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New York Flora Association Newsletter Spring 2025

Editor's Note: Happy Spring! We have two workshop reports in this issue, a report from a NYFA grant recipient, an article on skunk cabbage ponderings, and a note on the new NYS wetland regulations. Field trips have been announced and are rapidly filling. There are many exciting trips planned; take a look at the website to sign up!

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Reconstructing the community and disturbance regime of a fire-dependent ecosystem

Lydia Harvey and Amélie Przedwiecki, SUNY Plattsburgh Center for Earth and Environmental Science

Palaeoecological studies can provide us with a glimpse into our planet's past. This field allows us to study the ecosystems of the past and to answer questions about what the climate was like, when disturbance events such as fire occurred, what the plant communities were and how they changed over time, and much more (Rull 2010). Understanding changes in past plant communities can provide insight on how current communities could respond to ongoing and future changes in their environment. This can help us better understand and create more effective management plans for present ecosystems.

The study site for our project is the Altona Flat Rock, an approximately 2000-hectare sandstone pavement pine barrens in Altona, Clinton County, NY. This ecosystem is considered globally rare; the New York Natural Heritage Program classifies it as a S1G2 site (Cave et al. 2021, Thompson et al. 2022). The plant community at the Flat Rock is made up of fire-adapted species. The dominant tree species is jack pine (*Pinus banksiana*), a boreal species at the southernmost extent of its range (Cave et al 2021). Jack pine cones are semi-serotinous and rely on occasional crown fires for regeneration (Franzi and Adams 1999). Pitch pine (*Pinus rigida*), also fire dependent but not to the same extent as jack pine, is also present at this location and is at the northernmost extent of its range (Cave et al. 2021, Thompson et al. 2022). The understory is dominated by ericaceous shrubs, such as lowbush blueberry (*Vaccinium angustifolium*) (Cave et al. 2021). Most of the Flat Rock consists of shallow, infertile soils with a variety of beaver-pond, riparian, and poor fen wetlands interspersed (Bushey et al. 2023). In addition to storing carbon in significant peat accumulations, these wetlands also preserve a historical record of the plant community and fire history at the site through the preservation of pollen, macrofossils, and charcoal.

The Altona Flat Rock has had several documented wildfires, the most recent of which was in 2018. This wildfire lasted for six days and burned approx. 225 ha of the jack pine barrens (Bushey et al. 2023, Thompson et al. 2022). Prior to 2018, there were documented fires in 1919, 1940, 1957, and 1965 (Franzi and Adams 1999). There is very little information on these other wildfires, we know when they occurred, but we do not know much beyond that. Based on the jack pine-dominated forest at the Flat Rock, it is assumed that there were also wildfires prior to the one in 1919, but there are no existing records of them. Disturbance events, such as these fires, have the potential to cause changes in plant communities and alter the ecosystem as a whole. Knowing the disturbance history of this site for a longer span of time will help to determine disturbance patterns and understand what level and recurrence of wildfire is necessary to maintain jack pine as the dominant tree species.

The goal of this study was to document long-term changes in forest community composition and fire return interval for this fire-dependent ecosystem. Using a sediment core collected from a wetland in the Altona Flat Rock, we were able to: 1) analyze charcoal fragments to create a timeline of wildfire occurrences, 2) study macrofossils and pollen assemblages to gain insight into changes in the plant community, and 3) analyze organic carbon content in the sediment to investigate the history of the wetland.



Figure 1. Photo of the wetland where the core was collected.

A 3.24-meter sediment core was collected from a poor fen wetland at the Flat Rock in January 2024 using a Russian peat borer (Figures 1 and 2). The core was sectioned into one-centimeter samples and broken into three subsamples. For two of the subsamples, approximately one cubic centimeter of sediment was taken for both loss-on-ignition and pollen analysis. The rest of the sample was saved for macrofossil and charcoal analysis. To determine the age of the core and to document when wildfires and changes in the plant community occurred, four samples were sent to Woods Hole Oceanographic Institute for radiocarbon dating. The results of the radiocarbon dates indicate that the bottom of the sediment core is 7,462 YBP (see Figure 4).



