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## CELEBRATING 10 CONFERENCES

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# Ten Years of the Native Orchid Conference

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Since many folks who are recent participants at conferences of our organization may not know our past history, here, in simplest terms, is an overview of what we have been and highlights of the first ten conferences that were held. This review was presented at our latest conference (2012) along with photo highlights of some of the species seen over the years (see front cover for examples and page 23 for a full conference review).

## Organizational History

- Started in 2002
- Initial meeting in Greensboro, NC attended by 75 people
- Goal is to
  - ✓ build an active network of native orchid enthusiasts, and
  - ✓ hold annual conferences in different areas of North America
- The purpose is to foster the
  - ✓ study
  - ✓ conservation, and
  - ✓ enjoyment of the native orchids
- Incorporated in the state of North Carolina on 21 March 2003
- Granted federal tax-exemption under section *501(c)(3)*
- Set up a free Yahoo web site in 2003
  @ http://tech.groups.yahoo.com/group/nativeorchidconference/
- As of May 2012, there are over 650 world-wide web viewers

## Past Conferences

| | |
|---|---|
| Greensboro, NC | May 17-19, 2002 |
| Hamilton, Ontario | June 14-18, 2003 |
| Conway, SC | August 7-10, 2004 |
| Winnipeg, Manitoba | July 9-12, 2005 |
| Ashland, OR | June 8-12, 2006 |
| Miami, FL | April 14-17, 2007 |
| Morgantown, WV | July 18-21, 2008 |
| Green Bay, WI | June 12-16, 2009 |
| Edmonton, Alberta | June 12-15, 2010 |
| Mt. Cuba Center, DE | July 30-August 2, 2011 |

This 2012 conference in Wilmington, NC — **our eleventh one** — brought us back to our roots with field trips to the Green Swamp and the North Carolina mountains.

# The Pollination Biology of the Cowhorn Orchid (*Cyrtopodium punctatum*) in Florida

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Neotropical orchids that reach the United States in southern Florida are often very rare and poorly studied in that state. Although research on the pollination biology of conspecific neotropical populations is sometimes available, geographical differences in pollinator distributions and other environmental factors can preclude applying the results of such studies to Florida plants. For this reason these orchids were excluded from *The Pollination Biology of North American Orchids* (Argue, 2012). The amount of information available on Florida populations is, however, variable, and for some species it is possible to provide a preliminary account of the breeding system, pollinators, pollination mechanisms, and other factors associated with reproductive success, while at the same time suggesting areas in which further work is needed or current ideas ought to be more carefully examined.

One recently studied example is the rare cowhorn or cigar orchid, *Cyrtopodium punctatum* (L.) Lindley. One of North America's most massive and spectacular orchids, this species can measure up to 1.5 m in width and sometimes produce over 500 flowers (Brown, 2002) (Figure 1, page 15). It is found from southern Florida and the West Indies to South America (Romero-Gonzalez, 2002). Once abundant in Florida, particularly in swamps of the Big Cypress region, over collecting and cypress logging since the early 1900s have dramatically reduced its numbers. Small populations are now largely restricted to inaccessible and protected areas such as the Florida Panther National Wildlife Refuge, Big Cypress National Preserve, and Everglades National Park (Figure 2, page 3). Even here, illegal collection continues to pose a threat.

In Florida *C. punctatum* is usually epiphytic, frequently on bald cypress (*Taxodium distichum* (L.) Rich.) and less commonly on cabbage palm (*Sabal palmetto* (Walter) Lodd. Ex Schult. and Schult. f.) or old cypress stumps and buttonwood mangroves (*Conocarpus erectus* L.) in full sun (Dutra, *et al.*, 2009). A bulky assemblage of large fusiform (cigar-shaped) pseudobulbs develops over a massive, matted root system (Figure 3, page 15). Erect panicles

arise laterally from the base of the pseudobulbs. Up to a meter or more in length, they usually bear 30-40 bright yellow flowers with irregular, reddish to purple markings (Figure 4, page 15). Individual flowers are 4-6 cm wide and bloom for about 13 days (Pemberton and Liu, 2008a). The lip is three-lobed and is attached basally to the column-foot by a narrow extension (claw) (Figures 4, 5a, b; pages 15 and 4). Its lateral lobes are erect and arch over the column. A short middle lobe with a verrucose margin bears a central callosity extending from its base to a tuberculate thickening midway between the lateral lobes (Correll, 1978) (Figures 4, 5b). The column is about 7 mm long, compressed, and club-shaped with a terminal anther enclosing a pair of yellow pollen masses or pollinia (Figure 5a, page 4). These are attached basally to a sticky pad, the viscidium, which adheres to the pollen vector. The pollinia, viscidium, and any inter-connecting parts are extracted as a unit and comprise the pollinarium (Figure 5c, page 4). Fruits are large, pear-shaped capsules that contain thousands of seeds and require a year to mature (Figure 6, page 16) (Luer, 1972; Ackerman, 1995).

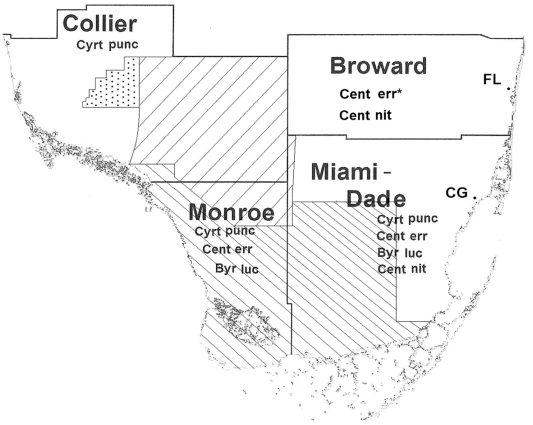


Figure 2. Map of South Florida showing currently known plant and insect distributions for each county. Dark lines mark county borders, lighter lines indicate boundaries of national parks, refuges, and preserves.
Abbreviations: Byr luc = Byrsonima lucida, Cent err = Centris errans, Cent nit = Centris nitida, CG = Coral Gables, Cyrt punc = Cyrtopodium punctatum, FL = Fort Lauderdale. Key: dots = Florida Panther National Wildlife Refuge, rising slanted lines = Big Cypress National Preserve, falling slanted lines = Everglades National Park.

* Pemberton and Liu (2008b) reported Centris errans in Broward County outside its previously established range (Pascarella, 2006).

Pemberton and Liu (2008a) and Dutra *et al*. (2009) found no evidence for spontaneous (*i.e.,* unassisted) self-pollination (autogamy) or asexual seed production (agamospermy) in studies of this orchid in southern Florida. Although it is self-compatible, the artificial transfer of pollen within a single flower or between flowers on the same plant (geitonogamy) produced fewer capsules than did the transfer of pollen between plants. Pemberton and Liu (2008a) observed no statistical differences in fruit set among these treatments, but Dutra

*et al*. (2009), based on a larger sample, found that significantly fewer capsules were produced by intraplant pollinations, and these were significantly smaller and had seeds with lower germination rates than those produced by outcrossing. Control plants included in this study that were left to be pollinated naturally (open pollinated) produced no capsules, but pollinaria were removed from some flowers, and capsules were observed on a few plants not included in the study, indicating that some natural pollination does occur.

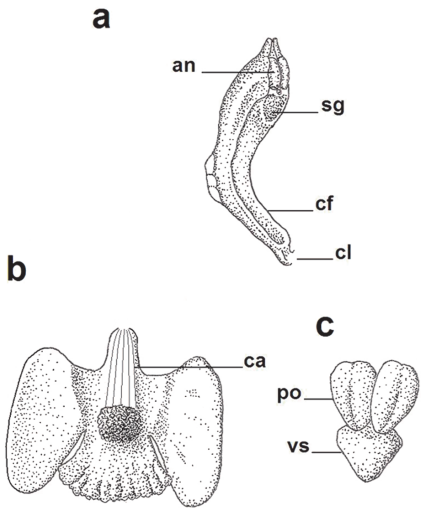


Figure 5. A. Column, B. Lip, C. Pollinarium. an = anther, ca = callus, cf = column foot, cl = claw, po = pollinia, sg = stigma, vs = viscidium. Drawn by the author.

Fruiting success can be limited by a number of factors including the amount and quality of pollen transferred and the quantity of resources (carbohydrate reserves, minerals, water) available for capsule and seed maturation (Charlesworth and Charlesworth, 1987; Sutherland, 1987). In orchids requiring an external pollinator, low levels of pollinator availability or activity are often assumed if, as in *C. punctatum*, a significant increase in fruit set is observed among flowers that are hand pollinated compared to those that are left to be pollinated naturally (Burd, 1994, but see Ashman *et al*., 2004).

Pemberton and Liu (2008a) and Dutra *et al*. (2009) consider that flowers of *C. punctatum* provide no food reward and, at least in Florida, attract visitors by deceit, using visual signals and a bouquet of aromatic compounds that insects associate with a food source. Non-rewarding flowers typically experience lower pollinator visitation rates and thus, lower levels of fruit and seed set than rewarding flowers. Tremblay *et al*. (2005), in a broad survey of the orchid family, found the median percent fruit set in non-rewarding orchids (20.7%) to be significantly lower than in rewarding species (37.1%). In North America, Neiland and Wilcock (1998) reported that fruit-set figures measuring the relative reproductive success of nectarless and nectar producing orchids averaged 19.5% and 49.3%, respectively, based on fruit to flower ratios. The persistence or selection of deception has therefore proved to be something of an evolutionary puzzle. Since non-rewarding orchids comprise about one-third of all orchid species, however, it may be assumed that this condition confers fitness advantages in some situations.

Two principal ideas have been advanced in an attempt to explain how deception could increase fitness. The first is that resources required for the production of a reward are limited and better reallocated to flower and seed production (Snow and Whigham, 1989; Ackerman and Montalvo, 1990). The second is that pollinators tend to visit fewer flowers and spend less time on the inflorescences of non-rewarding plants, resulting in a decrease in geitonogamy and an increase in cross-pollination (Hodges, 1981; Harder and Barrett, 1995; Johnson *et al*., 2004). Recent experimental studies have demonstrated that deception does promote outcrossing (*e.g.,* Jersakova *et al*., 2006 and references therein), a result that may be pertinent to the experimental observations associating artificial geitonogamy with decreased fecundity in *C. punctatum.*

The argument that deception is adaptive because rewards are costly is thought by some workers to be problematic because fruit and seed production in most orchids is severely pollen-limited rather than resource-limited and because small amounts of nectar are thought unlikely to significantly affect the energy budget of many orchids (*e.g*., Jersakova *et al*., 2006). We have seen that fruit production in *C. punctatum* appears to be pollen limited. The bulky assemblage of pseudobulbs likely house a large stock of reserves, and the availability of resources is reflected in the plant's capacity to produce extrafloral nectar in sufficient volume to attract the attention of a number of insects that do not visit the flowers of *C. punctatum* such as such as vespid wasps and halictid bees (Pemberton and Liu, 2008a). The allocation of resources toward the development of a large floral display is sometimes seen as an alternative to nectar production for the alleviation of pollinator limitation (*cf.* Hessing, 1988; Jersakova *et al*., 2006; Johnson and Niulsson, 1999; Catling and Kostiuk, 2011). *Cyrtopodium punctatum*, however, appears to have reserves enough to produce both nectar and a large floral display, suggesting that deception in this orchid could function primarily in the reduction of geitonogamy. Also, as a frequent epiphyte, *C. punctatum* may always have had a relatively discontinuous distribution. The production of floral nectar in dispersed, as opposed to clustered, plant populations is less likely to induce foraging constancy in pollinators (Heinrich and Raven, 1972) and would therefore also be less likely to significantly increase fitness.

*Cyrtopodium punctatum* does not function as a deceptive orchid everywhere. Although most of the aromatic compounds it produces are relatively common pollinator attractants (Kaiser, 1993; Dutra *et al*., 2009); two, indole and methyl salicylate, can be specifically associated with pollination by male Euglossine bees that gather the scents to attract mates (Williams and Whitten, 1983). Euglossine species collect both compounds in tropical America, and their role in the pollination of this orchid is well known in parts of its range (Pijl and Dodson, 1966; Jeffrey *et al*., 1970; Luer, 1972; Dressler, 1993; Ramirez *et al*., 2002, 2011). Under these circumstances the orchid is providing the bees with a legitimate reward. No Euglossine bees are native to Florida, but

one species, *Euglossa viridissima* Friese, is now naturalized in the southeastern part of the state (Skov and Wiley, 2005). There is, as yet, however, no evidence that it plays a role in the pollination of *C. punctatum* here. In a study at a residential garden in Fort Lauderdale, Brower County (Figure 2), Pemberton and Wheeler (2006) and Pemberton and Liu (2008a) observed no visits of *E. viridissima* to *C. punctatum* flowers during nine timed watches of over 15 hours on three cultivated plants bearing 473 flowers. The nine watches encompassed the entire blooming period of the orchid, and male *E. viridissima* bees were abundant during each watch. They collected pollen and volatile oils from several other species and visited the flowers of the perfume orchid, *Gongora powelli* Schltr., all within 1-4 m of *C. punctatum*, but although several bees hovered near the inflorescences of the latter, none were observed to touch the flowers. According to Pemberton and Wheeler (2006) and Pemberton and Liu (2008a), the flowers of *C. punctatum* differ in their fragrance components and morphology from the perfume orchids normally visited by *E. viridissima* and from the bee's other orchid and non-orchid sources of pollen, resin, nectar, and aromatic compounds (but see Dodson, 1962).

Several other introduced and native bees have been indicated as possible pollinators. In a study at the Florida Panther National Wildlife Refuge, Collier County (Figure 2), Dutra *et al*. (2009) reported that large carpenter bees, *Xylocopa micans* Lepeletier and *X. virginica* (L.), visited the flowers each year of a two-year investigation. *Xylocopa* bees are native throughout Florida and exploit a wide range of pollen and nectar sources, provisioning their egg chambers with pollen mixed with regurgitated nectar. Honeybees, *Apis melifera* L. and, rarely, carpenter-mimic leafcutter bees, *Megachile* x*ylocopoides* Smith, visited one year. Some flowers had pollinaria removed, but none of the visitors were observed carrying pollen to or from flowers, and capsule formation was very low. The honeybees are not large enough to remove the pollinaria. However, the species of *Xylocopa* Latreille may be capable. Ackerman (1995) believes that *Xylocopa* is a probable vector of *C. punctatum* pollen in Puerto Rico, and Dutra *et al*. (2009) consider it to be the most competent, potential pollinator of this orchid at their study site as well.

