwood Rd. and McCormick Rd., Ravenna 44266, west of Ravenna Arsenal. 41°11.000 N 81°11.428 W

May 11 – Geology Meets Botany at Holden Arboretum. Geologists take a 4-dimensional view of the world that includes time. Pat Biliter, a geologist retired from the U.S. Army Corps of Engineers, a 15-year Holden volunteer, an Ohio Certified Volunteer Naturalist and instructor, and vice president of the Burroughs Nature Club, will lead us on a walking tour that will focus on wildflowers, trees, and other plants that have an ancient geologic history, or grow only on specific types of rocks. We will meet in front of the Visitor Center. **Directions:** From I-90, take Exit 193 and turn south on Route 306. Go just short of a mile and turn left at the traffic light to take Route 615. After 0.2 mile, at another traffic light, turn right onto Kirtland Chardon Road. Continue southeast for 3+ miles to Sperry Road, where you turn left onto Holden property. Continue north on Sperry Road for 1+ miles. Watch for the gate to the Visitor Center on the left. **From U.S. 6,** turn northwest onto Kirtland Chardon Road. Continue for about 2 miles to Sperry Road. Turn right onto Holden property (passing the Sperry Road intersection that goes to the left—ignore it). Continue north on Sperry Road for 1+ miles. Watch for the gate to the Visitor Center on the left. 41.6126° N 81.3013° W

May 18 – Swine Creek Reservation, Swine Creek Lodge, Geauga Park District. This mature woods includes an amazing and colorful array of spring wildflowers; maybe the best in the area. The trail follows a small stream so be prepared for several crossings and a small hill or two. **Directions:** From downtown Middlefield, take Rt. 87 east 2.5 miles to Hayes Road. Turn right (south) 1.5 miles to the park entrance on the right. Bear left to Lodge at 16004 Hayes Rd., Middlefield, 44062. Leader Kent Scott. 41°26.262 N 81°1.314 W

May 25 – Sunnybrook Preserve, Geauga Park District, Geauga County. Enjoy a walk along trails that take you through woodlands and a meadow opening, alongside nearby wetlands, and a ravine, as we discover and observe wildflowers and wildlife that call this 73-acre natural area preserve home. Walking is easy to moderate on gravel path along flat to rolling terrain. **Directions:** Head south on Heath Rd. from Wilson Mills Rd. or head north on Heath Rd. from Mayfield Rd./US-322. Park entrance is on west. 12474 Heath Rd. Chesterland 44026. 41°30.314 N 81°6.103 W

Saturday, April 23, 1:00 pm – The West Woods Nature Center – Native Plant Landscaping.

Consider using some of our beautiful native plants when planning your garden or designing your landscape. Kathy Hanratty, Native Plant Society of Northeast Ohio President, shares how natives give our landscape a sense of place and promote a more biologically rich region. A limited number of native plants will be for sale after the program. Joint program with Geauga Park District. **Directions:** take Rt. 87 east from Rt. 306 in Russell Township approx. 2 miles to the park entrance on south side of the road. 9465 Kinsman Rd, Novelty, Ohio 44072. **No registration required.**

Saturday, May 7, 10:00 am – Noon – Morgan Swamp – Ashtabula County.

Karen Adair of the Nature Conservancy will take us on a walk to see painted trillium and heartleaf twayblade as well as an overview of their project to develop a native plant educational garden at the new Grand River Conservation Campus at Morgan Swamp. **Directions:** from I90 travel south on Rt. 45 approximately 12 miles. Turn right (west) on Callender Rd., proceed 1.4 miles to the campus drive on the right after the bridge. **Registration:** Call Judy to register at 440-409-1688 (C) or email judysbarnhart@gmail.com.

Saturday, May 14, 1:00 pm – 3 pm – The West Woods Nature Center – Wildflower ID workshop.

Learn the basics of spring wildflower ID indoors using the Newcomb's Wildflower Guide before heading down the trail in search of flowers. A limited number of wildflower guides will be available for purchase. **Directions:** take Rt. 87 east from Rt. 306 in Russell Township approx. 2 miles to the park entrance on south side of the road. 9465 Kinsman Rd., Novelty, Ohio 44072. **Registration:** Pre-registration required by calling Geauga Park District at 440-279-0880.

Thursday, May 19, 9:00 am – 12:00 pm – Bass Lake Preserve – Geauga County.

Jim Bissell, Curator of Botany at Cleveland Museum of Natural History, leads this joint trip with NEON to the museum's 192 acre preserve adjacent to Geauga Park District's Bass Lake Preserve.

Directions: 11445 Lakeview Rd, Chardon, OH 44024. **Registration:** Registration required by calling Judy at 440-409-1688 (C) or emailing at judysbarnhart@gmail.com.

2016 Membership Renewal

You should have already received your 2016 renewal form. Please renew at the highest level you can. If you wish a printed copy of *On The Fringe* mailed to you, simply check the box to receive the printed journal and add \$10 to your total.

Please also consider making a contribution to our endowment fund. This is the source of our Annual Grant and is a lasting tribute to our founder, Ann Malmquist. With the low interest rates, we need to increase the principal.

☛ PLEASE RENEW NOW ☛

ODNR is Helping to Restore Chestnut Trees to Ohio Landscapes



American chestnut field trial sapling from the American Chestnut Cooperators Foundation
https://en.wikipedia.org/wiki/American_chestnut

The Ohio Department of Natural Resources, ODNR, recently planted American chestnut trees at three sites on department-managed lands. The Gorge Overlook area at Mohican State Park, the Scioto Trail State Forest fire tower and the Waterloo Wildlife Area were selected for a reforestation project that is part of a state and regional effort to re-establish the native American chestnut trees in partnership with The American Chestnut Foundation, TACF.

“We are happy to be a part of helping to return the American chestnut to landscapes across Ohio and the region,” said Robert Boyles, ODNR deputy director and state forester. “The American chestnut was such an important component of our country’s eastern hardwood forest, and that is why great efforts are being made to resurrect this great tree to our woodlands.”

ODNR staff from the divisions of Forestry, Ohio State Parks, and Wildlife conducted the plantings, with volunteer assistance from the Mohican Trails Club at Mohican State Park. Approximately 1,000 seedlings were divided among the three sites. Tree shelter tubes were installed on the young trees to provide a

greenhouse-like atmosphere and offer protection from wildlife browsing and to promote growth and increase seedling survival.

