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Editor's Note: In this issue there are three very interesting articles, thanks so much to the writers! In hopes that this year's field season will be a bit more normal than last year's, we have plans to hold field trips; see the list on page 22. Also included is our annual vote for additions to the board of directors, a book notice, this past year's list of new rare plant reports, and a note on memberships. Happy Spring, and keep an eye out for those off color trilliums, which are always fun to see.

Articles Inside:

Non-anthocyanic or Green Morphs

by David Werier, Steven Daniel, Selma Rosenthal, and Andrea Connor

Abnormal or odd forms of plants have always attracted botanists' attention. Here we present documentation of previously unreported green or non-anthocyanic morphs of a few rare, as well as common, vascular plants that occur in New York State.

Figure 1 (left) Typically pigmented plants of *Jeffersonia diphylla*. **Figure 2 (right)** Green form of *J. diphylla*. Images taken 24 April 2011 in Livingston Co., NY by Werier.

Jeffersonia diphylla, a member of the Berberidaceae, is a widespread herbaceous perennial in the eastern United States. In New York, where it is rare, it is at the northeastern edge of its range (George 1997, Young 2020). In the early spring, this species emerges from the forest floor with leaves folded and flower buds ready to pop. At this stage, parts or the entire exposed portions of the plants are pigmented with red to pink hues, including the petioles, stems, and sepals (Figure 1). The red to pink color is from anthocyanins, pigments found in many plants, which produce orange, red, purple, and blue colors (Grotewold 2006). Anthocyanins function to pigment flowers but also occur in vegetative parts of plants. In vegetative parts, they are believed to act as protection against biotic and abiotic stressors, including excessive sunlight (Landi et al. 2015). The amount of anthocyanic pigmentation in *J. diphylla* varies from individual to individual. Later in the season, most if not all of the red coloration is lost, and the plants appear primarily green.

In 2011, Werier and Daniel were examining a population of *J. diphylla* in Livingston County, NY that was just emerging, when they found a few green or non-anthocyanic individuals of this species (Figure 2). The green plants were mixed with more typically pigmented plants, which were much more common. The green plants really stood out and caught our attention as a result of their complete lack of anthocyanic pigmentation. In a casual search of the literature, we could find no mention of this form.

Once the brief early stages of the plant have passed, the green forms likely do not appear much different than the typically pigmented plants, which lose much if not all of their red coloration. Therefore, it is possible that the green form is more common than our one observation suggests.

Figure 3 (left) Typically pigmented plant of *Caulophyllum giganteum*. **Figure 4 (right)** Green form of *C. giganteum*. Images taken 8 April 2012 in Erie Co., NY by Werier.

Caulophyllum giganteum, also a member of the Berberidaceae, is common in much of NY. It emerges in early spring with leaves folded and plants pigmented with purple and dark blues from anthocyanins (Figures 3, 6). The amount of anthocyanic pigmentation varies among individuals, but they contain at least some purple or dark blue color. As the plants mature, the purple and dark blue colors disappear, and they become mostly, if not entirely, green. In 2011, about two weeks prior to finding the green *Jeffersonia diphylla*, Werier and Daniel, along with friends and colleagues, were exploring a site in Erie Co., NY. They happened upon a patch of green or non-anthocyanic morphs of *Caulophyllum giganteum* (Figures 4, 8). The green morphs lacked any trace of anthocyanic pigmentation, including on the stems, leaves, and flowers. There were a total of 8 ramets or clumps of the green morphs, all within about 5.5 meters of each other. Because this species has rhizomes, it is possible that all of these ramets were part of one clone. The green individuals were greatly outnumbered by the more typically pigmented plants, which occurred over

acres. In 2018, in Onondaga Co., NY, Rosenthal also encountered green morphs of *C. giganteum*. She found only three individuals, all growing within a meter of each other, even though she searched for more. The overall site had many typically pigmented plants.

When we first saw the green *C. giganteum* morphs, we had wondered if they were *C. thalictroides*, a closely related and morphologically similar species. The two species sometimes grow together and typically differ in flower color. *Caulophyllum giganteum* generally has purplish petal-like sepals, while *C. thalictroides* generally has yellowish petal-like sepals (Figures 5, 6). In addition to flower color, *C. thalictroides* and *C. giganteum* differ morphologically in numerous other ways (Loconte and Blackwell 1985, Loconte 1997). One character that separates the two, and can usually be detected with a quick glance, is the size of the styles. In *C. thalictroides* the style is a small stub, while in *C. giganteum* it is elongate (Figures 5, 6). We were able to determine that the green morphs were indeed *C. giganteum*.

On occasion, the flower color of both species varies from typical (Loconte 1997). Usually when it varies, there remains some anthocyanic pigmentation in the flowers of *C. giganteum*, but rarely the anthocyanins appear to be completely lacking, as was the case for a plant Daniel found in St. Lawrence Co, NY, in 2016. (Figure 7). This plant lacked anthocyanic pigmentation in the flowers, but the rest of the plant had some of the typical purple color. Loconte (1997) noted that the sepals of *C. giganteum* can be yellow, so this is not new information. But, in a review of the literature, we could find no reference to the entire plants of either *Caulophyllum* species completely lacking anthocyanic pigmentation. Like *Jeffersonia diphylla*, once the brief early stages of growth have passed, the typically pigmented plants lose much if not all of their purple and dark blue pigmentation and might appear a lot like the green morphs. Therefore, the green morphs of *C. giganteum* could be overlooked.

One question that remains is, what color are the fruit-like seeds of these non-anthocyanic morphs of *C. giganteum*? Are they the typical blue, or might they be green, as would be predicted if the plants lacked anthocyanins? Hopefully one of these days, we can revisit these plants at the right time of year. Stay tuned.

Figure 5 (left) Typically colored flower of *Caulophyllum thalictroides*.; **Figure 6 (right)** Typically colored flower of *C. giganteum*. Images taken 26 April 2013 in Genesee Co., NY (figure 5) and 8 April 2012 in Erie Co., NY (figure 6) by Werier.

Figure 7 (left) Flower of *Caulophyllum giganteum* lacking anthocyanic pigmentation (other parts of this plant had anthocyanic pigmentation); **Figure 8 (right)** Flower of *C. giganteum* from plant fully lacking anthocyanic pigmentation. Images taken 8 May 2020 in St. Lawrence Co., NY by Daniel (figure 7) and 8 April 2012 in Erie Co., NY by Werier (figure 8).

Figure 9 (left) Typically pigmented plant of *Trillium erectum*, note red pigment in ovary and at base of stem*;* **Figure 10 (right)** Fully non-anthocyanic morph of *T. erectum*, note yellow ovary and completely green stem. Images taken 26 April 2006 in Cayuga Co., NY by Werier (figure 9) and 10 May 2018 in Essex Co., NY by Connor (figure 10).

Trillium erectum, a member of the Melanthiaceae, is a spring flowering, perennial, herbaceous plant that is common in NY (Figure 9). Botanists have observed much variation in the color of the petals and sepals (Case 2002). Typical plants (at least in NY) have maroon petals and green sepals (Figure 11), but forms with differently colored petals (and sometimes sepals too) are occasional in the state. These forms are varied and many (Figures 15-20). In 2013 or 2014, in Essex Co., NY, Connor found an individual of *T. erectum* that appeared to completely lack anthocyanic pigments (Figures 10, 13). In 2018, in St. Lawrence Co., NY, Daniel also found a plant that appeared to have lost the anthocyanic pigments in the flower (Figure 12), but he did not note if there was red pigmentation in the stem. From 2013 to 2016, Tony Gola (personal communication) also found three plants, two close together and a third about 100 meters distant, that lacked anthocyanic pigmentation in the flowers (Figure 14). He also did not note if there was red pigmentation on the stems. In all of these individuals, the lack of anthocyanins resulted in not only the petals but also the ovaries being yellowish. Additionally, in the plant Connor found, the stems were completely green. These non-anthocyanic *T. erectum* morphs could be mistaken for *T. flexipes*, a closely related and morphologically similar species. They are best separated by the presence or absence of anthocyanins, anther length, and anther to filament ratio. *Trillium erectum* non-anthocyanic morphs completely lack red or pink coloration (check base of stem) and have anthers 4–10(–12) mm long and (1.3–)1.4–2.7× as long as the filaments versus red or pink coloration often present (check base of stem) and anthers (5–)9–18 mm long and 2–5× as long as the filaments in *T. flexipes*. Additionally, *T. flexipes* does not get as far east as the plants we report.

Figure 11 Typically colored flower of *Trillium erectum*; **Figures 12–14** Flowers of non-anthocyanic morphs of *T. erectum*. Images taken 25 April 2018 in Tompkins Co., NY by Werier (figure 11), 6 May 2018 in St. Lawrence Co., NY by Daniel (figure 12), 10 May 2018 in Essex Co., NY by Connor (figure 13), and 4 May 2013 in Hampshire Co., MA by Tony Gola (figure 14).

Case (2002), an authority on the genus *Trillium*, noted that even when the petals of *T. erectum* have other colors, the ovaries remain dark purple to maroon. Other authors (Braun 1967, Gleason and Cronquist 1991, Haines 2011, Weakley 2020) also noted that, while *T. erectum* can have various petal colors, the ovaries remain dark. Voss and Reznicek (2012), on the other hand, noted that white-flowered forms of *T. erectum* in Michigan can have dark or pale ovaries. The non-anthocyanic morphs that we note have pale yellow versus white petals. The pale-ovaried plants noted by Voss and Reznicek (2012) could possibly be hybrids with *T. flexipes*, which are believed to be frequent in Michigan (Case and Case 1993), and in any case seem to be different than what we report here.

Figures 15–20 A few flower color morphs of *Trillium erectum* found in NY, not including the non-anthocyanic flower morphs, note that they all have anthocyanic pigmented ovaries. Images taken 25 April 2008 in Tompkins Co., NY by Werier (figure 15, 16, 17), 3 May 2009 in Tompkins Co., NY by Werier (figure 18), 19 May 2020 in Oswego Co., NY by Werier (figure 19), and 11 May 2020 in St. Lawrence Co., NY by Daniel (figure 20).

Allium tricoccum, a member of the Amaryllidaceae, is common in parts of NY. The plants consist of a few basal leaves that emerge in early spring and die back by summer. A stem appears in spring, which is topped by an umbel of flowers, which blooms from July through early August in NY. Typically, the base of the plants, petioles, stems, and bracts subtending the umbels have some red pigmentation from anthocyanins (Figure 21). The amount of red pigmentation varies considerably, and completely non-anthocyanic or green morphs exist (Figure 22). A closely related species, *A. burdickii*, which is common in the upper Midwest, and two other undescribed species, from the Appalachian and Interior Highlands, always lack reddish coloration (Sitepu 2018). While the green morphs of *A. tricoccum* have been widely noted in the literature, generally by stating that the plants usually or commonly have red pigmentation (Jones 1979, McNeal and Jacobsen 2002, Abbott 2016), in parts of NY, the green morphs are common, although often outnumbered by

red-pigmented plants. Previous confusion between *A. burdickii* and green morphs of *A. tricoccum* have led to the two being considered the same species (Walker 1961, Sitepu 2018). One difference between *A. tricoccum* and *A. burdickii*, as well as the other two undescribed putative species, is that *A. tricoccum* has the stems curved as they are developing, becoming straight in flower, while the other species have the stems erect (Sitepu 2018). We are in need of clear documentation of *A. burdickii* in the state, and one of the undescribed species may also occur in the state, so please keep your eyes out for green plants with erect developing stems.

Figure 21 (left) Typically pigmented plants of *Allium tricoccum*, note red at base of plant and leaves; **Figure 22 (right)** Non-anthocyanic morphs of *A. tricoccum*, note complete lack of red pigmentation. Images taken 26 April 2013 in Genesee Co., NY (figure 21) and 2 May 2018 in Tompkins Co., NY (figure 22) by Werier.

Plants that normally contain anthocyanins may be weaker if they lack anthocyanins, because anthocyanins are believed to provide beneficial effects in plants (Landi et al. 2015). This may account for the rarity of the green morphs of *Jeffersonia diphylla, Caulophyllum giganteum,* and *Trillium erectum*. But then what accounts for the relative abundance of green morphs of *Allium tricoccum*? The fact that there is another (and perhaps three other) closely related species in eastern North America that appear to always lack anthocyanins suggests that the entire *A. tricoccum* complex may have developed ways to overcome the loss of anthocyanins. Clearly our finds raise lots of questions, which we hope will lead to further investigations.

We would like to thank Tony Gola for sharing information and images about his find of non-anthocyanic morphs of *T. erectum*. We thank Arthur Haines for helping connect Werier with Tony Gola. And we thank iNaturalist, where Werier first noticed Daniel's images of *T. erectum* with non-anthocyanic flowers and asked him to contribute to this part of the article.

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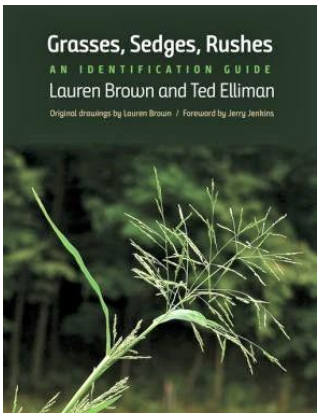
BOOK ANNOUNCEMENT

Yale University Press recently published a book that should appeal to members of our organization. ***Grasses, Sedges, Rushes: An Identification Guide*** by Lauren Brown and Ted Elliman is a user-friendly introduction to this group of plants that many botanical enthusiasts tend to pass by, considering them too challenging to identify. Using non-technical language and a simplified key, the book describes and illustrates 141 common species of grasses, sedges, and rushes, highlighting the features that are essential to their identification.

The book is a revised and updated edition of Lauren Brown's 1979 *Grasses: An Identification Guide.* The new edition keeps the clarity and descriptive quality of the original but has many enhancements, most notably the addition of diagnostic color photographs to complement the original line drawings. In addition, the text has been expanded to provide more information about species' life histories, ecology, and cultural connections, and scientific and common names have been updated to accord with current usage. The book recently was named one of the Best Reference Books of 2020 by the Library Journal. Compact and portable, the book is an excellent field companion.



Editor's Note: As a fan of the older edition, and having seen a copy of the new enhanced edition, I can attest to the usefulness of this book when learning graminoids. It is well worth the purchase!

New York City EcoFlora EcoQuest, CLIMBING THE WALLS

by Daniel Atha and Lydia Paradiso

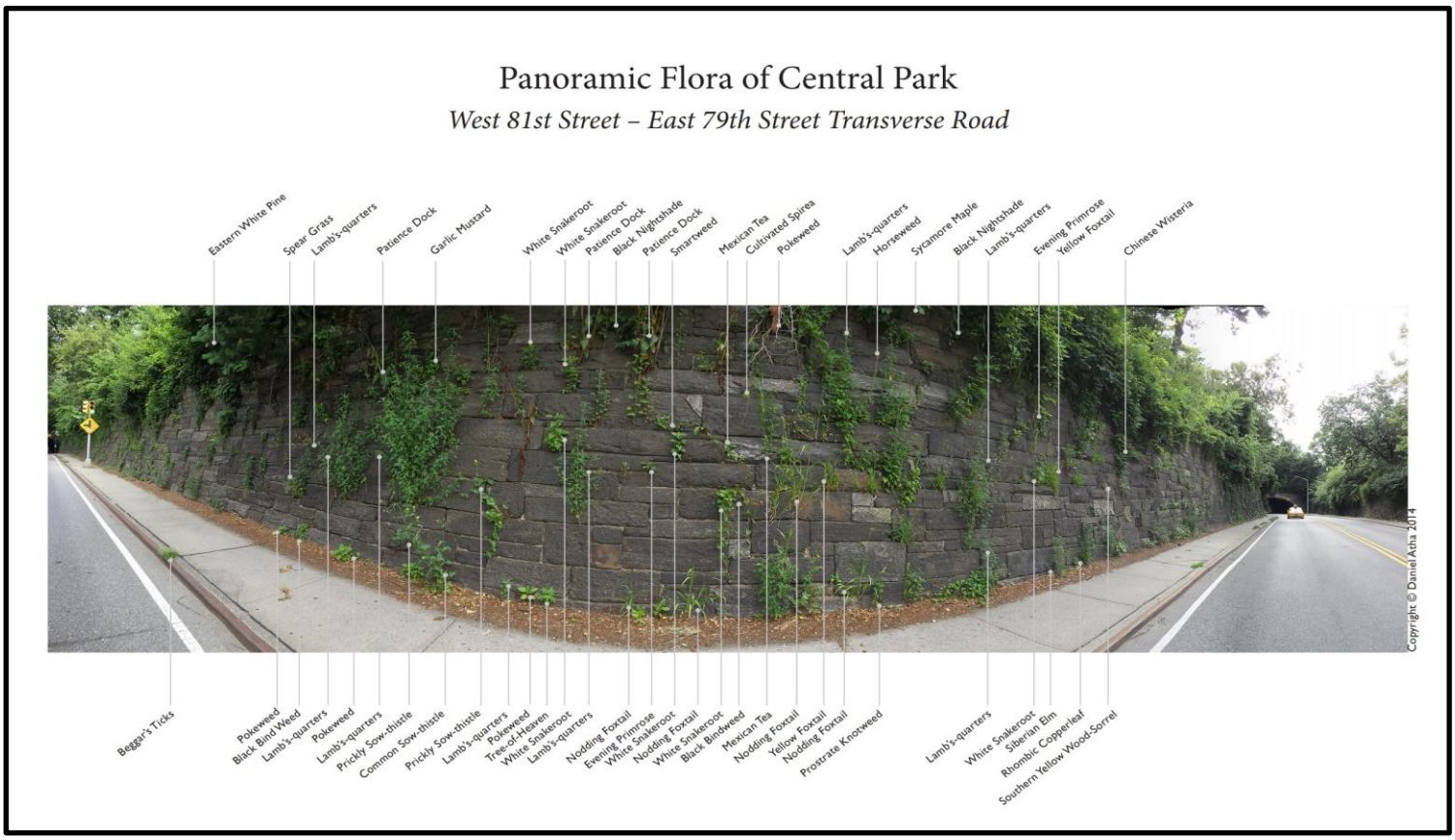


Figure 1. *Panoramic Flora of Central Park. Image showing the diversity of species that can be found on a single wall. The curvature of the wall is a distortion of the panoramic effect. Most species identified here are vouchered by herbarium specimens.*

Vertical surfaces that are solid and not transparent are generally considered walls. Recognizing that some organisms seem to have an affinity for these surfaces, scientific and vernacular names sometimes include epithets related to walls. Plants which have "wall" in their common name include Wall-Rue (*Asplenium ruta-muraria* L.), Wall Hawkweed (*Hieracium murorum* L.), Wall Rocket (*Diplotaxis tenuifolia* (L.) DC.), Spreading Wallflower (*Erysimum repandum* L.), Pellitory of the Wall (*Parietaria judaica* L.), and Wall Screw-Moss (*Tortula muralis* Hedw.). The Latin *murus*, meaning "wall", is utilized in the formation of scientific names with epithets such as *muralis*, *murorum*, and *muraria*. A query of the International Plant Names Index (IPNI, 2021) returns over 118 plant names carrying the epithet *muralis*, 71 with *murorum*, and 36 with *muraria* (a minimal number of homotypic synonyms were not removed). Other terms are related to the Latin root *paries*, meaning wall or partition, including the genus *Parietaria* in the Nettle family (aptly named as several members of the genus are commonly found on walls), and the epithets *parietaria*, *parietaroides*, and *parietale*. There are 213 plant names in IPNI containing this word root (minimal number of homotypic synonyms not removed). There are other terms that may be indirectly related to walls, such as *rupicolous* and *saxicolous* (pertaining to rocks), but these are more often applied to plants that prefer stone or gravel that is not necessarily vertical.

Because they are vertical, walls are drier than non-vertical surfaces and are more exposed to wind currents that increase evaporation. They may be exposed to intense radiation from the sun or receive no direct sunlight at all. A wall's composition, whether made of stone, brick, metal or other has distinct mineral and nutrient profiles. Their generally impervious nature restricts root-penetration and space to grow. For these

reasons, walls are a unique ecological niche (with distinct variants). Different parts of walls may provide slightly different conditions related to water and nutrient availability as well as environmental stress. As a habitat or ecosystem, however, walls are far less studied than ecosystems such as forests or wetlands, despite the fact that most humans spend their entire lives surrounded by walls. Much of the existing research (apart from floristic accounts) is focused on the effects of wall plants on the structure of the walls themselves (Lisci et al. 2003), as well as on artificial "green walls" (Manso & Castro-Gomes 2015).

Many plants that grow on walls possess characteristics enabling them to survive the physical constraints of the habitat, including small, mobile, often wind dispersed seeds (anemochory); seeds that germinate with minimal moisture; vegetative reproduction; and drought resistance (Lisci et al. 2003).

Because many walls are natural limestone or man-made with mortar or concrete containing lime, plants with an affinity to high pH often grow on walls. The Pennsylvania Pellitory (*Parietaria pensylvanica* Muhl. ex Willd.) is a local example of a plant that grows on limestone soils in nature (rare in New York City), but is quite commonly found rooted in the mortar of walls all over New York City.

In July 2020, the New York City EcoFlora sponsored a public event encouraging all New Yorkers to photograph what was living on the walls around them. Entitled CLIMBING THE WALLS, the event was a continuation of the monthly community science challenges begun in August of 2017. Each month is centered around a particular species and observations are uploaded to the community science program, iNaturalist (EcoFlora, 2021). Twenty-four people participated, observing 5774 plants of 257 species (Table 1).

A total of 84 different families representing fungi, lichens, bryophytes, ferns, angiosperms, and *Ginkgo* were observed; as well as some animals (not considered here). The most observed families were Asteraceae (36 taxa identified), Poaceae (23 taxa identified) and Polygonaceae (13 taxa identified). Ferns were the top group of organisms. The top three plants observed were all ferns (*Woodsia obtusa* [790 observations]; *Pellaea atropurpurea* [615 observations]; *Asplenium platyneuron* [325 observations]).

A majority of the taxa observed are perennials (61%), and many are herbs (~60%), with (sub)shrubs, trees, vines, and graminoid taxa appearing in roughly equal proportions (10-15% each). Among ferns and angiosperms, 3 in every 5 plant species observed are non-natives (based on Werier 2017).

Table 1. *Observations for the CLIMBING THE WALLS EcoQuest. A total of 5,782 observations of plants and fungi were recorded. 3,140 identifications are confirmed by two or more people (54.3%). A number of observations are not yet identified to the genus or species level. The complete data set is available here:* https://drive.google.com/file/d/1bi3Zc0ivEE4wY4Rw1LCAWqt1lmMhASOI/view?usp=sharing

Taxon	Number of observations	Number of families	Number of observations identified to species	Number of species
Fungi/Lichens	128	9	57 (44.5%)	13
Bryophytes	128	11	58 (45%)	12
Ferns	2299	9	1783 (78%)	16
Angiosperms	3186	54	2983 (93%)	210

Prior to the start of the New York City EcoFlora in January 2017, only three populations of Purple-Stem Cliffbrake (*Pellaea atropurpurea*) were documented from New York City. By 2020, six additional populations were added. During the CLIMBING THE WALLS EcoQuest, three more populations were noted (Riverside Park, Central Park and Church of the Intercession, all in Manhattan). The species is now known from twelve verified populations in New York City. Walking Fern, *Asplenium rhizophyllum*, known from one population in New York City, was observed three times from the same population.

Red Columbine (*Aquilegia canadensis* L.), a calciphile, was once found wild in New York City on marble outcrops in northern Manhattan and the Bronx and serpentine derived soils on Staten Island. It has not been

seen wild in over 100 years. There were three observations of spontaneous occurrences in Manhattan during the CLIMBING THE WALLS EcoQuest.

Several species were observed growing spontaneously on walls that are not reported as naturalized in New York City (Atha & Boom, 2018) or New York State (Werier, 2017). Further investigation of these occurrences will be necessary to confirm their status, and possible addition to the list of naturalized species for NYC and the state. Some interesting cases are listed here.

Japanese painted fern (*Athyrium niponicum* (Mett.) Hance) was observed 8 times in 3 localities (Pelham Bay Park, Central Park, and Carl Schurz Park), all of which appear spontaneous. Of the 60 fern species historically known from New York City, 42 are known to still occur and all are native (Atha & Boom, 2018). The Japanese Painted fern may be the first non-native fern to become naturalized in New York City.

Oakleaf hydrangea (*Hydrangea quercifolia* W. Bartram) was observed 16 times in Central and Riverside Parks. Butterfly-bush (*Buddleja davidii* Franch.) was also observed 17 times in Riverside and Jackie Robinson Parks. These are both commonly planted species, which may be on their way to becoming naturalized in our area, as these observations are clearly not planted and occur some distance from planted individuals.

The methodology of data collection was not dictated in advance. Participants were free to observe whatever they wished as long as it was on a wall. Therefore, observer bias must be considered when analyzing the results of the study. The data suggests a bias towards ferns and angiosperms. For example, only 2% of observations were of bryophytes, which are abundant on walls. But most general naturalists shy away from them for lack of expertise in identification. In addition, most of us have a natural bias toward familiar organisms or organisms we think can be readily identified. The large number of observations of *Pellaea atropurpurea* during the month (615 observations) is out of proportion to its actual abundance in New York City. Participants were enthusiastic about observing this plant and wanted to document as many individuals as possible. And they did!

Wall floras have been published for some places around the world including East Bohemia, Czech Republic (Duchoslav, 2002); Cambridge, England (Rishbeth, 1948); Kyustendil, Bulgaria (Nedlecheva, 2011); southeastern Essex, England (Payne, 1978); Varanasi, India (Varshney, 1971); Thessaloniki, Greece (Krigas et al., 1999); Banaras Hindu University, India (Singh, 2011); Qal'at Nimrud, Israel (Karschon & Weinstein, 1985); Elbasan, Albania (Gjeta et al., 2021); Chongquing, China (Huang et al., 2019). Follow-up study will supplement the data assembled here with the goal of producing a complete inventory and analysis of the wall flora of New York City.

Acknowledgements

We are grateful to the New Yorkers who participated in the CLIMBING THE WALLS EcoQuest Challenge, especially Kevin Sisco, Susan Hewitt and Jay Holmes who collectively made more than half of the observations. We are also indebted to the iNaturalist community identifiers who reviewed observations to add and confirm identifications. Thank you Sean Grasing, peakaytea, David Ringer, Chris Hoess and Sany Wolkenberg.

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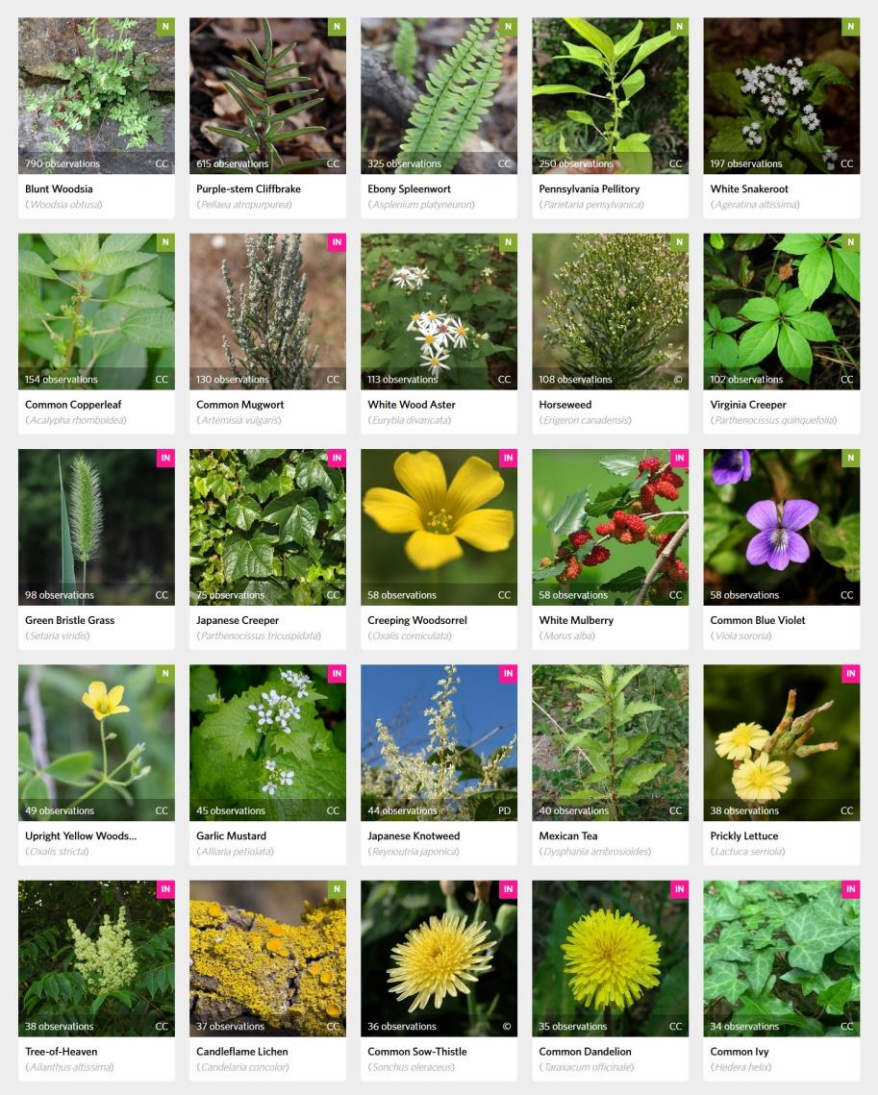


Figure 2. The twenty-five most-observed species from CLIMBING THE WALLS EcoQuest challenge, New York City, 1–31 July, 2020. The green box labeled “N” in the upper right of each thumbnail indicates a native North American species; the pink box labeled “IN” indicates a species introduced to North America.

The subspecies of *Arisaema triphyllum* (Jack-in-the-pulpit) in NY

by Michael Hough

Three subspecies of *Arisaema triphyllum* are believed to occur in New York: *triphyllum*, *stewardsonii*, and *pusillum*. The most common by far is the tetraploid (4n=56) subsp. *triphyllum*, which occurs primarily in mesic forests, while subsp. *stewardsonii* is diploid (2n=28) and is restricted primarily to conifer swamps. Because subsp. *triphyllum* is tetraploid, the mature plants tend to be larger on average, but very large specimens of subsp. *stewardonsii* are occasionally found. In addition, typical *A. triphyllum* often begins flowering a week or two before subsp. *stewardsonii*.

A taxon of relatively southern distribution, subsp. *pusillum*, has been collected in a few NY counties from Ulster south to Long Island, though it does not appear to have been observed recently. Like subsp. *stewardsonii*, it is diploid (2n=28) and shares with it many of the same characteristics except that: it lacks the prominent "flutes" on the spathe, tends to be smaller, and grows in woods like subsp. *triphyllum* though seemingly with a preference for wetter soil.

Color is not necessarily a good diagnostic feature, as all three subspecies can have spathes (and even the spadix) that vary from green to deep purple, though subsp. *stewardsonii* is the only one with raised white stripes on the back of the spathe (the others can be striped but they are not raised), and in subsp. *pusillum* any purple is likely to be restricted to the upper half of the spathe and spadix. Based on images viewed online, the spathe of subsp. *pusillum* seems to have a shorter, ascending, and less acuminate hood that doesn't cover the spadix to the extent that is does in the other two subspecies, though I have not seen enough examples to be sure that this is typical.

Given the recorded ploidy of the majority of specimens, it is quite possible that subsp. *triphyllum* is an allopolyploid (ancient hybrid) of subsp. *pusillum* and subsp. *stewardsonii*, though no genetics have been done to date that would detect this. There is ample evidence that the three subspecies are reproductively isolated (Treiber, 1980) and therefore might better be regarded as three distinct species. Huttleston (1949) reported finding six presumed hybrids of subsp. *triphyllum* and subsp. *stewardsonii* in Wayne County, NY. Two of them were apparently triploid (3n=42) and the other four diploid (2n=28), though he was not able to determine the fertility of these plants. He also reported finding two specimens at Big Gully in Cayuga County with the characteristics of typical *A. triphyllum* but with a chromosome number of 28. The apparent rarity of putative hybrids and the lack of understanding of the fertility of these would not seem to exclude recognition of the “subspecies” as distinct species, as subsp. *stewardsonii* was when first described by Britton (1901). Thompson (2000) treated *A. triphyllum* as “one highly variable species” in part because many of the diagnostic features are lost when plants are pressed and dried, but living specimens are rather easily identified.

A fourth subspecies sometimes recognized is subsp. *quinetum*; it is characterized by the presence of five leaflets instead of the usual three (or the two lateral leaflets lobed), and the tip of the spadix is usually somewhat elongated and slightly curved. It is only known from the southeastern U.S. from Virginia west to Arkansas and south to the panhandle of Florida west to eastern Texas. The morphology suggests possible ancient hybridization with *Arisaema dracontium*. Hybrids of *A. dracontium* with subsp. *stewardsonii* have been documented but are sterile (Sanders and Burk 1992).

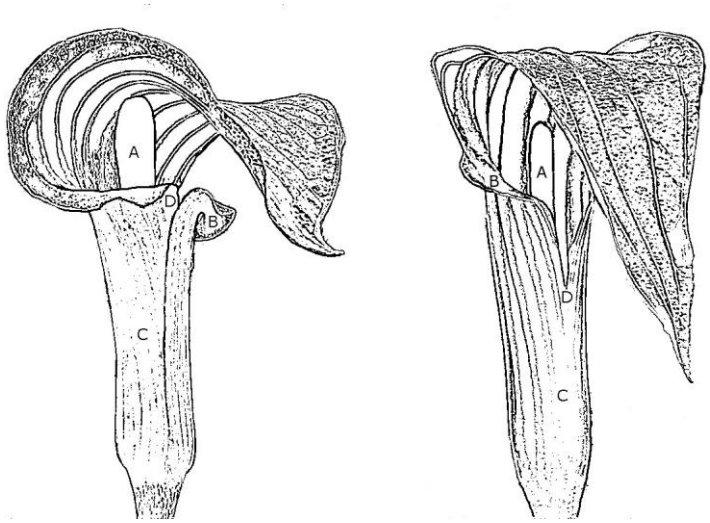
The following key to our (sub)species is based on field observations and a limited review of the literature (Wiegand & Eames 1926, Huttleston 1949, Thompson 2000). Note key sections are not completely parallel (parallel portion of first section in bold) so as to accommodate characteristics that distinguish subsp. *stewardsonii* from subsp. *triphyllum*.

1 **Margins of spathe tube often forming a V-shaped opening at summit; spathe strongly fluted** (i.e. veins broad and raised); spathe flange 1-3 mm wide; distal portion of spadix ± cylindrical (2-5 mm thick); underside of leaves glossy green.....subsp. *stewardsonii*

1 **Margins of the spathe tube at the summit contiguous, often overlapping; spathe not or only weakly fluted**..... 2

2 Spathe flange 2-9 mm wide; distal portion of spadix ± club-shaped (4-10 mm thick); underside of leaves typically whitish (glaucous) at maturity..... subsp. *triphyllum*

2 Spathe flange 1-3 mm wide; distal portion of the spadix cylindrical (2-5 mm thick), rarely club-shaped; underside leaves glossy green ..... subsp. *pusillum*

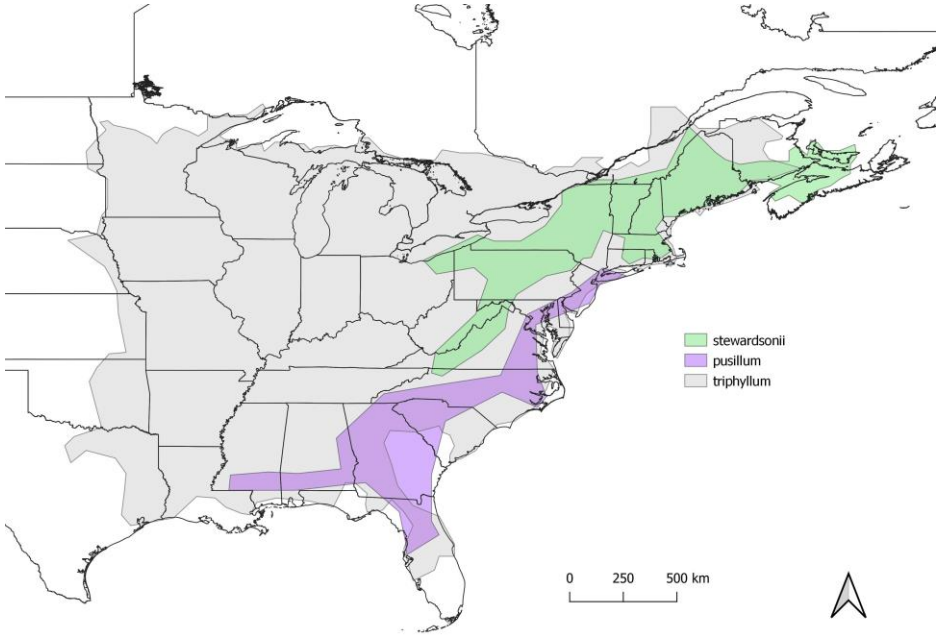


Inflorescences of subsp. *triphyllum* (left) and subsp. *stewardsonii* (right). Labels: A) Distal portion of spadix B) Spathe flange C) Spathe tube D) Summit of spathe tube. Images generated from photos using the computer program GIMP.

Strongly fluted spathe of subsp. *stewardsonii*. Note v-shaped summit of the ventral portion of the spathe tube, narrow flange, and cylindrical spadix appendage.

Smooth spathe of subsp. *triphyllum*. Note straight summit to the ventral portion of the spathe tube, wide flange, and club-shaped spadix appendage.

By examination of observations on *i*Naturalist (California Academy of Science and National Geographic Society 2021), I have put together a range map for the three (sub)species. Interestingly, subsp. *stewardsonii* appears to almost completely replace subsp. *triphyllum* in the Canadian Maritimes and there it grows in woods rather than being restricted to swamps as it is in New York. If subsp. *triphyllum* arose through hybridization of subsp. *stewardsonii* and subsp. *pusillum*, it is likely that this took place in the southern Appalachians as this is where the two ranges come into close contact.



Range map for the three subspecies of *Arisaema triphyllum* known to occur in New York: subsp. *triphyllum* (gray), subsp. *pusillum* (purple), and subsp. *stewardsonii* (green).

It is well-documented that individual jack-in-the-pulpit plants can change sex from year to year (Thompson 2000), with smaller plants only producing male flowers, large plants producing female flowers, and intermediate plants producing both. Often a plant that produced fruit in one year will revert to a smaller male plant for one or more years after. This is thought to be related to available energy reserves.

Jack-in-the-pulpit has a somewhat sinister means of pollination. Male plants produce a tiny opening at the base of the spathe to allow pollinators to escape so that they can visit other plants to pollinate. The female plants, however, do not produce this opening in the spathe. This forces the pollinator to remain inside the spathe longer to ensure cross-pollination, and sometimes the insects are not able to find their way out.

Opening at the base of the spathe of a male subsp. *stewardsonii*.

A version of this article was originally published in the Finger Lakes Native Plant Society Newsletter (Hough, 2015).

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New Rare Plant Finds Submitted to the NY Natural Heritage Program in 2020

Steve Young, Chief Botanist, NYNHP – smyoun26@esf.edu

The field season of 2020 was another great one for new discoveries of rare plants in New York, even with the setbacks of COVID19. There were many professional and amateur botanists out there exploring all kinds of natural areas and finding rare plants on the active list that they reported to me. The presence of iNaturalist projects like the New York City EcoFlora, the New York Wildflower Monitoring Project, The Rare Plants of New York, and the Adirondack Orchid Survey have helped locate new rare plant occurrences that may have been overlooked otherwise. I had many updates to known locations, but this list shows the new occurrences that were found or reported and sent to me either by email, by the online reporting form (www.nynhp.org/report-rare) or entered into the iNaturalist projects. Thank you all for your great work and amazing finds! Let me know if I missed any so I can update the list. I look forward to the 2021 field season when more of us can get together and botanize!

Long Island

Nassau Co. - Greentree Grasslands - *Euonymus americanus* S1 - Jim Stevenson
Nassau Co. - Jones Beach West - *Sabatia stellaris* S2 - Robert Levy
Nassau Co. - Mill Pond - *Polygala nuttallii* S2 - Robert Levy
Nassau Co. - Mill Pond - *Bartonia paniculata* S1 - Robert Levy
Suffolk Co. - Amsterdam Beach State Park - *Potamogeton pulcher* S2 - Vicki Bustamante
Suffolk Co. - Big Reed Pond - *Coelataenia anceps* S1 - David Werier
Suffolk Co. - Big Reed Pond - *Potamogeton pulcher* S2 - Vicki Bustamante
Suffolk Co. - Centereach - *Euphorbia ipecacuanhae* S1 - David Laby
Suffolk Co. - Centereach - *Opuntia cespitosa* S1 - David Laby
Suffolk Co. - Centereach - *Rubus cuneifolius* S1 - David Laby
Suffolk Co. - Centereach - *Sabulina caroliniana* S2 - David Laby
Suffolk Co. - Culloden Point - *Potamogeton pulcher* S2 - Vicki Bustamante
Suffolk Co. - Ditch Plains - *Potamogeton pulcher* S2 - Vicki Bustamante
Suffolk Co. - East Setauket - *Ageratina aromatica* S1 - David Laby
Suffolk Co. - East Setauket - *Crocanthemum propinquum* S2 - David Laby
Suffolk Co. - East Setauket - *Lespedeza angustifolia* S1 - David Laby
Suffolk Co. - East Setauket - *Rubus cuneifolius* S1 - David Laby
Suffolk Co. - East Setauket - *Spiranthes tuberosa* S2 - David Laby
Suffolk Co. - East Setauket - *Stachys hyssopifolia* S2 - David Laby
Suffolk Co. - Fishers Island - *Iris prismatica* S2 - Jack Schneider
Suffolk Co. - Fishers Island - *Spiranthes vernalis* S1 - Jack Schneider
Suffolk Co. - Havens Beach - *Oenothera laciniata* S1 - Jean Held
Suffolk Co. - Montauk - *Elymus virginicus* var. *halophilus* S1 - Vicki Bustamante
Suffolk Co. - Montauk - *Paspalum laeve* S2 - Vicki Bustamante
Suffolk Co. - Mount Sinai - *Symphyotrichum tenuifolium* S2 - David Laby
Suffolk Co. - Melville - *Crocanthemum propinquum* S2 - David Laby
Suffolk Co. - Port Jefferson Station - *Desmodium ciliare* S2 – David Laby
Suffolk Co. - Rocky Point - *Euphorbia ipecacuanhae* S1 - David Laby
Suffolk Co. - South Setauket - *Ageratina aromatica* S1 - David Laby
Suffolk Co. - South Setauket – *Amelanchier nantucketensis* S1 - David Laby
Suffolk Co. - South Setauket - *Cyperus lupulinus* ssp. *lupulinus* S1S2 - David Laby
Suffolk Co. - South Setauket - *Desmodium ciliare* S2S3 - David Laby

