



THE NATIVE ORCHID CONFERENCE JOURNAL



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A tribute to Joyce M. Reddoch (Dunston) Ph.D., 1938 – 2026

By Paul Catling & Brenda Kostiuk

One of Canada's great orchidologists, ecologists, and conservationists, Joyce Reddoch, was born on 27 December 1938 in Mimico, (west Toronto, Ontario) and grew up in Oakville, a short distance further to the west. She attended Oakville-Trafalgar High School where she took a great interest in learning and was always head of the class. In 1966, she earned degrees in organic chemistry from the University of Toronto, (B.Sc. 1961, M.A. 1962, Ph.D. 1966). Following postdoctoral work in organic chemistry and photochemistry at Cornell University, Ithaca, New York, she moved to Ottawa in the fall of 1966. Here she served as an Assistant Professor at Carleton University and was also a Postdoctoral Fellow and Research Associate at the National Research Council of Canada. Joyce soon became interested in botanical field studies. Working with her husband, Allan, as Research Associates at the National Herbarium of Canada and the Agriculture Canada Herbarium, they undertook and published numerous studies of orchids. Joyce passed away in Ottawa on Feb. 5, 2026.



Joyce in the field in 2012

Joyce was a member of the Native Orchid Conference from the beginning. She published seven articles in our Native Orchid Conference Journal. Many of her 50 publications relating to orchids were published in the “Canadian Field-Naturalist” and “Trail and Landscape,” the latter similar to NOCJ, but having more general content. It is also similarly free of access charges. Joyce edited Trail and Landscape for 19 years (from 1971 to 1989).

Joyce's long-term population studies of orchids, which spanned half a century, were extremely well done. They included 10 papers and featured four species in detail, this filling a significant gap in our knowledge of terrestrial orchid biology. Another, and equally remarkable achievement, was the “The orchids of the Ottawa District” (Reddoch & Reddoch 1997). The idea of Ottawa District studies of flora and fauna was taken up by many professionals working in museums and government departments in the nation's capital but this work by Joyce and Allan set a new and very high standard for these kinds of publications. Meticulous detail and precision in both field and museum collection studies made “Orchids of the Ottawa District” an exemplary

orchid flora. It contains descriptions of the plants, information on blooming, colony sizes, distribution, local history, morphological variation and aberrations as well as detailed distribution maps relating distribution to physiography and substrate. The line drawings prepared by Susan Laurie-Bourque from photographs and drawings, as well as fresh flowers, are of exceptional quality and artistic design. They were painstakingly evaluated, changed and improved by Joyce and Allen to reach the current level of perfection. The artwork ranks with that of Blanche Ames and Gordon Dillon in Correll's 1950 classic. The book has an extensive introduction to the area covered, and various topics including the need for protection of orchids and methodology, capsules and seeds, blooming periods, etc. A complete and very helpful bibliography of orchid literature is included as well as a list of significant vegetation of calcareous sedge fens in the area. Two companion articles published in NOCJ (and readily accessible at the click of a link) are Reddoch (2021d) and Reddoch (2024a).

In addition to their interest in orchids, Joyce and Allan were very much involved in conservation. They explored and documented natural areas to develop recommendations for the Ottawa-Carleton Regional Official Plan. Joyce served for many years as chair of various conservation committees. She created numerous briefs on planning documents to ensure that appropriate conservation goals were included.

Joyce and Allan gave many illustrated talks, but their orchid work extended far beyond publications, talks, and conservation. It included help to others with orchid projects. For example, they helped Ed Greenwood with the Canadian Native Orchid Location Survey (Reddoch and Reddoch 2002), and they provided the illustrations for Baird's (1983) article in Canadian Geographic Magazine. Their work was recognized by the Canadian Orchid Congress as an "outstanding lifetime achievement in orchid research and conservation."

Joyce did a lot for both people and for science. She received many awards, but she will also be remembered particularly for her kindness, enthusiasm and a very cheerful smile.

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Orchid Serendipity

By Blayre Nyitray, bnyitray108@gmail.com

Rain began to trickle in February 2025 as Ryan Horvath and I traversed our way along a river ridge slope in Columbia County, Florida. After back to back major hurricanes slammed the region in the autumn of 2024, the landscape had changed dramatically. It was heartbreaking to see the once open, rolling, ridges of karst topography altered for the foreseeable future. It was difficult to imagine the forest taking less than a decade to recover. What at first seemed grim, soon turned into delight. Patches of copper *Corallorhiza wisteriana* flowers darted above the deciduous leaf litter. We exhaled a sigh of relief after seeing that a few of the nearly seventy-nine flowering plants we had documented the year prior were alive and well. While the majority of the Spring Coralroot orchids were buried or crushed, the handful that were visible gave us hope. Not all was lost after all.

As we surveyed the habitat for additional plants, Ryan shouted that he had found something special. Standing only a few inches tall was a bright yellow *Corallorhiza wisteriana* (Figure 1). We did not know the name of it at the time, but we knew that Ryan had located a rare form. We knew that this was a unique discovery since neither of us had seen a yellow plant like that before. After we arrived back home, we eagerly flipped through the late Paul Martin Brown's book "Wild Orchids of Florida," for information. Finally, we were able to put a name to the delightful little yellow orchid that we had stumbled upon; it was *Corallorhiza wisteriana* f. *albolabia*. Prior to Ryan's discovery, there was only one other known site of *albolabia* documented several counties away. We were beyond excited at this development.



Figure 1. *Corallorhiza wisteriana* f. *albolabia*, Columbia County, Florida, February 2025

Now a year later, *Corallorhiza wisteriana* season was upon us again, and we began to wonder if the yellow plants would bloom two years in a row. The majority of the hurricane debris still blanketed the landscape. The hardwood forest was much too fragile for heavy machinery to completely remove all of the fallen trees. Not only that, but this year, there was another threat to these delicate orchids: drought. Much of North Central Florida has been under drought conditions for the past few months. As the dry leaves crunched under our boots, we looked down for any sign of Spring Coralroot. Non-native armadillos had also done a number on the orchid site. While their rooting is typically surface level, they can still uproot orchids as they search for insects and invertebrates. Thankfully, we found some *Corallorhiza* barely peaking above the soil. The drought seemed to have kept them short this year.

Several feet away from the standard color variation, I spotted the yellow-flowered plants by our landmark log. They also appeared a tad shorter this year, but there were two inflorescences this time around (Figure 2). Ryan and I were in awe of the bright yellow blooms standing out against the multitude of brown leaves. Despite the unfavorable conditions, these coralroots and three traditionally colored plants were flowering this year. Figure 3 shows the typical color for comparison. Satisfied, we took some pictures for our records and brushed the seed ticks off before calling it a day. This site is a testament to the resiliency of nature. We plan to make yearly pilgrimages to the area to check on the orchids. Here is to hoping that the site will recover and that we will be able to monitor *Corallorhiza wisteriana* for years to come.



Figure 2. Yellow *Corallorhiza* in leaf litter, 2026



Figure 3. Typical colored *Corallorhiza wisteriana* in pine leaf litter, 2026

Plant Explorer Andre Michaux and his Orchid Discoveries

By Mary Ruden, rudenm@gmail.com

Andre Michaux (1746-1802) was a French plant explorer who came to America, and among his vast botanical discoveries, were orchids. He made plant discoveries in North America, including Canada, the Bahamas, Middle East, and Europe, totaling approximately 742 vascular plant species. A range of plant species bear his name with the suffix “Michx.” Several species of orchids, including five native to North America, bear his name.

Habenaria quinqueseta (Michx.) Sw. is also known as Michaux’s orchis (Figure 1). It grows in bogs, damp woodlands, and pine forests in southeastern states such as South Carolina, Georgia, Alabama, Mississippi, Louisiana and Texas. It is also found in Central America, Mexico, the Caribbean and the northern portion of South America. Its characteristic spidery looking white flower has a nectar spur up to about ten centimeters and it may include about a dozen flowers on the bloom spike. The famed botanical artist Blanche Ames illustrated it in the early 1900’s for her book “Drawings of Florida Orchids.” The book includes two other orchids discovered by Michaux. The other Florida orchids she illustrated are *Platanthera cristata* and *Malaxis unifolia*. In 1921 she also designed the official cast bronze seal for the American Orchid Society which depicts a crouching Native American man holding the native orchid *Encyclia tampensis* and a lady slipper orchid. Her fame as an artist is well known, and she was married to the Director of the Botanical Museum at Harvard and botany professor Oakes Ames.

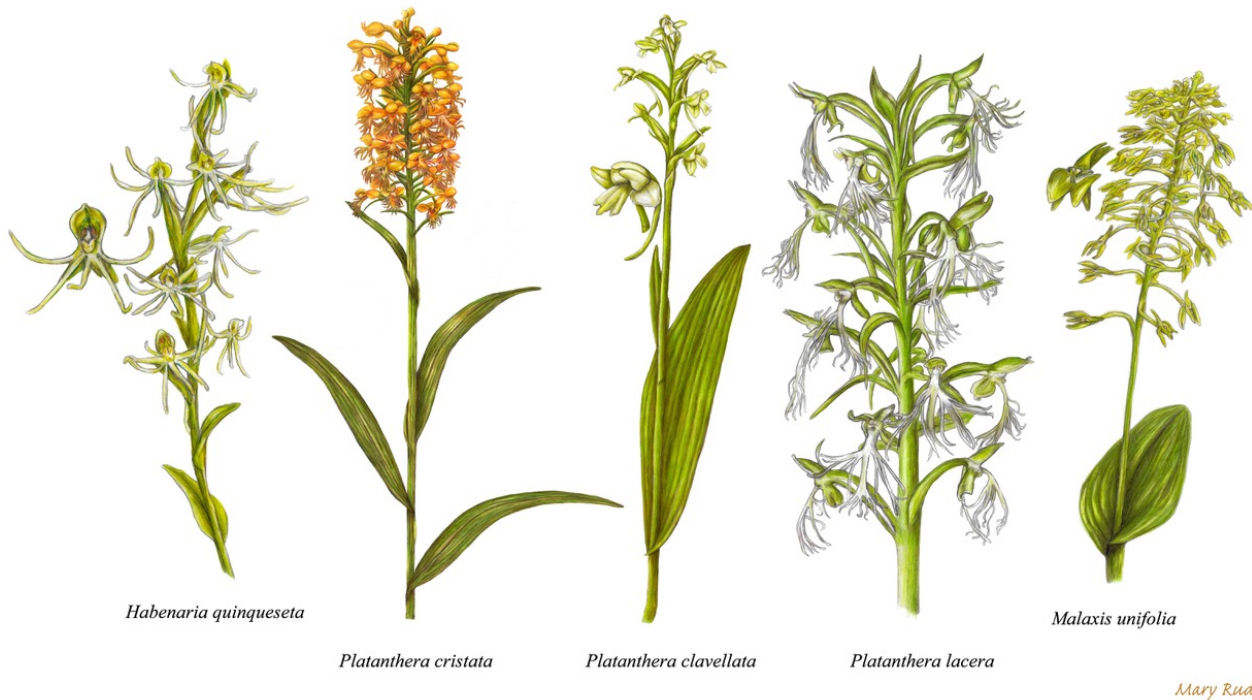


Figure 1. Native Orchid Michaux discovered

Platanthera cristata (Michx.) Lindl., or crested yellow fringed orchid (Figure 1), is one of the most spectacular. In Michaux's time it was classified as *Habenaria*. It inhabits bogs, marshes, and even prairies and plants can grow up to three feet in height. It can form natural hybrids with other *Platanthera* species such as *P. ciliaris*, *P. blephariglottis* and *P. chapmanii*. Its numerous apricot colored flowers are delicately fringed. It is mainly a summer bloomer and is found in the eastern and southeastern parts of the United States.

Platanthera clavellata (Michx.) Luer, little club spur bog orchid (Figure 1), is also a bog and marsh dweller with bloom spikes of small pale green flowers with a club-shaped nectar spur. It is widely found in the United States and Canada. *Platanthera lacera* (Michx.) G. Don, green fringed bog orchid, or ragged fringed orchid (Figure 1) has very finely fringed and lacy whitish-green flowers on tall bloom spikes. It is also found in the United States and Canada. *Malaxis unifolia* (Michx) or green adder's mouth orchid (Figure 1) has numerous tiny pale greenish-yellow flowers and is a bog dweller. It is widely seen in the United States and Canada.



Figure 2. Native Orchids mentioned in Andre Michaux's Journal

Several species of orchids mentioned in Michaux's journal that he observed are pinepink (*Bletia purpurea*) (Figure 2), an orchid with long stems, hot pink flower clusters with centrally-yellow flowers and long strap-like leaves. It grows in moist areas and bogs, and can make a good addition to a backyard bog garden.

Threebirds orchid (*Triphora trianthophoros*) (Figure 2) was mentioned in Michaux's journal and is found in mid and northern Florida as well as central United States and Canada. It has delicate white to pale pink flowers and very small leaves on short stems.

Also mentioned in Michaux's journal are rose pogonia (*Pogonia ophioglossoides*) (Figure 2), with its small, beautiful pink flowers that resemble a miniature *Cattleya* type of orchid with a showy and larger lower lip. It is found in woodlands and swamps throughout the United States and Canada.

Hairy shadow witch (*Ponthieva racemosa*) (Figure 2), grows throughout Florida and southeastern and southwestern states, in shady forests. It has a rosette of wide leaves and small hairy white and green flowers.

Other orchids in Michaux's journal are *Galearis spectabilis*, *Cypripedium reginae*, and *Liparis loeselii* (Figure 2). These orchids were referred to by their older names in his original journal entries.

In 1802-1803 his expedition took him across Ohio, Kentucky, Tennessee, and the Carolinas. He ventured to the summit of the Black Mountains, North Carolina in 1794, where there is a marker in his honor. In his journal, he reported seeing colonies of *Cypripedium parviflorum*. "Travels to the West of the Allegheny Mountains" was published by his son, Francois Andre Michaux. Andre Michaux authored two books, "The History of North American Oaks" and "Flora Boreali Americana," in Latin. Andre Michaux died of a fever in 1802 on the island of Madagascar, where he was exploring after being in Australia collecting plants. In honor of Andre Michaux a display by the author was shown at the Knoxville Botanical Garden (Figure 3).

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Figure 3. Mannequin of Andre Michaux on display at Knoxville Botanical Garden. Mannequin is surrounded by native orchid illustrations by artist and his journal

About the author: **Mary Ruden** has authored and illustrated two folding field guides on Native Orchids of North America for Waterford Press “A Pocket Naturalist” series. *Native Orchids of North America* has 75 species illustrated with descriptions of them and their habitat, and *Native Orchids of Florida* covers 83 species. She has produced three posters on native orchids (Figure 4) and a display of her orchid art is at North Carolina Arboretum in Asheville, NC until May 10, 2026 (Figure 5). Mary Ruden’s website: [Artist portfolio \(maryruden.com\)](http://Artist_portfolio(maryruden.com)) She is a member of American Society of Botanical Artists.



Figure 4. Posters on Native Orchids of North America



Figure 5. NC Arboretum Show: Native Orchids of North America

The recognition and taxonomy of the Pale Fringed Orchid— *Platanthera pallida*

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The Pale Fringed Orchid, *Platanthera pallida* P.M. Brown (Figures 1, 2, 4, 5) was described in 1992. It was not long before there were differences of opinion on whether it was recognizable, and if so, what rank was appropriate. Researchers and conservationists have treated *P. pallida* as:

- (1) a distinct species.
- (2) a synonym of *P. cristata* as part of the variation within that species.
- (3) a synonym of the hybrid *P. ×canbyi* (*P. blephariglottis* × *P. cristata*)

Some authors agree that whatever it is called, it is a partly stabilized distinct taxon resulting from a past hybridization, perhaps involving *P. blephariglottis* and *P. cristata*, but not equivalent to first generation hybrids involving these species which are currently treated as *P. ×canbyi* (Sheviak 2002).

It has not yet been treated as an infraspecific taxon, which seems inevitable, as it may provide common ground for those who cannot recognize it as a species, and those who want to recognize it as something. However, classification should not be entirely based on appeasement.

One of the big questions ...

The status of this orchid is one of the big questions in North American orchid taxonomy. A declining species, it is confined to the east end of Long Island, New York. There are roughly 1500 flowering individuals left, where there were once several thousand, and the plants and their habitat are seriously threatened. It is one of the rarest orchids in North America, ... but it may not take too much to save it. Unfortunately, experts do not agree on whether or not to recognize it as distinct. Here we present a brief historical outline along with some of the most recent information on this species that supports both recognition at the species level and a greater protection effort.

Individual reactions (in chronological order)

Lamont (1996) included it as a species in his “Atlas of the Orchids of Long Island.” Chapman (1997: 138) made a sensible decision to include *P. pallida*, but did not provide any advice on the debate. Sheviak (2002: 569) included a few valuable paragraphs of analysis of *P. pallida* in his Flora of North America treatment of *Platanthera*. He concluded that: “The plants described as *P. pallida* therefore appear to represent neither a distinct species nor are they merely hybrids; they seem to be partially stabilized introgression products and potentially useful subjects for evolutionary study.”



Platanthera pallida. Left, inflorescence showing pale yellow flowers with short spurs and recurved lips. Right, oblique frontal view of flower showing front of column and keyhole-shaped entrance to spur. Suffolk Co., Long Island, New York, iNat. photos 87729848 and 87729809 respectively by Sequoia Janirella Wrens, Aug. 2020. CC BY-NC 4.0 and CC BY-SA 4.0.

Brown (2007: 182-183) included *P. pallida* in his “Wild Orchids of the Northeast,” but without much additional information. He did stress the difference between the leaves of *P. pallida* and *P. cristata* (pale, conduplicate versus deep green, broad, - respectively), and the fact that the two taxa did not overlap morphologically or geographically. Much of what Brown published in 2008 was information repeated from the original description, but he did note that: “After 15 years of reviewing and searching for new colonies of *Platanthera pallida* and plants that indicate any intermediacy with other species of *Platanthera*, ... the only populations remain those near Montauk, Long Island, New York” (Brown 2008: 164). He also described the distinctive habitat of *P. pallida* (Figure 3) in more depth (Brown 2008: 164).

Fowler (2008) wrote that: “*Platanthera pallida* certainly is not like the “normal” *P. cristata* (crested fringed orchid), which it closely resembles.” Fowler thought that the plant may have originated as “ancient offspring of *P. blephariglottis* and *P. cristata*.” He also noted the habitat difference between *P. pallida* and *P. cristata*, the former “very dry indeed”, the latter “wet, open.” Fowler’s photographs of the habitat are some of the best available.

McGrath (2008) described some interesting aberrations of *P. pallida*. He agreed with Sheviak (2002) that *P. pallida* was of evolutionary interest: “considering the potential that these plants have for evolutionary study, it would be a shame if they were to be diminished in abundance or, even worse, extirpated because of the overpopulation of White-tailed Deer ...” (McGrath 2008: 5). He also wrote: “The findings presented here, while not directly supporting Brown’s claims, do indeed support the evidence that the eastern populations of this orchid, now formally referred to as *Platanthera pallida* P. M. Br. (1992), do in fact demonstrate certain distinctly different features from other populations of *Platanthera cristata*” (McGrath 2008: 4).

Nelson and Lamont (2012: 27) in their excellent New England and New York orchid field guide report that: “*Platanthera pallida* is definitely NOT a pale “color form of *P. cristata* (forma *straminea*).” They also note that it “has been a source of controversy ever since its original description in 1992”, and “it may be a population in the early stages of evolution.”

Noting “a great concern” for the future of *P. pallida*, Clayton (2022: 27), wrote: “Regardless of species status ..., the morphological differences make it a prime candidate for genetic conservation.” Clayton outlined the intent to establish and protect *P. pallida* at Longwood Gardens in Kennett Square, southeastern Pennsylvania, as part of the orchid conservation program ([Orchid Conservation | Longwood Gardens](#)). This would help to address the threats of deer herbivory and loss of shade and organic matter as a result of the Southern Pine Beetle infestation.

The study of morphological variation in the Orange and White Fringed Orchids by Hartvig *et al.* (2022) did not include *P. pallida*, although they referred to the uncertainty concerning its recognition.

Pace and Freudenstein (2018: 23) suggested that *Platanthera pallida* represents localized, pale-flowered populations of *P. cristata* from Long Island, NY, that intergrade with the wider variation exhibited throughout the range of this species. This comment was not accompanied by any data, details, or analysis. Later Pace (2020: 169) suggested that the rejection of *Platanthera pallida* was “based on expansive herbarium review and morphometric analysis” which has yet to be made available. Pace (2020: 169) also notes: “The pale floral coloration of *P. pallida* easily fits within the variability of *P. cristata*, the spur length variation of *P. pallida* is entirely contained within the variation of *P. cristata*, and there is no differentiation in the shape of the spur opening.”



Figure 2. *Platanthera pallida* inflorescences. Suffolk Co. Long Island, New York. Left, iNat photo 542946563 by trefunguy, July 2025. CC BY-NC 4.0. Right, iNat. photo 543127443 by Ryan, July 2025. CC BY-NC 4.0.

Platanthera pallida was treated as a synonym of *P. cristata* in Werier's (2017: 64) Catalogue of vascular plants of New York State, and as a synonym in the New York State Flora Atlas (2025).

Lamont (2025: 151) writes: "My observations and studies lead me to conclude that *P. pallida* possesses unique morphological features distinct from *P. cristata* ... and is endemic to a rare habitat on the Montauk Peninsula of eastern Long Island. The two differ consistently in morphology and ecology, and both are justifiably recognized as distinct species." Lamont's statement is very recent and extremely significant. It comes from a respected orchid expert who is co-author of "Orchids of New England and New York", and has 40 years, and hundreds of hours, of field experience with *P. pallida* and its close relatives (*P. cristata*, *P. cristata* var. *straminea*, and *P. ×canbyi*) on Long Island alone. Lamont's (2025: 313-315) text covers ecology, morphology, history, current status, threats, and conservation.

Our recent (Catling & Kostiuk 2026) study of separation of viscidia in fresh flowers from iNaturalist photographs in the *Platanthera blephariglottis* – *P. cristata* complex revealed that *P. pallida* is associated with, but different from *P. cristata* in viscidia separation, and less associated with *P. ×canbyi*. Furthermore, decreasing viscidium separation is associated with decreasing spur length.

Differences between organizations

It appears that NatureServe has not ranked *P. pallida*, but an explanation is not easily found for this decision, nor for the decisions on *P. pallida* from some other major supporters of conservation and research. Currently the USDA Natural Resources Conservation Service treats *P. pallida* as a synonym of the hybrid *P. ×canbyi* ([USDA Plants Database Plant Profile Synonyms](#)).

The New York Natural Heritage Program does not have *P. pallida* on the rare plants list, nor does it have a specific S-rank, but being considered a synonym of *S. cristata* by NYNHP (2025), it has the status rank of that species in New York State which is "S1" meaning "**Critically Imperiled** - At very high risk of extinction... or extirpation from New York... due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors." It is also listed as **Endangered** by New York State, again as a synonym of *P. cristata*. For plants this means that removal or damage without the consent of the landowner is prohibited (NYNHP 2025). **It is important to note that whether one calls the Long Island plant *P. cristata* or *P. pallida*, it is endangered and imperiled in New York State.** Additionally, *P. cristata* in the strict sense is believed extirpated on Long Island (and in New York, Lamont 2025: 311). Thus, all that is left of *P. cristata* in New York are the plants in eastern Long Island (i.e. *P. pallida*).

In contrast to some major research and conservation organizations noted above, the data sharing community, iNaturalist, has 80 observations, 18 identifiers, and 13 observers for *P. pallida*. Recognition from this rapidly growing, and very influential organization is an important consideration. Much valuable information can be found here.

The North American Orchid Conservation Center (NAOCC, [Go Orchids: North American Orchid Conservation Center](#)) presents *P. pallida* as a unique species, but notes that discussions are underway to determine the extent to which this is warranted.

***Platanthera* ×*canbyi* and *P. pallida* are different**

Brown (1992: 310) noted that the longer spurs of *P. x canbyi* are lacking in *P. pallida*, so that it is not likely to be that hybrid (but see identification notes below). If a relatively short-spurred race of *P. blephariglottis* occurred on Long Island (in the past), then the hybrid may have relatively short spurs. Spur length in *P. blephariglottis* does decline northward (e.g. Hartvig *et al.* 2022: Fig. 6, 537, Figure 7, 538, pers. obs.), but likely not enough to result in spurs short enough to implicate *P. pallida*. However, trying to make *P. pallida* into *P. x canbyi* may not be the best way to proceed. Sheviak's chromosome count of $2n = 42$ did not reveal a polyploid hybrid (Brown 1992: 310), but many Fringed Orchid hybrids may be homoploid (Evans *et al.* 2023: 11). Most *P. x canbyi* has been found in places where both parents occur (e.g. Evans 2023:12), but neither has definitely been reported in the immediate vicinity of *P. pallida*. Most recently, *P. pallida* has been shown to differ from similar taxa in separation of viscidia (Catling & Kostiuk 2026).

The unusual habitat of *Platanthera pallida*

Many authors have commented on the typical, dry and shaded habitat of *P. pallida* (Figures 3, 4) - some noted above. On the coastal plain *Platanthera cristata* occurs in open (unshaded), wet situations (but see below). Different species are expected to often have different habitats, so this difference is an important observation. An early definition of the ecological species concept defines a species as: "A species is a lineage (or a closely related set of lineages) which occupies an adaptive zone minimally different from that of any other lineage in its range, and which evolves separately from all lineages outside its range. A lineage is a clone or an ancestral-descendent sequence of populations. A population is a group of individuals in which adjacent individuals at least occasionally exchange genes with each other reproductively, and in which adjacent individuals do so more frequently than with individuals outside the population." (Van Valen 1976: 33). Although it is not the only, nor a fully reliable way, of defining species, a species so defined is not necessarily without a genealogical history, as favoured by many current phylogeneticists (e.g. Velasco 2008), so it stands as a helpful concept.

The habitat supporting *P. pallida* is described in detail as "4. Maritime Pitch Pine Dune Woodland" by Edinger *et al.* (2014: 99-100). Here the only examples given are in Suffolk County, Long Island, where this habitat is ranked as imperilled globally, and especially vulnerable in New



Figure 3. Sandy Pitch Pine (*Pinus rigida*) dune habitat of *P. pallida* at Napeague, Long Island, iNat. photo 337874821 by Kyle Webster, 21 Sept. 2023. CC BY-NC 4.0

York State. The orchids occur in an inch of pure humus over loamy sand in the shade of Pitch Pines, with or without other plants. The habitat is “excessively well drained and nutrient poor although the site may have a shallow depth to groundwater. The litter layer is shallow. The community is subject to high winds, sand-blasting, salt spray, and shifting substrate” (Edinger *et al.* 2014: 99).

The best available description of the Maritime Pitch Pine Dune Woodland ecological community is that from Edinger *et al.* (2014: 99): “Trees are somewhat stunted (10-12 m high) and salt pruned. The canopy is sparse with some openings. Pitch Pine (*Pinus rigida*) is the dominant tree and may have lower branches that grow out horizontally like aprons. Black Oak (*Quercus velutina*), White Oak (*Quercus alba*) and Post Oak (*Quercus stellata*) may also occur and can be codominant with Pitch Pine in more developed examples. The shrub layer is usually well developed. Characteristic shrubs are Bearberry (*Arctostaphylos uva-ursi*), Black Huckleberry (*Gaylussacia baccata*), Highbush Blueberry (*Vaccinium corymbosum*), Beach Heather (*Hudsonia tomentosa*), Bayberry (*Myrica pensylvanica*), and Scrub Oak (*Quercus ilicifolia*). The vine layer is often well developed. Characteristic vines are Common Greenbrier (*Smilax rotundifolia*) and Poison ivy (*Toxicodendron radicans*). The herbaceous layer is dominated by Hairgrass (*Avenella flexuosa*). Other characteristic herbaceous species

include Pennsylvania Sedge (*Carex pensylvanica*), Little Bluestem (*Schizachyrium scoparium*), Starflower (*Trientalis borealis*), Panic Grass (*Panicum* spp.), Jointweed (*Polygonella articulata*), Blunt-leaved Sandwort (*Moehringia lateriflora*), and Pine Barren Sandwort (*Minuartia caroliniana*). The nonvascular layer is often well developed. Characteristic bryophytes, fungi and lichens include Reindeer Lichens (*Cladonia arbuscula*, *C. rangiferina*), Cup Lichen (*Cladonia uncialis*), the Barometer Earthstar fungus (*Astraeus hygrometricus*), and mosses such as White Cushion Moss (*Leucobryum glaucum*), Hair Cap Moss (*Polytrichum juniperinum*), and Twisted Moss (*Tortella tortuosa*).” At both of the sites in Suffolk Co., Stemless Lady’s-slipper (*Cypripedium acaule*) was a frequent associate of *P. pallida*.

The unusual habitat of *P. pallida*, especially on Long Island, may seem to be a strong argument for recognizing it as a species distinct from *P. cristata*. However, some infraspecific populations of orchid species do have very different habitats. In parts of the northeast *Cypripedium acaule* and *Malaxis unifolia* both occur in wet and quaking sphagnum bogs, or in relatively dry sandy pine plantations, or in periodically dry, open rocklands. In some parts of the range of *P. cristata*, it does occur in relatively dry habitats in deciduous woodlands, particularly in the southern Appalachians. The



Figure 4. *Platanthera pallida*, Suffolk Co., Long Island, iNat photo 218901008 by Robert Levy, July 2022. CC BY-NC 4.0.

most similar habitat to eastern Long Island is in south-central Massachusetts where it is found in dry, semi-shaded areas with Sweet-fern (*Comptonia peregrina*), Early Lowbush Blueberry (*Vaccinium angustifolium*), Wintergreen (*Gaultheria procumbens*), and Haircap moss (*Polytrichum* sp.). Elsewhere *P. cristata* is mostly a plant of wetlands including bogs, marshes, and pinelands. Thus, the alleged unique habitat of *P. pallida* appears to be supported.

Explanation for some unusual features

A solution to the recognition problem should explain some of the “unusual” features of *P. pallida*. These include: (1) rapid flower senescence and rapid expansion of ovaries; (2) local abundance; (3) Floral diminution, i.e. relatively small flowers and perianth parts; (4) reduced spur length; (5) Subdued floral color; (6) high levels of fruit set; (7) reduced variation in floral characters; and (8) Entire calyx, not divided, or less often divided, than in close relatives. These unusual features of *P. pallida* are some of the features of auto-pollinating and/or asexual orchids (Catling 1990: Table 4-1, 125-126, 146-148) as discussed below. However, auto-pollinating and asexual plants may also be outbreeding. Pollination by a Bumble-bee (*Bombus* sp.) has been reported for the Napeague population of *P. pallida* (McGrath 2008: 5).

(1) **Rapid and early flower senescence and rapid capsule expansion.** With regard to *P. pallida*, Sheviak (2002: 569) noted that: “In the field, pollination normally is rapid and the flowers senesce while small and yellowish, but in cultivation in the absence of pollinators, flowers remain open for an extended period during which the lips elongate markedly and the flowers fade to a dull white.” Certainly, under natural circumstances, most flowers set seed, and such high levels of fruit set are often a characteristic of self-pollinating species. In the glass house, lack of rain, wind, and/or low air moisture can reduce self-pollination. Thus, early flower senescence may, or may not, be related to self-pollination.

If it was related, an explanation may be that; in self-pollinating or asexual species the signal for perianth senescence may occur relatively early because reproduction may be initiated early, even before the flower opens. Protection of developing seeds in an inflorescence may be promoted by perianth senescence which removes an advertisement for soft tissue and unused nectar resources. It may also save energy that could be directed to seed production.

(2) **Local abundance.** Brown (1992: 310) noted that “Unlike typical *P. cristata* in the north, the plants are locally abundant.” Saturation of local habitats and local abundance can result from the fertility insurance of self-pollination which may be selected due to pollinator-paucity at expanding range limits and/or in extreme environments. Regarding the latter *P. pallida* grows in periodically dry, nutrient-poor sand where it “is subject to high winds, sand-blasting, salt spray, and shifting substrate (Lamont 2025: 313).

(3) **Floral diminution.** Comparing descriptions, the flowers of *P. pallida* are at least slightly smaller than those *P. cristata*. This smaller size may not be entirely due to differences in spur length (see below). Self-pollinating or asexual species may have smaller flowers than their outbreeding relatives because flower size is less important for reproductive success.

(4) **Reduced spur length.** The most recent references to spur length of *P. pallida* are those of Lamont (2025: 314) who pointed out that, although spur lengths of *P. pallida* and *P. cristata* overlap, “the spur of *P. pallida* is generally slightly shorter (1–2 mm) than the spur of *P. cristata*... The spur length of *P. pallida* was consistently

5–6 mm long, whereas the spur length of *P. cristata* was more variable, (6)7–8(9) mm long.” Reduced spur length, as well as a reduced mentum or nectary, is characteristic of self-pollinating or asexual species as a result of the lesser importance of attracting pollinators.

(5) **Subdued floral color.** One of the most distinctive features of *P. pallida* is the pale yellow or creamy flowers which often fade to white (with one exception described below). This is certainly subdued compared to the bright orange or yellow of *P. cristata*. The lack of complete dependence on pollination by pollen vectors, to set seed, may result in subdued floral colour (less bright, attractive, and contrasting) in self-pollinating or asexual species.

(6) **High levels of fruit set (high fecundity).** “An interesting side note is that all the flowers on any given *Platanthera pallida* inflorescence always set seed (Brown 2008: 164).” This may be explained by the fertility insurance mechanism of auto-pollination or asexual reproduction (Catling 1990). Of course, this is a great deal more than “an interesting side note.” Without thoroughly understanding it, Brown had discovered that his *P. pallida* may have a different breeding system from that of *P. cristata*, - and different breeding systems may isolate species.

(7) **Relatively little (or reduced) morphological variation.** “One of the remarkable aspects of *P. pallida* is the uniformity of its floral morphology. All of the critical floral characters, i.e. perianth dimensions, color, positioning of floral parts, have little if any variation throughout all populations.” (Brown: 1992: 310). Self-pollination or asexual reproduction may lead to relatively low within-taxon variation.

(8) **Entire perianth, i.e. lacking fringe present in close relatives.** Brown (1992: 308) used “dorsal sepal entire” to identify *P. pallida* in his key, and elsewhere (Brown 2008: 159). However, Sheviak (2002: 569) noted that “dorsal sepals with entire margins are commonly seen also in *P. cristata*, and those of *P. pallida* may be deeply emarginate.” McGrath (2008: 3) described aberrations of *P. pallida* with a fringed dorsal sepal. To the extent that the fringe (or emarginate condition) exists to promote pollination by attracting insects, it is less important to a self-pollinating taxon. In *P. pallida*, the entire dorsal sepal is apparently not a unique condition.

How difficult is it to protect?

The Pale Fringed Orchid is already protected by the state Endangered Species Act and officially listed as an imperiled species in an imperiled habitat. It occurs in a very small area, and most, if not all, of the populations are on public land. There is already a substantial public interest and monitoring capability (Long Island Botanical Society). Most of the threats are understood, although they could benefit from clarification, including impacts on the habitat from the spreading infestation of Southern Pine Beetle (*Dendroctonus frontalis*, Taft 2022: 15, Clayton 2022).

There needs to be an *ex situ* as well as an *in situ* plan, and in one source the lack of *ex situ* protection for *P. pallida* is noted (Krupnick *et al.* 2013: Table 1, 186), yet there has been recent interest. It is anticipated that plants of *P. pallida* will be propagated at Longwood Gardens to help maintain the Long Island populations (Clayton 2022). Although protecting flora and fauna always has its challenges, protection in this case may be a relatively easy and inexpensive project. **The protection of a remarkable evolving orchid in the shadow of a big and beautiful North American city makes for a compelling story.**

Considering a distinct and independent stabilized lineage

The kind of taxonomic difficulty that we experience with *P. pallida* is not new. More or less stabilized lineages resulting from hybridization exist in other North American species of *Platanthera* including *Platanthera chapmanii* (Folsom 1984, Brown 2008: 279-283), the *P. dilatata-hyperborea* complex (Catling & Gange 2025: 16) and the *P. lacera-psycodes* complex (Catling & Kostiuk 2025: 240), and in other North American terrestrial orchids such as *Goodyera tessellata* (Catling & Gange 2025: 16), and European terrestrial orchids (e.g. *Dactylorhiza francis-drucei* subsp. *francis-drucei* and *D. purpurella*, which are both derived from the same pair of parental species, *D. fuchsii* and *D. incarnata*; Bateman *et al.* 2023: 107). The difficulty arises in the subjectivity of answering the question of whether or not the entity is sufficiently distinct, independent and stabilized. At this point, regarding *P. pallida*, some wonder whether we have enough information, others wonder whether more information will make a decision easier, and still others wonder how much time we have to make a decision!

Evidence from 1000 photographs

One relatively new development is that it is now possible to view a large number of photographs of different plants from throughout their range on the iNaturalist platform ([Observations · iNaturalist](#)). Here there are 1126 observations for *Platanthera cristata* (including var. *straminea*), 51 for *P. ×canbyi*, and 80 for *P. pallida*. Each observation is associated with one or more photographs. The quality varies and some photos are of leaves or fruiting stalks, or were misidentified, but all photos are valuable. In this case, over 1000 of all observations provided approx. 1300 photos of floral parts that provided particularly useful information for identification and research.

Examining the photos, it is possible to become familiar with a taxon, and then view the related taxa to help evaluate how different it is. Some of the photos have rulers and accurate measurements are possible, but these are a minority. Where measurement is not possible, we have been able to calculate the ratios of dimensions of floral parts (Catling & Kostiuk 2026). At the very least, it is possible to make notes and record aspects of variation. This is what we did in the present case.

We found *P. pallida* to be relatively uniform and distinct as reported in the literature (see above). *Platanthera cristata* does not occur where *P. pallida* occurs in the dry habitat at the east end of Long Island (e.g. Brown 2008, Nelson & Lamont 2012, Lamont 2025). However, an individual with a deeper yellow flower color was photographed in a wetter area near there in May 2022 by Robert Levy (iNat photo 128841627). It appears to be referable to *P. pallida* on the basis of the recurved lips, but the spurs may be longer than usual. This single



Figure 5. *Platanthera pallida*. Portion of an inflorescence. Suffolk Co., Long Island, New York, iNat. photo 87729848 by Sequoia Janirella Wrens, Aug. 2020. CC BY-NC 4.0

somewhat anomalous photo, in over 150 that we have seen, is not sufficient to seriously question the uniform and distinct nature of *P. pallida* on Long Island.

With regard to *P. cristata*, we found that in over 1000 photos on iNat, the flowers were very rarely cream but always yellow, yellow-orange, or orange and the lips were bent forward. The spurs varied in length but average longer than in *P. pallida*. In short we could not find anything corresponding to *P. pallida* throughout the North American range of *P. cristata*. Two photos from New Jersey warrant mention. Firstly, photo 259600908 has pale whitish-yellow flowers but the lips project forward and the spurs are relatively long. This may be *P. ×canbyi*. Secondly iNat photo 219704484 has spurs that are too long for *P. pallida*, the flowers are not cream, but pale greenish-yellow, and the lip is not recurved. The distance of separation of the anthers in an oblique frontal view of a flower in this photo suggests *P. ×canbyi*. The photos of *P. ×canbyi* on iNaturalist lack recurved lips, short spurs, and close viscidia (see also Catling & Kostiuk 2026). The only illustrations that were referable to *P. pallida* on iNaturalist were from eastern Long Island.

Identification

Although *P. cristata* may occasionally have pale cream flowers (f. *straminea*), these flowers often lack the distinctive morphological characteristics of *P. pallida* including the backwardly curved lip and relatively short spurs.

The following key for fresh flowers is based on Lamont (2025: 314):

- 1a. Flowers with spurs less than 10 mm long, not reaching to the base of the ovary **2**
- 1b. Flowers with spurs more than 10 mm long, reaching beyond the base of the ovary
..... *P. blephariglottis*, *P. ciliaris*, *P. chapmanii* and their hybrids (see also Hartvig *et al.* 2022)
- 2a. Flowers pale cream or pale yellow; Lip recurved; Spur 5-6 mm *P. pallida*
- 2b. Flowers pale cream, yellow, or bright orange; Lip projecting forward; Spur 6(7)-8(9) mm.....
..... *P. cristata* (including f. *straminea*)

Conclusions

(1) Although *P. cristata* (in the broad sense including *P. pallida*) may be secure elsewhere, **it is endangered and imperiled in New York State**. Furthermore, the unique kind of *P. cristata* noted by Sheviak as “partially stabilized introgression products and potentially useful subjects for evolutionary study” may only reside in New York and is thought by some to deserve a substantial protection effort, a view that has been expressed many times over the past 15 years. Lamont *et al.* (2011: 481, 2025) note that “regardless of the taxonomic status of this taxon, it is extremely rare... and needs protection.”

(2) The **new information** here includes (a) various updates including Lamont’s illuminating text proposing recognition at the species level and protection; (b) the idea that *P. pallida* may be associated with a unique breeding system (auto-pollination or agamospermy) in its history, and/or to the present, suggesting a different evolutionary history from *P. cristata*, this supporting recognition as a distinct entity; (c) the fact that threats may be seriously underrated; (d) an examination of 1300 photographs of fresh flowers, from throughout the range of

P. cristata and related taxa, failed to reveal any *P. pallida* outside of eastern Long Island; (e) the most recent information on the very restricted distribution, the very distinctive habitat, and the unique features, suggest that *P. pallida* may have had a different evolutionary history from *P. cristata* (as suggested by features associated with breeding systems); (f) viscidia separation is a useful character supporting species rank.

(3) Hybrids may have various combinations of characters of their putative parents. Rather than being largely intermediate, some (especially backcrosses) may possess most features of one parent and few of the other. It is conceivable that, using the key above, some *P. ×canbyi* may be very difficult to distinguish from *P. pallida* (Evans *et al.* 2023: 9). However, it may also be a challenge to distinguish some *P. ×canbyi* from either of its putative parents, - neither of which we want to demote as species. Thus, *P. blephariglottis*, *P. cristata*, and *P. pallida* can all be treated as species.

(4) *Platanthera pallida* is not cut out of a morphological continuum (like somewhat unpopular microspecies of *Ophrys* in Europe), and it is not to be confused with any examples of excessive splitting.

(5) Whether *P. pallida* developed through breeding system changes at a range limit, or by hybridization, or both, does not matter to its recognition, since both of these processes are known to have played a major role in evolution and speciation in the orchid family.

Nomenclatural Summary

Platanthera blephariglottis (Willd.) Lindl. in Gen. Sp. Orchid. Pl.: 291 (1835), WHITE FRINGED ORCHID

Homotypic Synonyms

Blephariglottis alba House in Muhlenbergia 1: 127 (1906)

Orchis blephariglottis Willd. in Sp. Pl., ed. 4. 4: 9 (1805)

Platanthera ciliaris var. *blephariglottis* (Willd.) Chapm. in Fl. South. U.S.: 460 (1860)

Platanthera cristata (Michx.) Lindl. in Gen. Sp. Orchid. Pl.: 291 (1835), CRESTED FRINGED ORCHID

Homotypic Synonyms

Blephariglottis cristata (Michx.) Raf. in Fl. Tellur. 2: 39 (1837)

Habenaria cristata (Michx.) R.Br. in W.T.Aiton, Hortus Kew., ed. 2. 5: 194 (1813)

Orchis cristata Michx. in Fl. Bor.-Amer. 2: 156 (1803)

Heterotypic Synonyms

Blephariglottis cristata f. *straminea* (P.M.Br.) Baumbach & P.M.Br. in N. Amer. Native Orchid J. 15: 74 (2009)

Platanthera cristata f. *straminea* P.M.Br. in N. Amer. Native Orchid J. 1: 12 (1995)

Platanthera ×canbyi (Ames) Luer in Native Orchids Florida: 151 (1972), CANBY'S HYBRID FRINGED ORCHID

(*P. blephariglottis* × *P. cristata*)

Platanthera pallida P.M.Br. in Novon 2: 308 (1992), PALE FRINGED ORCHID

Homotypic Synonym

Blephariglottis pallida (P.M.Br.) Baumbach & Lückel in Orchidee (Hamburg) 60: 126 (2009)

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Anther separation in *Platanthera pallida* supports recognition as a species based on examination of photos on iNaturalist

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While compiling and evaluating information relating to the status of *Platanthera pallida* (Catling & Kostiuk 2026), we noticed that it appeared to have a distance of basal separation of the anthers at the viscidia very similar to that of *P. cristata*, and less than that in flowers of *P. ×canbyi* (*P. blephariglottis* × *P. cristata*) with which it has been confused. Here we provide the results of a brief study that supported this observation. The traditional use of herbarium specimens to gather information on anther positions is limited by the flattening and distortion of flowers as a result of pressing and drying. Here we use photos which have recently become widely available for research.



Figure 1. *Platanthera cristata*. **Left. Forma straminea**, New Jersey, iNat photo 149698204 by Dan Wall in Aug. 2021. CC BY-NC 4.0. This is best treated as a pale colour variant of *P. cristata*. It does not have the relatively long spurs and well separated viscidia of *P. ×canbyi* (both from *P. blephariglottis* parent), and it lacks the recurved lip of *P. pallida*. Although the name “*straminea*” is available for this colour variant, we have not checked the photo of the type (AMES) from New Jersey where the often pale *P. ×canbyi* is present. Of course, this plant may be a *P. ×canbyi* backcross that does not display a few (of the few) characters that we rely upon to identify the hybrid, and it may possess other features of *P. blephariglottis* as well as pale colour (which may be attributable to the hybrid mix of white and yellow-orange). **Right. Forma cristata**. New Jersey, iNat photo 540956515, by bkfj in July 2025. CC BY-NC 4.0.

The question was: “How different in the reproductive character of viscidium separation distance are *P. blephariglottis*, *P. cristata*, *P. ×canbyi*, and *P. pallida*?” Based on preliminary observations we expected the distances for *P. blephariglottis* and *P. cristata* to be quite different, *P. ×canbyi* to be intermediate and overlapping in distance values, but *P. pallida* to be similar to *P. cristata*.

Methods

To understand the variability in the distance of viscidium separation (vs) we established 4 taxa of plants assigned to 6 groups within the geographic area of the Atlantic Coastal Plain from Long Island, New York, south through New Jersey to Delaware and Maryland. The taxa were identified in color photos as follows (see also Figures 1 – 4):

- 1a.** Flowers white with spurs reaching beyond the base of the ovary (the lips are flat or recurved and not deeply fringed) *P. blephariglottis*
- 1b.** Flower orange, yellow or cream with spurs as long as the ovary or much shorter **2**

- 2a.** Lip recurved; Flowers cream or very pale yellow; Spurs approx. as long as the lip including fringe (all plants from eastern Long Island) *P. pallida*
- 2b.** Lip flat or upcurved; Flowers cream or very pale yellow, to bright deep yellow or orange; Spurs approx. as long as the lip including fringe or much longer (all plants south of eastern Long Island) **3**

- 3a.** Spurs equal to or slightly longer than the lip; Flowers bright yellow or orange (or pale yellow in *f. straminea*) *P. cristata*
- 3b.** Spurs clearly longer than the lip and may extend to base of ovary; Flowers pale yellow or less often cream (rarely almost white) *P. ×canbyi*

Using iNaturalist (<https://www.inaturalist.org>), we selected 155 photos with relatively sharp frontal views of flowers from different locations in six groups of plants:

- (1) 10 photos of *Platanthera blephariglottis* from Long Island, New York.
- (2) 8 *Platanthera pallida* from eastern Long Island, Suffolk Co. where only *P. pallida* is known.
- (3) 43 *Platanthera ×canbyi* from New York, New Jersey, and Maryland (most of the range).
- (4) 23 *Platanthera cristata* from New Jersey.
- (5) 31 *Platanthera cristata* from Maryland and Delaware.
- (6) 40 *Platanthera blephariglottis* from New Jersey.

Since we could not measure the separation directly, but its size appeared to vary with respect to other floral parts, we used the relatively conservative character of dorsal sepal width (dsw) to compare with the separation of the viscidia. The dorsal sepal protects the developing flower in the bud stage and the reproductive parts on the column as they mature. It is presumed conservative, i.e. less subject to natural selection by pollinators than the lip or column. Measurements on varying scales, provided ratios of dorsal sepal width to anther separation with less separation indicated by a larger number of the ratio. The relationship of dsw/vs to spur length using the ratio of spur length/dorsal sepal length (spl/dsl) was explored with a subset of the data. Only one or two flowers were measured per photo.



Figure 2. *Platanthera blephariglottis - cristata* complex, frontal views of flowers showing separation of anther sacs at their bases (at the viscidia which attach pollinia to pollen vector). **a.** *Platanthera blephariglottis*, New Jersey, iNat photo 539540816 by jugbayjs in July 2025. CC BY-NC 4.0. **b.** *Platanthera* \times *canbyi*, Maryland, iNat photo 303397938 by Josh Emm in July 2023. CC BY-NC 4.0. **c.** *Platanthera cristata*, North Carolina, Brunswick Co., Green Swamp, iNat photo 536327410 by R. Haven Wiley on 12 July 2025. CC BY-NC 4.0. As well as illustrating the separation of anthers and viscidia these photos also illustrate some other notable intermediate features of the *P. canbyi* hybrid. These are: (1) The unfringed basal portion of the lip which is pronounced in *P. blephariglottis*, absent in *P. cristata* and present, but poorly developed in *P. canbyi*. (2) The pale yellow flower color of *P. canbyi* is intermediate between the white and orange-yellow of *P. blephariglottis* and *P. cristata* (respectively). (3) The dome of the dorsal sepal is high in *P. cristata*, much lower in *P. blephariglottis* and of intermediate height in *P. canbyi*. (4) The lip lamina (not including fringe) is widest near the base at the spur orifice in *P. cristata*, near to the lip apex in *P. blephariglottis*, but in an intermediate position near the lip base in *P. canbyi*. Although not shown here, the spurs were much longer than the lip in the *P. blephariglottis*, as long as the lip in *P. cristata*, and twice as long as the lip in *P. canbyi*.

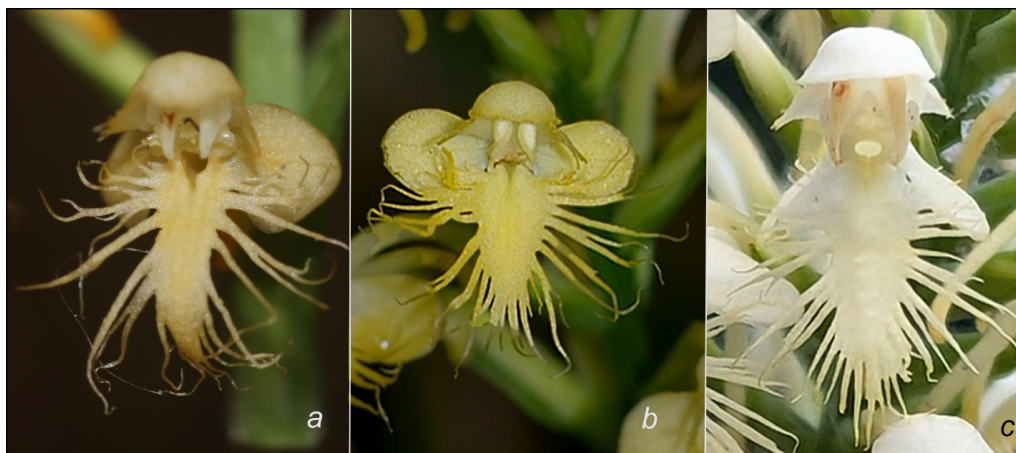


Figure 3. *Platanthera blephariglottis - cristata* complex, frontal views of flowers showing separation of anther sacs at their bases (at the viscidia which attach pollinia to pollen vector). **a.** *P. pallida*, Suffolk Co., Long Island, New York, iNat. photo 87729809 by Sequoia Janirella Wrens, Aug. 2020. CC BY-SA 4.0. **b.** *P. canbyi*, Maryland, iNat photo 137788130 by mlarocque1962 in July 20118. CC BY-NC 4.0. **c.** *P. canbyi*, New Jersey, iNat photo 412332361 by dOughOck in July 2025. CC BY-NC 4.0. The close viscidia ($dsw/vs = 3.5$), recurved lip, and creamy colour in “a” indicate *P. pallida*, and the spurs were short ($spl/dsl = 1.9$). Although “b” is similar to “a” with short spurs ($spl/dsl = 2$), the anther sacs are basally divergent and the viscidia more widely separated ($dsw/vs = 2.10$) and the lips were not recurved. This seems best placed with *P. canbyi* based on the anthers, but is close to *P. cristata f. straminea*. The creamy color variant of *P. canbyi* is represented by “c” ($dsw/vs = 2.5$, $spl/dsl = 3$).

Notes on the key

(1) Limitations. Where hybrids occur, many plants will have intermediate characteristics, but some may very closely resemble one of their putative parents, perhaps as a result of backcrosses with that parent. The resemblance of a hybrid to a particular parent may be so close that it cannot be identified as a hybrid because some of the characters of the other parent are not readily detectable (odour, physiological and chemical characteristics, environmental adaptations, etc.). Thus, “well disguised” hybrids may exist.

(2) Identification and history of forma *straminea*. The pale flowered plant referable to the later *P. pallida* was apparently present at Montauk on eastern Long Island in 1948 when a specimen was collected by C.S. Bryan (AMES, Carpenter 1959: 137). A cream-flowered variant of *P. cristata* was first described by Carpenter in 1959 from New Jersey, but he did not name it. The pale-yellow form of *P. cristata* was described from New Jersey and named “*straminea*” by P.M. Brown (1995: 12). It was not clear how this could be distinguished from the hybrid *P. ×canbyi* (*P. blephariglottis* × *P. cristata*) which may also have pale yellow flowers. Since plants with *P. pallida* characteristics are not known outside of eastern Long Island, Brown’s form is likely either *P. ×canbyi* or *P. cristata*. With spurs averaging 5.6 mm, it seems more likely to be *P. cristata*. Brown (1992: 126) later described *P. pallida*, which also has pale yellow flowers, from eastern Long Island.

(3) Spur lengths. Short spurs are much shorter than the ovary and up to 1.5 times as long as the lip. Medium length spurs are half as long as the ovary and more than 1.5 times to as long as the lip. Long spurs are longer than the ovary and 3 or more times as long as the lip.



Figure 4. *Platanthera cristata* f. *straminea*, New Jersey, iNat photo 145686173 by galecannon in July 2021. CC BY-NC 4.0. The dorsal sepals have a high dome and the anther sacs are close ($dsl/vs = 3.5$), and the spurs are moderately long ($spl/dsl = 2.2$). Thus, this inflorescence seems best referred to *P. cristata* f. *straminea* using the results of this study. See also Figure 1 for another example of this taxon.

Analysis

(1) Box & Whisker plots, ANOVA, and Clustering. The dsw/vs ratios for each group were summarized in Box & Whisker (BW) plots where the box indicates the middle 50% of the data with the vertical median line inside it. The maximum and minimum values are joined by a horizontal line and substantial outliers are shown as points (boxes) beyond the horizontal line. Analysis of variance (ANOVA) was used to determine the extent of significant differences between the six groups. An associated Multiple Range test using Least Significant Differences procedure defined groups with significantly different means. The groups were clustered (UPGMA method) by their pairwise dissimilarities to provide a visual explanation of relationship.

(2) Linear regression. Using 44 photos in the dataset that enabled both a dorsal sepal width/ viscidium separation (dsw/vs), and spur length /dorsal sepal length (spl/dsl) ratios from the same inflorescence we performed a linear regression. These 44 covered the taxa, and the total sample of 155 quite well, although it is not a large sample: 4 from group 1; 10 from group 2; 10 from group 3; 6 from group 4; 8 from group 5; 6 from group 6. The regression provided a correlation coefficient, significance level for the relationship between viscidium separation and spur length, and an indication of the amount of variation in viscidium separation that is explained by spur length.

(3) Plotting of ratios. The ratios of dorsal sepal width/viscidium separation and spur length/dorsal sepal length were plotted to provide a visual indication of the relationship between groups that can be obtained from photographs.

Results

(1) Box & Whisker plots, ANOVA, and Clustering. The BW plots show *P. blephariglottis* and *P. cristata* groups quite separate and the *P. ×canbyi* hybrid in an expected intermediate position (Figure 5) with respect to separation of viscidia (Figures 2 and 5). *Platanthera ×canbyi* is a variable group that connects the putative parents. The *P. pallida* group is closest to the *P. cristata* groups but mostly separate from them. The ANOVA F-ratio was 121.04 with a P value of 0.000 indicating a significant difference between means of the six groups at the 95% confidence level. The multiple range test indicated 5 homogeneous groups with significantly different means (Figure 6), the two groups of *P. blephariglottis* not being significantly different. The clustering of the pairwise dissimilarities from the multiple range test suggested that the *P. pallida* group was most closely related to, but different from, the *P. cristata* groups (Figure 6) as suggested also by the BW plots using the ratios (Figure 5).

(2) Linear regression. The regression demonstrated a significant relationship between the viscidium separation and spur length ratios (dsw/vs and spl/dsl) with $F=99.2$ and $P=0.0000$ (Figure 7). The equation is $dsw/vs = 4.94306 - 1.00209 \times spl/dsl$, and the $R^2 = 70.4064\%$ suggesting that spur length can account for 70 % of the variation in viscidium separation. The correlation coefficient is -0.8390 .

(3) Plotting of ratios. The plotting of the ratios of dorsal sepal width/viscidium separation and spur length/dorsal sepal length provided a similar relationship among *P. blephariglottis*, *P. ×canbyi*, *P. cristata* and *P.*

pallida as that shown in the clustering (cf. Figures 6 and 8). Here measurements from new photos can be plotted to help identify plants.