The year-old seedlings were donated by TACF, and the foundation is dedicated to the restoration of the American chestnut through scientific breeding and cooperative research. These seedlings, known as “Restoration” chestnuts, were bred at TACF’s Meadowview Research Farms in Virginia and were grown at the Clements State Tree Nursery in West Virginia.

Native populations of American chestnut were devastated by the chestnut blight disease that was introduced to the U.S. during the early 1900s. Chinese chestnut is highly resistant to the blight, and it has been successfully bred with American chestnut to provide resistance while retaining the favorable properties of the native American species. The hybrid Restoration chestnut seedlings are 94 percent American chestnut and 6 percent Chinese chestnut.

Chinese, Japanese and European chestnuts are available in nurseries and sometimes found growing in the wild. And some 100 percent American chestnuts live long enough to produce nuts, about 8 to 10 years - but they don't live much longer before they catch the blight and die.

Prior to the start of the 20th century, however, an estimated 4 billion American chestnut trees towered over 188 million acres of Appalachian forests from Maine to Florida, and as far west as the eastern half of Ohio. Some of the trees grew as high as 120 feet tall with trunks 15 feet in diameter.



American chestnut trees once covered nearly 200 million acres of forest in the Eastern U.S

Map courtesy of The American Chestnut Foundation

The American chestnut was a stately, fast-growing native species. It bears fruit in about five to eight years, and until its decline in population, provided important food for bear, deer, turkey, squirrels and other wildlife. The lumber was lightweight and highly valued for the grain, ease of working and rot resistance. Sprouts from native tree stumps can grow to 30 feet before they die back from the chestnut blight, which is still present.

Yet amazingly, several towering American chestnut trees have somehow managed to repel the

blight and thrive. One of those trees can be found in the woods at the Mentor Lagoons Nature Preserve. The state's oldest and tallest chestnut tree is believed to be in Sheldon's Marsh, located near Huron in Erie County. That tree is about 90 feet tall and is estimated to be 100 years old.

The Restoration chestnut tree plantings will be monitored and maintained by the ODNR Division of Forestry and the Ohio chapter of TACF. For more information on the American chestnut restoration efforts, visit the TACF website at acf.org.

Information taken from *The Morrow County Sentinel*, January 4th, 2016, and the *Cleveland Plain Dealer*, January, 18, 2016.

Ancient Algal "Tree Rings" Show Dramatic Decline in Arctic and Sub-Arctic Sea Ice

Adapted from Smithsonianscience.org

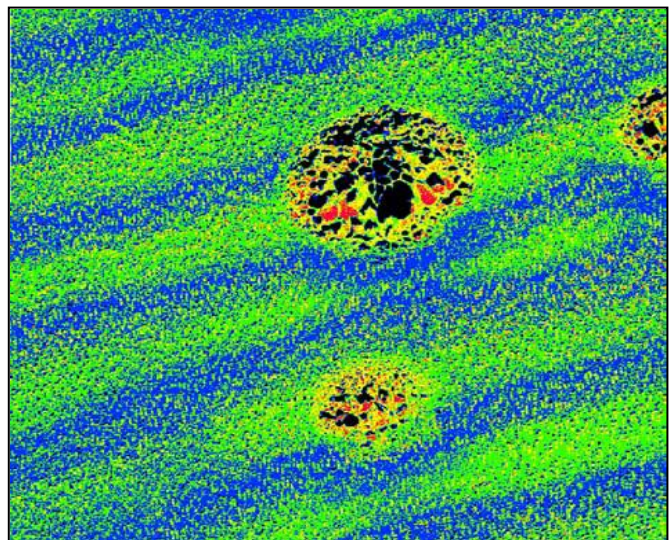
An ancient new player has entered the debate over global warming and it is pink.

Labrador fishermen call them "red rocks" because underwater they resemble odd-shaped pastry topped with thick pink frosting. The color is the living algae, *Clathromorphum compactum*, and the hard rocklike material on which it sits is layers of calcified crusts the algae deposit year after year. They grow in shallow water (49 to 55 feet deep) and are widely distributed in the Arctic and sub-Arctic Oceans.

Now, scientists from the University of Toronto, the Smithsonian Institution and other research organizations have discovered how to use these crusty layers to track changes in Arctic sea ice over centuries, according to Jochen Halfar, an associate professor in the University of Toronto's Department of Chemical and Physical Sciences. Halfar is co-author of a paper printed in *Proceedings of the National Academy of Sciences* reporting that this newly tapped 'archive' shows a dramatic decrease in ice cover during the last 150 years.

Each year *C. compactum* can lay down a crust one-tenth to two-tenths of a millimeter thick. "They grow very slowly so if you get a specimen that is 8 or 9 inches thick you are talking about something that is well over 1,000 years old," explains co-author Walter Adey, algae expert at the Smithsonian's National Museum of Natural History. When viewed under a scanning electron microscope the layers offer an archive of the levels of sea ice in the sub-Arctic dating back centuries.

The algae's growth rates depend on the temperature of the water and the amount of light they receive. As



Description of Algal Image:

When cut and analyzed for its element composition, algal growth layers' reveal pronounced chemical differences. Green indicates high amounts of magnesium that are incorporated into the calcite mineral structure during warm summer months, whereas blue reflects low amounts of magnesium characteristic of low temperatures. Circular spongy features are reproductive structures embedded in the algal skeleton. Scale is 1mm from top to bottom, 7 years of growth are shown. Image courtesy of Andreas Kronz.

snow-covered sea ice accumulates on the water over the algae, it turns the sea floor dark and cold, stopping the plant's growth. When the sea ice melts in the warm months, the algae resume growing their calcified crusts. This continuous cycle of dormancy and growth results in visible layers that can be used to determine the length of time the algae were able to grow each year during the ice-free season.

During several research cruises led by Adey, divers retrieved specimens of *C. compactum* rocks for study from near freezing seawater in the sub-Arctic. The more than 5,000 red rock samples Adey has collected are part of a growing climate archive housed at the Smithsonian's National Museum of Natural History.

"It's the same principle as using rings to determine a tree's age and the levels of precipitation," Halfar says. "In addition to ring counting, we used radiocarbon dating to confirm the age of the algal layers."

After cutting and polishing the algae, Halfar took thousands of microscope images of each sample. The images were combined to give a complete overview of the fist-sized specimens.

"In addition these algae have what is called a high-magnesium calcite skeleton," Adey explains. "Basically, the higher the water temperature the more magnesium it lets into its skeleton. Magnesium levels are a precise record of temperature that can be read sometimes down to a week." Measuring the magnesium levels found in each growth layer is an additional method the scientists used to corroborate the growth periods indicated by the layer thickness.

"During the Little Ice Age, a period of global cooling that lasted from the mid-1500s to the mid-1800s, the algae's annual growth increments were as narrow as 30 microns due to the extensive sea-ice cover," Halfar says. However, since 1850, the thickness of the algae's growth increments has more than doubled, bearing witness to an unprecedented decline in sea ice cover that has accelerated in recent decades.

"These coralline algae represent not only a new method for climate reconstruction, but are vital to extending knowledge of the climate record back in time to permit more accurate modeling of future climate change," Halfar says. "In the north, there is nothing in the shallow oceans that tells us about climate, water temperature or sea ice coverage on an annual basis. These algae, which live over a thousand years, can now provide us with that information."



Clathromorphum compactum red rock in Labrador. These crusts are commonly 100 years old, and under the right conditions can reach ages of more than 1,000 years. Photo courtesy Walter Adey.

Article: "[Arctic sea-ice decline archived by multicentury annual-resolution record from crustose coralline algal proxy](#)" Jochen Halfar, Walter Adey, Andreas Kronz, Steffen Hetzinger, Evan Edinger, and William W. Fitzhugh, PNAS 2013.

Reprinted from *The Plant Press*, a quarterly newsletter from the Smithsonian National Museum of Natural History, January-March 2014, Vol 17, No 1.

Frederick Pursh and the Discovery of Hart's-Tongue Fern

By Joseph M. McMullen

The recent New York Flora Association annual meeting was held at Clark Reservation State Park near Syracuse, Onondaga County. As part of the meeting I did a presentation on the life of Frederick Pursh, who originally discovered hart's-tongue fern in North America in 1807 in Onondaga County. The story of this rare and interesting fern and its equally rare and interesting discoverer is detailed in the following. It is a story about botanical pioneers exploring floristic frontiers, leading political figures, a mysterious death, murder, and the downright bad luck of Pursh. Some of the facts are taken from Beauchamp (1923), Rossi and Schuyler (2009), and Reveal (2014).

Hart's-tongue fern, *Asplenium scolopendrium* var. *americanum*, was originally discovered in North America on July 20, 1807, by Frederick Pursh at Split Rock, just west of Syracuse. This rare fern is federally listed as threatened under the Endangered Species Act (listed July 14, 1989); it is one of only two ferns so listed in the continental United States. According to Leopold (1990), 92 of all the hart's-tongue fern in the United States are found in Onondaga and Madison counties, and 80 of the hart's-tongue fern in NY occur at Clark Reservation. Also, the largest single population of hart's-tongue in the entire US is at Clark Reservation. All of those who attended the annual meeting and saw this population should relish this fact, because how often in your life do you get to see the largest population of a species in

the country?

In McMullen (2008), I briefly described the 1807 botanical exploration of Frederick Pursh and his discovery of hart's-tongue fern, but the story of this botanical explorer is much richer than that. Pursh was German, not formally educated, but studied plants at the Dresden Botanical Gardens. He came to the United States in 1799 at the age of 25 and settled in the Philadelphia area. At that time Philadelphia was the center of activity in the US. It was not only the place where the Declaration of Independence and Constitution were created and signed, but it was the capital of the US for ten years prior to the construction of the capitol buildings in Washington, DC.

Pursh left his original employer in Philadelphia and went to work as curator for Dr. Benjamin Barton, a leading botanist and influential person of the time. (He also did work with William Bartram.) Barton had a dream of creating a complete herbarium and flora of America, which was favored by Thomas Jefferson, who happened to be the current president of the US. Jefferson was a friend of Barton and together they served on the board of the American Philosophical Society (started by another famous fellow Philadelphian, Benjamin Franklin).

In early 1807 Barton sponsored Pursh on a botanical excursion across Pennsylvania, central and eastern New York, and western Vermont. Just a month prior to Pursh's departure on this excursion, Meriwether Lewis (of

Lewis and Clark fame) commissioned Pursh to classify and describe plants Lewis collected during his western expedition. Jefferson had originally turned the plants over to Barton to describe and catalogue, but for whatever reason he didn't do it. When it became evident that Pursh had the ability to do the work, Lewis paid Pursh the lordly sum of \$60 to begin this effort. Pursh set this work aside to go on his planned excursion for Barton.

As you think about Pursh getting ready for this excursion, keep in mind that he traveled alone and that it was 1807. At this time, only three individuals had served as US Presidents; Onondaga County had a bounty of \$20 on timber wolves; and the transportation system and natural environment of the day was strikingly different and much more challenging than today.

The reason that we know so many details of Pursh's excursion is that he kept a daily journal (Pursh 1869). He recorded his travels from place to place, where he stayed, what plants he saw, weather conditions, and other interesting observations. Unfortunately for Pursh, this detailed journal was not discovered and published until 1869, nearly 50 years after his death.

On May 27, 1807 Pursh set out from Philadelphia on his excursion. He left by stage coach, one of the few times he traveled so luxuriantly (he mostly walked). He stayed at the stage office overnight to ensure he had a seat. His journal record of the day is as follows.

At 4 o'clock this morning we left Philadelphia, the stage being remarkable full of passengers & goods, which made it very disagreeable traveling; the road about 25 m. from the city got bad & hilly; we brok down the stage twice, but lukly without any injury to us; arrived at 10 o'clock in the evening at Easton. Took up lodging at Abraham Horn's Sign of the Golden Swan.

So after 18 hours on a bumpy, crowded stage, Pursh managed to travel about 60 miles to Easton along the Delaware River.