Figure 2. Photo of the Russian peat corer in action.

Macrofossil, charcoal, pollen, and carbon content analyses were performed at five-centimeter increments. For macrofossil and charcoal analysis, each sample was sieved through 250 μm and 125 μm screens. Charcoal fragments were counted and macrofossils, such as cone and needle fragments or seeds, were identified using a dissecting microscope.

The organic content of the sediment core was analyzed using loss-on-ignition (LOI). In this process, samples of sediment approximately one cubic centimeter in size were dried and weighed. After the initial weight was taken the samples were combusted in a furnace at 550°C for one hour and reweighed after cooling. To determine what percent of the sample consisted of organic content the following equation was used: $(\text{dry weight}/\text{weight after ignition}) \times 100$. For the pollen analysis, clubmoss spores were used as tracers to more accurately determine species abundance. Tablets containing a known amount of clubmoss spores were dissolved in 10% potassium hydroxide (KOH) and added to a beaker containing a small sample (1 cubic cm) of sediment. From there, the samples underwent several chemical treatments to remove organic matter, carbonates, and silicates, leaving spores and pollen grains in a clear solution to be observed under a microscope. Pollen grains were



identified to the genus level and a minimum of 400 terrestrial pollen grains were counted per slide.

The loss-on-ignition results showed a significant increase in organic content over time within the sediment (Figure 3). The trendline shows organic carbon in the sediment increased to approximately 95% around 5,000 YBP and has remained above 80% organic carbon since then. The trendline suggests the site began to transition into a wetland approximately 7,000 YBP (Figure 3).

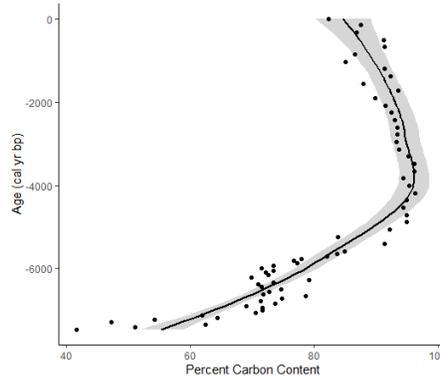


Figure 3. Change in organic carbon content over time. Age 0 indicates the present.

Most of the charcoal fragments were found in the top half of the core (4,000 YBP to present) and indicate frequent wildfires near the wetland where our coring site was located. There were some charcoal fragments found in the older layers of sediment; however, the abundance was not high enough to indicate wildfire activity.

Based on the macrofossil data collected so far, there was a significant shift in species composition from an eastern hemlock (*Tsuga canadensis*) dominated ecosystem to a jack pine dominated ecosystem, with eastern white pine (*Pinus strobus*) as a transitional species between the two. Our radiocarbon dates suggest that by 5,000 YBP jack pine was the dominant species (Figure 4). Changes in composition within the wetland have also been observed. In the younger layers of the sediment there is more wetland vegetation present. Peat moss (*Sphagnum* sp.) is also more abundant in the younger layers, which could indicate a shift in the nutrient content within the wetland. Additionally, the lack of macrofossil data in the top half of the core could be a result of the high fire activity.