Suffolk Co. - South Setauket - *Eupatorium subvenosum* S2S3 - David Laby
Suffolk Co. - South Setauket - *Euphorbia ipecacuanhae* S1 - David Laby
Suffolk Co. - South Setauket - *Lespedeza stuevei* S2 - David Laby
Suffolk Co. - South Setauket - *Polygala nuttallii* S2 - David Laby
Suffolk Co. - Southaven Park - *Carex collinsii* S1 - Ethan Maitra
Suffolk Co. - Southaven Park - *Hottonia inflata* S2 - Zihao Wang
Suffolk Co. - Steppingstones Pond - *Potamogeton pulcher* S2 - Vicki Bustamante
Suffolk Co. - The Sanctuary - *Potamogeton pulcher* S2 - Vicki Bustamante

Spiranthes vernalis, Photo by Jack Schneider.

New York City
Kings Co. - Bath Beach - *Polygonum buxiforme* S1 - Zihao Wang
Kings Co. - Gateway - *Elymus virginicus* var. *halophilus* S1 - Zihao Wang
Queens Co. - Broad Channel - *Coleataenia anceps* S1 - Zihao Wang
Richmond Co. - Arbutus Woods - *Viola primulifolia* S2 - New York City Parks
Richmond Co. - Brookfield Park - *Strophostyles umbellata* S1 - Ray Matarazzo
Richmond Co. - Mount Loretto - *Cyperus lupulinus* ssp. *lupulinus* S1 - Zihao Wang
Richmond Co. - Mount Loretto North - *Viola primulifolia* S2 - New York City Parks
Richmond Co. - Oakwood - *Sphenopholis obtusata* S1 - Zihao Wang
Richmond Co. - Oakwood Beach - *Oxalis violacea* S2S3 - New York City Parks
Richmond Co. - Ocean Breeze Park - *Cyperus echinatus* S1 - Zihao Wang
Richmond Co. - Ocean Breeze Park - *Eupatorium torreyanum* S2 - Zihao Wang
Richmond Co. - Ocean Breeze Park - *Juncus brachycarpus* S1 - Zihao Wang
Richmond Co. - Westwood - *Euonymus americanus* S1 - Zihao Wang

Strophostyles umbellata, flower and bean. Photo by Don Recklies.

Lower Hudson
Dutchess Co. - Dover - *Lysimachia quadriflora* S1 - Chris Graham
Dutchess Co. - Millbrook - *Jeffersonia diphylla* S2 - Christine Young
Dutchess Co. - Poughkeepsie - *Andersonglossum virginianum* S1 – Chris Mangels
Orange Co. - West Point - *Chenopodium foggii* S1 - David Werier
Putnam Co. - Cold Spring - *Coleataenia anceps* S1 - Zihao Wang
Putnam Co. - Garrison - *Piptochaetium avenaceum* S2 – Ethan Dropkin
Putnam Co. - Hudson Highlands State Park- *Carex typhina* S2 - Patricia Butter
Rockland Co. - Iona Island - *Myriopteris lanosa* S1 - Ed McGowan
Sullivan Co. - St. Joseph's Lake - *Utricularia radiata* S2 - Donna Vogler
Westchester Co. - Cranberry Lakes - *Lechea tenuifolia* S2 - John Egenes
Westchester Co. - Hartsdale - *Paspalum laeve* S2 - Patricia Butter
Westchester Co. - Marshlands - *Silene caroliniana* var. *pensylvanica* S2 - David Berg
Westchester Co. - Marshlands - *Oxalis violacea* S2 - Zihao Wang
Westchester Co. - Rockefeller State Park - *Paspalum laeve* S2 - Patricia Butter
Westchester Co. - Rockefeller State Park - *Lespedeza stuevei* S2 - Patricia Butter
Westchester Co. - Sleepy Hollow - *Paspalum laeve* S2 - Patricia Butter
Westchester Co. - Yorktown Heights - *Carex typhina* S2 - Patricia Butter
Westchester Co. - Yorktown Heights - *Carex lupuliformis* S2 - Patricia Butter

Lysimachia quadriflora, Photo by Chris Graham.

Eastern New York
Rensselaer Co. - Lock 4 - *Erigeron pulchellus* var. *provancheri* S1 – Jackie Donnelly
Ulster Co. - Esopus - *Carex typhina* S2 - Mark Carabetta
Ulster Co. - Accord - *Pedicularis lanceolata* S2 - Michele Hertz
Ulster Co. - Balsam Lake Wild Mountain Forest - *Geum macrophyllum* S1 - Ethan Maitra

Erigeron pulchellus var. *provancheri*, Photo by Jackie Donnelly.

Adirondacks
Clinton Co. - Altona Flat Rock - *Piptatheropsis canadensis* S2 - David Werier
Clinton Co. - Altona Flat Rock - *Carex adusta* - S1 - David Werier
Franklin Co. - Upper St. Regis Lake - *Arethusa bulbosa* S2 - Carol Gates
Franklin Co. - Jones Pond Brighton - *Arethusa bulbosa* S2 - Carol Gates
Franklin Co. - Little Colby Pond - *Arethusa bulbosa* S2 – Carol Gates
Franklin Co. - Little Weller Pond - *Arethusa bulbosa* S2 – Carol Gates
Franklin Co. - Roilys Bog - *Arethusa bulbosa* S2 – Carol Gates
St. Lawrence Co. - Titusville Mountain State Forest - *Carex haydenii* S2 - David Werier
St. Lawrence Co. - Hickory Lake Swamp - *Liparis liliifolia* S1 - Steve Daniel

Arethusa bulbosa, photo by Carol Gates.