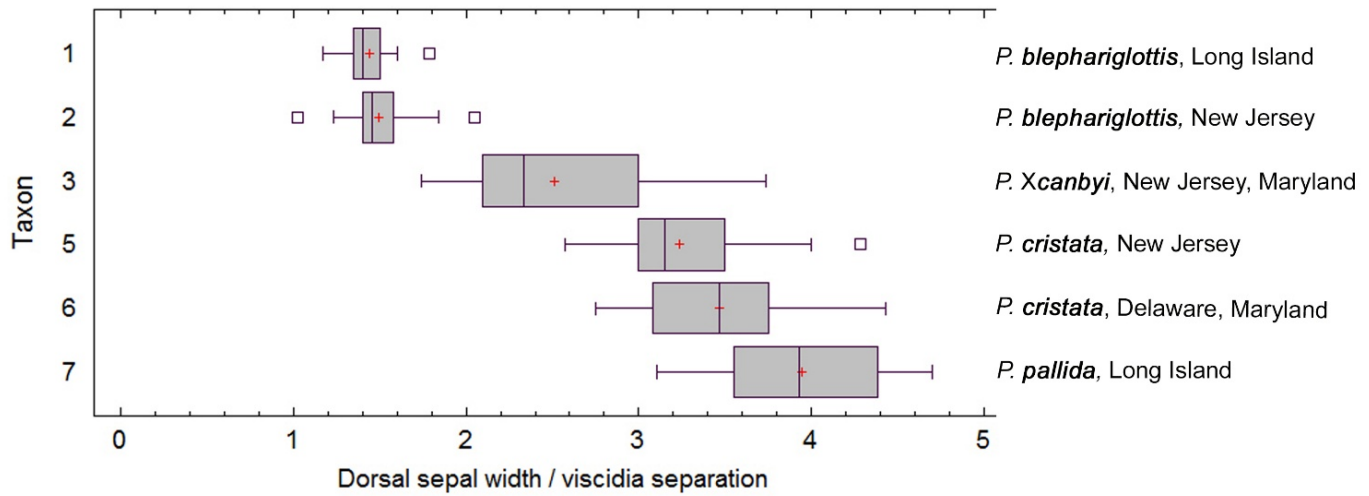


Figure 5. **Box & Whisker plots** summarizing information on dorsal sepal width / viscidium separation (dsw/vs) in 6 groups including 4 taxa of orchids in 155 photos of flowers in the *Platanthera blephariglottis - cristata* complex from iNaturalist. The box indicates the middle 50% of the data with the vertical median line inside it. The maximum and minimum values are joined by a horizontal line and substantial outliers are shown as points (boxes) beyond the horizontal line.

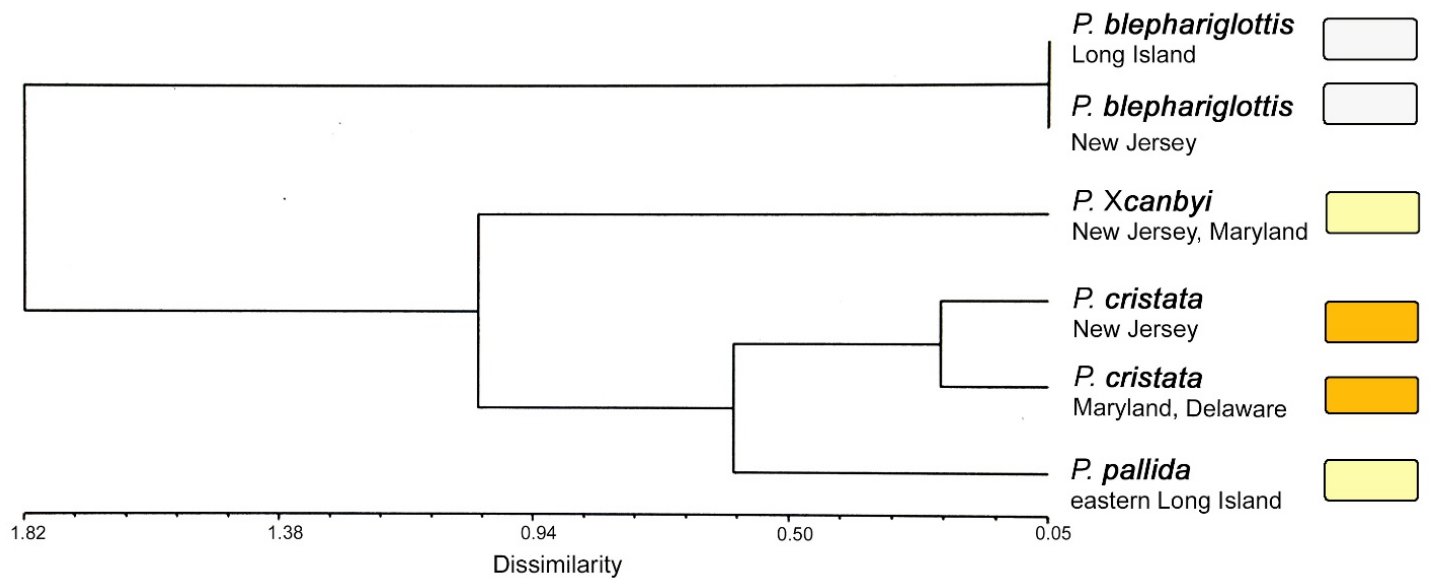


Figure 6. **Clustering** of pairwise dissimilarities among six groups of plants in the *Platanthera blephariglottis - cristata* complex based on a Multiple Range Test. The predominant flower color in the group is indicated in a rectangle on the right.

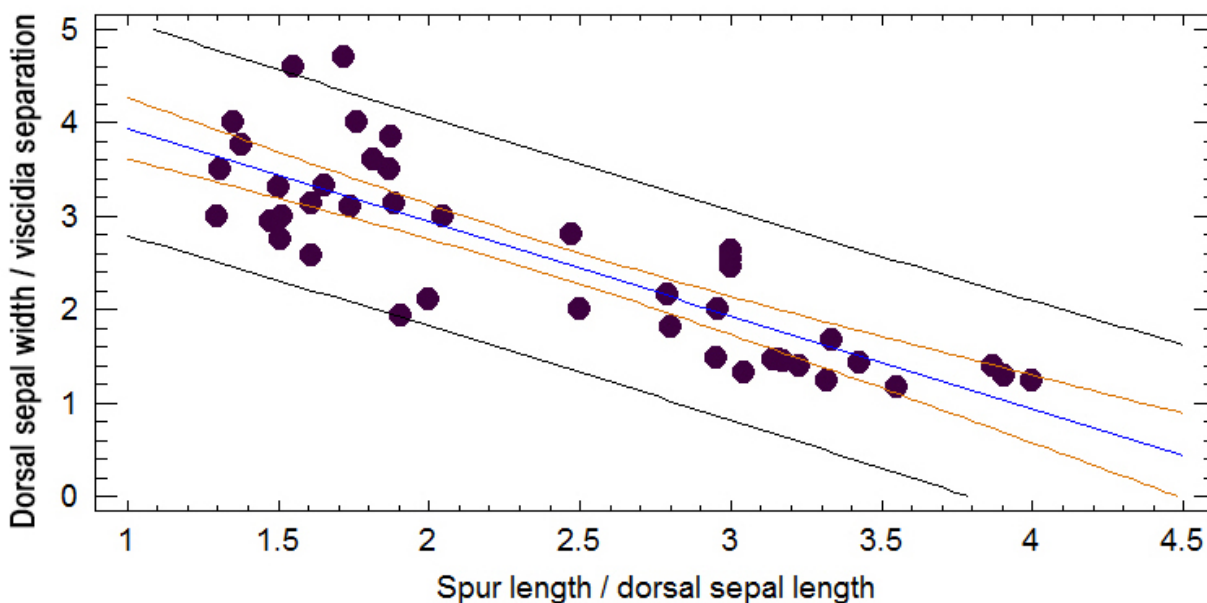


Figure 7. **Linear regression** for the two ratios, dsw/vs and spl/dsl, in 6 groups of 44 inflorescences in iNaturalist photos. The blue line is the regression (prediction equation). The orange lines on either side define the 95 % confidence interval for the mean response at x, describing how well the regression line has been estimated. The outer black lines are the limits of 95% confidence for prediction of position of new observations.

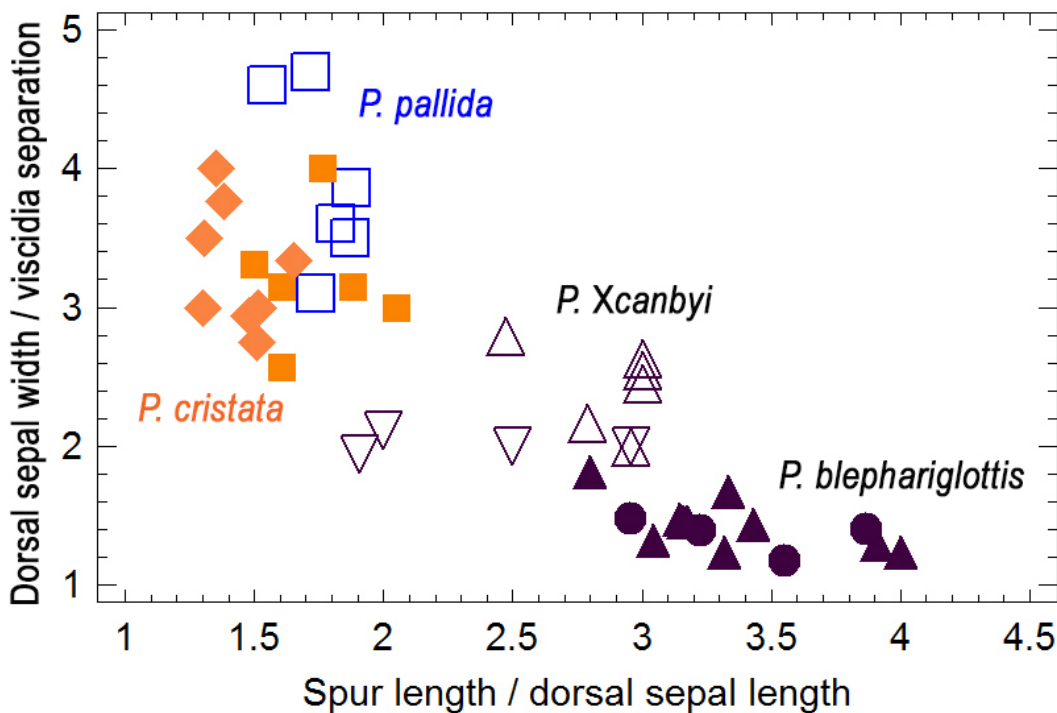


Figure 8. Plot of ratios in four groups to help with identification of photographs. A subset of both ratios (dsw/vs and spl/dsl) in 44 photos where both features could be measured in the lower part of the inflorescence. Solid black symbols (dots and triangles) are *P. blephariglottis* (2 groups), Open triangles are *P. Xcanbyi* (2 groups). Solid orange symbols (squares and diamonds) are *P. cristata* (2 groups) and open blue squares are *P. pallida*.

Discussion

The short distance of separation of the viscidia can be used with other distinctive characters (creamy flower color, recurved lip, short spurs) to help define *P. pallida*. The latter taxon is more similar to *P. cristata* than to the *P. ×canbyi* hybrid in the dsw/vs ratio reflecting viscidia separation in photos of fresh flowers (Figures 5, 6 and 8). *Platanthera pallida* is also still different from two groups of *P. cristata* in this character but overlaps. These observations support its recognition at the species level. Although the data set is small, there is evidence that viscidium separation is strongly correlated with spur length, further suggesting the importance of this character. Although floral parts of flowers cannot be measured in a photo without a scale in the photo, it is possible to compare and identify photos using ratios (Figure 8). This project provides an example of the use of photos on iNaturalist to acquire relevant taxonomic information that is not otherwise widely available.

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A checklist and distributional record for the wild orchids of Wisconsin, USA

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Abstract

A checklist and distributional review of the wild orchids of Wisconsin is presented based on herbarium specimens, literature records, and recent observations. A total of 57 taxa, including species, infraspecific taxa, and hybrids, are recognized from the state. Wisconsin's orchid flora reflects a mixture of boreal, eastern temperate, Great Lakes, and prairie-savanna biogeographic elements shaped by glacial history and regional physiography. Historical records, excluded taxa, conservation status, and phylogeographic affinities are discussed. Several orchids, such as *Calypso bulbosa* var. *americana*, have declined substantially due to a combination of environmental factors and habitat loss, while others such as *Spiranthes ovalis* var. *erostellata* appear to be expanding northward within the state in recent decades.

1.1 Introduction to Wisconsin

The U.S. state of Wisconsin is situated in the Great Lakes region, bordered by the Mississippi and St. Croix Rivers, Iowa, and Minnesota to the west, Lake Superior and Michigan's Upper Peninsula to the north, Lake Michigan to the east, and the state of Illinois to the south. Wisconsin's ecological setting reflects the convergence of several major North American ecological regions, including the northern Laurentian forests, eastern temperate forests, Midwestern oak savannas, and Great Plains grasslands, along with additional minor elements such as the Coastal Plain (Curtis, 1959; Reznicek, 1994). Accordingly, Wisconsin supports a diverse orchid flora of 57 taxa (species, infraspecific taxa, and hybrids), making it a notable destination for orchid enthusiasts.

The flora of Wisconsin, including its orchids, has been shaped profoundly by glacial history and the subsequent environmental heterogeneity it produced across the landscape (Fuller, 1933). During North America's most recent glacial period, the Wisconsin glaciation, beginning approximately 75,000 years ago and ending around 11,000 years ago, repeated advances and retreats of continental ice sheets reshaped much of northern North America, reaching as far south as present-day Tennessee, Arkansas, and Virginia during the Last Glacial Maximum (ca. 20,000 years ago). During this time, much of Wisconsin was scoured and buried beneath the Laurentide Ice Sheet; however, portions of southwestern Wisconsin's Driftless Area remained largely unglaciated, retaining a rugged topography distinct from much of the rest of the state. Following glacial retreat, the glacial legacy across much of Wisconsin became evident in the form of eskers, drumlins, moraines, kettle lakes, sandy glacial lakebeds, and outwash plains. Major waterways, including the Great Lakes and the Mississippi, St. Croix, and Wisconsin Rivers, were strongly influenced by glacial processes. Wisconsin was subsequently recolonized by flora and fauna from multiple directions; additionally, some taxa may have persisted regionally within refugial habitats associated with the Driftless Area (Spalink et al., 2018). The combination of east-west and north-south gradients in precipitation and temperature, variation in soils and bedrock, and glacial geomorphology contributed to the mosaic of native vegetation of pre-settlement Wisconsin

including prairies, forests, and wetlands across the state. Today, the Wisconsin Department of Natural Resources recognizes 108 natural plant communities, 16 Ecological Landscapes, and more than 1,800 native vascular plant species in Wisconsin.

Broadly, the ecological regions of Wisconsin include the “Northwoods” of the northern third of the state, characterized by mixed northern forests, bogs, conifer swamps, and other wetlands interspersed with dry sandy barrens; the “Central Sands” region of central Wisconsin, characterized by extensive wetlands and sandy barrens associated with the former basin and outwash of Glacial Lake Wisconsin; the southwestern “Driftless Area,” marked by rugged topography, river valleys, and a mosaic of forest, prairie, and savanna; and the till plains and morainal landscapes of southern and southeastern Wisconsin, including the Kettle Moraine region. Running diagonally through the state is the “Tension Zone,” a broad ecological transition between the northern conifer-hardwood forests and the southern deciduous forests, prairies, and savannas (Curtis, 1959). Although orchids occur throughout Wisconsin, the greatest diversity is associated with bogs, forested wetlands, and conifer swamps in the northern tier of the state, particularly within the calcareous plant communities of the eastern Door Peninsula, part of the dolomitic arc of the Niagara Escarpment.