Pemberton and Liu (2008a) found that a small carpenter bee, *Centris nitida* Smith, recently naturalized in southern Florida, accounted for 90% of the visits to *C. punctatum* at their Fort Lauderdale site. However, despite the fact that 35 bees of this species visited at least 151 flowers over 255 minutes of timed observation, only one entered a flower, and it failed to remove any pollinaria. Even so, subsequent to the completion of one timed watch, a single female was captured bearing a pollinarium of *C. punctatum* attached to the back of its head. Four unidentified, small green halictid bees, an unknown small gray bee, and a monarch butterfly also entered or probed the flowers but did not contact the column or remove pollen.

In addition to pollen and nectar, female *Centris* bees collect floral oils to provision their brood and/or construct their nests (Simpson *et al*., 1977; Buchmann, 1987). Pemberton and Liu (2008a) believe the flowers of *C. punctatum* mimic those of oil rewarding taxa of the Malpighiaceae in an independently evolved syndrome similar to that found in *Oncidium* Sw. (Dressler, 1993; Chase *et al*., 2003). In both cases, female bees attempt to extract oils from the lip callus or interior of the flowers. Oil producing flowers of the native Long Key locustberry, *Byrsonima lucida* (Mill.) DC. (Figure 7, page 16), were planted about 15 m from those of *C. punctatum* at the Fort Lauderdale site and were open and available throughout the blooming period of the orchid. Females of *Centris nitida* visited them daily to collect oil and may have visited the similar looking, non-rewarding orchid flowers by mistake.

Elsewhere, a four-year survey (2002-2005) in Big Cypress National Preserve (Figure 2) located 22 widely scattered plants of *Cyrtopodium* (J. Saddle, personal communication in Pemberton and Liu, 2008a). Ten were reproductively mature, but only two fruiting plants were found, each bearing a single fruit. It is unclear if low fruit production is leading to population decline here or at other sites because it is not known if seed production, rather than factors such as seed germination and seedling development, is limiting. Although they could be present, *Centris* bees have not been collected in Collier County, which includes the Panther National Wildlife Refuge and most of the Big Cypress National Preserve (Figure 2) (Pemberton and Liu, 2008a). It was noted that large carpenter bees are possible pollinators at the former site, and additional, as yet unknown, pollinators of *C. punctatum* might be present both in this part of its range and elsewhere.

In a study at Fairchild Tropical Garden in Coral Gables (Figure 2), Pemberton and Liu (2008a) conducted five timed watches over four days in mid- to late-March on a single plant with 526 flowers. During this interval nine *C. nitida* bees visited 23 flowers and sometimes touched the calli on the lips but failed to fully enter the flowers. During the same interval, eleven females of a native *Centris* bee, *C. errans* Fox, completely entered 18 of 41 visited flowers. On two occasions they removed pollinaria, the viscidia again attaching to the back of the head. These bees collected the oil reward from flowers of *Byrsonima lucida* (Figure 7, page 16) located about 500 m from the plants of *C. punctatum*. They also collected oils from two non-native members of the Malpighiaceae, *Galphimia gracilis* Bartl. (Figure 8, page 16), a shrub located about 200 m from *C. punctatum*, and *Stigmaphyllon sagraeanum* A. Juss. (Figure 9, page 16), a vine about 20 m away. In contrast to *C. nitida*, a polylectic species, the foraging behavior of *C. errans* may be oligolectic (Pemberton and Liu, 2008b, but see Mitchell, 1962), a behavior that would promote cross-pollination within a single species. Pemberton and Liu's (2008a) observations are consistent with an earlier report identifying *C. errans* (as *C. versicolor* (Fabricius), synonymy according to Pemberton and Liu, 2008b) as a pollinator

of *C. punctatum* in southeast Florida (Dodson and Adams in Luer, 1972). A single carpenter-mimic leaf-cutting bee, *Megachile xylocopoides*, and a honeybee also visited the flowers but did not remove pollinaria. *Euglossa viridissima* was not seen in the Garden and has not yet been recorded for central or southern Miami-Dade County (Pemberton and Liu, 2008a).

Pollinaria removal rate (male success) and fruiting rate (female success) varied widely among the few inflorescences sampled at Fairchild Tropical Garden. Six of 12 plants flowered and three fruited. Comparisons were made with plants growing in Everglades National Park. *Centris* bee pollination in the Everglades might involve only *C. errans*, as *C. nitida* has not yet been collected there (Pascarella *et al*., 1999). A survey located 16 plants. Ten of these flowered, and three produced a single fruit each. Based on the limited sample, the probability of a given plant fruiting was not related to location (Everglades vs. Fairchild); however, the average number of flowers that produced fruit at Fairchild Tropical Garden was 18 times higher than in the Everglades, probably because of the presence of additional species and individuals of oil-rewarding plants in the Malphigiaceae at the garden compared to dispersed individuals of *Byrsonima lucida* in the park (Allee *et al*., 1949).

*Byrsonima lucida* is the only native wild member of the Malphigiaceae found in southern Florida (Wunderlin and Hansen, 2011). *Centris errans* is thought to be closely associated with this plant. Both occur in Miami-Dade and Monroe Counties in pine rockland and hammocks. Much of their habitat has been lost, and Pemberton and Liu (2008a) speculate that populations of *C. errans* have declined along with their principal food source. This decline could account for the low fruit set of *C. punctatum* observed in the Everglades. The relationship is complicated, however, by the fact that the *known* distribution of *B. lucida*, like that of *C. errans*, does not fully coincide with that of *C. punctatum* (Figure 2) (Pascarella, 2006; Wunderlin and Hansen, 2011).

Although the available data provide important information on fruit and seed set in *C. punctatum*, they leave a number of unanswered questions as well. It is clear that this orchid is not autogamous or agamospermous, depends on pollinators for seed production, and benefits from outcrossing. Capsule production within a given season in Florida appears to be limited by pollinator visitation rates, but long-term studies are needed to examine the effect of artificially enhanced pollination on lifetime fecundity. The capsules that do mature produce large numbers of seeds, but nothing is known of seedling recruitment. Proposed pollinators include *Centris* (especially *C. errans)* and more widely distributed *Xylocopa* bees. Mimicry of the oil producing *Byrsonima lucida* might be a significant strategy for *Centris* bee pollination, but we have seen that the currently known distributions of the orchid, its model, and its proposed *Centris* pollinators do not fully overlap. Moreover, Dutra *et al*. (2009) have questioned the role *Centris* bees play in the natural pollination of *C. punctatum* in Florida.

They note that Pemberton and Liu's (2008a) observations were made in artificial settings and based on a mixture of exotic and native plants of unknown origins planted in unnatural arrangements. It is evident that further studies will be needed to fully understand the reproductive biology of this orchid across its distribution in southern Florida. Once the necessary base-line data are gathered, scientists will be able to provide land managers with better information on which to base decisions affecting the long term survival of both the orchid and its pollinators.

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# Our New Friend – *Epipactis palustris*

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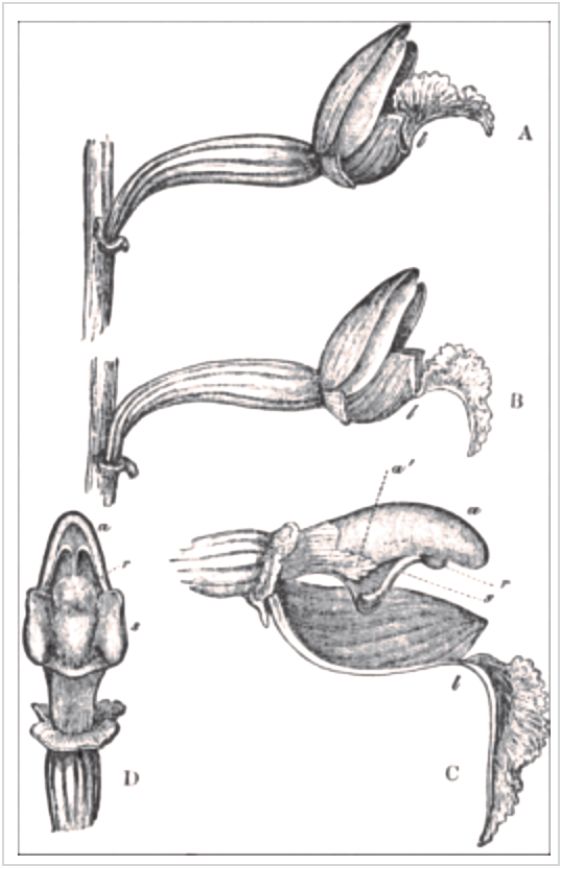
The proliferation of a few foreign orchids in the United States and Canada has been a sometimes welcome addition to our flora. Species such as *Epipactis helleborine* and *Oeceoclades maculata* have sometimes been considered weeds or invasive species. However, most orchid enthusiasts still consider all orchids a treat and not a nuisance. In Lancaster County Pennsylvania, we have mostly farm land and some rich wooded ravines along the Susquehanna River. There are limestone areas along the river valleys which produce abundant species of lime loving orchids such as *Aplectrum hyemale* and *Galearis spectabilis*. In the small village of Safe Harbor, there are two abandoned limestone quarries. One of the quarries is mostly wooded over, but in recent years may be opening up due to tree loss. The other is an open fen like area. The ground water table is at the surface which has allowed the formation of a bog mat on one sunny end of the quarry. Back in June 1991, local botanist Tim Draude and I visited the quarry based upon a 1970s herbarium record for *Spiranthes lucida*. We found approximately 50 plants in bloom along with *Liparis loeselii* (Figures 1-2, page 17). Over the subsequent years, I continued to visit the site. The bog area started to shrink due to the encroachment of a non-native arborvitae. Through the help of Joan King and Bob and Amy Sprague, we were able to cut down all of the arborvitae to keep the bog area opened up in 2009-2011.

In 2007, I attempted an experiment of introducing one plant of *Epipactis palustris* to the quarry. This species has a creamy white flower with yellow and red markings (Figures 3-4, pages 17-18). Since the quarry is a bowl like habitat with no other suitable habitat, I felt safe that the species would not become an issue locally. The Epipactis like sunny and wet limestone areas in Europe. The quarry is the only suitable habitat within the county for it. In 2008, the original plant appeared to divide and produce five new plants at the same location. I visited the site in late 2008 to do some pruning and found that the plants had set seed. In 2009, I counted over 15 plants — some along the bog edge and some up in the sunny drier limestone areas of the quarry. By 2012 there were 20+ blooming plants and likely 50+ vegetative plants scattered throughout the open quarry. The plants seem to be thriving and seeding readily. In June 2012, Duane Erdmann photographed a flower and a visiting fly with pollen on its wing (Figure 5, page 18).

The quarry is a special habitat. The land is owned by the local utility (PP&L) but is tucked away and hard to find. The only real menace is the deer population. I have also introduced plants of *Gymnadenia conopsea*, *Epipactis atrorubens*, *Cypripedium candidum* and *Cypripedium reginae* to the quarry in recent years. So far, the plants are stable. Only time will tell if they will thrive. It should be noted that the type locality for *C. candidum* was Lancaster County, PA. This is the first time this species has been back in the county since the early 1900s, when it was extirpated.




*Epipactis palustris*
Terrestrial Orchid Gallery - Charles Darwin, 1862
flower morphology - drawing

# Valmont Bog, PA – Update

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***A Conservation Project in Progress in a Most Unlikely Place*** — that was the title of my presentation at the NOC conference last year (2011) at Mt. Cuba Center in Hockessin, DE during which I discussed the Hazleton bog. Brief mention was also made of the bog in the *Native Orchid Conference Journal*, Volume 8 (4) Oct.-Nov.-Dec. 2011. Earlier this year I reported on the Yahoo site that the North Branch Land Trust (NBLT) had completed the purchase of the bog which will henceforth be known as the Valmont Bog. It is so named for the **industrial park** in which it is found. What an odd circumstance.

Those who attended last year's conference and visited the bog will recall that it is the site of one of the largest known populations of *Platanthera ×bicolor*, the natural hybrid of *P. blephariglottis* and *P. ciliaris*. It is a hybrid swarm which includes many color expressions of the cross. (*Note:* Matt Richards and his associates at the Atlanta Botanical Gardens are monitoring a recently discovered site in Georgia which is very reminiscent of the Valmont Bog.)

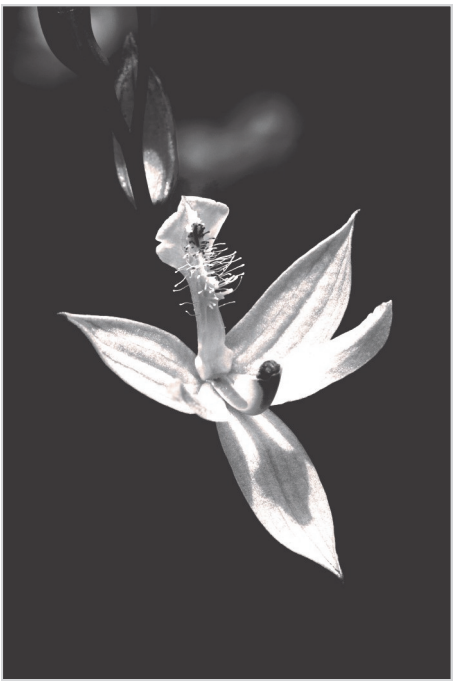
**UPDATE — June 25, 2012:** At the ~~suggestion request urging~~ insistence of our *NOC Journal* editor, I submit this update on the project.

Like many things in life, the Valmont Bog is associated with "good news and bad news." First the good. 1) NBLT acquired title to approximately 59 acres in the industrial park, 2) they began a concerted effort to publicize the project, 3) Pennsylvania Power and Light (PP&L) made repairs to their service road (PP&L owns an easement through the bog; their road washed out and dumped sand onto prime orchid habitat), 4) yesterday we conducted a guided tour of the bog, and 5) today (June 25) we begin in earnest, discussions with PP&L.

And now the bad. 1) NBLT acquired approximately 59 acres in the industrial park (unfortunately, that's not enough as it only includes a small part of the actual bog), 2) they began a concerted effort to publicize the project (this goes to the very subject we have been discussing recently … when does revealing the location of rare plants and sensitive habitat become problematic), 3)

PP&L made repairs to their service road (in the process, they dumped 6" of rip -rap on top of orchids), 4) on June 24 we conducted a guided tour of the bog (NBLT arranged a terrific outing which included my slide presentation, refreshments and detailed instructions about how to carefully view the large population of *Calopogon tuberosus* which also inhabits the bog. It attracted morning and afternoon groups, each about 35 people, who seemed genuinely interested and very committed to conservation. Duane Erdmann, Rudy Keller, Amy and I acted as docents, each of us taking 8-10 people down the dirt lane into the bog. Despite our admonitions and best efforts, one woman bolted from the group. In her exuberance, she stepped off the road before we could stop her, attempted to photograph the first blooming *Platanthera* of the season, stepped on newly emerging orchids and broke off not just one, but five green spikes), and 5) today we begin in earnest discussions with PP&L (and not a minute too soon … new surveyor's stakes in the bog and a bulldozer nearby reveal intentions that are surely not in the best interest of the orchids).

NBLT Executive Director Paul Lumia expressed his sincere thanks to the NOC for our help thus far in developing this project in a way that offers passive recreation to the public while still protecting the orchids … not an easy task. He promised to continue working with us and will, as much as possible, yield to our technical advice. Much remains to be done … stay tuned.



More than 200 plants of *Calopogon tuberosus* were at peak blooming. Many color variations excited those on the guided tour of Valmont Bog, Hazelton, PA June 24, 2012.

Figures to accompany "The Pollination Biology of the Cowhorn Orchid (*Cyrtopodium punctatum*) in Florida" by Charles L. Argue, page 2. Photo providers as noted.


1. Plant of *Cyrtopodium punctatum*. Photo courtesy of R. L. Hammer, © Roger L. Hammer.


3. Pseudobulbs and roots of *Cyrtopodium punctatum*. Photo courtesy of R. L. Hammer, © Roger L. Hammer.


4. Flowers of *Cyrtopodium punctatum.* Photo courtesy of Belize Botanic Gardens.

6. Capsules of *Cyrtopodium punctatum*. Capsules are up to 8 cm long and 3-5 cm in diameter. Photo courtesy of Jim Fowler © 2012.
7. Flowers of *Byrsonima lucida*. Photo by Pedro Acevedo-Rodriguez, courtesy of Smithsonian Institution.
8. Flowers of *Galphimia gracilis*. Photo courtesy of Gerald D. Carr.
9. Flower of *Stigmaphyllon sagraeanum*. Photo courtesy of Daniel Nickrent and the photoimages website.

Figures to accompany "Our New Friend – *Epipactis palustris*" by Mark Larocque, page 11. Photos by author unless noted otherwise.




1. *Liparis loeselii.*
2. *Spiranthes lucida.*
3. *Epipactis palustris* in habitat.


4. *Epipactis palustris* — close-up
5. Syrphid fly bearing pollinarium — photo by Duane Erdmann

Figure to accompany "How to Win a Photo Contest: An Overview of Shaken Creek Preserve" by Robert Thornhill, page 28. Photo by author.

A rare and magnificent stand of the yellow pitcher plant, *Sarracenia flava*.

Figures to accompany "2012 Native Orchid Conference Overview" by Ben Rostron *et al.* Photo credits as noted.




Some of the highlighted orchids from the 11th NOC Conference are featured. Photos by Duane Erdmann.

1. *Calopogon tuberosus*, an alba form
2. *Spiranthes praecox*
3. *Spiranthes vernalis*



Photos by Ben Rostron.

4. *Cleistes bifaria*

5. *Cleistes divaricata*




Photos by Duane Erdmann

6. *Listera smallii*

7. *Listera smallii*, close-up

8. Seed pods on *Isotria verticillata*

*Conference Talk Synopsis —*

# 2012 Native Orchid Conference Overview

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The 2012 Native Orchid Conference (NOC) convened in Willington, North Carolina May 19-21 and continued in the Brevard, North Carolina area on May 23. This year's organizers, Mark Rose and David McAdoo, arranged for lectures to be held at the University of North Carolina - Wilmington. They also made use of the area's lush orchid habitats that included the Green Swamp and the Smoky Mountains.

Day one's session, May 19, began with Mark, current NOC president, welcoming everyone to this, the eleventh conference. Jim Fowler, noted author and excellent photographer, gave a photographic tour of the plants that should be seen on the tours and particularly focused on "Flora of the Green Swamp." Melissa McCormick, a researcher with the Smithsonian group, shared an update on the "Research Advances and Conservation of Small Whorled Pogonia."

John Horner, with help from Bettie Creutz, shared highlights of their trip to "The Anza Borrego Desert: A California Botanical Paradise" that featured *Epipactis gigantea*. Moving on to an update on conservation efforts, Ron Coleman spoke about "The Orchid and the Coppermine." His relentless efforts to systematically help save species *Hexalectris colemanii* was an inspiration for many. Mark Rose ended the day talking about "*Isotria medeoloides* - America's Most Elusive Native Orchid?" The day was capped with an opportunity to have refreshments and interact with old and new native orchid lovers.

Attendees moved out early on day two in three groups to cycle through orchid areas near the Wilmington area and the Green Swamp. Highlights included: *Calopogon tuberosus* - both the pink and alba forms (Figure 1, page 20), several perfect specimens of *Cleistes divaricata* (Figure 5, page 21), many *Pogonia ophioglossoides*, uncountable numbers of *Spiranthes vernalis*, and

*Spiranthes praecox* (Figures 2-3, page 20). In addition, participants were treated to seeing the native habitat of *Epidendrum magnoliae*, many different species and hybrid pitcher plants (*Sarracenia*), butterwort (*Pinguicula*), sundews (*Drosera*), rare milkweeds (*Asclepias*), and abundant (even flowering) Venus fly traps (*Dionaea*).

On Monday, the group once again convened at the University to hear Melissa McCormick — this time speaking on "Native Orchids - Complex Species That Require a Central Focus for Conservation." This update generated much enthusiasm and support from the attendees; so much so that later the NOC presented her organization, NACCO, a check for $1,000.

Since many people come to photograph native orchids and other flora in their native habitat, it was appropriate that David McAdoo, with help from Jim Fowler, led an open discussion on photographing flora in the wild. Many tips were shared.

Robert Thornhill, a graduate student at NC State University, enthusiastically talked about "Shaken Creek Preserve: The New Green Swamp?" He reviewed the studies he has been undertaking as well as the various genera he has been finding and the habitat in which they are growing. The audience was entranced by his time lapse photographs of controlled burns, how quickly the ecosystems recover, and how beneficial they were for orchid habitats.

Later, Ron Coleman also pinch hit with his talk on "Orchids of Big Bend National Park."

Following the business meeting that included reports on the Fred Case scholarship fund, the state of the conference's journal (it will continue as is) and elections (the current members of the board agreed to stay on for another term), David McAdoo took the attendees through a nostalgic photographic review of the "Ten Years of the Native Orchid Conference" conferences. The Colemans served birthday cake.

Tuesday was open for everyone to travel at their leisure to the Brevard, North Carolina area. Some people had arranged individual field trips along the way and enjoyed the beautiful scenery along the Blue Ridge Parkway. Trekkers saw *Cypripedium acaule*, *Goodyera pubescens* (not in bloom), and many types of rhododendrons/azaleas.

Day two of the conference field trips took place Wednesday. The group first went to the Ashmore Heritage Reserve where they were treated to more *Calopogon*, *Pogonia*, a rare pitcher plant (*Sarracenia jonesii*), several non-flowering orchids, with the highlight being a flowering specimen of *Cleistes bifaria* (Figure 4, page 20). The group split into two with some visiting private

property with our hostess from the local garden club to view blooming *Liparis liliifolia*. The other group headed up into the Smokies to take on several more orchid areas. Most people were awed by an old graveyard site with a huge number of seed pods of *Isotria verticillata* (Figure 8, page 21). Additionally, some people opted to visit a location hosting rare *Isotria medeoloides,* unfortunately not in flower!

The last planned stop of the field trip was up the Parkway into the Smokies to see dozens of *Galearis spectabilis* with seed pods and blooming *Listera smallii* (Figures 6-7, page 22) hidden under large rhododendrons.

The organizers might have been disappointed with the number of native orchid species that cooperated, but the attendees renewed old acquaintances, appreciated the beauty of the two areas, saw nine native orchid species flowering and three out of bloom, and generated enthusiasm for attending the 2013 Native Orchid Conference (see page 26).

Highlights of the talks, submitted by the speakers, follow.

## Speakers

**Flora of the Green Swamp** .....Jim Fowler

Developed an early interest in nature in general and wildflowers in particular. An independent botanist and a retired software systems developer. Jim holds B.S. and M.S. degrees from Clemson University. He is a frequent contributor to several journals, the author of *Wild Orchids of South Carolina: A Popular Natural History* (2005) and his photographic images of native orchids have appeared in numerous magazines, newsletters, and websites.

**Research Advances and Conservation of Small-whorled Pogonia** ..... ..... Melissa McCormick

Ecologist at the Smithsonian Environmental Research Center with a PhD in Ecology, Evolutionary Biology and Behavior from Michigan State University. Her current research focus is on mycorrhizal associations and how they affect the distribution of host plants, especially orchids. She is particularly interested in how invasive species and environmental change can affect orchids indirectly through effects on their mycorrhizal fungi. She has published 12 papers.

**Native Orchids – Complex Species that Require a Central Focus for Conservation (NAOCC Report)** ..... Melissa McCormick

**The Orchid and the Copper Mine** .....Ron Coleman

Retired electronics engineer. Ron devotes weekends and vacations to seeking and studying native orchids. He has published over 30 orchid articles, and his authorship includes *The Wild Orchids of California* (1995) and *The Wild Orchids of Arizona and New Mexico* (2002). He is a published native orchid photographer.

**Orchids of Big Bend National Park** ..... Ron Coleman

(Not reviewed in this summary.)

**Shaken Creek Preserve: The New Green Swamp** .....Robert Thornhill

Plant biology graduate student at NC State University. His research has involved inventorying the flora of, comparing the vegetation of, and creating an identification guide to the savannas of Shaken Creek Preserve (Pender County, NC). He hopes (foolishly?) to make a living studying plants.

**Ten Years of the Native Orchid Conference** ..... David McAdoo

Co-founder and past president of the Native Orchid Conference and co-organizer of this year's Conference. David is a published native orchid photographer, a retired business director and a distinguished, highly decorated veteran as a helicopter pilot in Vietnam.

***Announcing the***

# 2013 NOC Conference

**Save the date:** Our 2013 NOC Conference is firming up and we have tentative plans for our meetings in Oroville, California. The dates are June 10-14, 2013. This is a slight change as we will be holding the conference during the week instead of the weekend as in the past. Please mark your calendars and we will have more definite details in the next issue of the *Journal*. The field trips look to be spectacular also!!

*Conference Talk Synopsis —*

# Green Swamp

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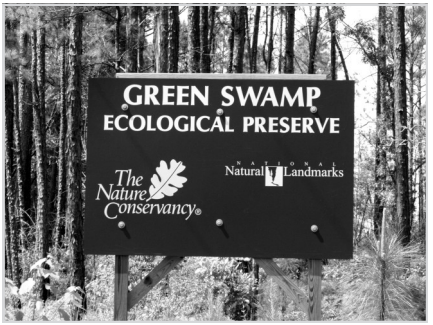


The Greater Green Swamp is an area in southeastern North Carolina, comprising portions of Brunswick and Columbus Counties. It provides safe harbor for many endemics and other plants that are rare to North Carolina. Included in this plant list are more than two dozen native orchid species and more than three dozen species of carnivorous plants.

The center of attention of the Greater Green Swamp is the 16,000 acre Green Swamp Preserve. It is managed by The Nature Conservancy, which provides periodic prescribed burns to mimic the seasonal ground fires that were historically present. The purpose of these periodic burns is to remove fast-growing woody shrubs so that the native grasses and other forbs can flourish.

The numerous native orchid species provide flowers from February through November and are among some of the most striking native orchids found on the Atlantic Coastal Plain. The Green Swamp Preserve is probably more well-known for its spectacular list of carnivorous plants. These include *Sarracenia* (pitcher plants), *Drosera* (sundews), *Dionaea* (Venus' fly-traps), *Utricularia* (bladderworts), and *Pinguicula* (butterworts). The Green Swamp Preserve is ground zero for the rare and endemic Venus' fly-trap. It is a federally protected species and is present in great numbers in several areas of the Green Swamp Preserve.

In addition, there are a number of wildflowers that are state species of concern. Some of these wildflowers are found in states either much farther north or much farther south. This convergence of unusual species and unique environments makes The Green Swamp a must-visit for those whose interests lie with native orchids and carnivorous plants.

*Conference Talk Synopsis —*

# How to Win a Photo Contest: An Overview of Shaken Creek Preserve

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A tour brochure for botanists, if such a thing existed, would certainly feature the Venus Flytrap (*Dionaea muscipula)* on the cover of the "North Carolina, Coastal Plain" edition. (Or, since this is an orchid journal, maybe a rare *Platanthera* would be better?) But if a landscape photo were needed for the back cover, I think I know the perfect place. Shaken Creek Preserve, a 6050-acre tract in Pender County, North Carolina, provides one of the state's best remaining examples of the now-rare longleaf pine savannas that once dominated the coastal plain from southern Virginia to eastern Texas. Until its purchase by The Nature Conservancy in 2003, Shaken Creek Preserve was owned and managed by a private hunting club, whose periodic burns of portions of the site (conducted as much, I think, for aesthetics and recreation as for alleged hunting benefits) not only preserved the beauty of the savannas, but also maintained their ecological integrity. Thus, when the site was "discovered" by botanists in the 1990s, preliminary surveys found twenty-two state-listed plant species, three of which were federally endangered: Cooley's meadowrue (*Thalictrum cooleyi*), golden sedge (*Carex lutea*), and roughleaf loosestrife (*Lysimachia asperulifolia*). (The observation of the red-cockaded woodpecker (*Picoides borealis*) at Shaken Creek Preserve brought the total number of federally-endangered species to four, more than any other site in North Carolina.) Interestingly, the savannas themselves also represented a unique diversity, with four distinct types of Wet Pine Savanna communities (as classified by the North Carolina Natural Heritage Program) occurring on site—another unique feature of the property. By the time I was introduced to the site in 2010, one of the savannas, which contained one of the largest known populations of Cooley's meadowrue and golden sedge, had already been dubbed "The Holy Grail." The site was approaching the mythic.

