On The Fringe

Journal of the Native Plant Society of Northeastern Ohio

ANNUAL DINNER

Friday, September 14, 2007
At the Cleveland Museum of Natural History
Socializing: 5:30 p.m.
Dinner 6:15 p.m.
Lecture by Dr. Doug Tallamy at 7:30 p.m.
"Fighting Extinction with Native Plants: A New Role for the American Garden"
This speaker is co-sponsored by the Cleveland Museum of Natural History Explorer Series.
Tickets: Dinner and lecture: $22.00
Students: $15
Send checks to Kathryn Hanratty, 9059 Auburn Road, Chardon, Ohio 44024; 440-285-3722
Tickets for the lecture only: $9.00, purchased through the Museum
TICKETS ARE LIMITED, SO MAKE YOUR RESERVATIONS EARLY

Fall 2007 Program Schedule

We are finishing off the 2007 program season with a bang with two exciting field trips to opposite ends of the state and our annual dinner meeting, all coming up in September. The field trips are joint programs with other like-minded agencies who share our interest in nature and natural areas. Experts will be along to help us make the most of what we are seeing. We hope you can make one or both, meet some interesting people, share our love of plants and animals, and learn from the experts.

Don't forget the annual dinner meeting on September 14 at the Cleveland Museum of Natural History. The museum has a new caterer who will be providing a mouth-watering meal, followed by a short meeting. Afterwards, adjourn to the lecture hall as we kick off the Museum's 2007-2008 Explorer Series with Doug Tallamy who will be speaking on "Fighting Extinction with Native Plants: A New Role for the American Garden". Watch for a registration flyer coming soon in the mail.

Grant Announcement

The Native Plant Society of Northeastern Ohio hereby announces that it will consider applications and nominations for an Annual Grant to be awarded to a person or persons working in the field of botany or conservation that demonstrates excellence in research, conservation or education, including land trusts, organizations and causes that clearly support the Mission of the Ohio Native Plant Society. Please see the back page of any issue of On The Fringe for our mission statement.

The amount of the grant will be $500.00. Deadline for submissions is September 1st and will be awarded at the annual meeting in September.

Applications should include contact information, summary of the project, and how money will be used. Awardee will be asked to give a brief presentation on the project the following year at the Annual Meeting.

Please e-mail your request to **bunchberry1@netzero.net** or submit 3 copies to:
Judy Barnhart, President, Native Plant Society of Northeastern Ohio, 10761 Pekin Road, Newbury, Ohio 44065.

The Journal of the Native Plant Society of Northeastern Ohio is published four times a year at Novelty, Ohio. ISSN 8756-6087. Questions or comments are welcome and may be addressed to Jane McCullam, 9880 Fairmount Road, Newbury, Ohio 44065, 440-338-3253; npsohio@hotmail.com; or to Ann Malmquist, 6 Louise Drive, Chagrin Falls, Ohio 44022; 440-338-6622, inky5@juno.com

Fall 2007 Program Schedule

September, 8 & 9, Sat & Sun: EDGE OF APPALACHIA PRESERVE & SHAWNEE STATE FOREST, Adams and Scioto Counties, OH. ODNR State Botanist Rick Gardner and Dan Boone of Cincinnati Wildflower Preservation Society lead this trip to one of the most biologically diverse areas of the state. Owned jointly by The Nature Conservancy and Cincinnati Museum Center, the Richard and Lucille Durrell Edge of Appalachia Preserve provides habitat for 100 rare plant and animal species. Visit Lynx Prairie, Buzzardroost Rock and Shawnee State Forest, known as Ohio's "Little Smokies." Meet at Bill's Store in Lynx, Ohio, on Rt. 125 (only store in town) at 10:00 a.m. Saturday. A later meeting, around 1:00pm for those not able to make it by 10:00 (must notify Ami). We will meet at 10:00 a.m. Sunday at the same place. For registration and more information contact Ami Horowitz at (216) 561-7059 and on days of the trip (216) 571-9242 (cell).

Driving Directions to Lynx, OH

(Distance from Shaker Hts: **254 miles** Estimated Time: **4 hours 11 mins)**
Starting at I-271 and I-71 S
Go on I-71 S - for 113.0 mi
Take the CINCINNATI/DAYTON exit onto I-70 W - go 1.7 mi
Bear LEFT on I-71 S - go < 0.1 mi
Take LEFT exit #99A/CINCINNATI onto I-71 S - go 4.4 mi
Take the WHEELING RIGHT exit onto I-270 E - go 2.5 mi
Take exit #52/CIRCLEVILLE/HIGH ST onto US-23 S toward CIRECLEVILLE - go 40.0 mi
Take ramp onto US-23 S toward PORTSMOUTH - go 20.5 mi
Take ramp toward JACKSON/CINCINNATI - go 0.3 mi
Bear RIGHT on OH-124 W - go 5.1 mi
Continue on OH-32 W - go 19.0 mi
Bear LEFT on STEAM FURNACE RD(CR-27) - go 2.2 mi
Continue on STEAM FURNACE RD(OH-781) - go 0.1 mi
Continue on CR-27 - go 3.1 mi
Bear RIGHT on CEDAR MILLS RD - go 3.2 mi
Bear RIGHT on OH-348 - go 5.0 mi
Turn LEFT on OH-125 - go 2.5 mi
Arrive at the center of LYNX, OH