From Easton, Pursh made his way to the Delaware Water Gap and spent a couple days exploring there. He then searched wetlands across the Poconos to Wilkes-Barre, PA. Next, he traveled north into New York to a place called Chenango Point. You probably never heard of this town, because it later changed its name to Binghamton. From there Pursh went west to Owego and then north to Ithaca. After spending a few days in the Ithaca area, Pursh proceeded farther north to the northern end of Owasco Lake to a settlement called Hardenburgh's Corner, another place you might not recognize, because around this time it was renamed Auburn.

On July 10 Pursh took another stage trip, traveling from Auburn to Onondaga Hollow, where he resided with John Adams. On several occasions while there, he visited with Squire Geddes, a prominent figure of the area, and father of the Town of Geddes and the salt production industry. He spent about one and a half months in and around Onondaga County. He was very interested in the salt springs around Onondaga Lake and the plants growing there.

The premier discovery of his trip was on July 20, when he found hart's-tongue fern. His journal notes are striking.



Asplenium scolopendrium var. *americanum* habitat. Photo by DJ Evans.
www.fs.fed.us/.../TEP/asplenium_scolopendrium_americanum/index.shtml

*Mr Geddes brought me to a deep valley about 1 m. from his house, where we ascended a steep, very rocky hill; here large masses of rocks seem to be piled up, or tumbled over one & another in such a confused manner, that it has left large chasms between them, which sometimes appear like caves; as it has a north aspect & overshadowed with trees, all the rocks are covered with moss and vegetables; & I suppose this must be a very interesting place for the botanist in the spring, the walking is very precarious, as in some places large holes are hid by weeds & bushes, & every step, one is in danger of breaking a leg or falling into a gulph. (After listing many plants he continues) *Asplenium rhizophyllum*, & what I thought the most of *Asplenium Scolopendrium*. - this fern, which I don't find mentioned by anyone to grow in America I always had a notion to be here; & indeed I was quite enjoyed to find my prejudice so well founded in truth.*

I love this writing. He says he thought hart's-tongue fern was here and upon finding it, instead of saying he was happy to see it, he writes: "*and indeed I was quite enjoyed to find my prejudice so well founded in truth.*" So if you ever get the opportunity, you should read Pursh's Journal, not just for the botanical content, but to enjoy his observations and writing style.

Pursh continued on his journey across New York, ending up in Rutland, Vermont. Being short of funds (Barton had failed to provide them), he grudgingly sold his "fowling piece" and left Rutland on September 24. He then travelled to New York City where he took a boat to Philadelphia, arriving on October 6.

A few days after Pursh's return from his four-and-a-half-month excursion, he left the employment of Barton, who failed to properly pay him for his efforts. He continued working on the collections of Lewis, many species of which were never before recorded. There were disagreements as to who should get credit for naming the new species and frustration on the part of Pursh about the failure to get the work published. Then in the fall of 1809, at a critical point in the

work, Lewis died (reportedly mysteriously). Although Pursh turned his work over to Clark, who was overseeing Lewis' estate, he left Philadelphia for New York and took some of Lewis' specimens and other information with him.

After spending some time in New York, Pursh traveled to London where he worked on the first complete flora of North America. Preparation of such a flora was also being pursued by Thomas Nuttall, who interestingly was hired by Barton for a few years to take Pursh's place. Pursh and Nuttall were competing to be the first to complete this monumental work – an American flora.

Perhaps it should be noted here that Pursh was an alcoholic and somewhat of a social misfit. His appearance was described as rough-hewn and "tartaresque", the meaning of which I am not entirely sure, but I don't think it means handsome. Interestingly, there is no known portrait of Pursh.

In 1814 Pursh formally published his flora, which is titled *Flora Americae Septentrionalis* (Pursh 1814). He beat Nuttall, but he included new plants collected by others as his own. He was greatly criticized for this by Nuttall and others. After some additional

work, Pursh turned down an opportunity to establish a botanical garden at Yale University, but accepted an offer to serve as botanist for the Red River settlement in Canada. Shortly after he arrived there in 1816, the leader of the expedition was murdered and the entire project fell apart.

Pursh ended up in Montreal and was working on a flora of Canada. In 1819 his entire work and collected specimens burned up in a fire. Pursh died the following year in June 1820. Of the two biographies I read on line, one reported he died drunk and destitute and the other drunk and poor.

Pursh was only 46 when he died. He made a lot of great discoveries and botanical contributions in his life, but he also did some improper things. I always thought that anyone who could go off all alone on a several-month excursion in 1807 and write the journal he did must have been an interesting and hardworking individual, and the way he talked about plants I thought he must have been an incredibly observant and proficient botanist. After doing a lot of reading on Pursh, I would conclude that: indeed, I was quite enjoyed to find my prejudice so well founded in truth.

Reprinted from the New York Flora Association's Quarterly Newsletter, Summer 2014, Vol 25, No 3.

**Native Plant Society Field Trip
Holden Arboretum Canopy Walk and Emergent Tower
Lake County, October 10, 2015**

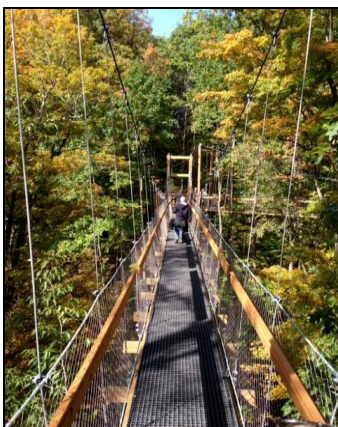


By Judy Barnhart

After checking in at the Corning building, ten of us congregated for our canopy adventure on a glorious Saturday afternoon. We added an additional member later along the way. Many other people also decided to take advantage of the nice day as there was a half hour back-up to get through the Arboretum gate. At the Visitors' Center each person was issued an admission ticket for entry into the tower and the canopy walk.

We headed off through the main display gardens following the signs until we needed to make a decision about which structure to explore first. We chose to do the tower first as it was more strenuous, being 120 feet tall with 202 steps. Upon reaching the trail to the tower, we were greeted by a line of people waiting to ascend. After a half hour we were able to enter as people emerged. About 50 people were let in at a time as the previous climbers exited. The winding wooden staircase with an open grated floor was beautifully constructed. We ascended through the understory of young beech, maple, and magnolia trees, stopping every other landing to catch our breath and enjoy the scenery. Once we reached the top, the sun highlighted the start of fall color. We could see 360 degrees around, including Little Mountain and Lake Erie. Once everyone was at the summit, a group picture was taken. What surprised me the most was that the canopy trees were mainly red oaks. When everyone had their fill of the scenery, we descended, often waiting on a landing for people ascending to pass. At the bottom, the line was still as long, with another of our members waiting to go up.