Yet, for all its growing fame, no systematic inventory of the savannas on site had been conducted; previous surveys had focused predominantly on only a few areas (those of the highest-quality) and had been conducted sporadically over the years rather than at regular intervals throughout consecutive growing seasons. To fill this gap in our knowledge of the site—and as an excuse to get to go botanize in such a cool place!— I began a floristic inventory of all the savannas on site in August 2010. (Somehow, this project is counting towards

my master's degree in plant biology at North Carolina State University. Could life be better?) The specific goals of my project are to 1) document the vascular flora of the savannas with voucher specimens and tissue samples; 2) compare the vegetation and soils of the four wet pine savanna communities on site; and 3) create a taxonomic manual (complete with keys, synonymy, phenology, notes on abundance, and illustrations) of the savanna flora. To date, I have spent 55 days of field work on site and collected 392 taxa, a significant increase over the 227 species previously reported from the preliminary site inventories. Notably, six previously-unreported state-listed species have been found, and several new populations of both state-listed and federally-endangered plants have been discovered. As to be expected, the grass (*Poaceae*), sedge (*Cyperaceae*), and sunflower families (*Asteraceae*) are the richest families, though the Orchidaceae comes in a respectable fifth with a total of eleven species. (See table at the end of the article for a listing of orchids reported from the savannas on site.) Among genera, the beaksedges (*Rhynchospora* spp.), witch-grasses (*Dichanthelium* spp.), and rushes (*Juncus* spp.) are the three richest, with a total of 27, 16, and 11 taxa, respectively. And if you're reading too fast and didn't fully absorb that last sentence, let me repeat: 27 species of beaksedge! For all you sedge-ophiles, welcome to paradise!

Alas, all good things must come to an end, and my floristic study will conclude in December. (Leaving a paradise, even of beaksedges, is never easy.) Ultimately, the data from this study will provide the baseline information critical for optimal management and future biological and ecological research on site. Through the creation of a floristic guide (see goal 3 above), this study will also provide a valuable educational resource for anyone interested in the exceptional flora of Shaken Creek savannas and similar sites. And perhaps someday, when botany overtakes basketball as the pride of all North Carolinians and the state Department of Transportation holds a photo contest for its first botany brochure, this study will furnish a sure-fire winner. (See photo on page 19.)

**ORCHIDACEAE of Shaken Creek Preserve Savannas**

| Scientific Name | Common Name |
|---|---|
| *Calopogon barbatus* (Walter) Ames | Bearded grasspink |
| *Calopogon pallidus* (Chapman) | Pale grasspink |
| *Calopogon tuberosus* (L.) B., S., & P. *var. tuberosus* | Tuberous grasspink |
| *Cleistesiopsis divaricata* (Linnaeus) Pansarin & F. Barros | Rosebud orchid |
| *Platanthera conspicua* (Nash) P.M. Brown | Large white-fringed orchid |
| *Platanthera ciliaris* (Linnaeus) Lindley | Yellow fringed orchid |
| *Platanthera integra* (Nuttall) A. Gray ex Beck | Yellow fringeless orchid |
| *Pogonia ophioglossoides* (Linnaeus) Ker-Gawler | Snakemouth orchid |
| *Spiranthes cernua* (Linnaeus) L.C. Richard | Nodding lady's tresses |
| *Spiranthes laciniata* (Small) Ames | Lacelip lady's tresses |
| *Spiranthes praecox* (Walter) S. Watson | Greenvein lady's tresses |

*Conference Talk Synopsis —*

# The Orchid and the Copper Mine

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This talk reviewed the ongoing saga involving a rare orchid and a copper mine. The orchid is *Hexalectris colemanii* and the copper mine is a proposed development in the Santa Rita Mountains south of Tucson, AZ.

Coleman has been studying the recently described *H. colemanii* since 1995, and his data were the only ones available when the U. S. Forest Service decided to investigate the potential impact of proposed mining activities upon the orchid. Coleman emphasized that even an amateur can contribute to scientific discussions by conducting long-term field studies and documenting and publishing the results.

The issue was to determine if the orchid is sufficiently rare to be deserving of endangered species protection. There are pending petitions to make *H. colemanii* an endangered plant within the meaning of the Endangered Species Act. Therefore it is necessary to know the exact range of the orchid and the total number of plants. Coleman's initial research had found only three locations with a total of about 100 plants.

Coleman agreed to teach a classroom session about *H. colemanii* and led field trips showing Forest Service personnel and botanists working for the copper mine how to identify the orchid and the type of habitat it grows in. The objective of this effort is to have all parties involved in decision making agree on the numbers and distribution of *H. colemanii*. If the data show the orchid is in fact as rare as Coleman believes it to be, the Forest Service will then have data necessary to help determine ways to mitigate the impact of the mine upon the orchid's environments.

Two years of field searches by botanists, including a team contracted by the U. S. Fish and Wildlife Service, have been able to identify several sites beyond those initially known by Coleman. The total number of plants is now greater than 200. At the time of this talk, it is unknown what the final resolution of the investigations will be.

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Ron also graciously filled a last minute vacancy with his talk on **Orchids of Big Bend National Park** .

*Conference Talk Synopsis —*

# Research Advances and Conservation of Small-whorled Pogonia

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Orchids are widely threatened or endangered worldwide, and the small-whorled pogonia, *Isotria medeoloides*, is considered one of the most endangered orchids in the United States. Challenges to conservation of this orchid are many. Early in life, orchids rely entirely on mycorrhizal fungi for all nutrition. Many orchids supplement their nutrition at every stage in their lifecycle by continuing to digest mycorrhizal fungi, but all species, except those that have no green leaves, also fix carbon through photosynthesis. The life cycles of many orchids, including *I. medeoloides*, also include periods, sometimes lasting for years, when the plants are physiologically active but do not produce any aboveground tissues during an entire growing season. These periods are referred to as vegetative dormancy, and high rates of dormancy are associated with declining populations in many orchids (*e.g.,* Mehrhoff 1989, Shefferson *et al,* 2003). Little is known about what factors cause orchids to enter or emerge from dormancy (Shefferson *et al,* 2001, 2003), though it is commonly associated with stress (*e.g*., Reintal *et al,* 2010). While dormant the individual plants must rely almost completely on fungi (*e.g.,* Wells 1967, Shefferson *et al,* 2001, Reintal *et al,* 2010), though this has not yet been demonstrated. Because orchids are affected by different factors during different life stages, we hypothesized that the extent to which different life stages contribute to population decline in threatened orchids could be used to identify the factors that are driving decline. To test this hypothesis we have been investigating the population dynamics and mycorrhizal fungi in 14 populations of *I. medeoloides* in the mid-Atlantic area.