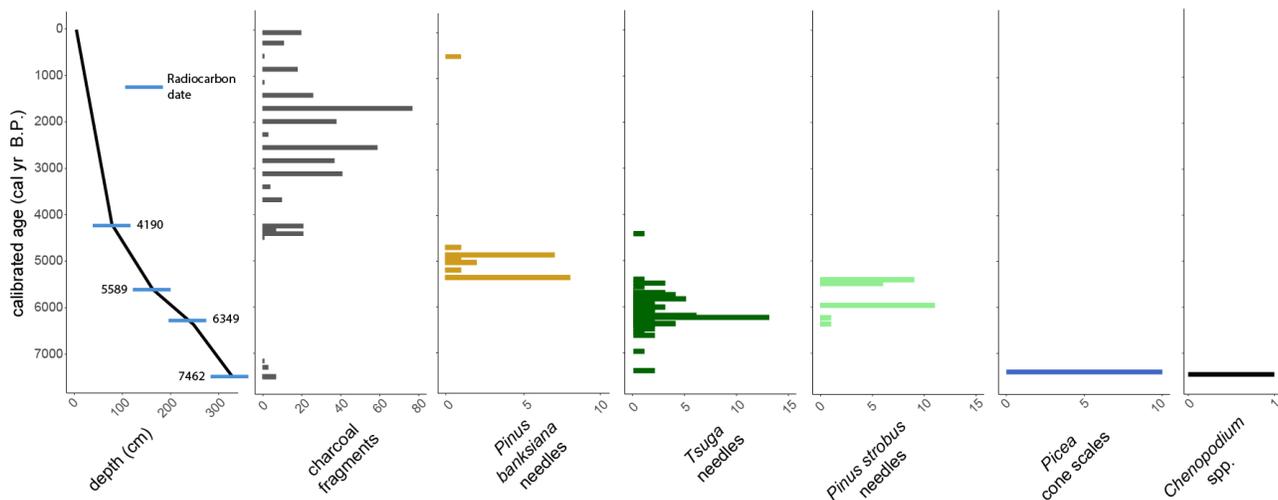


Figure 4. Charcoal fragments and macrofossil counts. The y-axis is the calibrated age based on the radiocarbon dates from Woods Hole Oceanographic Institute, 0 indicates present day and would be the top of the sediment core.



Pollen analysis is still ongoing for this project, but so far, the results are in line with the macrofossil data. There was an abundance of hemlock pollen towards the bottom of the core (5,000-7,462 YBP). Pine (*Pinus* sp.) and birch (*Betula* sp.) have been the most abundant (Figure 5). Based on the macrofossil data, the pine pollen grains are likely to be jack pine or white pine, but measurements need to be taken to distinguish between the two. The final results of the pollen analysis are expected to be completed by late February.

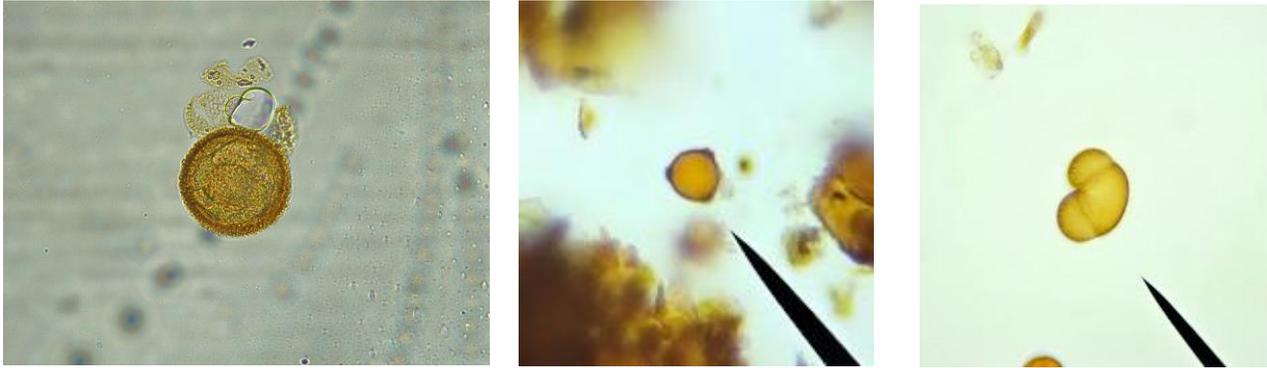


Figure 5. Pictures of hemlock, birch, and pine pollen grains.

Acknowledgements

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Upcoming 2025 Field Trips and Workshops

Check out our workshop and field trip schedule for 2025 at <https://nyflora.org/events-directory/>. It is quite a full list this year: we're offering five workshops, eight Learn 10's, and twenty-eight field trips in eighteen counties and we're partnering with eight regional botanical societies or nature preserves. Space is limited so don't delay - some trips and workshops have already filled.



2025 Winter Plant Identification Workshop

by Kaity Moranz, Kaitlyn.Moranz@bartonandloguidice.com

Winter may not be what everyone considers ideal for plant identification, but it is certainly a good opportunity to learn key identifying features not easily visible during other seasons. On January 18, 2025, a group of sixteen individuals with varied interests in the world of botany met at the Onondaga Lake Visitors Center in Syracuse, New York to learn about winter plant identification from the workshop's presenter, Joe McMullen.

Before starting the workshop, Joe set out four tables full of plant specimens to allow any early-comers a chance to compare species they may have already known with some new species. This also gave everyone who arrived early an opportunity to meet each other and discuss questions with Joe that he could incorporate into his presentation.



Plant specimens provided for examination.

Afterwards, we all assembled in the conference room for quick introductions and to start the presentation. Attendees came from all over New York State, including nearby Syracuse and Rochester, and even some who came from over three hours away. We also had recent transplants from some more southern states, giving us new perspectives on plants found in both areas as well as some plants native to either region. The group had a range of botany backgrounds, with attendees including graduate students, environmental science professionals, property owners interested in native vegetation, and people with backgrounds in edible plants.

Joe started his presentation with handouts and specimens for each attendee to give us an overview of relevant plant structures and features for identifying woody plants in the winter. These included lateral buds, terminal buds versus false terminal buds, lenticels, pith, and the unique scars that appear on a woody plant as a result of plant components falling off in the winter. At first some of us were fooled by the tricky false terminal bud, but we quickly caught on and were able to identify them by the branch scar and leaf scar on either side of the bud, and were asking questions regarding their impacts on plant growth. Joe informed us that these can sometimes result in a “Z-shaped” growth, as each year the growth is directed in the opposing direction.

Following our overview of plant morphology, Joe moved on to the key identifying features of woody plants. He emphasized that the first feature to look for when attempting to ID a deciduous species is branch or leaf arrangement. If you note branches or leaves that are directly across from each other (opposite), you have significantly narrowed down your possibilities to maples, ashes, dogwoods, honeysuckles, viburnum family members, or horse chestnut. For evergreen species, the first feature to note is how the needles are attached to the twig. Pines have bundles of needles. Spruce and fir needles are individually attached, with the angular spruce needle leaving a small peg when shed and the flat fir needle attached by a pad that leaves the twig smooth. Hemlock needles are attached by a very small petiole.

When discussing the identification of herbaceous plants in the winter, Joe provided examples of plants that persist or keep traits that are identifiable in any season. For example, many fern species maintain their green fronds or have persistent spore stalks, false nettle will often persist, and woolgrass seed heads will remain visible through the winter. Since the number of flowering parts is essential for flowering plant identification, it was useful to note that the seed capsule of a plant, often visible in winter, can be helpful by counting the number of flowering parts.



Once the PowerPoint presentation was complete and we had discussed the edible components of various plants (fun fact: all components of a cattail are edible), it was time to put on snow pants and boots and head out to the Onondaga Lake shoreline. We learned about the work that occurred over the years planting native vegetation on the shoreline, saw multiple plants discussed during the presentation, and used the tips and tricks we were taught to identify additional species. Before anyone got too cold, we somewhat begrudgingly ended our hour-long walk with a total of 26 species successfully identified (see list below) and an appreciation for the information we were given.



Attendees of the 2025 Winter Plant ID Workshop.

Onondaga Lake Plant Observation List

Herbaceous Species

Aster species, *Symphyotrichum* sp.
 Broadleaf cattail, *Typha latifolia*
 Brown knapweed, *Centaurea jacea*
 Burdock, *Arctium* sp.
 Common milkweed, *Asclepias syriaca*
 Common mullein, *Verbascum thapsus*
 Common reed, *Phragmites australis*
 Common wild bergamot, *Monarda fistulosa*
 Hawkweed, *Hieracium* sp.
 Indian grass, *Sorghastrum nutans*
 Northern wild senna, *Senna hebecarpa*
 Pokeweed, *Phytolacca americana*
 Wild cucumber, *Echinocystis lobata*

Wild teasel, *Dipsacus fullonum*
 Wingstem, *Verbesina alternifolia*

Woody Species

Autumn olive, *Elaeagnus umbellata*
 Black locust, *Robinia pseudoacacia*
 Box elder, *Acer negundo*
 Eastern cottonwood, *Populus deltoides*
 Eastern sycamore, *Platanus occidentalis*
 European buckthorn, *Rhamnus cathartica*
 Green ash, *Fraxinus pennsylvanica*
 Red-osier dogwood, *Cornus sericea*
 Silky dogwood, *Cornus amomum*
 Staghorn sumac, *Rhus typhina*
 Willow species, *Salix* sp.



The Increased Role of Plants in Determining Wetland Jurisdiction under the Revised New York Freshwater Wetlands Legislation by Joseph McMullen, Senior and Emeritus PWS

As many of you may know, the state is making drastic changes to what wetlands are regulated under the New York Freshwater Wetlands Act (Article 24 of NY ECL). Effective January 1, 2025, the state's current Freshwater Wetlands Maps will no longer limit the New York State Department of Environmental Conservation's (NYSDEC) regulatory authority. These wetland maps will be available for informational purposes and referred to as Previously Mapped Freshwater Wetlands. In three years (January 1, 2028), the default size threshold of regulated wetlands will decrease from 12.4 acres to 7.4 acres.

Of perhaps greater significance, effective January 1, 2025, small wetlands, regardless of size, of "*unusual importance*" will be regulated if they meet any of the newly established criteria listed in the new legislation. The existence of plant species **listed or recognized** by the NYSDEC as endangered, threatened, or rare and some plant communities play a role in labeling a wetland as having unusual importance.

Of the three criteria (vegetation, soils, and hydrology) used to define a wetland, vegetation has always been the paramount component to define a state regulated wetland. The prevalence of hydrophytic vegetation is determined using the indicator status ratings of the dominant plants in an area. The nuances of these ratings (Obligate Wetland, Facultative Wetland, Facultative, Facultative Upland, and Upland), which are a measure of a plant's fidelity to upland or wetland conditions, can be found in McMullen (2024), and their application and the procedures to define a state wetland are found in New York's wetland delineation manual (Browne *et al.* 1995).

However, that is not the subject of this current article. The subject here is how the changes under the new wetland legislation increase the role of rare plants and rare plant communities in determining the regulatory jurisdiction of wetlands in general and wetlands regardless of size.

Wetland Classification System

The state has always recognized that wetlands are not of equal value (i.e., they do not all supply equally the benefits listed in the regulations), and a classification system was presented in the original wetland regulations in 6NYCRR Part 664, Freshwater Wetlands Jurisdiction and Classification. Under these regulations, wetlands are ranked into four Classes (I to IV) based on their ability to provide certain benefits and functions. The revised Part 664 regulations in the new legislation maintain this classification system, but the criteria used to define classes are greatly modified. Criteria involving plants are discussed in the following text.

Class I Wetlands – Class I wetlands have the highest rank. One of the criteria for a Class I wetland is that "*it contains an endangered or threatened plant species as listed in Part 193 of this Title*". Part 193, specifically 6NYCRR Part 193.3, contains the regulations that list plants protected under the Protected Native Plants Act (ECL Section 9-1503). Another Class I criterion is a wetland that contains a critically imperiled plant community, which is defined as one "*with generally five or fewer occurrences within the state*". In addition, nutrient poor wetlands are considered Class I. Examples of nutrient poor wetlands include: northern white cedar swamp, dwarf shrub bog, black spruce-tamarack bog, inland poor fen, marl fen, sedge meadow, highbush blueberry bog thicket, and several others.