Figure 1. *Galearis rotundifolia*, Sawyer County, Wisconsin. June 2019. Photo: Brandon Corder.

1.2 A Short History of Orchidology in Wisconsin

There is no doubt that the orchids of the land now known as Wisconsin were well known to its first inhabitants. Traditional medicinal uses of orchids such as *Malaxis unifolia*, *Cypripedium reginae*, and *Coeloglossum viride* were documented in accounts of plant use by members of the Ojibwe (Meeker et al., 1993) and Menominee (Smith, 1923).

Orchids were not mentioned in the sparse botanical accounts left by the earliest European visitors to present-day Wisconsin, such as Jean Nicolet in 1634 (Cheney, 1900). The earliest known written orchid records instead appear in the journals of residents of territorial forts. Among these was Dr. Edwin James, who noted orchids such as *Cypripedium parviflorum* var. *pubescens* from the vicinity of Fort Crawford in present-day Crawford County, Wisconsin, as early as 1824 (Lammers, 2017). The earliest surviving physical orchid collections from present-day Wisconsin were made in the late 1830s by Increase A. Lapham, a polymath and pioneering Wisconsin naturalist, in the vicinity of Milwaukee.

After Wisconsin was admitted as a state in 1848, most orchid collecting occurred in the more heavily settled southern half of the state and near military forts, though important contributions were also made by collectors such as L. Foote on the Door Peninsula and by expeditions along rivers in the northwestern portion of the state. During this period, Wisconsin underwent rapid landscape transformation as settlement and development expanded across the region. These early observations by naturalists preserve records of orchid species from areas that are now heavily developed. One such example is *Platanthera ciliaris*, reported from the Milwaukee area by Lapham in 1852, but not subsequently documented from the state.

During the first half of the 20th century, Wisconsin's orchid flora received more comprehensive treatment through the work of botanists such as Norman C. Fassett and Albert M. Fuller. Important contributions to understanding the ecological and edaphic requirements of orchids were later made through pioneering studies by John T. Curtis at the University of Wisconsin–Madison and the pedigree of research on orchids by faculty of Wisconsin's institutes of higher education continues into the 21st Century with numerous important contributions on regional and global orchidology.



Figure 2. *Liparis liliifolia*, Jefferson County, Wisconsin. June 2020. Photo: Brandon Corder.

A crucial development in the conservation of Wisconsin's orchids began with the passage of Wisconsin's endangered species law in 1971, preceding the United States federal Endangered Species Act of 1973. Wisconsin's first state endangered and threatened species list was developed in 1972, though no orchids (or other plants) were included at that time. By the fourth revision of the state list in 1979, *Neottia convallarioides* and *Cypripedium arietinum* had been added, reflecting growing concern over the conservation status of Wisconsin's orchid flora, with others being added in subsequent revisions. In 1989, *Platanthera leucophaea* became the first orchid occurring in Wisconsin to be listed as federally threatened under the amended Endangered Species Act of 1973.

1.3 Checklist of Species

Key: US-Thr. = Ranked as federally threatened (United States); WI-End. = State endangered (Wisconsin); WI-Thr. = State threatened (Wisconsin); WI-SC = State special concern (Wisconsin);
* = Introduced/Non-native to Wisconsin

Aplectrum hyemale (Muhl. ex Willd.) Torr., PUTTY ROOT ORCHID

Arethusa bulbosa L., DRAGON'S MOUTH ORCHID

Calopogon oklahomensis D.H.Goldman, OKLAHOMA GRASSPINK (WI-SC)

Calopogon tuberosus (L.) B.S.P. var. *tuberosus*, TUBEROUS GRASSPINK

Calypso bulbosa (L.) Oakes var. *americana* (R.Brown) Luer, EASTERN FAIRY-SLIPPER (WI-Thr.)

Coeloglossum viride (L.) Hartm. var. *virescens* (Muhl. ex Willd.) Luer, LONG BRACKETED FROG ORCHID
(WI-SC)

Corallorhiza maculata (Raf.) Raf. var. *maculata*, EASTERN SPOTTED CORALROOT

Corallorhiza maculata (Raf.) Raf. var. *occidentalis* (Lindl.) Ames, WESTERN SPOTTED CORALROOT

Corallorhiza odontorhiza (Willd.) Poir. var. *odontorhiza*, AUTUMN CORALROOT

Corallorhiza odontorhiza (Willd.) Poir. var. *pringlei* (Greenm.) Freudenst., PRINGLE'S AUTUMN
CORALROOT

Corallorhiza striata Lindl. var. *striata*, STRIPED CORALROOT

Corallorhiza trifida Châtel., EARLY CORALROOT

Cypripedium × *andrewsii* A.M.Fuller nothovar. *andrewsii*, ANDREW'S HYBRID LADY'S-SLIPPER
(*Cypripedium candidum* × *C. parviflorum* var. *makasin*)[†]

Cypripedium × *andrewsii* A.M.Fuller nothovar. *favillianum* J.T.Curtis, FAVILLE'S HYBRID LADY'S-S-
SLIPPER (*Cypripedium candidum* × *C. parviflorum* var. *pubescens*)[†]

Cypripedium acaule Aiton, PINK LADY'S-SLIPPER

- Cypripedium arietinum* R.Br., RAM'S-HEAD LADY'S-SLIPPER (WI-Thr.)
- Cypripedium candidum* Muhl. ex Willd., SMALL WHITE LADY'S-SLIPPER (WI-Thr.)
- Cypripedium parviflorum* Salisb. var. *makasin* (Farw.) Sheviak, SMALL YELLOW LADY'S-SLIPPER (WI-SC)
- Cypripedium parviflorum* Salisb. var. *pubescens* (Willd.) O.W.Knight, NORTHERN LARGE YELLOW LADY'S-SLIPPER
- Cypripedium reginae* Walter, SHOWY LADY'S-SLIPPER
- **Epipactis helleborine* (L.) Crantz, BROAD-LEAVED HELLEBORINE
- Galearis rotundifolia* (Banks ex Pursh) R.M.Bateman, SMALL ROUND-LEAVED ORCHID (WI-Thr.)
- Galearis spectabilis* (L.) Raf., SHOWY ORCHIS
- Goodyera oblongifolia* Raf., WESTERN RATTLESNAKE PLANTAIN (WI-SC)
- Goodyera pubescens* (Willd.) R.Br., DOWNY RATTLESNAKE PLANTAIN
- Goodyera repens* (L.) R.Br. var. *ophioides* Fernald, DWARF RATTLESNAKE PLANTAIN
- Goodyera tessellata* G.Lodd., CHECKERED RATTLESNAKE PLANTAIN
- Liparis liliifolia* (L.) Rich. ex Lindl., LILY-LEAVED TWAYBLADE
- Liparis loeselii* (L.) Rich., LOESEL'S WIDE-LIPPED TWAYBLADE
- Malaxis monophyllos* (L.) Sw. var. *brachypoda* (A.Gray) F.Morris & E.A.Eames, NORTH AMERICAN WHITE ADDER'S-MOUTH (WI-SC)
- Malaxis unifolia* Michx., GREEN ADDER'S-MOUTH
- Neottia auriculata* (Wiegand) Szlach., AURICLED TWAYBLADE
- Neottia convallarioides* (Sw.) Rich., BROAD-LIPPED TWAYBLADE (WI-Thr.)
- Neottia cordata* (L.) Rich., HEART-LEAVED TWAYBLADE
- Platanthera* ×*andrewsii* (M.White) Luer, ANDREW'S BOG ORCHID (*Platanthera lacera* ×*P. psycodes*)
- Platanthera aquilonis* Sheviak, NORTH WIND BOG ORCHID
- Platanthera clavellata* (Michx.) Luer, CLUB-SPUR ORCHID
- Platanthera dilatata* (Pursh) Lindl. ex L.C.Beck var. *dilatata*, TALL WHITE BOG ORCHID
- Platanthera flava* (L.) Lindl. var. *herbiola* (R.Br.) Luer, NORTHERN TUBERCLED BOG ORCHID (WI-Thr.)
- Platanthera hookeri* (Torr.) Lindl., HOOKER'S BOG ORCHID (WI-SC)
- Platanthera huronensis* (Nutt.) Lindl., LAKE HURON BOG ORCHID
- Platanthera lacera* (Michx.) G.Don var. *lacera*, RAGGED FRINGED ORCHID

Platanthera leucophaea (Nutt.) Lindl., EASTERN PRAIRIE FRINGED ORCHID (US-Thr., WI-End.)

Platanthera obtusata (Banks ex Pursh) Lindl. var. *obtusata*, BLUNT-LEAVED BOG ORCHID

Platanthera orbiculata (Pursh) Lindl. var. *orbiculata*, LESSER ROUND-LEAVED ORCHID (WI-SC)

Platanthera psycodes (L.) Lindl., LESSER PURPLE FRINGED ORCHID

Pogonia ophioglossoides (L.) Kew Gawl., ROSE POGONIA

Spiranthes × *simpsonii* Catling & Cruise, SIMPSON'S HYBRID LADIES'-TRESSES (*Spiranthes lacera* var. *lacera* × *S. romanzoffiana*)

Spiranthes casei Catling & Cruise var. *casei*, CASE'S LADIES'-TRESSES

Spiranthes incurva (Jenn.) M.C.Pace, SPHINX LADIES'-TRESSES

Spiranthes lacera (Raf.) Raf. var. *gracilis* (Bigelow) Luer, SOUTHERN SLENDER LADIES'-TRESSES

Spiranthes lacera (Raf.) Raf. var. *lacera*, NORTHERN SLENDER LADIES'-TRESSES

Spiranthes lucida (H.H.Eaton) Ames, SHINING LADIES'-TRESSES

Spiranthes magnicamporum Sheviak, GREAT PLAINS LADIES'-TRESSES

Spiranthes ovalis Lindl. var. *erostellata* Catling, NORTHERN OVAL LADIES'-TRESSES

Spiranthes romanzoffiana Cham., HOODED LADIES'-TRESSES

Triphora trianthophoros (Sw.) Rydb. var. *trianthophoros*, THREE BIRDS ORCHID (WI-SC)

Excluded:

Cypripedium parviflorum Salisb. var. *parviflorum*, SOUTHERN SMALL YELLOW LADY'S-SLIPPER

This taxon, which has a predominantly southern distribution, is occasionally reported from Wisconsin but appears to represent misidentified material of the common *Cypripedium parviflorum* var. *pubescens*.

Platanthera blephariglottis (Willd.) Lindl., WHITE FRINGED ORCHID

A single specimen of this species has been reported from Wisconsin, collected by S. H. Watson (*s.n.*; 1862) from Rock County on the southern edge of the state (specimens at WIS and MICH). The original label states that it was collected from "Prairies" and the specimen was initially labelled as *Habenaria leucophaea* (= *Platanthera leucophaea*), though it was later determined as *P. blephariglottis* by T. Cochrane and W. Alverson and subsequently by Fred W. Case. Cochrane ultimately excluded *P. blephariglottis* from the Wisconsin flora, noting that no additional specimens of this conspicuous species had been documented from the state and that the closest natural populations occur in Berrien County, Michigan. He further noted that the reported prairie habitat is atypical for the species (Wetter et al., 2001). Cochrane concluded that the specimen may have been transferred to Watson and incorrectly labelled.

Platanthera ciliaris (L.) Lindl., ORANGE FRINGED ORCHID

This species was listed for the Milwaukee region by Lapham (1838), but it is unclear whether it occurred in Wisconsin. No specimens are known and it is not recorded in Lapham's subsequent floras. Later floras (e.g., Gleason & Cronquist, 1963) also reported it from Wisconsin but with no additional information. The closest verified records were made two counties south of the Wisconsin border in Cook County, Illinois (H. H. Babcock, *s.n.*, 1874). and therefore may be considered possible but with incomplete evidence. Further investigation is ongoing.

Platanthera macrophylla (Goldie) P.M. Brown, GOLDIE'S ROUND-LEAVED ORCHID

Albert M. Fuller (1933) noted plants resembling *Platanthera orbiculata* from northeastern Wisconsin with nectar spurs 30-40 mm in length corresponding to the concept of *Platanthera macrophylla*. This interpretation was apparently followed by Carlyle A. Luer (1975), who included *P. macrophylla* for extreme northeastern Wisconsin. Fuller, however, did not cite specific specimens. In their examination of herbarium material of *P. orbiculata* and *P. macrophylla* across North America, Reddoch & Reddoch (1993) excluded *P. macrophylla* from Wisconsin, noting that they were unable to locate material matching Fuller's concept, although they remarked that collections from the region "would not be surprising." The nearest confidently identified specimens of *P. macrophylla* are from Michigan's Upper Peninsula. A recent examination by the author of more recently collected Wisconsin material deposited at WIS reached the same conclusion. Further field study and careful measurement of living material from northeastern Wisconsin and the Door Peninsula may help clarify whether this species occurs within the Wisconsin flora.

Potential additions:

Cypripedium* × *herae Ewacha & Sheviak, QUEEN HERA'S HYBRID LADY'S-SLIPPER (*Cypripedium parviflorum* var. *pubescens* × *C. reginae*)

Although the parents frequently occur near to each other, reports of the hybrid *Cypripedium* × *herae* are rare (Brown, 2007). The parents may be found blooming at the same time in the same vicinity in northern Wisconsin (Corder, personal observation) and hybrids should be sought there. *C. parviflorum* var. *makasin* also blooms overlapping with *C. reginae* in some of its range and may grow in close proximity together and hybrids should also be sought for this combination.

Liparis* × *jonesii S.L. Bentley (*Liparis liliifolia* × *L. loeselii*)

Reported from the Appalachian Mountains of western North Carolina (Bentley, 2000) but rarely noted elsewhere, despite parents growing in close proximity and often blooming at the same time. Should be sought in southern Wisconsin.

Neottia* × *veltmanii (Case) Baumbach, VELTMAN'S TWAYBLADE (*Neottia auriculata* × *N. convallarioides*)

Reported from the Upper Peninsula of Michigan by Case (1964) and apparently widespread in northeastern North America (Catling, 1976). Both parents occur in the Bayfield Peninsula of Wisconsin's Lake Superior shore, although collections of *N. auriculata* are more limited, being reported only from the western side of the Peninsula, with *N. convallarioides* reported from the eastern Peninsula and the Apostle Islands (Judziewicz & Koch, 1993).

Platanthera* × *hollandiae Catling & Brownell, HOLLAND'S HYBRID FRINGED ORCHID (*Platanthera lacera* × *P. leucophaea*)

Reported from Ontario by Catling & Brownell (1999). Putative individuals were also identified by Nate Martineau in Washtenaw County, Michigan, in southeastern Michigan (2016, iNaturalist observation number 14023040). Both parents occur in southern Wisconsin.

Platanthera* ×*reznicekii Catling, Brownell & G.Allen, REZNICEK'S HYBRID FRINGED ORCHID (*Platanthera leucophaea* × *P. psycodes*)

Reported from Ontario by Catling et al. (1999). Both parents occur in southern Wisconsin.

1.4 Short note on forms of Wisconsin orchids

A number of color forms, vegetative variations, and other abnormalities have been noted among Wisconsin orchids. In some cases, authors have made an attempt to formalize these variations in the naming of forms (*forma*) and in other cases they have been unnamed. Some notable forms and aberrations of Wisconsin orchids are named below, although the list here is not comprehensive.

Corallorhiza odontorhiza (Willdenow) Poir. var. ***odontorhiza forma viridis*** J.Horner

Nearly lacking all purple-red pigment in the flowers, stems, and bracts; labellum mostly unspotted with light purple fringing on margin. First reported from the Door Peninsula, Wisconsin (Horner, 2021).

Albino ***Cypripedium acaule*** Aiton

Records of unusual achlorophyllous mutants of the pink lady's-slipper have been known in Wisconsin since 1975 and as recently as 2005 (Bushman, 2006). In one instance, two plants from Waushara County were reported to have leaves completely lacking chlorophyll but typical in other characters, and typical flowers that retained the same light brown sepals and pink petals and labellum. In other instances, plants reported from Price County had reduced leaves lacking pigment and did not flower. These remarkable observations are the only known accounts of such an achlorophyllous form in *C. acaule*, but chlorophyll-deficient mutants (although not completely achlorophyllous mutants) are known other *Cypripedium* such as *C. debile* from Japan (Suetsugu et al., 2021).

Epipactis helleborine (L.) Crantz ***forma monotropoides*** (Mousley) Scoggin, and other *forma*

Several sporadically occurring color forms of the introduced *Epipactis helleborine* exist across eastern North America, with even more occurring within its native Eurasian range. Many have been named at various ranks (species, variety, subspecies, *forma*) leading to taxonomic confusion (Łobas et al., 2021). One of the most notable forms is the fully achlorophyllous *forma monotropoides*, which has been observed rarely in Wisconsin. European taxonomists have also recently suggested naming the form at varietal rank (*E. helleborine* (L.) Crantz var. *monotropoides* (Mousley) L.Lewis) (Lewis, 2015) but it has not been widely adopted.

Triphora trianthophoros (Sw.) Rydb. var. ***trianthophoros forma rossii*** P.M.Brown

This completely achlorophyllous color form with pink and white leaves and stems and white to pink or yellowish flowers was first reported from Florida (Brown, 1999) and appears sporadically across its range. The first known observation of *forma rossii* in Wisconsin was made by Sarah Friedrich in August 2025 in Madison, Wisconsin (Dane County), in an unusual and remarkable occurrence in her backyard flower bed.

1.5 Phytogeographical Notes

The orchid flora of Wisconsin is broadly similar to that of the other Upper Great Lakes regions, particularly Michigan, Minnesota, and the Canadian province of Ontario (Fig. 3). The elements of Wisconsin's orchid flora can generally be grouped into several major biogeographic affinities: (1) a circumboreal element (e.g., *Corallorhiza trifida*); (2) a temperate eastern North American element (e.g., *Aplectrum hyemale*); (3) species associated primarily with the Great Plains and eastern prairie-savanna region (e.g., *Spiranthes magnicamporum*); (4) species centered in the Great Lakes region (e.g., *Cypripedium reginae*) or in the Great Lakes and northern Atlantic states (e.g., *Goodyera tessellata*); and (5) species with a mainly western Cordilleran distribution that stretch in a continuous band to the Great Lakes, or otherwise occur discontinuously in the Great Lakes (e.g., *Corallorhiza maculata* var. *occidentalis*). Particularly unusual elements of the Wisconsin orchid flora include *Calopogon oklahomensis*, a species centered in the Interior Highlands and south-central prairie-savanna region of the United States, the only Wisconsin orchid species not shared with the other Upper Great Lakes states and provinces. Although Wisconsin possesses a distinct Coastal Plain disjunct element within its flora (Reznicek, 1994), it lacks orchids with predominantly Coastal Plain distributions, unless the historical occurrence of *Platanthera ciliaris*, a southern species associated with the Coastal Plain and Appalachian regions, is considered (see Excluded taxa above).

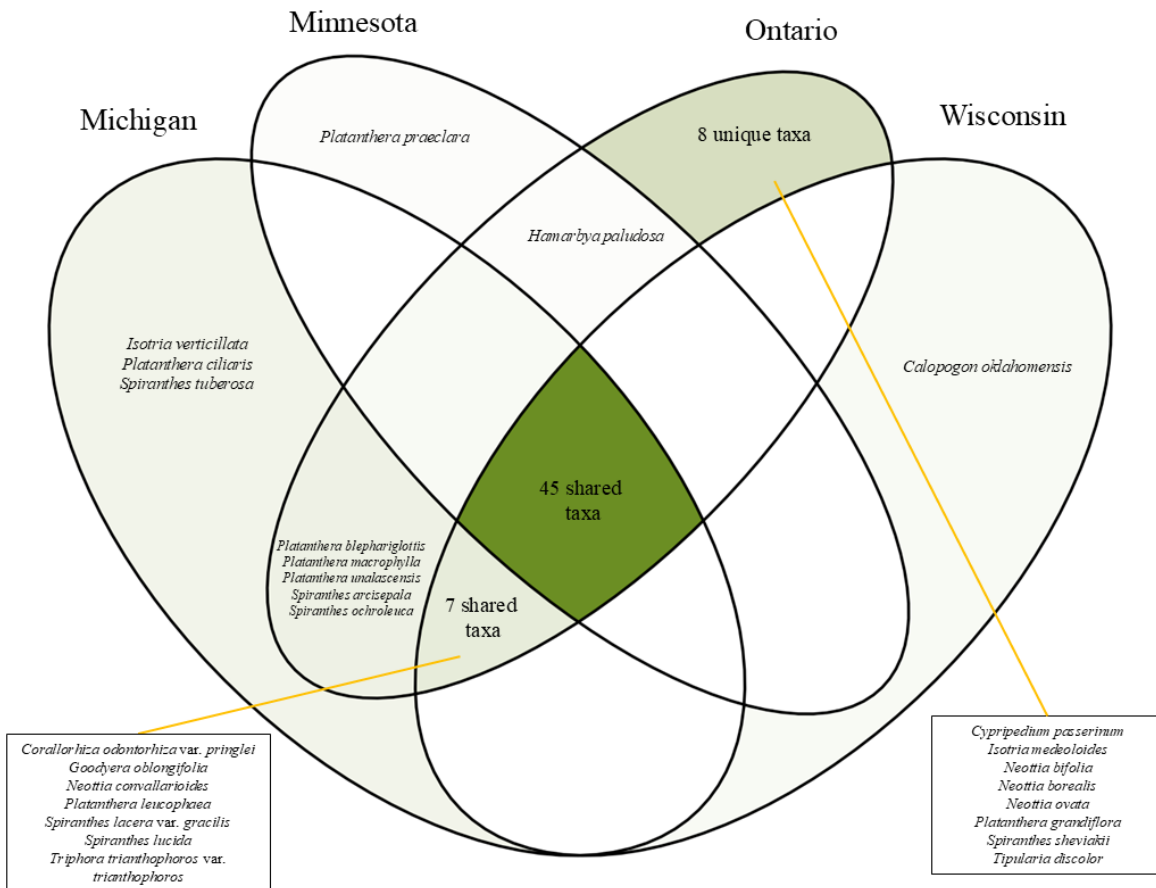


Figure 3. Venn diagram comparison of the orchid floras of the U.S. states of Michigan, Minnesota, and Wisconsin, and the Canadian province of Ontario. Cells are colored on a green color scale of highest similarity.

Wisconsin lies at or near the northern range limit of several North American orchids, including *Aplectrum hyemale*, *Calopogon oklahomensis*, *Spiranthes ovalis* var. *erostellata*, and *Triphora trianthophoros* var. *trianthophoros*, while also occurring near the southern range limit of species such as *Calypso bulbosa* var. *americana*, *Galearis rotundifolia*, and *Neottia auriculata*. Some southern species may experience continued northward expansion in coming decades as Wisconsin's climate changes, as appears to have occurred in *Spiranthes ovalis* var. *erostellata*. At the time of its recognition at varietal rank, *S. ovalis* var. *erostellata* had not yet been recorded from Wisconsin (Catling, 1983). Charles J. Sheviak both noted increasing collections of *S. ovalis* from regions north of its historically recognized range, with Sheviak (1974) reporting the species as far north as Knox County, Illinois.

Since the first Wisconsin collection in southwestern Grant County in 1990, *S. ovalis* var. *erostellata* has apparently expanded northward as far as Fond du Lac County. Observations of the taxon in Wisconsin have increased conspicuously since 2000, particularly when verified observations from the online platform iNaturalist are considered (Fig. 4). Although it is possible that the species was historically overlooked, it seems unlikely that it would have remained undetected across much of southern Wisconsin. Sheviak (1974) offered insight into the possible causes of this expansion, noting that the species “[has] become a plant of old fields and abandoned wooded pastures where it occurs with greater frequency than it ever did in its primeval moist woodland habitat.” The northward expansion of southern species into Wisconsin, as well as the loss of northern taxa from the southern portions of their ranges, has also been predicted by species distribution modeling and spatial phylogenetic analyses under climate change scenarios (Spalink et al., 2018). Consequently, future changes in climate and land use may alter the composition of Wisconsin's orchid flora through the extirpation of some native species and the arrival or expansion of others.

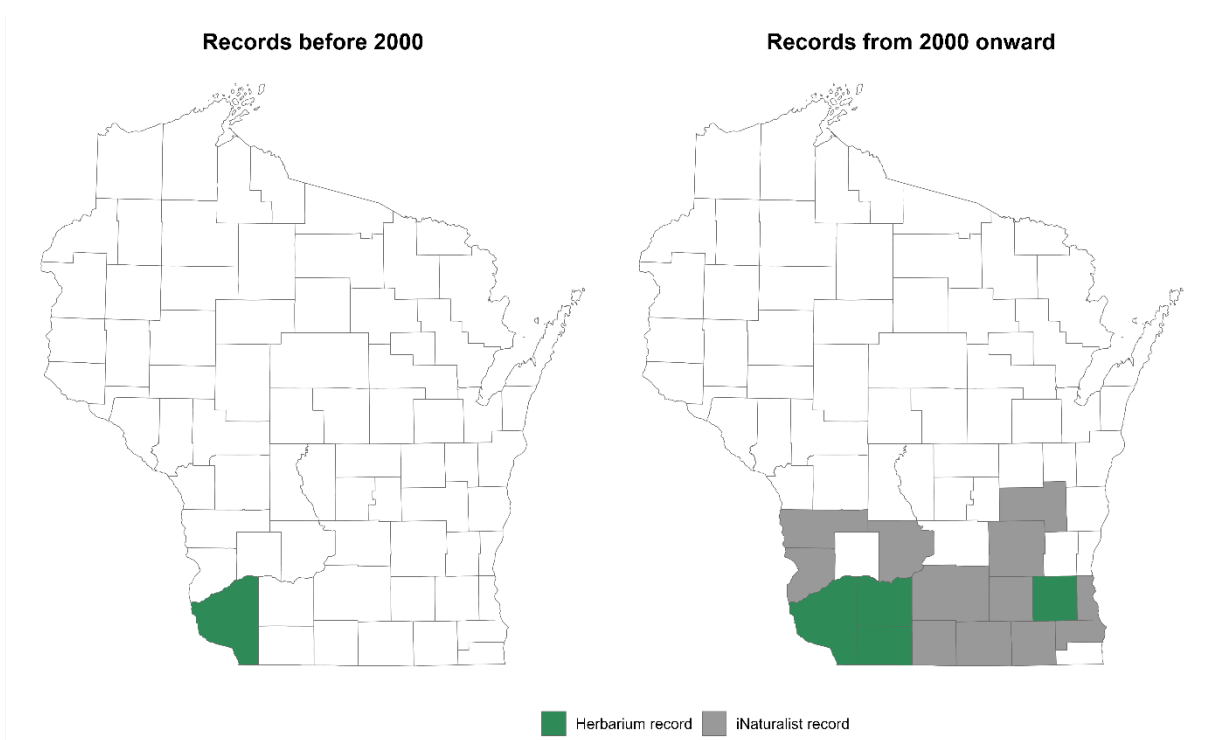


Figure 4. Records of *Spiranthes ovalis* var. *erostellata* from Wisconsin collected pre-2000 and from 2000 onward. Data compiled from herbarium records and iNaturalist.org.