Hotel Info:

Super 8 Motel, Portsmouth, OH, $63/night. 1-800-800-8000 or 270-353-8880. This is where Ami stays.
Holiday Inn Express, Portsmouth, OH, $95/night. (Through Travelocity.com)
Ramada Inn, Portsmouth, OH, $82/night. (Through Travelocity.com)

Comfort Inn, Seaman, OH, $67-90/night, 937-386-2511.
Budget Host Inn, Winchester OH, 937-695-0381
Shawnee State Park lodge, $108-122/night, ODNR website
Shawnee State Park camping, $23/night, ODNR website

September 14, Friday ANNUAL DINNER – 5:30 Social Hour, 6:15 dinner, 7:30 lecture - Cleveland Museum of Natural History - Watch for flyer

September. 29, Sat: BIRDS & BOTANY ALONG THE LAKE - 9:30 A.M. at MENTOR MARSH - This joint program with Cleveland Audubon will take us to several natural areas along Lake Erie beginning at Mentor Marsh, then to Headlands Dunes State Nature Preserve, then to Mentor Lagoons, as we discover the plants and bird-life found in these coastal areas. Join us for a picnic about Noon between locations. Hotdogs and beverages provided. Bring a side to share if you wish. Directions to Mentor Marsh: Take St. Rt. 44 north to Rt. 283 Lake Shore Blvd. Head west to Corduroy Rd. Turn right, continuing to the Marsh House at 5185 Corduroy Rd., Mentor, on the right side of road. Call Bill Oberdick to register: 216-371-3345 (H) or 216-392-7027 (cell).

From Dried Plants to Paper

By Vondie O'Conner

[Ed. Note: if any NPS members are interested in making paper from plants, Cleveland has an active chapter of the Guild of Book Workers who can help find us a teacher.]

On April 22, KNPS President Jeff Hansen taught a class of eager students the fine art of making paper from native plant material. We met Sunday morning at the Karlyle Woods campus of Washburn University in Topeka, a beautiful, secluded campus once owned by the Menninger family and now used as a biology laboratory. Jeff began the session with a discussion of the history of papermaking and how the process evolved over time. Next we learned the actual process of making paper in general and talked about the tools and chemicals needed for the process. Jeff shared his experience of the native plants that he had used most successfully and showed beautiful examples of many of the papers he had made with various stems, leaves, and seeds of plants harvested from the prairie.

Each student selected a plant to work with and we began the process of making our own paper. Thanks to Jeff and a few of the students who had brought a variety of dried native plants, we had a good variety of plant material from which to choose. The first step was to cut the plants into 1-inch pieces, add this to a solution of sodium carbonate, and then bring the mixture to a boil on stoves set up outside. It was a beautiful sunny day, so while the plant material was cooking, Jeff led a nature walk to identify spring wildflowers on the campus, and to point out the unfortunate results of the introduction of non-native plants, such as imported honeysuckle, and their effect on the habitat. We returned to the lab, had a quick lunch, and then began processing our respective plants.

The boiled material had to be thoroughly rinsed to remove all of the sodium carbonate, and then depending on the plant, had to be pounded with a rubber mallet to further break down the stem fiber, and processed in a blender to separate the material even further. The resulting fiber was suspended in a tray of water. Jeff brought several different sized screens and frames (called deckles and molds) used to catch the water-suspended fiber in thin sheets that were then transferred to pieces of cloth (called felts). With a little practice, all of us mastered the process.

The sheets of fiber and felt were stacked and put into a press to remove much of the water. After a few minutes, the stack was removed from the press, and the individual felts were separated to dry a little. Finally, when it was dry enough to work with, we peeled the paper off of the felt and laid it out to dry. It was amazing to see our resulting papers of goldenrod, false indigo, and little bluestem, among others.

Reprinted from the Kansas City Native Plant Society Summer Newsletter, 2007.

When is a lake not a lake?

Most of Ohio's favorite lakes are not natural-born bodies of water

Laura Jones, ODNR

When is a lake not a lake?

Our query may sound like the kind of riddle passed around in elementary school classes, but we guarantee the answer may surprise you.

Ohio has at least 50,000 lakes and ponds worthy of those names, with more than 2,000 that cover 5 acres or more. But not all are true lakes, or at least not true "natural" lakes that were here before settlers began building farm ponds, reservoirs and canals.