Central New York
Cortland Co. - Town of Solon - *Spiranthes casei* var. *casei* S2 - Matt Young
Jefferson Co. - Town of Belleville - *Jeffersonia diphylla* - S2 - Robert Smith & Brittney Rogers
Onondaga Co. - Split Rock - *Ulmus thomasii* S2 - Mike Serviss
Seneca Co. - Demont Creek - *Najas marina* S1 - Joshua Neff

Western New York
Cattaraugus Co. - Allegany State Park - *Botrychium oneidense* - Erik Danielsen
Cattaraugus Co. - Cattaraugus Creek - *Houstonia canadensis* S2 - Erik Danielsen
Cattaraugus Co. - Red House - *Carex caroliniana* S1 - David Werier
Cattaraugus Co. - South Valley - *Botrychium oneidense* - Erik Danielsen
Cattaraugus Co. - Zoar Valley - *Houstonia canadensis* S2 - Erik Danielsen
Cattaraugus Co. - Zoar Valley - *Lithospermum latifolium* S2 - Erik Danielsen
Cattaraugus Co. - Zoar Valley - *Astragalus neglectus* S1 - Erik Danielsen
Cattaraugus Co. - Zoar Valley - *Houstonia canadensis* S2 - Erik Danielsen
Cattaraugus Co. - Zoar Valley - *Carex schweinitzii* S2S3 - Erik Danielsen
Chautauqua Co. - College Lodge Woods - *Botrychium oneidense* S2S3 - Erik Danielsen
Chautauqua Co. - Fredonia - *Ophioglossum pusillum* S1 - Erik Danielsen
Chautauqua Co. - South Ripley - *Vernonia gigantea* S1 - Sara Stebbins
Erie Co. - 18 Mile Creek - *Cornus drummondii* S1 - Priscilla and Jon Titus
Erie Co. - Sheridan - *Asimina triloba* S2 - Adam Price
Monroe Co. - Golah - *Carex aggregata* S1 - Steve Daniel, David Werier, Kyle Webster
Monroe Co. - Golah - *Carex davisii* S2 - Steve Daniel, David Werier, Kyle Webster
Monroe Co. - Mendon Ponds - *Eleocharis quinqueflora* S1 - Steve Daniel

Monroe Co. - Webster - *Boechera stricta* S2 - Kyle Webster
Niagara Co. - Niagara Falls - *Houstonia canadensis* S2 - Erik Danielsen

Vernonia gigantea, Photo by Sara Stebbins.

Ophioglossum pusillum, Photo by Erik Danielsen.

NYFA 2021 Field Trips

Our field trips will begin in June and we will initially be restricting them to 10 participants and the leader. There will be waiting lists and people will be informed if they are on the waiting list. We will ask you to bring masks to wear if you get closer than the 6-foot social distancing recommendation. You can see more details about the trips at our website at https://nyflora.org/events-directory/
There will be no workshops this year and we hope they will begin again in 2022.

June 5 – Hudson River Ice Meadows Part 1 – Jackie Donnelly
June 6 – Hunter Island, Pelham Bay Park – Zihao Wang
June 10 – Invasive Woody Species SUNY Morrisville – Rebecca Hargrave
June 12 & 13 – Zoar Valley Weekend – Erik Danielsen
June 19 – Central Park New York City – Daniel Atha
June 19 – Altona Flat Rock – Steve Daniel and Anne Johnson
June 26 – Binnewater Lakes Flora – Chris Graham
June 27 – Essex Quarry Flora – Steve Young
July 10 – Hudson River Ice Meadows Part 2 – Jackie Donnelly
July 11 - Polemonium at the Kudish Natural History Preserve – Mike Kudish & Dan Spada
July 17 – Four Peaks Adirondacks Flora – Steve Langdon
August 7 – Whiteface Alpine Flora- Steve Young
August 14 & 15 – Split Rock Mountain Adirondacks – Rich Ring
August 22 – Moss Island Geology and Flora – Steve Young
September 9 – Valcour Island North Shore – Steve Young, Dan Spada
September 18 – Jones Beach Island Rare Plants and Cyperus – Steve Young
September 25 – Mohawk Bike Trail Petal Pedal – Steve Young
September 26 – Wilson Tuscarora State Park Flora – Ed Fuchs

Ballot for 2021 Board Election

As per custom and NYFA bylaws, a ballot with the nominee's names is published in the spring newsletter. The final vote will be taken and all votes counted at the annual meeting on August 28, 2021. Three current directors and five additional nominees are on the ballot this year. If elected, each will serve a three-year term on the NYFA Board.

_____**Richard M. Ring**, Botanist, NY Natural Heritage Program (returning)
_____**Dan Spada**, Environmental Consultant, Tupper Lake, NY (returning)
_____**Kyle Webster**, Stewardship Project Coordinator, NYS Office of Parks, Recreation and Historic Preservation (returning)
_____**Chris Graham**, Field Botanist, Mapping Coordinator, Hudsonia
_____**Vicki Bustamante**, Botanical Consultant, Owner, Warren's Nursery, Inc.
_____**Clara Holmes**, Field Scientist, Plant Ecologist, NYC Parks
_____**Mary Alldred**, Assistant Professor, SUNY Plattsburgh
_____**Rachel Schultz**, Associate Professor, SUNY Brockport

Vote for one or all of the candidates on the ballot. Ballots should be received by Aug. 15 and submitted to:
Daniel Atha, The New York Botanical Garden
2900 Southern Blvd., Bronx, NY 10458
Email: datha@nybg.org

Recent Changes to Membership Dues Categories

By Joe McMullen, NYFA Treasurer

Membership dues and donations are the primary sources of funding for the NYFA. This funding permits us to advance our mission of furthering the understanding of plants that grow wild in New York State, by continuing to provide many products and activities, including: the widely utilized New York Flora Atlas, an excellent quarterly Newsletter, student research awards, technical botanical workshops, and interesting field trips.

If you look at our membership dues over the years, you will note that there has been very little change. When the NYFA was originally founded, the annual dues were set in 1989 at $10. A few years later, the dues were increased to $20 and our standard membership dues currently remain at that level. We have always recognized the importance of attracting students to our organization, and a student membership was free for the first year and $10 thereafter.

We have had dues with associated donation options on our website for a number of years and those were made into more formal categories in the last year or so, as follows.

Regular Membership - $20
Associate Membership - $30 ($20 plus $10 donation)
Supporting Membership - $40 ($20 plus $20 donation)
Sustaining Membership - $70 ($20 plus $50 donation)

There are two recent membership dues changes of note. First, we feel that student members are very important to our future, and have decided to make membership for full-time students completely free, with proof of enrollment. Secondly, like most organizations, we have created a lifetime membership category, which we set at $500.

We greatly appreciate the dues and donations provided by our membership over the years. Donations made in association with membership payments have been especially strong in recent years, and we are very thankful for those. There are options for making membership payments using PayPal on our website (www.nyflora.org/membership) or by check (see the last page of our Newsletter). Please keep your membership current. Thanks to all our members for your support.

Find us on **Facebook** Follow us on instagram and **@newyorkflora**

And check out what's on our Website www.nyflora.org
and YouTube Channel: NY Flora

NEW YORK FLORA ASSOCIATION MEMBERSHIP FORM 2021
We are a 501c3 Tax Deductible Organization!

Annual Membership dues:
_____ Student Member – FREE – Please visit the website to join – www.nyflora.org/membership
_____ Regular Membership $20 per year
_____ Associate Membership $30 ($20 plus $10 donation)
_____ Supporting Membership $40 ($20 plus $20 donation)
_____ Sustaining Membership $70 ($20 plus 520 donation)
_____ Lifetime Membership $500
_____ **Check if renewing your membership**
_____ **Check if your address has changed**

Name:_____

Address:_____

Address:_____ County:_____

City: _____ State: _____Zip Code:_____

E-mail address: _____

We are only accepting credit card payments through PayPal at this time. If you would like to use a credit card, please use the link on our website: http://www.nyflora.org/membership/

Mail this form to: Treasurer, NY Flora Association, 17 Quail Path, Liverpool, NY 13090
Thank you for supporting NYFA and the flora of New York State

NY Flora Association
PO Box 122
Albany, NY 12201-0122