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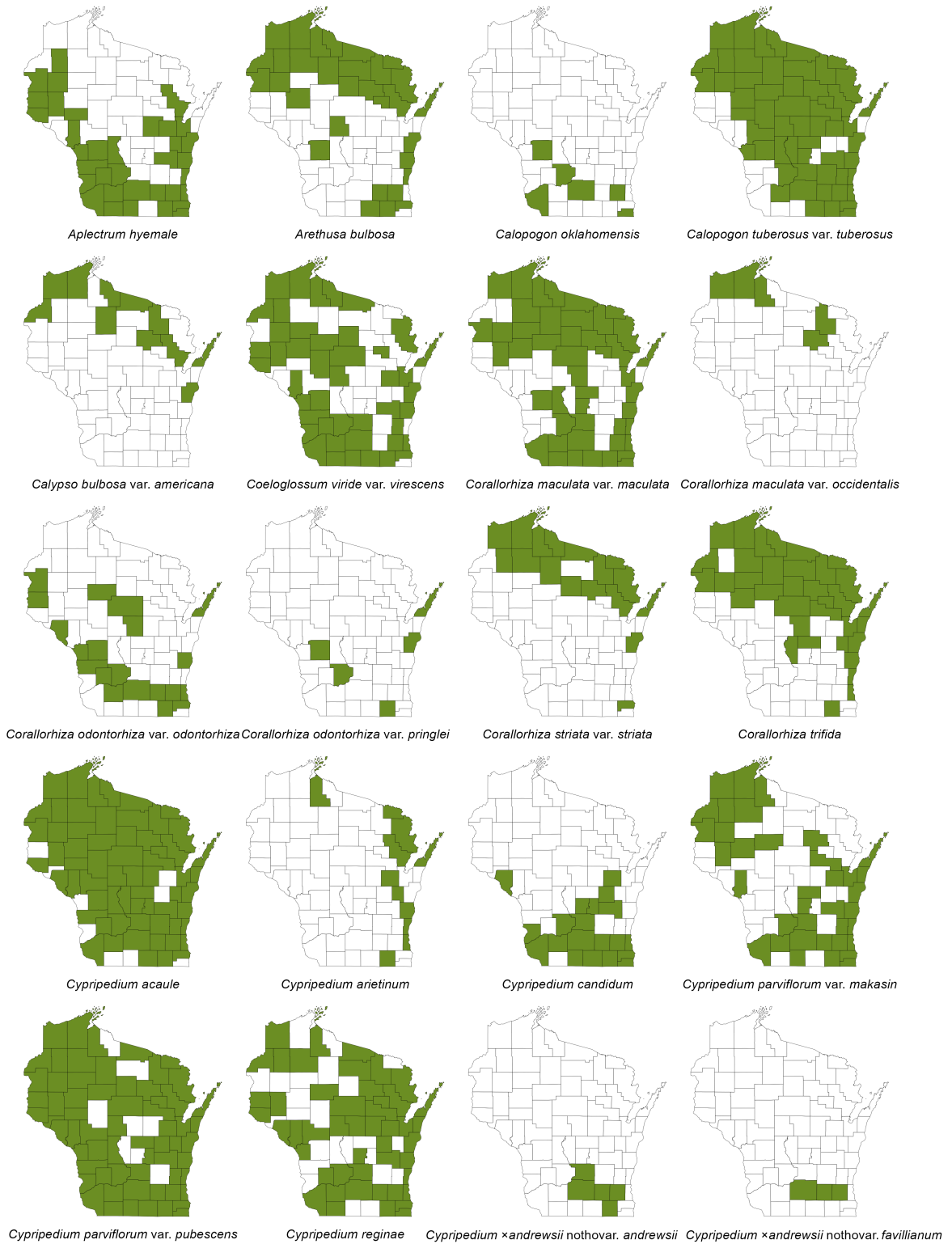
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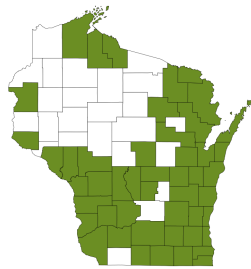
APPENDIX:

County distributional maps for the wild orchids of Wisconsin, USA compiled from herbarium records accessed from the Online Virtual Flora of Wisconsin (WisFlora) and from verified iNaturalist.org observations. Note that not all herbarium records have been examined and verified.

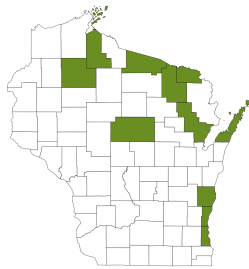
A large number of Wisconsin specimens under the name *Platanthera hyperborea* exist in herbaria. Species concepts within the *Platanthera diliata-hyperborea* complex (including *Platanthera aquilonis* Sheviak, *Platanthera dilatata* (Pursh) Lindl. ex L.C.Beck, *Platanthera huronensis* (Nutt.) Lindl., *Platanthera hyperborea* (L.) Lindl., and corresponding infrataxa, hybrids, and synonyms) have changed over time (Catling & Gange, 2025), and the names on the original labels and later determinations and annotations reflect concepts that were in use at those times. A contemporary annotation effort of Wisconsin material is needed to clarify the range and

status of each taxon. A county distribution map of specimens labelled *P. hyperborea* is provided in the appendix below, but the identity of each of these specimens is pending further review.

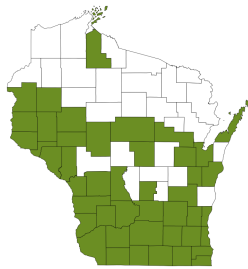




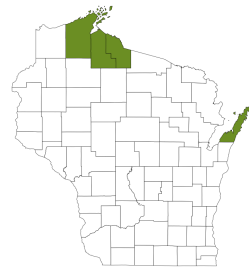
Epipactis helleborine



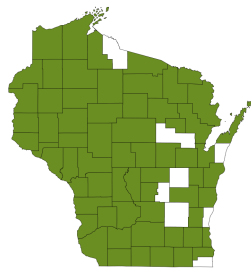
Galearis rotundifolia



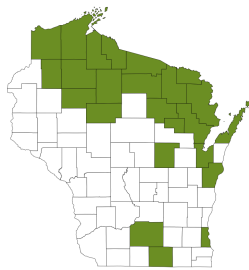
Galearis spectabilis



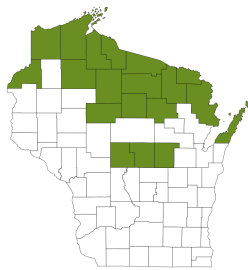
Goodyera oblongifolia



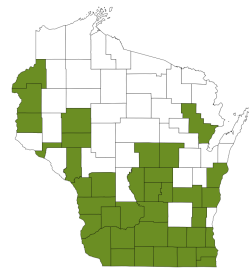
Goodyera pubescens



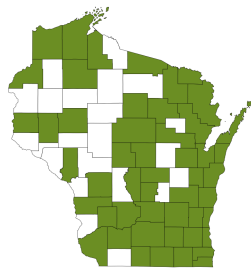
Goodyera repens var. *ophioides*



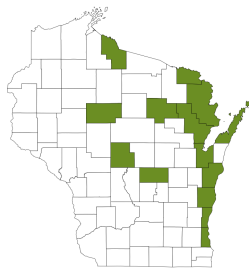
Goodyera tessellata



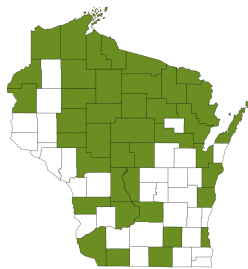
Liparis liliifolia



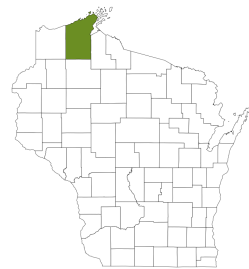
Liparis loeselii



Malaxis monophyllos var. *brachypoda*



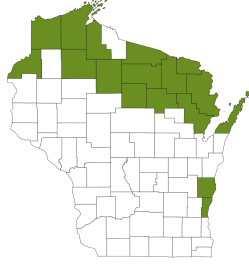
Malaxis unifolia



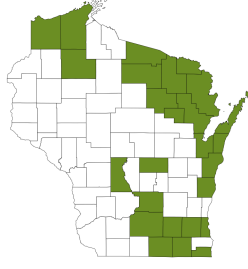
Neottia auriculata



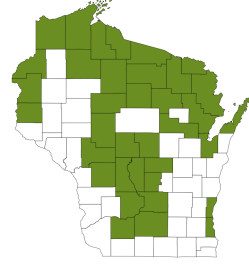
Neottia convallarioides



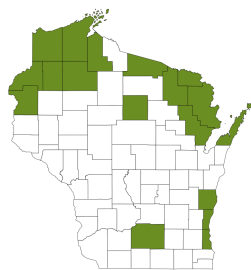
Neottia cordata



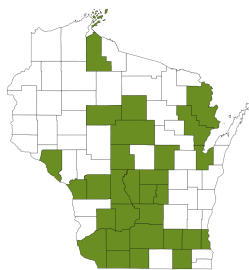
Platanthera aquilonis



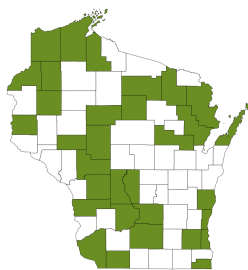
Platanthera clavellata



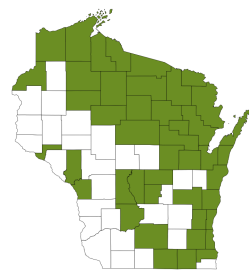
Platanthera dilatata var. *dilatata*



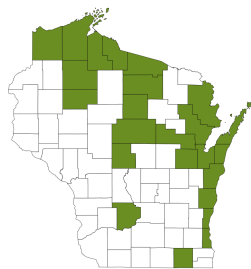
Platanthera flava var. *herbiola*



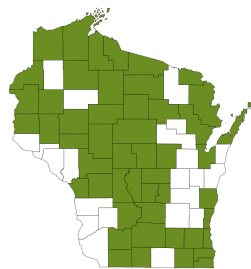
Platanthera hookeri



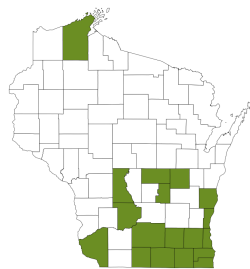
Platanthera huronensis



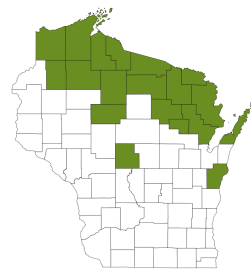
Platanthera hyperborea



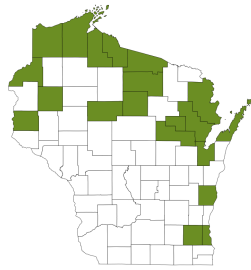
Platanthera lacera var. *lacera*



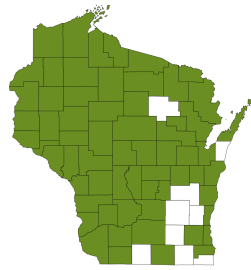
Platanthera leucophaea



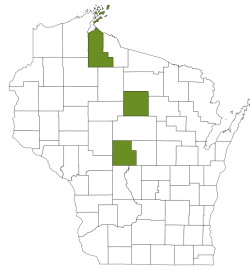
Platanthera obtusata var. *obtusata*



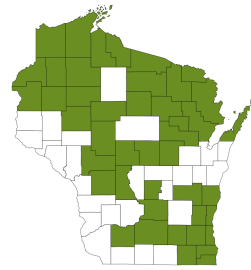
Platanthera orbiculata var. *orbiculata*



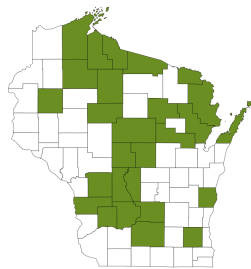
Platanthera psychodes



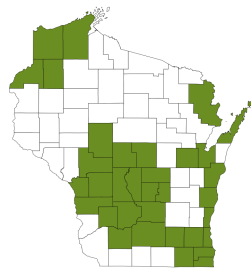
Platanthera ×*andrewsii*



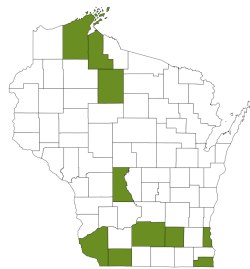
Pogonia ophioglossoides



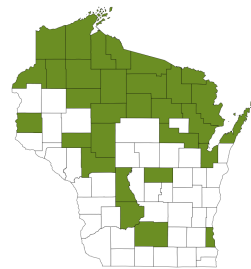
Spiranthes casei var. *casei*



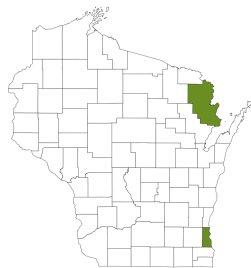
Spiranthes incurva



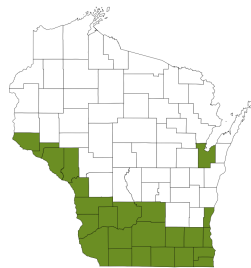
Spiranthes lacera var. *gracilis*



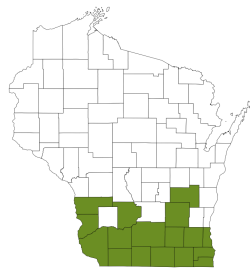
Spiranthes lacera var. *lacera*



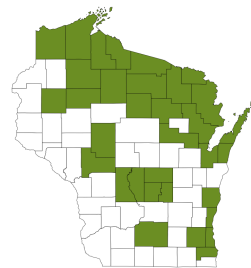
Spiranthes lucida



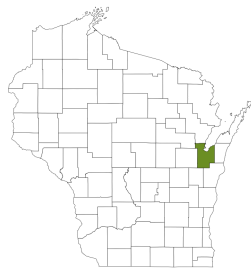
Spiranthes magnicamporum



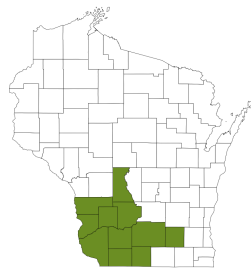
Spiranthes ovalis var. *erostellata*



Spiranthes romanzoffiana



Spiranthes ×*simpsonii*



Triphora trianthophoros var. *trianthophoros*

2026 CASE FUND GRANT RECIPIENTS

The Native Orchid Conference is proud to sponsor a research grant program in memory of Mr. Frederick W. Case, Jr.—teacher, botanist and an internationally acclaimed expert on the North American Orchidaceae, Sarracenaceae and Trilliaceae. The purpose of the grant is to support basic or applied research on orchids native to North America north of Mexico to university undergraduate or graduate students, or other approved researchers.

This year we are pleased to award Case Grant to four researchers:

Alison A. Autry

California Botanic Garden, Claremont Graduate University

Conserving Rare and Disjunct Orchids in a Changing American West: Ms. Autry is studying two rare orchids, *Spiranthes infernalis* and *Malaxis monophyllos* var. *brachypodia*, using multiple techniques including population genetics, phylogenetics and demographic monitoring. She will also examine pollinator and mycorrhizae interactions, and compare the genetic makeup of a wild population of *S. infernalis* with that of an *ex-situ* population at the Desert Botanic Garden. These data will aid efforts to protect and expand populations of both orchid species. Ms Autry was also a Case Grant recipient in 2023.

Flecher Falk

University of Northern British Columbia

The role of hybridization as an evolutionary process within the *Platanthera hyperborea-dilatata* complex: Mr. Falk will use his Case Grant to determine the whole genome sequence of *Platanthera dilatata* as his first step in studying the *Platanthera hyperborea-dilatata* complex and the role of hybridization in producing other members, particularly *P. huronensis*.

Braiden S. McAlpin

Appalachian State University

Transcriptomic Analysis of the *Cypripedium parviflorum* Complex: Mr. McAlpin will determine and compare the transcriptomes of flowers and leaves in three varieties of *Cypripedium parviflorum*: var. *parviflorum*, var. *pubescens* and var. *makasin*. A transcriptome tells us which genes are active and which proteins are present in a particular tissue.

Makayla Roberts

Texas A&M University

Examining the habitat of the critically endangered orchid *Spiranthes parksii*: Ms. Roberts is studying the habitat of *Spiranthes parksii*. She will compare sites where the orchids occur and ones without orchids. By surveying numbers and types of other plants present and comparing soil samples for nutrients and mycorrhiza, she will attempt to identify critical factors that determine the presence or absence of the orchid. This information will assist in habitat management and attempts to reintroduce or expand populations of this endangered orchid.

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May Ruden