We then followed the signs to the Rhododendron Garden where the Canopy Walk was located. An accessible walkway provided easy access to the start of the four suspension bridges 65 feet above the Pierson Creek valley below. The creaking and mild swinging was a little unnerving for some. The time following the 500-foot walkway passed quickly. To make our way back to the parking area we elected to detour through the Wildflower Garden and Prairie before making our way home from a memorable afternoon. At 3:30 there was still a line of cars out to the road waiting to get in. They were being warned that there were no more tickets to the Tower available that day.



Judy Barnhart is the Vice President and Program Director for the Native Plant Society of Northeastern Ohio.

~Editor's note:

In 2016, the structures will be open from April 1st through to November 1st. The structures will be closed in inclement weather, including thunderstorms, wind over 30mph, and snow.

Do Plants Dance, Prance, and Wear Pants?

By Norm Trigoboff

Plants have long been thought to respond well to music and kind words (common knowledge). However, the anecdotal nature of the evidence, the few, if any, mechanisms by which plants might hear and interpret sound, and the fringe element/whacko character of some of the advocates for the idea have discouraged serious research. This paper explores a related—and I hope more scientifically respectable—similarity between plants and animals, that between plant stems and animal legs.

A strong intuitive similarity between plant stems and animal legs arises from their long narrow shapes, their proximity to the ground, their high strength-to-weight ratios, and their roles in physical support. Their functional equivalence may be gathered from the common practice of supporting a lame leg with a cane or crutch made of wood, i.e., a plant stem. In addition, note that we often call the nodes of plants, such as grasses and horsetails, “joints”. The key piece of evidence is that the terminal meristems of plant stems and the growth plates of vertebrate long bones show several important morphological similarities, especially at the microscopic level. Until now, these have been overlooked by both plant and animal morphologists.

Let us first consider a generalized plant shoot tip. All new longitudinal growth of a plant stem starts in an area known as the terminal meristem. This consists of several zones. The central or initial zone is a group of very slowly dividing cells. The central zone provides cells to the next zone below, the peripheral zone, where cells divide rapidly. Beneath the peripheral zone is the transition zone, where cells form long longitudinal files. The last zone is the rib meristem, which consists of the stem's differentiated tissue. (Plant root tips may be analyzed similarly, but since no one in their right mind would say that roots look like legs, we will ignore them.)

Let us next consider a generalized animal long bone. All new longitudinal growth of such a bone starts in an area known as the growth plate. This consists of several zones. The reserve zone consists of very slowly dividing cells, known as

chondrocytes. The reserve zone provides the cells to the next zone below, the proliferative zone, where the cells divide rapidly. Beneath the proliferative zone is the hypertrophic zone, where the cells form long longitudinal files. These files look strikingly similar to those in plant stems. (The next and final zone is the calcification zone, but since plant stems seldom, if ever, calcify to the same extent as bones, we will ignore it.)

Further similarities are that terminal meristems and growth plates are avascular, aneural and non-ossified; longitudinal growth of both depend on cell division and cell enlargement; the growing structure adapts to mechanical forces (compression and tension) with differential growth; plant cells die to give rise to xylem and chondrocytes die to give rise to bone; growth is monopolar (daughter cells move away from a proliferative zone in one direction); and chondrocytes and plant cells enlarge as they move away from proliferative zones. Note that although the concept of zonation is widely accepted in the study of meristems and growth plates, the exact details in each are still debated. Here, we follow the general practice of employing the treatments that best support the point we wish to make.

Whether stems and legs are analogous in the biological sense—having similar functions, but different evolutionary origins, internal structures, and developmental courses—is unclear. Their internal structures and developmental courses are a little too similar for them to be analogous. The other option, homologous—having a common evolutionary origin, though not necessarily the same function—seems even less likely. We probably need a new term. On the other hand, analogous and homologous are confusing enough; we might do better just to pretend we didn't notice this problem.

To conclude, we are now in a better position to address the question of whether plants dance, etc. However, all we can say for sure is that they probably could, if they wanted to. Further research is needed in the fields of musical preference and dance style.

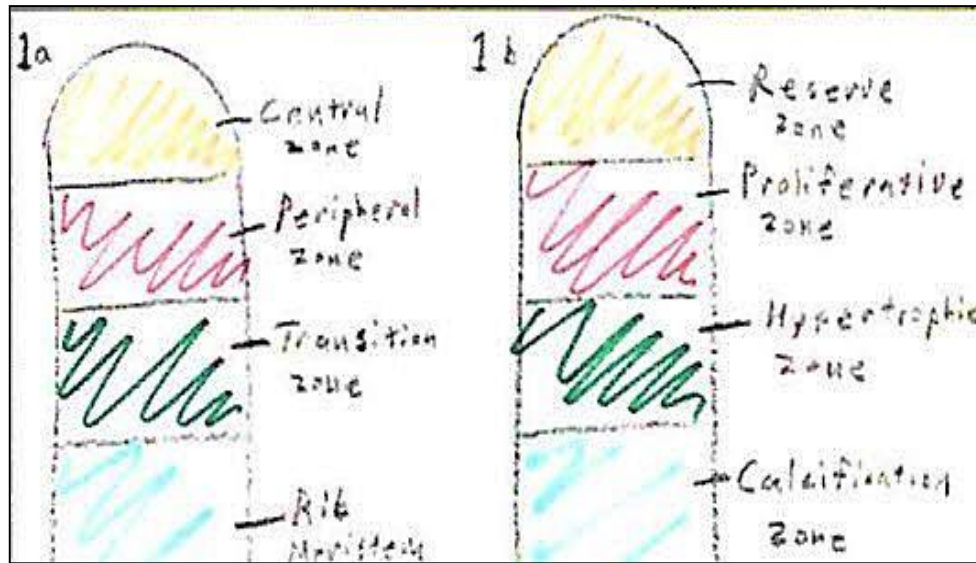


Figure 1: Comparison of a generalized plant stem tip (1a) to a generalized long bone tip (1b). Note that these are false color images.