We found that high rates of plants entering dormancy, combined with low rates of re-emergence after dormancy, have been the primary drivers of population decline. Half of all vegetative plants and one-third of flowering plants failed to appear above-ground the following year. The rates of dormancy that we have measured were similar to those found by Mehrhoff (1989) for declining populations and were much higher than he found in stable populations. Possible drivers of plant entry into dormancy are any factors that affect plant condition and nutrition, such as decreased light availability, altered hydrology, and insufficient fungal contribution to plant nutrition. In a recent study, Brumback *et al*.

(2011) found that increasing available light increased *I. medeoloides* recruitment from seed and also decreased the likelihood of plants becoming dormant.

In our current study we have found that individuals that became dormant were very likely to remain so for multiple years. Eighty-five percent of the individuals that were dormant remained dormant the following year. This finding is nearly identical to the percentage of plants that Mehrhoff (1989) found remained dormant in declining populations. We have identified two possible causes for plants remaining dormant. First, plants might fail to initiate an emergent bud. Second, they might initiate a bud that was subsequently damaged and unable to recover. Individual plants only produce one bud per year so the loss of a bud that had formed should result in dormancy the next growing season. We have conducted bud manipulation experiments with the other *Isotria* species (*I. verticillata* – large whorled pogonia), which is more common, and found that plants were often able to produce another bud if the original bud was damaged. Whether or not *I. medeoloides* has the same potential remains to be determined. To distinguish between these two factors, we tracked bud development and subsequent emergence in all emergent and a subset of dormant plants in our study populations. We found that 99% of plants that produced an overwintering bud emerged the following year, suggesting that persistent dormancy resulted from failure to initiate a bud, rather than bud damage. This suggested that nutrition during dormancy was insufficient to support bud development, as few of the plants that entered dormancy have re-emerged during our study. The failure to produce buds may be the result of several factors. Low light levels could contribute to low levels of resources needed to initiate bud development and could increase the likelihood of plants entering dormancy. Bud development may also depend on resources obtained by digesting mycorrhizal fungi. Factors that negatively influence either fungi or the interaction between the orchid and its fungi could influence both high rates of entering dormancy and also low rates of re-emergence after dormancy.

While most orchids associate primarily with decomposer fungi belonging to the genera *Tulasnella* and *Ceratobasidium* (*e.g.*, McCormick *et al,* 2004), we have identified *I. medeoloides* mycorrhizal host fungi as members of *Russula* and *Lactarius* in the Russulaceae, a family of obligately ectomycorrhizal fungi. These fungi all require associations with trees and their abundance is likely driven by the health of their host trees. In the mid-Atlantic the major potential host trees for ectomycorrhizal fungi are oaks (*Quercus* spp.), hickories (*Carya* spp., and beech (*Fagus grandifolia*), along with pines (*Pinus* spp.). This implies that management to conserve *I. medeoloides* may need to promote trees that host the mycorrhizal fungi needed by the orchids. We are working to identify which trees host these fungi and what factors drive their abundance.

Taken together, initial results from this study indicate that growing conditions, including nutritional support of plants, which could be attributed to my-

corrhizal fungi and/or to light and climatic conditions, must be examined to understand factors contributing to high rates of dormancy and low emergence from dormancy.

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*Conference Talk Synopsis —*

# Native Orchids – Complex Species That Require a Central Focus for Conservation

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Orchids are arguably the largest plant family on earth, and more than 50% of the species in the U.S. and Canada are protected at some level. Orchids grow throughout North America, and many species are threatened, endangered, or have been extirpated in at least part of their ranges because of habitat loss and alteration. No single organization in North America focuses on the conservation and restoration of native orchids, and no single entity is devoted to educating the public about the importance of orchids in an evolutionary and ecological context. However, every state has orchids that are listed as threatened or endangered, and both federal and state agencies are responsible for conserving orchids or tracking their populations (NatureServe 2011, Krupnick *et al*, in press). Individual scientists and botanic gardens are also involved in orchid conservation (*e.g.,* Bowles et al. 2005, Zettler *et al*, 2011), but the number of active researchers and organizations is small. Furthermore, there is broad interest in orchid conservation (*e.g.,* Dixon *et al,* 2003), and an integrated national effort will be required to assure the survival of our native orchid heritage.

Restoring or conserving native orchids is especially difficult because of their complex life cycles, especially the interactions between orchids and the mycorrhizal fungi that provide necessary resources. Most orchids can only form mycorrhizal associations with a few kinds of fungi (McCormick *et al,* 2004), so they can only grow where these fungi also occur. Recent studies have shown that orchid abundance and distribution can be limited by the abundance of the mycorrhizal fungi that support seed germination and supplement nutrition of mature plants (Swarts *et al,* 2010, McCormick *et al,* 2012). Such specific associations may make orchids particularly sensitive to disruption by environmental changes and particularly difficult to re-introduce to natural populations.

Management agencies rarely have access to the specialized techniques needed to identify, grow, and locate the fungi needed by particular orchids. The Smithsonian and the U.S. Botanic Garden have partnered to establish the North American Orchid Conservation Center (NAOCC) to serve as a focus for overcoming the difficulties in orchid conservation. The establishment of NAOCC has been accomplished by grants from the Smithsonian and funding from the

U.S. Botanic Garden and the Native Orchid Conference. NAOCC is developing a continental network of botanic gardens, public and private landowners, researchers, educators and citizens to assure the survival of our native orchid heritage. Research, education and outreach are key components of NAOCC and will contribute to conserving orchid biodiversity through collections of seeds, mycorrhizal fungi and living collections representative of regional genetic diversity. The goals of NAOCC will be reached through a rich diversity of partnerships that will be supported by long-term private and public efforts.

NAOCC is still in its infancy. Resources provided by the initial set of grants and gifts will result in the establishment of a set of goals and a timetable for reaching them. The first NAOCC website will be launched in 2012, and a collaborative project between NAOCC and the New England Wild Flower Society will result in a nationally-focused website that will enable individuals to identify orchids through technologies compatible with a variety of platforms (*e.g.*, web, smart phones). Next year, NAOCC will hire a director and work to establish its advisory board, strengthen partnerships, and implement goals of preservation, propagation, and education.

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# Orchid Hunt

I know swamps, bogs, marshes and fens in the heat of August,
When vegetation is head-high with switch grass, cattails, brambles and vines
Along with downed trees, and boot-sucking mud all set on preventing my progress.
Poison ivy, poison sumac and stinging nettle wait in silence to snag me.
But I must risk it, if I'm to find orchids protected by these stalwart defenders.

Some orchids may be present within this mess, but the elusive nodding pogonia
Resides on the other side, through a field of tall goldenrod and thickets that add
To my misery, then into the deep woods adjacent to yet another swamp
That has left fingers of black muck on whose edges grow beech and yellow birch.
Here, with diligence because they are nearly invisible, I find a few of these orchids
Six inches off the ground, white with limey green throats and purple pollen sacs.
This small flower, resembling a bird in flight, opens for just one day, then dies.

Ubiquitous mosquitoes more interested in me than these endangered orchids
Swarm, nip, tuck, dart, dodge and defy insect repellant DEET.
I'm soaked in sweat, swatting and swearing at these creatures, anxious to flee
So in reckless haste I take some pictures and trudge the same route back.
Elated to find them in flower, exhausted by the effort, with smug satisfaction
I now reside in orchid hunter's heaven.

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