Class II Wetlands – Class II wetland criteria include a wetland that "*contains a plant species or plant community identified as critically imperiled or imperiled*", with imperiled defined as one that generally has 6 to 20 occurrences within the state. Critically imperiled and imperiled correspond to the NY Natural Heritage Program's (NYNHP) S1 and S2 status rankings, respectively. Another Class II criterion is a wetland that contains three wetland structure groups (woody, herbaceous, and open water). Also, a wetland consisting of



floating or submerged aquatic vegetation and not dominated (less than 50%) by invasive species listed in Part 575 of this Title is a Class II criteria.

Class III and Class IV Wetlands – These lower wetland classes do not include any rare plant or plant community criteria. However, they do contain criteria involving different wetland cover types and percentages of invasive species.

Wetlands of Unusual Importance

As indicated, wetlands of unusual importance are regulated regardless of size beginning January 1, 2025. The characteristics for defining a wetland of this nature are included in the revised Part 664 regulations. One of the characteristics is that the wetland meets the definition of a Class I wetland. So, since any wetland that contains an endangered or threatened plant species listed in Part 193 is a Class I criteria, those wetlands would be considered of unusual importance. Likewise, a wetland that contains an imperiled plant community or a nutrient poor wetland community would be of unusual importance.

Another unusual importance characteristic is: *“Rare Plants. It contains a plant species occurring in fewer than 35 sites statewide or having fewer than 5000 individuals statewide, as documented by the department”*. This wording is interesting. First, a plant occurring in fewer than 35 sites would correspond to the NYNHP S3 or rare status. Plants recognized by the NYNHP as S1 (endangered) and S2 (threatened) would also meet this definition.

More importantly, the characteristic states *“as documented by the department”*. It does not say as listed under regulations. As discussed in McMullen (2023), one of my concerns is that environmental regulations often refer to listed species and the official regulatory lists of endangered, threatened, or rare species are usually out of date. Part 193.3, which lists protected rare plants, was last updated in 2010, fifteen years ago. Since then, there have been many discoveries of rare plant species and changes to the status of other listed species.

The NYNHP updates their list of S1, S2, and S3 species on an annual basis and their list is much more accurate than those officially protected and listed under Part 193.3. So, assuming the revised regulation’s wording of *“as documented by the department”* applies to those recognized by the department’s NYNHP, my concern with the sporadic nature of updating official lists of rare plant species would be moot in this case and make a wetland that contains a NYNHP documented S1, S2, or S3 species a wetland of unusual importance. A wetland with any of these documented species would thus be regulated regardless of size.

This is a significant change and a dramatic increase in the role of rare plant species in defining regulatory wetlands. Rare plant communities included within a wetland and nutrient poor wetland communities of any size would also be regulated, another major change in regulatory authority under the new legislation.

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Summary of Goldenrods of New York State Workshop, taught by Chris Graham, September 8, 2024

by Catherine Josefa Spolarich

7:00 am. My friend, Erica, and I departed, heading to the workshop, and watched the sun burn the fog off the Berkshires. We discussed what we hoped to gain from the workshop while we watched as the cool, crisp morning transitioned into a warm, sunny day.

9:30 am. We arrived at the Bard College Biological Field Station. We had carefully studied Chris' detailed emails about where to park and how to navigate and after some fear that my car may not make it down the hill we arrived safely at our destination, where we were entertained by the exhibits of plants, pamphlets, and views the station offered.

9:45 am. We began the morning by introducing ourselves. Goldenrods are a ubiquitous, diverse, and challenging group so naturally, participants were drawn to the workshop for many reasons, including medicinal, cultural, ecological, horticultural, and taxonomic perspectives. Throughout the day people bonded over their interests in herbalism, old growth, alpine plants, geology, pupfish, and the places in New York and beyond that they care about.

10:15 am. Our instructor Chris Graham introduced the plants via slideshow, highlighting and profiling the 31 species in two genera currently accepted and recognized in New York State. He also discussed some differences in the recognized taxonomy in New England. The slideshow took us from the Long Island Coastal Plain to Bergen Swamp, to the Adirondack High Peaks, and everywhere in between. Chris, a humble wealth of knowledge and experience, had lots of tricks he used to distinguish species. Workshop participants also offered their knowledge, sharing more about habitat, where they observed each plant, conservation status, and how they break species apart.



Participants viewing Chris' slideshow. Photo by Andrew Leonardi.

10:45 am. After we finished the detailed slideshow and scribbled little diagrams in our notebooks, we took a break for some tea and coffee. Once everyone was over-caffeinated, we were ready to look at herbarium



specimens. We keyed out species after species, building the strength of our ID skills with each specimen. Soon we could break out the first main characters without looking at the key and we became more efficient. We then started to look more closely at finer traits. I love watching people use hand lenses— as they look, in wonder, at tiny folds and worlds of variation they had not known before. I have often marveled at how some more experienced botanists seem to have the key saved in their heads, rattling off each trait for certain groups of plants. I can see how that may be the result of years and years of repetitively working with a group, making keys or using them consistently. There were a few herbarium specimens Jerry Jenkins had previously determined were hybrids. They certainly challenged us but helped us to key in on subtle traits.

12:30 pm. We began our botanizing outdoors around the field station, experiencing the plants in their lively 3D forms. We immediately saw *Solidago caesia* with its distinct glaucous blue stems, and *S. flexicaulis* with its distinct zig-zagged shaped stems. Though we set out to look at goldenrods we couldn't help but look at other aster family members, including the state rare *Bidens laevis*.

We then went to a seeded pollinator grassland and found *S. rugosa* with its pubescent stems and rugose leaves, *S. nemoralis* with its minutely pubescent stems, and *Euthamia graminifolia*, a distinct grass-leaved goldenrod (which, as a side note, is a group that was recently revised and has been shown to have more diversity than previously recognized). *Sorghastrum nutans* and the distinct, big, bright purple *Symphotrichum novae-angliae* also attracted attention.

As we were forming our final Bayesian inference and reaching a consensus on an identification, Chris came prancing through the goldenrod meadow to ask us what we had learned. As a group, we had keyed our specimen out incorrectly, which was validating; as a young botanist, I often struggle with keying out groups I am less familiar with. Seeing that lack of experience and understanding of key traits challenge others as well gave me some assurance. Some keys have specific meanings and sensibilities that can only be worked out through experience and seeing multiple species repetitively. I was grateful to be working with the group and that Chris was there to guide us through it. We keyed out some more species and then packed ourselves back into our cars.



Left: observing goldenrods in the field, photo by Andrew Leonardi. Right: The distinct squarrose involucre bracts of *S. squarrosa*, photo by Catherine Spolarich.



2:30 pm. We crossed into the Catskills Park and visited the Bluestone Wild Forest. As someone who primarily works in Northern New England and Long Island, I was excited to see species common in New York but not present or very rare where I typically botanize. Notably, we stopped and smelled horsebalm leaves (*Collinsonia canadensis*) which, while common in New York, is state-historic in New Hampshire. We ran into *S. arguta*, and then saw the distinct squarrose involucre bracts of *S. squarrosa*. We saw the white flowers of *S. bicolor*, the nearly spent flowers of the early-blooming *S. juncea*, and the hairs on the bottoms of the leaves and fruits of *S. ulmifolia*. We also ran into some species we had already seen at the other sites and got some repetition, and couldn't help but notice and observe *Eurybia macrophylla*, *Eurybia divaricata*, and *Symphyotrichum pilosum* in flower.

Overall, it was a beautiful day; I got to meet some lovely people and reconnect with people I had only met a few times. I learned things and gained knowledge and skills. Erica and I completed a rare plant survey in New Hampshire the following week and where we previously would have noticed 4 species, we now noticed seven. It was great to learn from Chris and the other workshop participants and to see things we might have missed previously.



The workshop group, photo by Kathryn Natale.



Skunk Cabbage – Still many aspects to explore

By Steve Young, Botanist, Botany Visible

By the time you read this, skunk cabbage (*Symplocarpus foetidus*, Araceae), my favorite wildflower, will have been blooming for at least a month depending upon the area in which you live. On Long Island there have been photos of the flowers blooming in February but in St. Lawrence County, where our most northern plants are known, they may still be in full bloom, or perhaps putting out their first leaves if the spring is warm.

This first blooming flower of late winter and early spring usually goes unnoticed by most people because the flowers are at ground level and they bloom in swamps where people don't tend to go at that time of year. Even looking into a swamp when they are blooming you might not see the flowers, since their dark maroon, yellow mottled, cone-shaped flowers blend in well with the surrounding leaf litter, mud, and dappled sunlight. Some swamps have thousands of plants and even then, they may not be obvious. Occasionally the flowers are yellow or chartreuse and really stand out - to the excitement of the person who finds them.

When the huge leaves arise after the flowers start to senesce, voila! There is no problem seeing them then, as they dominate the understory of many swamps, especially red maple hardwood swamps.

From their underground stems and early flowers to their big leaves, the skunk cabbage is a very unusual plant and there are still new discoveries to be made. The confusion in the literature and on websites about its structures illustrates how little is settled about what to call them. The underground stems that are pulled down into the soil by their contractile roots have been called rhizomes, rootstock, and underground stems (Figure 1). I prefer the latter term since the other two can signify that they produce other stems that connect plants together, but skunk cabbage seems to have no such connections and new plants are formed by seed only (Winters 1992). It would be interesting to make sure this is the case by digging up more plants to find out, not an easy job.



Figure 1. The interior of a stem below the growing point with contractile roots around the edge.

As young plants grow up from seed they also grow in diameter and the larger they get the more flowers they produce (Winters 1992). But is the diameter growth determinate or indeterminate? I have seen no studies or results that show that skunk cabbage stops growing at a certain diameter, but neither have I seen wide plants with more than seven flowers (Figure 2).





Figure 2. A young plant with flowers and leaves at the top and roots below.

The four structures around the ovary have been called petals, sepals, and tepals or just “the perianth”. I prefer tepals, since they are not differentiated into separate whorls, but maybe they are petals without sepals or sepals without petals like in other plant families. How can you tell? I usually think of tepals in the sense that there are two whorls of sepals and petals that are not differentiated but that would mean that here there would be only two petals and two sepals that look alike.

Another interesting feature of the flowers is the sheen the spathes have when they are new and making and receiving pollen. As the flowers age they lose that sheen (Figure 3). What makes them shiny and is it instrumental in attracting insects? What do they look like under ultraviolet light?



Figure 3. Flower color variation and spathe sheen.



There have been studies looking at the sequence of how the bracts, leaves and flowers arise from the stem, but they are hard to understand, and it would be nice to have better illustrations, or an animation done showing how it all proceeds (Foerste 1888, Barabé et al. 1986, Figure 4). It is really very complicated!



Figure 4. Cross section of the flower stalks and leaves.

It would also be educational to have an animation of how the styles and stamens arise at different times, known as dichogamy, to prevent self-fertilization (Figures 5 and 6). Early studies thought that the stamens came out first before the styles (protandrous, Williams 1919), but it seems to have been established that the styles arise first (protogynous, Barriault et al. 2021). A group of botanists headed by Joanna Coleman and her students at Queens College in New York City is testing this and other theories about skunk cabbage this spring and summer. I eagerly await the results and encourage our readers to study the plant in the field and learn more about this very unusual and beautiful wildflower. You can contribute your photos and findings on the Facebook page *Skunk Cabbage Appreciation Society* or on iNaturalist.



Figure 5. A spadix of multiple flowers showing the stigmas of the female phase and four tepals.





Figure 6. A spadix showing the four stamens of the male phase with pollen released outward and collecting at the base of the spathe.

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