Additional Reading

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Reprinted from *Solidago*, Newsletter of the Finger Lakes Native Plant Society, December 2014, Vol 15, No 4, pp 12-13, with the author's permission.

Invasive Plant:

European Black Alder, *Alnus glutinosa*

BACKGROUND

European black alder was introduced in colonial times. It tolerates low-lying, wet soils and has been planted for use as shelter belts, reclamation areas, landscaping and biomass production.

RANGE

Native to Europe and western Asia, North Africa and Asia Minor. In North America, it is locally naturalized in the northeastern United States and maritime Canada.

DESCRIPTION

A deciduous tree with narrow pyramidal or columnar shape, typically multi-stemmed. It grows 40 to 60 feet tall and 20 to 40 feet wide. Leaves are simple and alternate, two to four inches long and three to four inches wide, rounded with a crenate or shallow toothed margin. Flowers are catkins, four inches long. Fruit are egg-shaped nutlets that mature in October. Bark is greenish-brown and young stems are smooth. Buds are stalked, purplish and valvate.



Green Alder Leaf.

Susan McDougall © USDA-NRCSPLANTS Database

HABITAT

This tree grows well on acid soils; growth is reduced on alkaline and near-neutral soils. It prefers low-lying soils with high fertility and moisture, often along stream, floodplains, as well as lake and marsh edges.

BIOLOGY AND SPREAD

It reproduces primarily by seed; vegetative reproduction (root-suckering) is rare. Seeds are wind dispersed (for short distances of 100 to 200 feet) and water dispersed (possibly for long-distances).

ECOLOGICAL THREAT

This plant's ability to disperse by water and establish monospecific stands causes it to colonize wetland soils and displace native plants. Its ability to fix nitrogen allows it to establish on sites with very poor soils.

LOOK-A-LIKES

The native alternatives listed below do resemble European alder in their foliage and fruit. However, European alder is taller and less shrub-like, often appearing as a small to medium-sized tree.

NATIVE ALTERNATIVES

There are a variety of native shrubs that can replace this invasive, including speckled or gray alder, *Alnus incana*, smooth or hazel alder, *Alnus serrulata*, and green alder, *Alnus viridis*.



Image courtesy of USDA
PLANTS Database



Robert H. Mohlenbrock. USDA NRCS 1995.
Northeast wetland flora: Field office guide to plant species.
Northeast National Technical Center

Content for this article taken from www.dcnr.state.pa.us.

Folklore:**A Stinky Spring Wildflower**

By Emliss Ricks

One of the more noticeable events of mid-spring is the explosive appearance of great patches of giant yellow-green leaves popping up in state nature preserves where the ground is wet. In early May, the large, luxuriant leaves of skunk cabbage, *Symplocarpus foetidus*, develop quickly and can completely cover extensive areas of swamp, streambank, and wet woodlands with a lush yellow-green, knee-high blanket of vegetation—albeit a rather rank and smelly one! Broken or bruised leaves emit a foul-smelling odor that some liken to musk and garlic. Closely related to Jack-in-the-pulpit, and a member of the Arum family, the skunk cabbage most likely

originated in Asia and entered North America via a former land bridge across the Aleutians. It ranges from Canada to the mountains of Georgia in the east and extends westward to Iowa. Some of its more common names include skunkweed, polecat weed, fetid hellebore, Midas ears, swamp cabbage, and clumpfoot cabbage. This wetland denizen exhibits a characteristic typical of the Arum family: complex chemical compounds, including leaves laced with calcium oxylate which are acrid to the taste.

By looking closely at the base of the rosette of leaves in mid-May, the careful observer may spot a small "black blob" sticking up out of the mud. This is what remains of the flower that bloomed in the late winter and has all but rotted away. Skunk cabbages bloom from late January through mid-March, sometimes in the snow. The flower is striking in appearance. A leathery, purple-green hood called a spathe completely hides the spadix, a globe-like cluster of flowers within. The plant is remarkable in that it has its own oven, creating heat within the protective cover of the spathe and maintaining a temperature of seventy degrees Fahrenheit even when temperatures outside are well below freezing. This heat, a product of chemical activity associated with the maturation of the many tiny flowers, melts the snow away from the plants and attracts insects that are active during warm days in midwinter, mostly small flies and several species of beetles. Enticed by the heat and the fetid odor of seemingly rotting meat, these insects are responsible for pollinating the skunk cabbage long before other flowers are even up through the ground. Some believe

that honeybees are also involved in the pollination of the flowers, using the warm sanctuaries as "heat stops" on their way to and from the hive.

Skunk cabbages can be quite long-lived plants: a colony of large plants may be centuries old! The three or four large, tentacle-like roots radiate from the leafstalks downward and essentially act as an auger, constantly "screwing" the entire plant into the ground at the rate of a few millimeters a year. The roots can be two to three feet long. From viable seed to flowering plant generally requires seven to ten years of development.

Since skunk cabbage likes to have its "feet" wet, it is an excellent indicator of damp ground. Sometimes spring seeps on hillsides can be located by the presence of skunk cabbage, and wet woods can be home to great expanses of its lush greenery.

It was used by Native Americans for everything from bronchial coughs to contraceptives, the roots were also dried and used in tattooing of the skin to prevent diseases. Herbalists tout skunk cabbage for the treatment of diabetes, asthma, whooping cough, and lockjaw. Some believe that skunk cabbage can be helpful in treating multiple sclerosis and Parkinson's disease.

Look for the attractive leaves along the trails at Eagle Creek and Tinkers Creek State Nature Preserves in Portage County and Jackson Bog State Nature Preserve in Stark County and consider that you may be staring at the oldest living thing around as well as certainly one of the strongest smelling in the entire preserve!

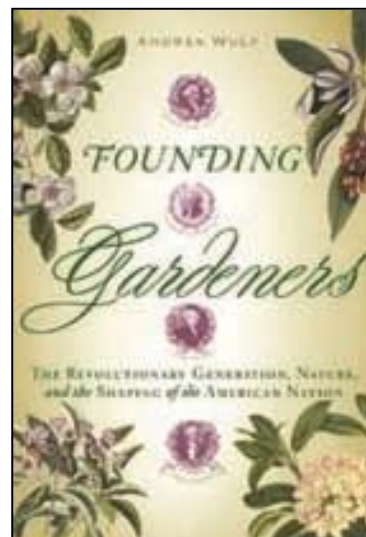
Emliss Ricks served as a State Nature Preserve Manager for 31 years in Northeast Ohio and retired in 2007.



Skunk Cabbage, *Symplocarpus foetidus*
Photo taken from <http://commons.wikimedia.org>



Skunk Cabbage, *Symplocarpus foetidus*
Photo taken from <http://wildeherb.com>

Book Review:**Founding Gardeners
By Andrea Wulf****Publisher:** Vintage; Reprint edition (April 3, 2012)**Pages:** 368 pages**ISBN-10:** 0307390683**ISBN-13:** 978-0307390684**Paperback, Kindle and hardback****Price:** \$14.39, 14.99 and 26.43 (price varies)**Size:** 5.2 x 0.8 x 8"**Reviewed by Bob Krueger, Ph.D.**

This book is “illuminating and engrossing” said the New York Times in its review. It earned a Kirkus Reviews, best book of the year for 2011. Sub-titled ‘The Revolutionary Generation, Nature, and the Shaping of the American Nation,’ the book is an insightful look at the personalities and passions of the men who shaped our country. Andrea Wulf, through her impeccable scholarship, colorful prose, and captivating narrative tells the marvelous story of how our founding fathers expressed their philosophy of freedom in their gardens in much the same way they did in their writings. Kirkus Reviews called it “a history book for gardeners, a gardening book for historians.”

The text features many of our founders but concentrates heavily on Washington, Jefferson, Adams, Madison and Franklin. The author describes their travels to foreign gardens, meetings with horticulturists like William Bartram, seed exchanges with political colleagues, and their passion that American native plants occupy the pinnacle of the world’s flora. Jefferson once said, “The greatest service which can be rendered any country, is to add a useful plant to its culture.” Washington (in a letter in 1776 to his estate manager) said, “Plant tulip poplars, red cedars, alabaster dogwood”—only American natives should be planted, all of which come from Mt. Vernon’s forests. No English trees were allowed! Joseph Fay wrote “attention to our sugar orchards (maples) is essentially necessary to secure the independence of our country,” which was based on Jefferson’s opinion that the sugar maple could supply enough sugar for the nation (hence freeing it from British Caribbean sugar) yet still serve as a valuable export. Jefferson even planted Vermont sourced sugar maples at Monticello, but they were too far south to produce well. Jefferson’s book *Notes on the Flora of Virginia* can be seen, in hand, in John Adams portrait. Adam’s planted many natives on his farm “Peace field” in Massachusetts, and valued Jefferson’s expertise in botany though often was displeased by Jefferson’s political ideology.

Perhaps what is so endearing about the book is the many personal insights Wulf’s research brings to light. Stories such as Jefferson’s thrill upon receiving seeds of a giant cucumber from a friend; Washington’s searches for natives to plant his estate in true American fashion, the planning and planting of the White House garden in natives; Dolly and James Madison’s picnics at Montpelier, where the contrasting shades of oaks, beeches and tulip poplars ‘decorated’ the vistas guests enjoyed; and the 30 day trip Jefferson and Madison took up the Hudson to Lake George where Jefferson found paper birches and stripped some bark to write letters to his daughter. This was a book I found to be completely fascinating and I would guess many of you will too! In addition to its text, the author includes maps of the described estates and their gardens, an extensive bibliography (20 pages) and notes section (80 pages), an index which includes botanical names, and two glossy sections of colored plates.

Reprinted from *Wildflowers*, a publication of the Wildflower Association of Michigan, Winter 2015, Vol 18, No 8.

Beechdrops

By Mark Howes

The forest floor is a fascinating place to explore any time of the year. Vibrantly colored wildflowers in spring make way for the verdant greens of summer. In the midst of this annual splash of color lies a very non-descript plant nestled under the spreading limbs of our American beeches. Almost unnoticed except for those with observant eyes, this purple-brown skeleton of a plant is actually one that teases the imagination. Its name is most appropriate: beechdrops.

A member of the *Orbanchaceae* family, beechdrops is a most unique plant. Its generic name, *Epifagus*, is derived from the Greek *epi* for “upon” and the Latin *fagus* for “beech.” It has been confirmed in at least 64 counties in Ohio. Although some have suggested that beech drops are saprophytic (i.e., living off of dead or decaying organic matter) or that it is self-sustaining after an initial period of parasitism, in fact it is a true parasite all of its life. Drawing its very life from beech roots, it can attach to trees of all sizes and has been known to parasitize even one-year-old seedlings. It does so by projecting a haustorium, a root-like outgrowth through which food is absorbed from the host, into the beech root. As the beechdrops tuber grows, its tissues develop around the beech root, which eventually becomes buried within. Thus, beechdrops withers and dies quickly if a trough is cut around the parasitized root, in effect severing the root. The purple-brown phase is the most common in Ohio although there are several color variants.

Beechdrops have been used in herbal preparations and medications for generations. Three of its common names—cancer-root, claproot and flux plant—attest to

several of its numerous medicinal uses. It has a bitter, nauseating, astringent taste which is lessened by drying. It has been used for bowel afflictions and is reputed to have cured certain forms of cancer although this is doubtful. Beechdrops has been known to arrest gangrene when applied topically to wounds and ulcers and appears to act upon the capillary system. The Iroquois used it as an anti-diarrheal agent.



Very little is known regarding pollination in *Epifagus*. Both the cleistogamous (closed) and chasmogamous (open) flowers of the plant contain nectaries. However, the lack of fruit development from most chasmogamous flowers indicates that cross-pollination is at best infrequent. The exact method of seed dispersal is also uncertain. One possible explanation is that the mature seeds are dislodged by rain drops striking the heaven-ward facing open flowers. Germination usually takes place in the spring. By early July the plants appear as smooth, whitish tubercles about an inch long. By mid-August the plants are mature and can flower anytime into November. Beechdrops overwinter as dry and brittle plants which stand out in stark contrast to a white

snowy backdrop. By spring the fragile skeletons remain but show no signs of life, and the plants are thus considered an annual.