In fact, aside from Lake Erie, most of the well-known recreational lakes in Ohio—the water enjoyed most for boating, swimming and fishing—are definitely man-made. Virtually all are reservoirs, held back by dams and built for water supply or flood control where no lake existed before.

Just where are the true, natural lakes in Ohio? How many are there and how can you tell the difference? That's where the answers get tricky, for even the experts don't always agree.

Geologists with the Ohio Department of Natural Resources say there are two types of natural lakes in Ohio. First are the glacial and kettle-hole lakes, both types were created thousands of years ago when glaciers moved out of Ohio and left behind a trail of melting ice. Think of them as large, Ice Age puddles, left behind mostly in northern Ohio where glaciers once reigned. Lake Erie is, of course, Ohio's grand champion glacial remnant, followed in size by 385-acre Chippewa Lake in Medina County. Perhaps Ohio's best known and best preserved inland glacial lake is the 100-acre beauty at Punderson State Park in Geauga County. While so many of Ohio's glacial lakes have disappeared over the past two centuries—filled in or drained as the state was settled—Punderson has remained an open body of "natural" water. What ancient glaciers left behind, modern-day Ohioans can enjoy today.

Other glacial lakes have been lost over time to natural processes that transformed them into something quite different: glacial bog meadows. One fascinating example, still in transition, is Triangle Lake Bog State Nature Preserve. While some of the ancient lake remains, you can clearly see how vegetation is slowly closing in on the open water. This nature preserve protects one of the finest and least disturbed kettle-hole bogs in Ohio, supporting a wide variety of unique plants. Nearby, Kent Bog State Nature Preserve is what Triangle Lake Bog will become—a completely filled-in bog meadow. Both Portage County sites feature tamarack trees, another remnant of Ohio's Ice Age.

The second type of natural lake in Ohio is more likely to be found in southern counties, although few and far between. These are oxbow lakes, formed when a bend in a winding river becomes separated from the main flow—either by floods or erosion—then left on its own as a free-standing body of water. These lakes are neither large nor long lasting, therefore most of them remain unnamed.

Many would be surprised to learn that fewer than three dozen of Ohio's 50,000 lakes and ponds make the Cleveland Museum of Natural History's list of "natural" lakes. Jim Bissell, the museum's curator of botany, places the count at 33. He's been helping compile a list since 1988.

Bodies of water making Bissell's list must not only have natural origins, but must also be home to certain floating and deep-water vegetation—often these plants are rare or endangered. In some cases, these plants may be found exclusively in just one specific lake.

According to Bissell, there are other naturally occurring lakes in Ohio beyond his list of 33, but they no longer support the types of vegetation he looks for as hallmarks of these unique ecosystems. Bissell fears that Ohio's precious few natural lakes will become fewer still, as human encroachment and invasive plant species—yellow iris, purple loosestrife and others—continue to take their toll.

Reprinted from *Natural Ohio*, ODNR Division of Natural Areas and Preserves, Fall 2006

Laura Jones is with the Ohio Department of Natural Resources, Office of Communications

Global Invasive Species Database

http://www.issg.org/database/welcome/

The Global Invasive Species Database is a free, online searchable source of information about species that negatively impact biodiversity. The GISD aims to increase public awareness about invasive species and to facilitate effective prevention and management activities by disseminating specialist's knowledge and experience to a broad global audience. It focuses on invasive alien species that threaten native biodiversity and covers all taxonomic groups from micro-organisms to animals and plants.

The Herrick Magnolia Gardens

by Tom S. Cooperrider

Introduction

In the early 1980s, Christopher Rizzo and I designed and built the Magnolia Gardens at Kent State University. Both of us were with the Department of Biological Sciences. Chris served as Director of Horticultural Facilities, and still does so today. In addition to other assignments, I served as Director of Botanical Gardens. The Department maintains two large, named botanical gardens and several smaller ones in the vicinity of the biology building, Cunningham Hall. The other named garden is the C. V. Riley Alumni Garden, located immediately north of Cunningham.

The Magnolia Gardens include some 50 trees and shrubs. A few are located north of Cunningham Hall, but the majority are in plots north of Henderson Hall, the nursing building, adjacent to Cunningham.

Taxonomically all the plants belong to the Subclass *Magnoliidae*, the group that includes the most primitive flowering plants. The North American species of this Subclass are treated in vol. 3 of Flora of North America (1). The Asian species and hybrids, as well as the North American species in the Gardens, are treated in Hortus Third (2).

The plants are about 25 years old, and all have now reached flowering maturity. Most of the species bloom only in the spring months of April and May. Most have flowers that are fragrant and stems that emit a pleasant odor when cut.

Some of the plants were donated by Dr. J. Arthur Herrick from the arboretum he maintained at his home in Kent, some by the KSU Grounds Department from their holdings, and some by myself collected from the wild. