



The Fringe

Newsletter of the Native Orchid Preservation and Education Society
nativeorchidpreservationeducationociety.com

March 2021

Letter from the President

Hello everyone,

As spring approaches and vaccines are made available, I'm seeing this orchid season as a chance for us to get together in the great outdoors where we can still practice social distancing as we wait for everyone to get their vaccine.

As I'm thinking about the orchids that I hope to see this year, I think about the education part of our society and why field trips to see orchids are important. When we go to a new area to see an orchid, we get the opportunity to see the environment where the orchid grows, and this knowledge is so important to our conservation efforts. This knowledge will help us identify where we could reintroduce disappearing species or relocate a population that may be in danger from environmental changes. Field trips also allows us to share our love of orchids with others who are just discovering that orchids grow right here in Ohio, Kentucky, Indiana and in every state in the USA and that they need our help.

I hope to see you on a future hike.
Teresa Huesman

Zoom Meeting April 8, 7:00 pm

Jan Yates will be speaking on "A Spring Tour in 'the Bruce'." Login on pg. 8.

Orchid Hike

We will have the first orchid flower sighting in April for *Corallorhiza wisteriana*! We will send out emails to our members when they are in bloom and set up a date to see them.

Field Trips for Native Orchids - Angela Carter

Finding terrestrial native orchids can occasionally be serendipity but scheduled field trips, networking and research are likely to yield more joyous moments to view their diversity and beauty. If you end up like so many of us orchidophiles, your friends will be amused, your vehicle will log hundreds of miles, and many sites may become annual pilgrimages to revisit and monitor populations along with basking in their splendor.

Keep in mind that orchids are Mother Nature's creatures and subject to weather and soil conditions (+/- 7 days of projected date), have boom and bust years, and may go dormant for up to 20 years. Some orchids, such as three birds, tend to bloom across states on the same date based on weather conditions; but many orchids will range 2-4 weeks depending on what state and/or site that you are targeting. If found in OH, dates ranges are below. A few orchids in nearby states have been included as well.

- late April to early May
 - o *C. wisteriana*
- mid-May

- late June to July
 - o *P. peramoena*
 - o *P. leucophaea*



- o *C. acaule*
- o *C. parviflorum*
- o *C. candidum*
- o *C. pubescens* var. *makasin*
- o *G. spectabilis*
- o *C. viride*
- mid-May to late May
 - o *N. cordata*
 - o *S. lucida*
 - o *C. x andrewsii*
 - o *C. kentuckiense*
 - o *I. verticillata*
 - o *A. hyemale*
 - o *C. trifida*
- late May to early June
 - o *C. reginae*
 - o *C. bifaria*
 - o *A. bulbosa*
 - o *C. bulbosa*
 - o *L. liliifolia*
 - o *L. loeselii*
 - o *P. psychodes*
- mid-June
 - o *C. tuberosa*
 - o *P. orbiculata*
 - o *P. flava* var. *herbiola*
 - o *P. ophioglossoides*
- o *P. clavellata*
- o *M. unifolia*
- o *H. spicata*
- o *P. grandiflora*
- mid to late July
 - o *G. pubescens*
 - o *G. repens*
 - o *P. nivea*
- late July to early August
 - o *T. trianthophoros*
 - o *T. discolor*
 - o *P. blephariglottis*
- early to mid-August
 - o *P. ciliaris*
 - o *P. integrilabia*
 - o *S. lacera* var. *gracilis*
 - o *S. vernalis*
 - o *S. tuberosa*
 - o *P. cristata*
 - o *S. romanzoffiana*
- mid-August to September
 - o *C. maculata*
- late August to mid-September
 - o *C. odontorhiza*
 - o *S. ovalis* var. *erostellata*
- September
 - o *S. arcisepala*
 - o *S. ochroleuca*
 - o *S. magnicamporum*
 - o *S. incurva*
 - o *S. cernua*

Membership Renewals

It's only a few weeks before we go from looking for over-wintering orchid leaves to blooming spring ephemerals to our own blooming native orchids. The prospect of organized hikes this year is better – we'll be watching that closely – and if hikes with others are not your first choice, we'll provide directions to see native orchids on your own. Your membership dues support our plant purchases to re-establish orchids in protected areas and our other minimal expenses. Our membership notice is at the end of this newsletter, so please rejoin and share your interest in NOPES with your friends. You can now make payment at online via PayPal at

<https://nativeorchidpreservationeducationsociety.com>

Germantown hike - Jan Yates

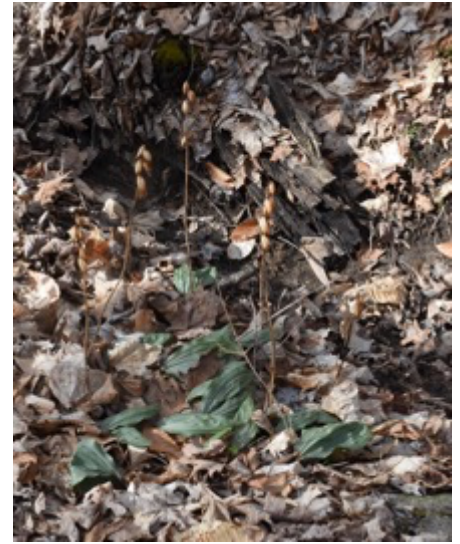
Sometimes something that is delayed is more pleasurable because of the subsequent anticipation. NOPES's first hike (to see orchid leaves) was cancelled as a snow day in February, then actually happened on March 13th on a relatively balmy, partially sunny Saturday. Ann and Dan Tsui, Kathleen Tiller and Jan Yates hiked three locations in the Germantown Metro Parks looking for and finding leaves of the putty root, *Aplectrum hyemale*, crane-fly orchid, *Tipularia discolor*, and rattlesnake plantain, *Goodyera pubescens*. The leaves of the first two overwinter, then disappear so counting flowers only can be misleading as to the size and





health of the population. (Plus looking for ‘green’ against a ‘brown’ background is pretty easy on a sunny winter day.)

The first stop was the Conservancy Trailhead, which leads to the Orange and Silver trails. Many of us know the prime location, at the ‘dip’ in the trail where, when the flowers bloom, the leaf canopy is so oppressive, I refer to it as ‘taking pictures in the bat cave’ and non-orchid hikers pass us on the trail and cannot figure out what we are doing. That location seemed to be in very good shape. What was nicer is that, in the sun, we found additional single plants and pairs which will be worth finding again during bloom time. These were off the trail by 10-20 feet on the hillside, near the trail and a handful



Aplectrum hyemale Puttyroot

more leaves at the start of the Orange Trail. We were told that *Goodyera* may also be found there but we were unsuccessful finding them.

Our next stop was the trailhead near the road over the dam, which does not seem to have an agreed-upon name, but scads of hikers find it anyway. The grassy area leading to the trail had standing water but the trail itself was in good shape. After walking past the road equipment, which is regularly stored here, we had two locations to check. Later this spring, a few plants of *Liparis liliifolia* will be found on a hill bisected by a deer trail; we checked, and leaves were not up yet.



Tipularia discolor Crane fly Orchid

On the next hill, last year we found a fallen log and three to four seed pods of the crane fly orchid, with the leaves still hanging on. That appeared to be ‘it’ for this hillside but finding those leaves was worth doing again. And what we found was remarkable; first, the plants from last year’s find seemed to be quite happy – I thought at least one leaf was markedly larger. And at all the other fallen logs and log remnants, we found more clusters of leaves. As we walked slowly uphill, taking pictures all the while, we ended at a tree, whose base was almost entirely circled by leaves of (probably) young crane fly

orchids. Our leaf tally was ultimately between 50-60 leaves, some mature enough to support blooms later this year, many more not. But the size of the population on the hillside was a revelation.

Kathleen, whose husband Tom, joined up at the last stop, knew where *Goodyera pubescens* grow at the park’s visitor’s center. She quickly found for us a patch of five nice plants and, as we scuffled through the nearby leaves, found three more mature plants. While I enjoy the blooms, the patterns of the *Goodyera* leaves are more interesting to me, it was just very satisfying. There are other



Goodyera pubescens
Downy Rattlesnake Plantain

locations on the loop trail around the visitor's center where Kathleen has seen additional orchid species, we'll be checking those out as well over the summer.

The hike over, we scattered to different destinations. More to come in 2021.

Real Life Tips for Hiking Photography - Jan Yates

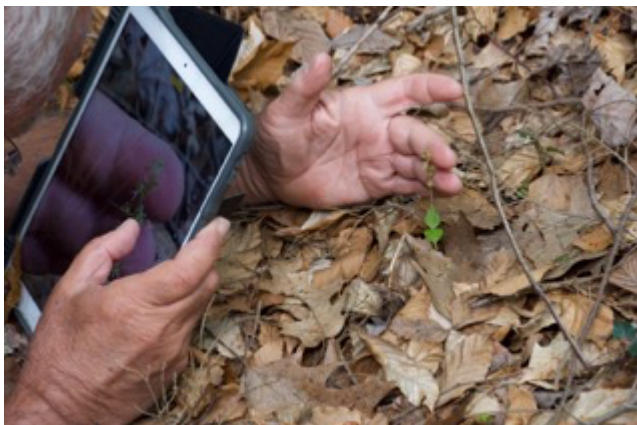
My first camera bag was a \$2 purchase from an Army surplus store. Over the years, I took it hiking in the Midwest, Kansas and the Colorado Rockies where it carried a point-and-shoot film camera, and occasionally a miniature dachshund. Taking good pictures was secondary to just hiking.

Taking good pictures of orchids while hiking, though, presents some practical issues much different than – will the dachshund fit in the bag? For example, *Platanthera peramoena* (the purple fringeless orchid) is *large*; *Neottia cordata* (heart-leaved twayblade) is not. How do you choose what camera equipment to take since you will be carrying gear with a water bottle, possibly a hiking stick, and other necessities?

Orchids bloom in generally good weather unless the forecast is wrong, and a thunderstorm coincides with arrival at your destination. How do you protect your camera/phone/lens in the rain, not drop it in the creek and not leave it behind in the prairie grass when you depart?



Platanthera peramoena in a Maryland park

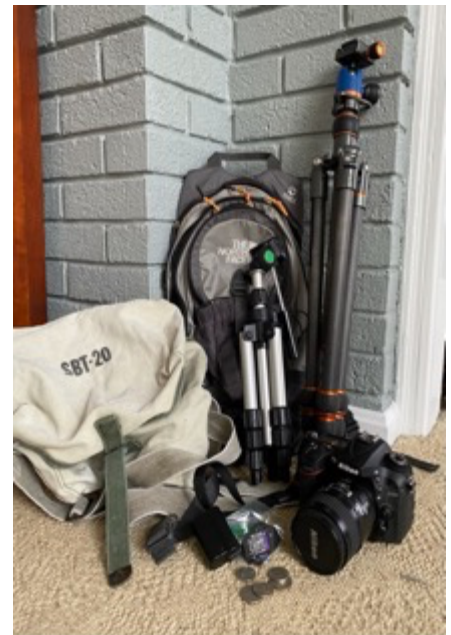


John Lamey, Ontario, with *Neottia cordata* in an Ohio forest

Unless you are hiking solo, your companions are also interested in the same plants and under the same time constraints. Can you all take photographs without trampling the orchids and ruining the spot for others? And, the biggie, how can you not be 'that' photographer when you are hiking with others?

These are questions I posed to friends Ann DePrez, Jeanne Rhinehart, Angela Carter, Alan Wolfson, Ann Tsui, Eric Sauer, Jun Lao and Doug Martin, all of whom

hike responsibly, take very good orchid photographs and were willing to share their experiences. Beginning with: what equipment do you take in the field? I'll start with what I usually take: a small backpack which is not a true camera bag, 1 water bottle stuffed into a backpack pocket, a hiking stick, a crop sensor Nikon D7200 with a hand strap and one lens, either a vintage Nikon 60 mm micro lens or vintage Nikon 105 mm micro lens, an extra battery, extra camera cards, and sometimes a tripod. And my cell phone with cords to keep it charged in the car. Weight matters, particularly on a long hike, and if I'm going to carry more weight, it will be additional water. In the car, I usually keep a pair of boots, a second tripod, a pair of YakTrax lookalikes and more water, bug repellent and so on.



My original \$2 camera bag (minus the dachshund) with the gear I usually carry now.

If there was a trend in what my friends are carrying into the woods, it was this: cell phone cameras, including iPads, are replacing a second lens and, sometimes, the traditional camera itself. Jun has a DSLR camera with a zoom telephoto lens but uses his cellphone to close in on small flowers and flower details, such as for the coral roots, the *Malaxis unifolia* or Green Adder's Mouth orchid, and the Three Birds orchids. Angela's cell phone camera takes pictures in RAW and JPG formats, so she leaves her traditional camera home. She reports that Andrew Gibson, known for his Buckeye Botanist blog, uses his cell phone more than his camera now. And those of us who know John Lamey, from Ontario, have seen his breathtaking pictures shot exclusively on an iPad.



Cypripedium acaules at Shawnee State Forest, Ohio

For myself and the others who still pack a camera, the cell phone replaces the second lens we would have packed for habitat and 'whole plant' shots. We also use cell phones to duplicate shots we take with 'real' cameras because sometimes, those photos are as good as those from the 'real' camera. Think about what the photos are for – personal memories or publications; it can affect your choice of equipment.

Getting back to the variety of cameras and lenses in use, two kinds of lenses are popular: true macro lenses, in the range of 60, 90 or 105 mm, and

zoom telephoto lenses, some of which have a built-in macro feature. With the latter, one lens replaces many. Ann DePrez has a Nikon D750 paired with a micro 60 mm lens with a 1.4X teleconverter and a 75-300 mm zoom lens, each with UV filters. The filters she considers indispensable. Alan uses a Nikon D500 paired with a close focusing zoom lens. Doug has a Nikon D5000 with a standard 50 mm and a macro lens. Jun uses a Nikon DSLR and an 18-400 zoom lens, and occasionally an 800 mm mirror lens that is compact. For its versatility, he considers his telephoto zoom lens indispensable; able to shoot an orchid from minimum focusing distance or on a hillside too steep to climb. If he is using his long lens, he is likely also using his tripod. Ann Tsui uses a Sony a6000 with a 55-210mm/5-6.3 zoom



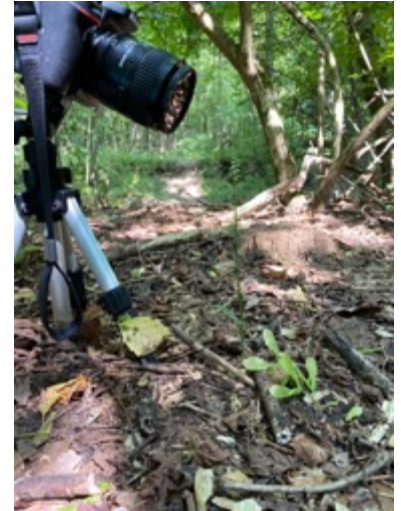
Ann DePrez with *Cypripedium arietinum*, the ram's head orchid, in the woods by Hwy. 6 in the Bruce Peninsula

lens and, sometimes, a wide-angle lens. Jeanne uses a Canon 7D Mark II usually paired with her Tamron 18-400 mm telephoto zoom and has a Tamron 90 mm macro lens available. She said she rarely needs the dedicated

macro lens because her telephoto zoom is so versatile; it is also light enough she says she shoots most plants handheld.

What equipment no longer makes the cut when hiking? And what is indispensable? First, what stays home. For those who primarily use cell phones now, it is the camera itself. For others, it is equipment which weighs more than it is useful. A flash and a wide-angle lens, Doug said, he did not like the effect of the flash and decided a wide-angle lens was too much extra weight. A camera bag capable of holding multiple lenses, Ann D said; it was too much weight and her hiking companion husband got tired of waiting while she was fiddling with lens choices. Ditto for a heavy Bogen tripod.

In deciding whether to carry a tripod, we all think about how far the orchids are away from our parked cars. My ancient 6-pound Bogen tripod has not left its closet in years but I have an even older Slik tabletop tripod for shooting wee-small coral roots, three birds orchids and such and a larger but more versatile 3-Legged Thing tripod for hikes that involve both large/small orchids and an unsteady photographer. Ann T chose as indispensable a tiny Manfrotto tripod which tucks into her pocket and even with her camera mounted gives her flower-level photographs. She relies on the smaller footprint of her miniature tripod to eliminate the need to kneel or lay on the ground. Eric also considers his tripod indispensable; his has a panoramic ball head which allows him to improve composition by making simple adjustments.



My ancient Slik tripod keeping my vintage micro lens steady on a wee *Spiranthes*.

Other indispensable items for some or all included:

extra batteries

extra bodies if it's a multi-day hike

extra charging cables for phone/iPads

UV or Skylight lens protectors

camera with tilting LCD screen or touch screen

extra camera cards

a nickel and quarter to tighten camera on tripod head

I added that last item; I have carried spare change with camera gear for years along with heavy duty rubber bands, pieces of duct tape, plastic trash bags, zip lock bags and plan to add a small pocketknife to the mix. A pocketknife came in handy last summer when a friend accidentally inserted his camera battery incorrectly and it jammed. Jammed very convincingly, it resisted being pulled loose by fingernails and other assorted camera doodads. Trash bags and zip lock bags are cheap, nearly weightless weatherproofing for photographer and camera. Angela packs similarly; separate waterproof carriers for her cell phone and backup battery.

What else keeps camera gear dry or undamaged. For rain (and no, we generally don't plan to hike in the rain, but it happens), Doug tucks his camera into his poncho to shield it, as we all have done, and if that doesn't work switches to his more waterproof phone or heads for home. Ann D packs a raincoat for her camera; Alan uses plastic bags. Jun and Eric rely on their shoulder bags or camera backpacks, many of which also have a separate rain cover. I just retired such a backpack which protected my camera from strong pelting rain in the Bruce Peninsula in 2019 until the wind blew the rain cover off. I loved the padded pockets for my gear, loved the fact that the weight was centered on my back; hated the convoluted process of unpacking the bag to get the camera and lens out to use.

As for leaving gear in the field, I left the original cap to my late 90's 60 mm lens somewhere on the north end of the Potts Rail Trail in West Virginia; it came off as I was stooping under a fallen tree with my camera in my hand. Eric protects his lens caps with a Hufa lens cap clip that mounts to his camera strap. He calls it the best \$10 he's ever spent on camera gear. I also left a small tabletop tripod (newer and better than my Slik) somewhere in the Daniel Boone National Forest two years ago; lost a foot to a tripod leg in Mercer Woods last year because walking through waist high grasses somehow unscrewed it. Stuff happens. My best advice, seconded by my friends, is

stay observant and don't walk off without checking that you have everything. Or ask a friend or spouse to spot for you.



Toni Doty shooting, from the side of the road, some of the thousands of *Cypripedium parviflorum* var. *pubescens*, the Large Yellow Lady's-Slipper, in the Bruce Peninsula.

This is not an article about technique, but I asked my friends for advice anyway and they said: READ THE MANUAL and PRACTICE, PRACTICE, PRACTICE. Specifically, practice around home or in parks the kind of photography you will be doing in the field. Think about what orchids you are planning to shoot, how you plan to use your pictures and pack your bag accordingly. If uncertain about depth of field, shoot the orchid from farther away; you can crop the picture later. Shoot from various angles and include shots of the entire plant, not just flowers. If you plan to use a tripod, practice before your hike setting it up and breaking it down.



Teresa Huesman at Lynx Prairie where the *Spiranthes* are very adept at hiding in the grasses.

If possible, take a good photo class from a professional photographer – even a basic understanding of f stops and composition will improve your photographs. Ann D uses Color Checker which she says makes a real difference in getting true-ish colors. Jun said, while he often uses his DSLR's autofocus, he switches to manual focus or speed-priority when the light is low and to aperture-priority to improve focus. For tablets and cellphones, he passed on a tip from John Lamey: to control automatic focus, find something nearby, or your finger, that is about the distance as your target. Long press on the object to 'fix' the focus and prevent it from changing. Then move your camera to the target flower and move slightly in and out until you get sharp focus. Then take the picture.

He opens the 'pro' setting on his cell phone camera to control exposure time and manual focus. He finds it helpful in dim light for tiny flowers, such as coral roots under the forest

canopy, and for mostly white flowers because cell phones tend to overexpose the white and make the picture too contrasty. Since our eyes are much better than cell phones and cameras at visualizing ranges of light and dark, he also does some post-processing using the Shadows/Highlights function in Adobe Photoshop Elements to bring out the shadows. Just be careful not to overdo it, he says.

Finally, when hiking with others, how can we all take photographs without trampling the orchids and ruining the spot for other? No one wants to be 'that' photographer. The universal answer was 'be considerate' and 'watch your feet.' Be aware of your surroundings, including behind you. Whether on or off trail, Jun walks slowly and looks down and to the side for plants and where he will plant his feet next. (It's also a good habit in snake territory, he said.) Know what a small orchid or seedling looks like.

A smile or kind word mean a lot when with a group. Try not to be so excited that you forget others are waiting – you can always come back or go to the end of the line if you did not get your ‘perfect’ shot. While you wait for another turn at the orchids, you can look around for other rare plants OR plan your shot, set up your tripod and camera - that pretrip practice will pay off.

Eric reminded me of the old adage to leave only footprints and that’s how I was originally going to close this story – I’ve certainly used it often enough to close PowerPoint programs. Then he added that he also remembers the plant he is photographing is part of an ecosystem and may rely heavily on a companion plant, soil conditions, and/or shade for continued survival. And I recalled two pictures I took three days apart in Petrel Point Fen, in the Bruce, a few years ago. Here they are:



At Flower Pot Island, Bruce Peninsula, small orchids aplenty.



Cypripedium reginaes seen from the boardwalk at Petrel Point Fen, Bruce Peninsula; they looked undisturbed.



Three days later, a new path of trodden plants led to the *Cyps*

When my friends and I were there, you could see the *Cypripedium reginaes* from the boardwalk and from there, we took our pictures. Three days later, a trail of flattened fen plants led to the *Cypripediums* even though, as Bruce *cyps* go, they weren’t remarkable. Maybe, even probably, the flattened areas are fine, but I’ll close with this instead. Take only pictures, leave only footprints and if in doubt, leave with only memories.

Zoom Meeting Login Time: Apr 8, 2021 07:00 PM Eastern Time (US and Canada)
Join Zoom Meeting
<https://us02web.zoom.us/j/86164451961?pwd=RW5ONDg2T0pIeTBEV05vSIV3dHA0UT09>

Meeting ID: 861 6445 1961 Passcode: 204427

One tap mobile
+13017158592,,86164451961#,,,,*204427# US (Washington DC)
+13126266799,,86164451961#,,,,*204427# US (Chicago)

Dial by your location

+1 301 715 8592 US (Washington DC)	+1 253 215 8782 US (Tacoma)
+1 312 626 6799 US (Chicago)	+1 346 248 7799 US (Houston)
+1 646 558 8656 US (New York)	+1 669 900 9128 US (San Jose)

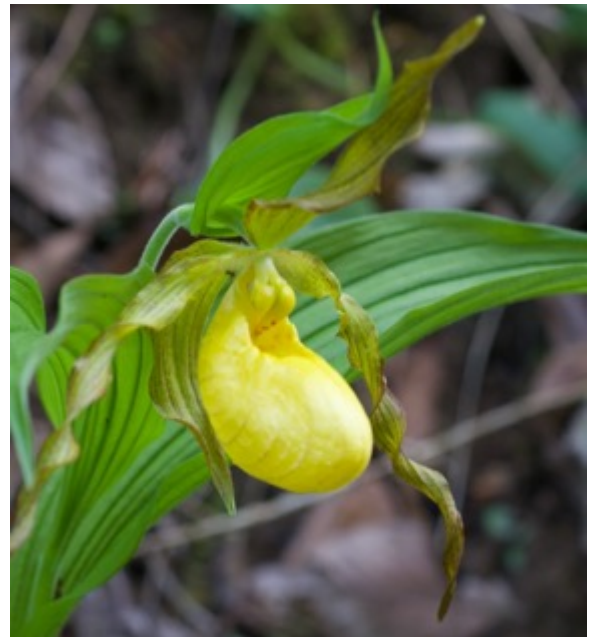
Meeting ID: 861 6445 1961 Passcode: 204427 Find your local number: <https://us02web.zoom.us/j/86164451961?pwd=RW5ONDg2T0pIeTBEV05vSIV3dHA0UT09>

Orchid of the Month *Cypripedium parviflorum* (Salisbury)

- **Jeanne Rhinehart**

When we first started NOPES and discussed the education portion of our mission statement, we agreed that in addition to educating others about native orchids we would also be educating ourselves. Having an orchid of the month in the newsletter does both and I especially enjoy educating myself while doing the research. My original plan was to start with the yellow lady's slipper, having seen the spectacular displays in the Bruce Peninsula in comparison with the sparse number found locally in Ohio. When I started this research, my first questions revolved around how the three I knew of were different. The small lady's slipper eluded me, so I started with an easier orchid. Now I've finally decided to bite the bullet and summarize all that I've learned about this orchid species and its four varieties.

On my first trip to the Bruce Peninsula, John Lamey showed me examples of *Cypripedium parviflorum* var. *pubescens* with different petal shading, and on my second trip we found *Cypripedium parviflorum* var. *makasin*. Seeing *Cypripedium parviflorum* var. *pubescens* growing like dandelions do at home was just unbelievable, and everyday Jan Yates had us stopping at the next large clump which must have been the biggest yet. I do think she finally found it!



Cypripedium parviflorum var. *pubescens*
Bruce Peninsula, Ontario. Photo by Jan Yates



Cypripedium parviflorum var. *pubescens* in the Bruce Peninsula, Ontario
Photo by Jan Yates

In North America the genus has three or four varieties (depending on what you reference and its date of publication), *Cypripedium parviflorum* var. *pubescens*, *Cypripedium parviflorum* var. *parviflorum*, *Cypripedium parviflorum* var. *makasin* and *Cypripedium parviflorum* var. *exiliens*. There are descriptions of each of the varieties and some feel there are enough differences to call them separate species. Others think they are one species whose differences are caused by environmental conditions.

So as usual I start my search with my local bible *Orchids of Indiana* by Michael Homoya. I next check Go Orchids, goorchids.northamericanorchidcenter.org, followed by Flora of North America and the USDA Database of Plants and then several of the books referenced below. For this species I also check the Royal Botanic Gardens Kew database and *Orchids* articles. This is followed by an internet search by species and, in this case, variety and hybrid names. An extensive reference is listed below. This article explores what I found starting with the points of agreement followed by the parts that differ and shows what a varied and spectacular species *Cypripedium parviflorum* is.

Lady's slipper orchids (*Cypripedium*) are the best known of North America's wild orchids. There are more than 45 species of *Cypripedium* across the northern hemisphere. They belong to the *Cypripedioideae* subfamily of orchids (*Orchidaceae*). This subfamily includes *Paphiopedilum* in southeast Asia, *Phragmipedium* and *Selenipedium* in Central and South America and *Mexipedium* in Mexico. This group of orchids has a distinctive pouch giving it the name Lady's slipper, or slipper orchid.

The genus name *Cypripedium* comes from Greek Κύπρις (Kúpris), which is a reference to Aphrodite from Greek myths and from πέδιλον (pédilon), meaning sandal. The specific Latin name "parviflorum" means "small flowers." *Pubescens* means pubescent, ripening or hairy in Latin. The earlier name *calceolus* is the Latin meaning "little shoe," in reference to the slipper-like shape of the labellum. In 1740 Linnaeus named the yellow lady's slipper, which had been recognized as an orchid in the 1600's, *Cypripedium calceolus*.

Lady's slipper orchids origins exist in North American native myths. One of these is:

"An old Ojibwe legend tells of a village visited by plague. It was the dead of winter and many died, including the village healer. To save the community, a young girl made a dangerous journey through the snow to find medicine for the sick. She succeeded, but on the way lost her moccasins, leaving a trail of bloody footprints in the snow. When spring arrived, the bloody footprints put forth moccasin flowers, better known today by their Western name, the lady's slippers." ¹

D. S. Correll, who is credited with lumping our North American yellow lady's slipper species into the group *Cypripedium calceolus* along with the European and Asian species, gave it the name *Cypripedium calceolus* Linnaeus var. *pubescens* (Wilde) Correll. This name held for half a century. "



Cypripedium parviflorum var. *pubescens* showing hairs on petals and bracts. Photo by Jan Yates

Along with his practice of lumping names, Correll recognized the complex as having four "ecological entities" ²:

- 1) A northern group which was the smallest was called by some *Cypripedium parviflorum*. It ranged across northern North America in calcareous swamps and was quite fragrant.;
- 2) A northeastern group given the name *Cypripedium calceolus* var. *planipetalum* Fernald was found in the barrens of Newfoundland. He considered them more closely related to European species.;
- 3) The most widely found, larger, less scented was called *pubescens*.;
- 4) A lesser-known group growing in semi shade in rich moist hot temperatures in the Gulf States was known as *kentuckiense*.

By the mid 1900's recognition for two varieties based on plant size became accepted: *Cypripedium calceolus* Linnaeus *pubescens* (Willd.) Correll, the Large Lady's Slipper and *Cypripedium calceolus* Linnaeus var. *parviflorum* (Salisb.) Fernald, the Small Lady's Slipper. These names were used in most books published then.

At present the species is accepted to consist of four varieties and they are different than the four Correll listed. The next section will be the taxonomic description of three varieties along with the accepted ranges as found in the Flora of North America database.³ They do not list the fourth variety as it was accepted after the database was last updated. The fourth more recently described follows.

***Cypripedium parviflorum* (Salisbury) var. *pubescens* (Willd.) Knight**



Cypripedium parviflorum var. *pubescens*
Bruce Peninsula, Ontario

“Bracts: abaxial surface of distalmost sheathing bract (and often the next) densely and conspicuously silvery-pubescent when young (later sometimes glabrescent). Leaves 3–5, on proximal portion of or more evenly spaced along stem, alternate, erect to spreading; blade orbiculate or broadly ovate to elliptic-lanceolate or oblanceolate, 7.9–20.9 × 1.5–12 cm. Flowers 1–2, large to rather small (very small in some boreal and northern cordilleran specimens), scent moderate to faint, rose or musty; sepals commonly spotted, striped, and reticulately marked with reddish brown or madder, rarely extensively blotched or wholly unmarked; lip oblance-ovoid to calceolate or subglobose, 20–54 mm; orifice 10–23(–27) mm. 2n = 20”



***Cypripedium parviflorum* var. *makasin* (Farwell) Sheviak**

“Bracts: abaxial surface of distalmost sheathing bract (and often the next) sparsely and inconspicuously pubescent or glabrous when young. Leaves (2–)3–5, on proximal portion of or more evenly spaced along stem, alternate, erect to spreading; blade orbiculate or broadly ovate to elliptic-lanceolate, 5.2–18.5 × 1.6–14.3 cm. Flowers 1–2(–3), small, scent intense, sweet; sepals and petals usually suffused with dark reddish brown or madder, or in west often spotted and blotched; lip oblance-ovoid to calceolate, 15–29 mm; orifice 10–17 mm. 2n = 20.”





Cypripedium parviflorum var. *makasin*, Manitoba.
Photo by Ben Rostron

Cypripedium parviflorum* Salisb. var. *parviflorum



Cypripedium parviflorum var. *parviflorum*, Kentucky
Photo by Angela Carter

“Bracts: abaxial surface of distalmost sheathing bract (and often the next) densely and conspicuously silvery-pubescent when young (later sometimes glabrescent). Leaves 4–5, rather evenly spaced along stem, alternate, spreading; blade orbiculate to lance-elliptic to ovate or obovate, 9–19 × 2.5–9 cm. Flowers 1–2, small, scent moderate to faint, rose or musty; sepals and petals usually minutely but densely spotted with reddish brown or madder and appearing uniformly dark, rarely only coarsely spotted and blotched; lip oblong-ovoid to calceolate (slipper-shaped), 22–34 mm; orifice 12–19 mm.”





Cypripedium parviflorum var. *exiliens*,
Alberta. Photo by Ben Rostron

“Perennial herb from slender rhizomes and coarse, fibrous roots; plants small, slender.



Lanceolate-elliptic, ribbed, ascending, arched and spreading from the lower stem with sheathing base. Bracts 2 (rarely more), sheathing, tubular; uppermost bract glabrous to sparsely pubescent if not leaf-like, pubescent in the lower-half if leaf-like; flowers 1 (rarely 2), intensely sweet -scented when young, becoming rose-scented at maturity; lip (16) 20 to 24(26) mm long, golden yellow; sepals and petals pale, dull, green-tan, finely marked with clusters of red-brown spots; petals (23) 27 to 45 (52) mm long. Capsules erect, ellipsoid, ribbed.” 4

Ben Rostron’s description for identifying it “I believe this to be an example of *C. parviflorum* variety *exiliens*, following Sheviak (2010). These are small plants, smaller than the typical "YLS" that we commonly see in our area. These have a distinct lack of colouration on the petals and sepals. And, most importantly, these are growing in mostly dry, rocky habitat, in rubble of limestone and dolostone. Normal "YLS" grow in wet to intermediate calcium rich soils. I was not able to check the stems when they emerged for hairs but will try better next time!

[I went to this location June 2019 to check on them but was unable to get past the mother black bear and her 2 cubs right at this spot!!]” Excuses! Excuses!

A Flipping Book on *Cypripedium parviflorum* var. *exiliens* <https://fliphtml5.com/ylgt/gdbn/basic/> gives a great description and information on this variety.

Key

This key is taken from two sources: Charles Sheviak’s key in *Orchids* June 1994 5 and 2b from Ronald Coleman’s article modifying Sheviak’s earlier key of only the first three varieties to include the fourth variety In *Orchids* July 2019. 6

1. Abaxial (outer) surface of uppermost sheathing bract densely and conspicuously silvery- pubescent when young (later sometimes glabrescent;) flowers large to small, lip 20-54 mm long; sepals and petals variably spotted, striped blotched and reticulately marked with reddish brown or madder (dark purplish brown) (rarely unmarked); scent moderate to faint, rose or pungent-musty
.....go to 2

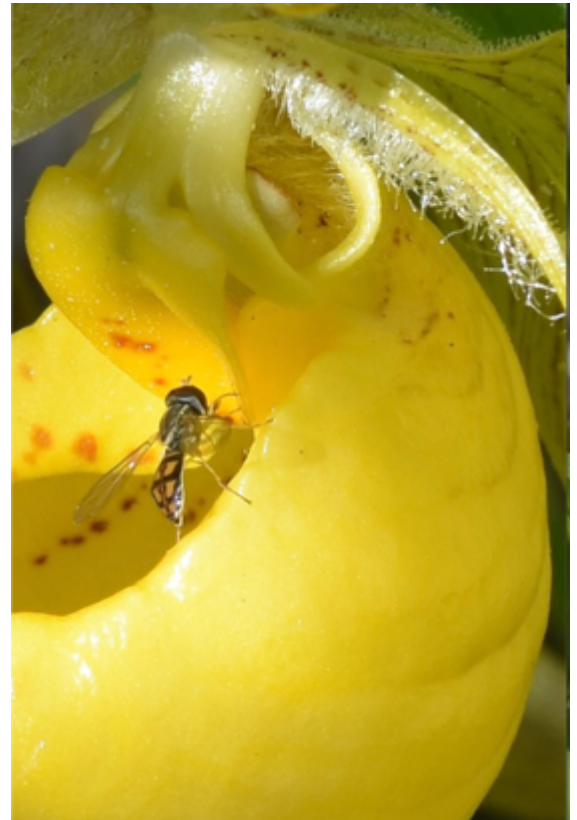
1. Abaxial (outer) surface of uppermost sheathing bract sparsely and inconspicuously pubescent to glabrous when young; flowers small, lip 15-29 mm long; sepals and petals usually suffused with dark reddish brown or madder, or in the West often spotted and blotched; scent intense, sweet
..... var. **makasin**
2. Flowers commonly large, lip to 54 mm long, but very small in some boreal and northern cordilleran plants, (as small as 20 mm); sepals and petals unmarked to commonly spotted, striped, and reticulately marked with reddish brown or madder, rarely extensively blotched; throughout the range of the species
..... var **pubescens**
2. Flowers small, lip 22-34 mm long; sepals and petals usually densely and minutely spotted with dark reddish brown or madder and appearing uniformly dark (rarely coarsely spotted and blotched); southern New England to Kansas and southward..... var **parviflorum**
- 2b. Flowers small; pouch 16- 26 mm; sepals and petals dull green tan with small clusters of rust colored spots; scent intense, sweet.....var **exiliens**

Cypripedium parviflorum var. *pubescens* blooms from April until August depending on its location. It is generally found growing in deciduous and coniferous forests, prairies meadows and fens. *Cypripedium parviflorum* var. *makasin* blooms from May until August and is found in mesic to wet fens, prairies, meadows, coniferous and mixed forests. *Cypripedium parviflorum* var. *parviflorum* blooms from April until June in mesic to dry deciduous forests. *Cypripedium parviflorum* var. *exiliens* flowers in early June until mid-May. It is found in open forests of spruce and aspen. Fred Case ⁷ found through studies that the flowering times of the various strains were fixed. Strains from warm woodlands with early blooming times compared to those in blooming later in cold bogs when moved to the same location kept their original bloom times. Michael Homoya ⁸ discusses comparative growth habits in South Dakota with *Cypripedium parviflorum* var. *pubescens* growing more abundantly in limestone soil regions than in sandstone or granite regions.

Like one third of orchid species, *Cypripedium parviflorum* uses deception to trick pollinators into pollination. It is a food-deceptive orchid which tricks the pollinator into the trap (pouch) of the orchid flower. The pollinator must find the escape holes located near the anthers and to get there, pressure is exerted on the stigma. Studies have shown pollinators from *Hymenoptera* including *Andrenidae*, *Apidae*, *Halictidae*, *Megachidae*, *Agapostemon*, *Andrena*, *Apis*, *Ceratina*, *Eristalis*, *Osmia* and *Lasioglossum* pollinate *Cypripedium parviflorum* and that bee size matters for successful pollination. The more successful at pollination were small to mid-size female bees. Not all pollinators have been spotted on all varieties.

Mycorrhizal fungi are necessary for germination in many orchids and may be necessary in adult orchids. Some plants have specific fungal associations. *Cypripedium parviflorum* association is found with the *Tulasnellaceae* family of mycorrhizae fungi. This fungal relationship is the reason plants taken from the wild usually will not survive a year and/or produce viable seeds when planted in an area where the fungus does not exist. If you want to grow these plants, buy from a responsible vendor.

While *Cypripedium parviflorum* is the best known and widest spread of North American native orchids, it or one of its varieties is threatened or endangered over much of its range. The various states do not all recognize which of the varieties



Cypripedium parviflorum var. *pubescens* showing one of the syrphid flies of the family *Syrphidae*. Also note pubescent hairs. Photo by Jan Yates

they list with some naming them by the older synonyms *Cypripedium calceolus* var. *parviflorum* and *Cypripedium calceolus* var. *pubescens*. The *Flora of North America* list *Cypripedium parviflorum* var. *exiliens* as threatened in Alaska. It lists *Cypripedium parviflorum* var. *makasin* as threatened in Connecticut and Kentucky; endangered in Illinois, Massachusetts, New Hampshire, New York, Pennsylvania and Washington. It lists *Cypripedium parviflorum* var. *parviflorum* as endangered in Illinois, New Hampshire New York, Ohio, Pennsylvania, Rhode Island, and Washington; threatened in Kentucky; unusual in Georgia; rare in Indiana. It lists *Cypripedium parviflorum* var. *pubescens* as endangered in Illinois, New Hampshire, New Mexico, Washington, and Rhode Island; threatened in Kentucky; and vulnerable or unusual in Arizona, Connecticut, Georgia, New York, and Pennsylvania. Again, because of naming issues, exactly which variety is really meant is not necessarily up to date. Because of the confusion over the names of the representative plants for each species, these lists are confusing and probably inaccurate. So, whereas the yellow slipper is spread over a large portion of North America it is still threatened in many areas. Most state department of resources show information about what is found in their state along with varying levels of updated naming accuracy.

D. S. Correll, also described historical medicinal uses for *Cypripedium calceolus*. In 1907 the roots were used as the drug “Cypripedium”. The root powder was used as a sedative and can still be found for sale by some herb companies. Cherokee Indians were said to use it to get rid of worms. The plant itself can irritate the skin of some people who come in contact with its glandular hairs.

Correll considered the rust, *Puccinia Cypripedii* to be a natural enemy of *Cypripedium calceolus* causing minor plant decline. Slugs also have a definite fondness for the plants.

Other sources mention that its flowers when individually picked, partially filled with sand, and floated in water were used as play boats by Native American children.

The *Cypripedium parviflorum* complex has five natural hybrids. Three are hybrids of *Cypripedium parviflorum* varieties with *Cypripedium candidum*. The other two natural hybrids are crossed with *Cypripedium montanum* and *Cypripedium reginae*.



Cypripedium x andrewsii, Castalia, Ohio
Photo by Jan Yates

***Cypripedium x andrewsii* A. M. Fulle**

“Perennial herb 10 - 60 cm **Stem**: one, erect, green, leafy, hairy. **Leaves**: two to five, alternate, ascending, stalkless, green, 5 - 20 cm long, 1 - 10 cm wide, somewhat elliptic, non-toothed, folded lengthwise, strongly ribbed, and hairy. **Inflorescence**: of one or two, erect, terminal, stalked flowers with each flower closely subtended by a stalkless, erect, green, hairy, leaf-like, 5 - 10 cm long, 1.5 - 4 cm wide, somewhat egg-shaped bract. **Flowers**: showy, variously colored, often ivory-white or pale cream fading to dull yellow, hairy, bilaterally symmetric with highly modified, very inflated, egg-shaped lip petal. Unlike other orchids, the reproductive parts of stamens and stigma are not fused into a column above the inferior ovary, but instead at the basal opening of the lip petal there are two separate anthers, one large, sterile, modified staminode, and a lobed stigma above the hairy inferior ovary. **Sepals**: three, but two lower fused together into synsepal positioned

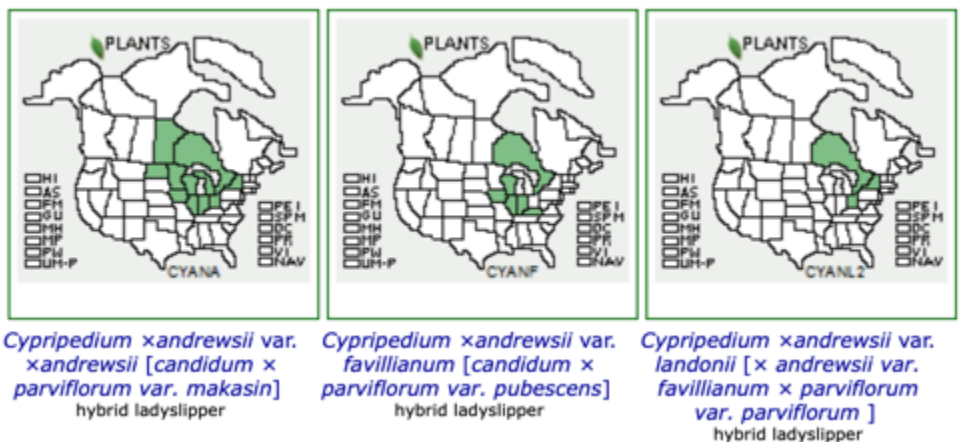
behind and below lip petal, with single upper, central, more or less egg-shaped sepal above inflated lip petal. Both the synsepal and upper (dorsal) sepal are hairy, and the same color as the lateral petals, namely either maroon to dark purple-brown (from one variety of parent species) or greenish yellow and streaked with brown (from the other variety of parent species). **Root system:** of slender, fleshy, fibrous true roots arising from rhizomes. **Lateral petals:** two, more or less spreading, either maroon to dark purple-brown or greenish yellow and streaked with brown, hairy, 2.3 - 6 cm long, under 1 cm wide, spirally twisted, lance-shaped to more linear. **Lip petal:** one, central, lowermost, predominantly dull off-white (either ivory-white, or pale cream then fading to dull yellowish), 1.5 - 6 cm long, 1 - 3 cm wide, greatly inflated, pouch-like, more or less egg-shaped, and hairy. On the inner surface of the pouch the veins are usually colored dark purple, which is faintly visible on the outside especially along the bottom, and there is typically purple spotting surrounding and inside the basal opening (orifice) of the petal. Basal orifice with outer edge (opposite staminode) either forming somewhat pointed acute angle, or more blunt obtuse angle. **Staminode:** one, prominent, yellow with purple spots and sometimes green streaks, more or less broadly triangular, and positioned below upper sepal and pointing down to basal opening (orifice) of lip. On the back side of the staminode the two anthers are positioned on each side of the central lobed stigma.” The Morton Arboretum 9



Cypripedium candidum forms three hybrids one with each of the *Cypripedium parviflorum* varieties. Different parents crossing with *Cypripedium candidum* produce variations in color in the hybrids. Crossed with *Cypripedium parviflorum* var. *makasin* the hybrid had maroon to dark purple brown sepals and lateral petals and its lip is dull white or ivory. When crossed with *Cypripedium parviflorum* var. *pubescens* the sepals and petals are greenish yellow streaked with brown and the lip cream fading to dull yellow. Below the ranges are given for the different hybrids and their variety names. When both parents are not found in the same area as the hybrid, it is difficult to determine which of these varieties may be present. I was not able to find any photos defining these three varieties.



Cypripedium x andrewsii
Castalia, Ohio



The following pictures are at sites in Michigan and Ohio. The Ohio site is a sunny meadow and so far, we have only found *Cypripedium candidum*. along with the hybrid. Most references for the site refer to the cross being with *Cypripedium makasin*, but we have not to be able to find the other parent.



Cypripedium candidum
Castalia, Ohio



Cypripedium x andrewsii
Castalia, Ohio

The second site is in Michigan and again this time we only found one parent, *Cypripedium parviflorum* var. *makasin*. This site is much more shady and almost swampy. The plants are mostly found on raised sunny hummocks in the surrounding swamp.



Cypripedium parviflorum var.
makasin, Waterloo, Michigan



Cypripedium andrewsii
Waterloo, Michigan

Cypripedium x columbianum Sheviak

The only plant description I could find was from Dr. Charles J. Sheviak *published* in the *American Orchid Society Bulletin*, June 1992. “Plant intermediate between *Cyp. montanum* and *Cyp. parviflorum* in habit and floral color, or with the features of the species intermixed; in particular the lip commonly ivory or pale-yellow fading to white.”

10

In writing this article I have been lucky to get some fantastic photos from Chelsea Kieffer and Ben Rostron for the orchids I have not yet been able to see.



Cypripedium x columbianum,
Washington. Photo by Chelsea Kieffer



Cypripedium montanum, California
Photo by Chelsea Kieffer

Most of our group have not been able to see one of the parents of this hybrid *Cypripedium montanum* Dougl., ex Lindl., the Mountain Lady's Slipper, as it is found in western North America from California to southern Alaska at the edges of deciduous forests.

Cypripedium montanum is 25 to 71 cm in height and *Cypripedium parviflorum* is from 12 to 80 cm in height so the hybrid should also be in this range and easily seen when hiking.

The following photos are examples of its parent species together for comparison.

The lower left is Chelsea's photo from California of *Cypripedium montanum*, a spectacular example of a multiple bloom inflorescence. This species is known to have multiple blooms while the other parent seldom does. The picture on the lower right is of the other possible parent *Cypripedium parviflorum* var. *pubescens*. This photo belongs to Ben Rostron and is representative of the variety in Canada. This photo is from Alberta. Comparing the parents with the hybrid you can see how it fits Dr. Sheviak's description.



Cypripedium montanum, California
Photo by Chelsea Kieffer



Cypripedium parviflorum var.
pubescens, Alberta. Photo by Ben
Rostron

***Cypripedium x herae* Ewacha, Sheviak**

"Flower dull yellow tinged with brown, suffused with very pale pink. Lip and inflated sack forming a semi-globose slipper, dull yellow, somewhat more golden above, suffused with whitish pink below and extensively marked with brownish red spots and lines. Petals linear-elliptic, the margins with a few broad undulations, dull yellowish apically, otherwise suffused with whitish pink. Dorsal sepal ovate, dull yellow, suffused with whitish pink at the base, somewhat marked with brownish red spots. Synsepal mostly whitish pink." 11

The photograph at right 12 is of *Cypripedium x herae* and *Cypripedium reginae* found in a field in Manitoba. *Cypripedium x herae* is a hybrid of *Cypripedium parviflorum* var. *pubescens* and



Cypripedium x herae and *Cypripedium reginae*,
Manitoba. Photo by Agnes Ryckman



Cyripedium reginae, Bruce Peninsula
Photo by Jan Yates

Cyripedium reginae. This hybrid is a rare find as the two parents' bloom times rarely overlap making pollination difficult. The name *Herae* comes from the name of the Greek queen of the gods, Hera who walked in golden slippers. It was chosen because the cross was with the queen of the orchids *Cyripedium reginae* and has golden coloration.

Much of the information available is historical discussions about the *Cyripedium parviflorum* complex as found in books on native orchids and online in the Flora of North America and state natural resource departments. Unfortunately, many of these references do not have the funds to keep the information up to date. Finding more recent scientific articles is more difficult. I am thus referencing many *Orchids* articles especially those from Dr. Charles Sheviak along with some articles from academic thesis studies. References are below.

Taxonomy is the language of describing things. Giving names to objects (plants, animals, etc.) along with an understanding of the meaning of the name allows us to discuss and recognize what is being discussed without the object being present. Names are especially important in identifying endangered species. The history of the naming of *Cyripedium parviflorum* like all scientific studies involve hypotheses and theories which are developed and tested and accepted or discredited until other evidence is found for new theories to be tested. At one time some taxonomists argued that the plants with pouches were not orchids at all and proposed a separate family group for them called *Cypripediaceae*!

Is *Cyripedium parviflorum* a single varied species with its various morphology determined by its habitat, four separate species (made difficult by the scientific definition of a species) or a single species with four defined varieties? Looking at *Cyripedium parviflorum* from its first description and history of its name changes along with taxonomic naming requirements and adding to that the choice of plants named for description helps to explain issues with its identification.

Recognized throughout the world for over three hundred years as an extremely variable plant, the yellow lady's slipper has had various names over the same time period. When the exact name of a plant cannot be determined, discussion about the plant is difficult. Thus, an agreed upon name is vital. Because of the variation in *Cyripedium parviflorum*, people naming the plant have given it different names. The following is a short summary of how this has contributed to the naming and variation issues. I am not going to list all the names of people contributing to the naming problem. Philip Cribb **13** and Charles J. Sheviak **14** have more in-depth coverage.



Cyripedium parviflorum var.
pubescens, Ohio

Accepted plant classification recognizes the person having first named a species recording his name after the species name so the dates listed for the name become important. *Cyripedium parviflorum* (Salisb.) refers to Richard Anthony Salisbury (1761 – 1829). He was a controversial British botanist who was first credited with the name *parviflorum* for a plant collected in Virginia. His description of the plant appears to describe the small yellow lady's slipper. Apparently, *Cyripedium calceolus* Linnaeus had been the historical name in Europe for

the yellow lady's slipper Linnaeus considered var *pubescens* within it. Salisbury did not like the Linnaeus system of naming plants and is credited with the name of *Cypripedium parviflorum*.

In 1828, while many taxonomists considered the group to be two species *Cypripedium pubescens* and *Cypripedium parviflorum*, C. S Rafinesque felt that the large and small lady's slipper should be one species and named them one species *Cypripedium lutescens* (incorrectly claiming it the earliest name). He even recognized six varieties in this group!

Correll considered his second ecological entity found in Newfoundland more closely related to the European *Cypripedium calceolus* and some consider it a species *planipetalum*. Jim Fowler has phenomenal photos from Newfoundland showing the forma *planipetalum*. Thanks to Jim for permission to link to these plants to see why some think they might be a fifth variety.

https://www.flickr.com/search/?user_id=22032600%40N04&sort=date-taken-desc&text=pubescens%20newfoundland&view_all=1&fbclid=IwAR1_dCGHRdcEswP9KFcUY8YL2G35WY5H60mbewY14UsWqbNnzPZUVVyzR08

Correll kept the name *Cypripedium calceolus* for North American yellow Lady's slipper when he made the four ecological entities listed above. The fourth ecological entity, the southern group he listed is now considered its own species *Cypripedium kentuckiense*. *Cypripedium kentuckiense* Reed is found in more acidic areas with sandstone as the underlying rock than *Cypripedium parviflorum* which has limestone as the underlying rock.

In the 1970's and 1980's taxonomists were still arguing single species versus two species, the large and small lady's slippers or the single species *Cypripedium calceolus* arguing the number of varieties and which were species. The main



Cypripedium kentuckiense from Kentucky



Cypripedium parviflorum var. *pubescens* Newfoundland, Canada, Photo by Susan J. Meades 14 (be sure to check website)

arguments for a single species were: 1) the variation

observed is due to hybridization among the various forms or, 2) as Carlyle A. Luer thought, a single species complex undergoing active speciation with three varieties: *pubescens*, *parviflorum* and *planipetalum*. In 1985 J. T. Atwood separated the North American group into four species based on flower differences: *Cypripedium pubescens*, *Cypripedium parviflorum*, *Cypripedium planipetalum*, and *Cypripedium kentuckiense*.

In 1995 Dr. Charles J. Sheviak separated the North American *Cypripedium* species from the European based on the differences in the morphology of the plants. Following naming conventions, the new name was *Cypripedium parviflorum* Salisbury following the earliest use of the name by Salisbury. At this time the accepted names still separated the large varieties from the small, so he further separated the small into two groups delineating their differences and creating a key to tell the three apart. Finally, he named a new variety separating a group from Alaska. The fifth group of plants from Newfoundland he does not consider a variety so has the forma name *planipetalum*. He feels their appearance differences are caused by their environment as similar plants are found in New York and other areas with a similar

environment. *Cypripedium kentuckiense* remains a separate species. So, for now, this is where it stands. An interesting side note, because of taxonomic naming conventions if *Cypripedium parviflorum* var. *pubescens* is named a species it will be *Cypripedium flavescens* because A. de Candolle in 1802 first called it a species with that name.

So, the question of identification can still be seen in the variety observed among the plants in the species. Some appear to be accurate examples of their named variety and others growing nearby show differences. While some of this variance may come from the growing environments of different plants, consideration must be given to the fact that pollinators do not pay attention to plant names as they go about their life. So, some of this variation may be breeding related. Ben Rostron has extensive examples in photos from plants found in Canada. The links will show this. I'm so envious of the people living where these plants grow in abundance

https://www.flickr.com/photos/ab_orchid/albums/72157647414476446

https://www.flickr.com/photos/ab_orchid/albums/72157718189598138



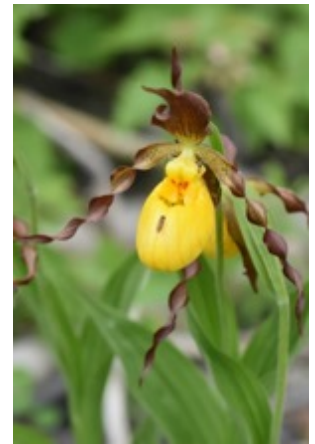
Cypripedium parviflorum
var. *pubescens*, Ohio
Photo by Jan Yates



C. parviflorum var.
pubescens, Ohio and not
always found in a sunny
environment.



C. parviflorum var.
pubescens,
Bruce Peninsula
Photo by Jan Yates



C. parviflorum var.
pubescens,
Bruce Peninsula
Photo by Jan Yates

It can be fun listening to taxonomists discuss (argue?) about lumping and splitting and the reasons for each labeling. Keeping all these sources in mind in this summary on the history of this species, I will bow to the conclusions of Kew (Phillip Cribb) and Dr. Charles J. Sheviak for determining them to be four varieties ... until such time DNA studies are done that change this. It will be interesting knowing how these studies determine which species/variety/hybrid they are testing when they pick specific plants and from how many different sites. Will they consider substrate, temperature and other environmental conditions, fungal specificity, morphological appearance, or descriptive nomenclature? (taxonomical historical custom) It will also be interesting to see how possible changes will be accepted after observing the uproar over the renaming of the orchids in the Cattleya Alliance and *Oncidiinae* groups.

So, in researching this species I discovered that nature does not read the books and it produces beauty and variety in amazing ways. It shows us the need to protect this beautiful complex along with our other native orchid treasures. The species *Cypripedium parviflorum* is a fabulous representative of nature in all its glory and shows how much it can teach us if we just take time to explore.

References and Endnotes

Because of the large amount of information available, I decided to include an extensive list of resources that can be checked in more detail. Endnote numbers are in front of sources are in bold.

Books

- 2 *Native Orchids of North America North of Mexico*, Donovan Stewart Correll, Stanford University Press, 1978, pp. 24 - 27.
- 13 *The Genus Cypripedium*, Phillip Cribb, Royal Botanic Gardens, Kew, 1997, pp. 170 – 190.
- 8 *Orchids of Indiana*, Michael A. Homoya, Indiana Academy of Science, 1993, pp.100 – 105.
- Native Orchids of the Southern Appalachian Mountains*, Stanley L. Bentley, University of North Carolina Press, 2000, p.p. 96 – 107.
- 7 *Orchids of the Western Great Lakes Region*, Frederick W. Case, Jr., Edwards Brothers, Inc., 1987
- Wild Orchids of South Carolina*, James Alexander Fowler, University of South Carolina Press, 2005, pp. 52 – 55.
- The Native Orchids of the United States and Canada excluding Florida*, Carlyle A. Luer, The New York Botanical Garden, 1975, pp. 44 – 51.

Magazine articles

- 5 “Cypripedium parviflorum Salisb. I The Small-flowered Varieties”, Charles J. Sheviak, PhD, *American Orchid Society Bulletin*, June 1994, pp. 664 – 669.
- “Cypripedium parviflorum Salisb.”, Charles J. Sheviak, PhD, *American Orchid Society Bulletin*, June 1995, pp. 606 – 612.
- 6 “The Cypripediums of the United States and Canada Part I The parviflorum complex”, Ronald A. Coleman, *Orchids*, May 2018, pp. 356 – 366.
- 12 “The Cypripediums of the United States and Canada Part II acaule, passerinum, reginae and x herae”, Ronald A. Coleman, *Orchids*, June 2018, pp. 430 – 435.
- 11 “Cypripedium x herae”, Bud Ewacha and Charles J. Sheviak, *Orchids*, April 2004, pp. 296 – 296.
- “Of Wolves, Steelworks and Corn: In Search of Northern Orchids”, Charles J. Sheviak, *American Orchid Society Bulletin*, May 1975, 423 – 431.
- “Conservation at Work Biogeographic history and conservation of western North America”, Tara Luna, *Orchids*, March 2019, pp. 197 – 201.
- 10 “Natural hybridization between Cypripedium montanum and its yellow-lipped relatives”, Charles J. Sheviak, *American Orchid Society Bulletin*, June 1992, pp. 548 – 558.
- “Growing Two Lady’s-Slipper Orchids”, Rodd May PhD and Karen May, *Orchids*, January 2002, pp. 22 – 26.
- “The Yellow Slippers of Eastern North America as a continuum rather than three varieties of one species, or who dey?”, Tom Sampliner, *The Native Orchid Conference Journal*, Volume 17.1, pp. 63 - 68.
- “The Range of Cypripedium kentuckiense”, John T. Atwood, *American Orchid Society Bulletin*, October 1985, pp. 1197 – 1199.
- “United States Terrestrial Orchids Patterns and Problems”, Charles J. Sheviak, PhD, *North American Terrestrial Orchids Symposium II Proceedings and Lectures*, October 1981, pp. 49 – 57.

Websites

- 1 “Medicine, Myth and the Lady’s Slipper Orchid”, SHORELINES Life and science at the Smithsonian Environmental Research Center, <https://sercblog.si.edu/medicine-myth-and-the-ladys-slipper-orchid/>
- 4 Flipping Book on <https://fliphtml5.com/ylgt/gdbn/basic/>
- 14 S.J. Meades and W.J. Meades. 2019+. Flora of Newfoundland and Labrador. Web design by Miramar Design Studio, Inc., Sault Ste. Marie, ON. Published online.
URL: <https://www.newfoundland-labradorflora.com/>

Website databases

- Go Orchids, <https://goorchids.northamericanorchidcenter.org>
- US Department of Natural Resources, <https://plants.usda.gov/core/profile?symbol=PLCI2>

3 Flora of North America, http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=242101532

Kew, <https://www.kew.org/science/collections-and-resources/data-and-digital>

9 North American Network of Small Herbaria, <https://nansh.org/portal/imagelib/index.php?taxon=Cypripedium>

Scientific Studies

“Comparative pollination ecology between two populations and two varieties of *Cypripedium parviflorum* (*Orchidaceae*) in Missouri, United States of America – does size matter? “, Retha Edens-Meier, Michael Arduser, Gerardo R Camilo, Peter Bernhardt

<https://academic.oup.com/botlinnean/article/186/4/544/4921132?login=true>.

“A Preliminary Investigation of *Cypripedium parviflorum* (Yellow Lady Slipper) *Mycorrhizae* at Peninsula State Park”, Rebecca M. Malcore and Lisa C. Grubisha https://peninsulafriends.org/wp-content/uploads/2019/08/Malcore_FinalReport.pdf.

“Systematic and Population Genetic Analyses of Northern Vs Southern Yellow Lady's Slippers (*Cypripedium parviflorum* vars. *parviflorum*, *pubescens*, and *makasin*): Inference from Isozyme and Morphological Data”, Lisa Ellen Wallace, <https://scholarworks.wm.edu/cgi/viewcontent.cgi?article=5562&context=etd>.

“Molecular Phylogenetics of *Cypripedium* L. (*Cypripedioideae*: *Orchidaceae*) Based on Plastid and Nuclear DNA Sequences”, H.N. Nur Fatihah and Michael F Fay,

https://www.researchgate.net/publication/237075023_Molecular_Phylogenetics_of_Cypripedium_L_Cypripedioideae_Orchidaceae_Based_on_Plastid_and_Nuclear_DNA_Sequences.

“Examining *Cypripedium* (*Orchidaceae*) Hybridization in a Prairie/Woodland Ecotone”, R. P. Walsh,

[https://www.semanticscholar.org/paper/Examining-Cypripedium-\(Orchidaceae\)Hybridization-in-Walsh/d691589d9735ccad4940ec824b3b78c2e281660b](https://www.semanticscholar.org/paper/Examining-Cypripedium-(Orchidaceae)Hybridization-in-Walsh/d691589d9735ccad4940ec824b3b78c2e281660b).

“Pollination of Slipper Orchids *Cypripedioideae*): A review”, Robert W. Pemberton,

https://www.researchgate.net/publication/287428524_Pollination_of_slipper_orchids_cypripedioideae_A_review.

Native Orchid Preservation and Education Society

2021 Membership Application

IN CONSIDERATION of being given the opportunity to participate in any NOPES activity, including scheduled, supervised club activities, and during my membership, I, for myself, my personal representatives, assigns, heirs, and next of kin:

1. Understand the nature of NOPES Activities, both in meetings and hiking based, and that I am in good health, and in proper physical condition to participate in such Activity.
2. Understand that:
 - A. some NOPES ACTIVITIES such as Orchid Hikes involve risks and the danger of serious bodily injury, including permanent disability, paralysis and death ("Risks") as a number of the activities of NOPES will be outdoors where there may or may not be trails, or sloping terrain that may have moderate effort required, or the possibility of insect or animal bites or inadvertent contact with poisonous plants;
 - B. these Risks and dangers may be caused by my own actions or inactions, the actions or inactions of others participating in the Activity, the condition in which the Activity takes place, or the negligence of the Releasees named below;
 - C. there may be other risks and social and economic losses unknown to me or not readily foreseeable at this time; and I assume all such risks and responsibility for losses, costs and damages I incur as a result of my participation in the Activity.
 - D. if I observe any condition which I consider to be unacceptably hazardous or dangerous, I will notify the proper authority in charge of the Activity and will refuse to take part in the Activity until the condition has been corrected to my satisfaction.
3. Understand that NOPES is a society dedicated to the appreciation of native orchids through education and preservation. Individuals found poaching orchids will have their membership immediately revoked and will be reported to local and state authorities.
4. Understand that a member may not act on behalf of nor invoke the name of NOPES without the express written permission of the board of NOPES. Members agree to hold harmless NOPES, the board, its officers and other members for any activities conducted by said member.
5. Release NOPES, its administrators, directors, agents, officers, volunteers, other participating organizers, any sponsors, advertisers, and if applicable, owners and lessors of premises on which the Activity takes place (the "Releasees"), from all liability, claims, losses or damages on my account caused or alleged to be caused in whole or in part by their negligence, including negligent rescue operations; and I further agree that if, despite this release and waiver of liability, assumption of risk, and indemnity agreement, I, or anyone on my behalf, makes a claim against any of them, I will indemnify, save and hold harmless the Releasees from any litigation expenses, attorney fees, loss, liability, damages, or costs which any may incur as a result of such claim, to the fullest extent permitted by law.

I have read this agreement, understand its terms, understand that I have given up substantial rights by signing it and have signed it without any inducement or assurance of any nature and intend it to be a complete and unconditional release of all liability to the greatest extent allowed by law and agree that if any portion of this agreement is held to be invalid, the balance, notwithstanding, shall continue in full force and effect.

Native Orchid Preservation and Education Society

2021 Membership Application

Printed Name of Participant: _____

Address: _____

CITY STATE ZIP: _____

Phone: _____ (Home ____ Cell ____)

Email: _____

Participant's Signature: _____ **Date:** _____

PARENTAL CONSENT (if participant is under the age of 18).

AND I, the minor's parent and/or legal guardian, understand the nature of NOPES 'activities and the minor's experience and capabilities and believe the minor to be qualified to participate in the activity. I hereby release, discharge, covenant not to sue, and AGREE TO INDEMNIFY AND SAVE AND HOLD HARMLESS each of the Releasees from all liability, claims, losses, or damages on the minor's account caused or alleged to be caused in whole or part by the negligence of the Releasees or otherwise, including negligent rescue operations, and further agree that if, despite this release, I, the minor, or anyone on the minor's behalf makes a claim against any of the above Releasee,

I WILL INDEMNIFY, SAVE, AND HOLD HARMLESS each of the Releasees from any litigation expenses, attorney fees, loss liability, damages, or costs any may incur as the result of any such claim, to the fullest extent permitted by law.

Printed Name of Parent/Guardian: _____

Address: _____

CITY STATE ZIP: _____

Phone: _____ (Home ____ Cell ____)

Email: _____

Parent/Guardian Signature (only if participant is under the age of 18):

Signature: _____ **Date:** _____

Membership dues are \$20.00 for an individual or \$30 for a family. Please make checks payable to NOPES and mail to Jan Yates, 4110 Rose Hill Avenue, Cincinnati, OH 45229. Or pay online via PayPal at <https://nativeorchidpreservationeducationsociety.com> and mail or email the membership form to Jan Yates.

The Native Orchid Preservation and Education Society is a 501(c)(3) organization and dues and donations are tax exempt for most people who itemize their deductions.