If you have the opportunity the next time you hike, head for the nearest beech tree and look closely at the ground underneath. The chances are good that you will spot these understated yet integral components of the forest ecology, and your life will have been enriched if but in a small way.

Mark Howes is a Preserve Manager with the Ohio Department of Natural Resources.

Beechdroop, *Epifagus*; Photo taken from www.midmichigannatureandscience.

Interesting Factoid:**The Quintessential Spring Wildflower****By Diane Christensen**

Botanically known as the *Trillium grandiflorum*, the white trillium is coaxed into bloom in April and May by spring's increasing amount of daylight. The wildflower is abundant throughout the state and presents the greatest displays in old-growth forests. The large white trillium is also known as the wake robin, great white trillium, or white trillium.

According to *Wildflowers of Ohio*, the name trillium comes from the Latin word *tres*, meaning three. The flower's parts are found in sets of three—three petals, three sepals, and three large leaves.

Trilliums are perennials which sprout each season from small (two to three centimeters) deeply buried, irregularly shaped rhizomes. Like all spring woodland flowers, their early growth takes advantage of spring's abundant sunshine before forest trees leaf out. During this brief time in the sun, the trillium must create enough energy for growth, flowering, and seed development, as well as store sufficient energy in the rhizome for next season's start. Enjoy trilliums in their natural setting.

Ohio's state parks and nature preserves are among the best places to view the state's numerous species of wildflowers in their natural settings. In addition to *Trillium grandiflorum*, Ohio is home to five other varieties of trilliums. They include the red trillium, painted trillium, sessile trillium, drooping trillium, and snow trillium.

Trilliums are the quintessential spring time wildflower, and their long history of popularity and acclaim among their botanical and horticultural admirers makes them the stuff of legends.

**Interesting Facts:**

- Trilliums are also called wake robins, which suggests that their flowering signals the robins' waking in spring, an idea consistent with eighteenth-century beliefs that northern birds hibernated.
- The painted trillium, *Trillium undulatum*, is a stunning wildflower. It is our state's rarest species of trillium and is currently listed as an endangered species. For the last few decades its only known occurrence in the entire state has been in a swampy hemlock woods in Ashtabula, our most northeastern county.
- The seeds of the trillium are spread by mice and ants, territorial creatures, which is why the trillium grows in clusters. Although myrmecochory is by far the most common dispersal method, white-tailed deer have also been shown to disperse the seeds on rare occasions by ingestion and defecation. While ants only move seeds up to about 10 meters, deer have been observed to transport the seeds over 1 kilometer. This helps to explain post-agricultural colonization of forest sites by *Trillium grandiflorum*, as well as long distance gene flow which has been detected in other studies. Furthermore, it helps resolve what has been called "Reid's paradox," which states that migration during glaciation events must have been impossible for plants with dispersal rates under several hundred meters per year, such as *Trillium grandiflorum*. Thus occasional long distance dispersal events, such as by deer, probably helped save this and other species with otherwise short distance dispersal ability from extinction during the glaciations of the ice ages.
- Once a plant has been cut, it takes about seven years for it to recover, and it takes about fifteen years to grow from seed to bloom. Picking parts off of a trillium plant can kill it even if the rhizome is left undisturbed.
- Because of its fragility, Michigan and Minnesota have made it illegal to pick the trillium. In New York it is illegal to pick the red trillium, which is listed as exploitable and vulnerable, meaning that it might become threatened should certain factors not be mitigated. In Maine, the trillium (not the red trillium) is listed as endangered, and might in fact have been extirpated entirely.

- *Trillium grandiflorum* has twice graced a U.S. postage stamp.
- For hundreds of years, this plant and its name have been used to symbolize purity, simplicity, elegance, and beauty.

The *Trillium grandiflorum* was adopted as the official wildflower of Ohio in 1987. Ann Malmquist, founding president of the Ohio Native Plant Society, was instrumental in securing this designation. Up to that time the red carnation was the state flower. The commercially-grown flower had been selected to honor Ohio president William McKinley, who favored the flower and wore it in the buttonhole of his lapel.

Native plant enthusiasts felt that the designation of the red carnation overlooked the treasure of wildflowers found in Ohio. Rather than propose the state change its prior designation, however, Malmquist wisely decided to work with the state legislators on a bill to add the trillium as the state's wildflower. Malmquist said the trillium was selected because it was found throughout the state's 88 counties and was easily recognizable. On December 4, 1986, Governor Richard F. Celeste signed into law an act making the *Trillium grandiflorum* Ohio's official state Wildflower.

Step into Ohio's woodland's this spring to discover the beauty Ann Malmquist and other Ohioans have come to appreciate in our state's wildflower. Ann will be eternally in my heart whenever I gaze upon this beauty of a flower. Thank you, Ann.

Diane Christensen is on the Board of the Native Plant Society of Northeastern Ohio and is the Editor of *On The Fringe*.

This article was based on material taken from www.TheBuckeyeBotanist, www.wikipedia.com, www.michigangardener.com, www.davesgarden.com/guides/articles/, www.netstate.com/states/symb/wildflowers/oh_large_white_trillium.htm and www.ohiomagazine.com in which an article by Theresa Woodard was posted last year but is no longer available.



Cuyahoga Soil and Water Conservation District National Wildlife Federation Backyard Habitat Stewards

Each spring, the district teams up with the National Wildlife Federation to host the NWF Backyard Habitat Stewards program. This program is a series of six classes designed to teach participants how to help people in their community create and restore wildlife habitat in backyards, schoolyards and other private and public areas. Completion of this course certifies the participant as a NWF Habitat Steward.

The district recently began a shorter course called Introduction to Creating Backyard Habitats, which covers creating wildlife-friendly habitat, promoting a more sustainable backyard and sharing information about how participants can make a difference for wildlife in their community. This course does not certify the participant as a NWF Habitat Steward.

www.cuyahogawcd.org/programs/backyard-habitat-stewards

The Cuyahoga Soil and Water Conservation District website lists many programs offered to the public. Under the Rain Gardens program, they have Native Plant lists and places to buy Native Plants locally. They also list the Native Plant Society of Northeastern Ohio as a resource.

The National Wildlife Federation is the United States' largest private, nonprofit conservation education and advocacy organization, with over four million members and supporters, and 48 state and territorial affiliated organizations.

www.nwf.org/



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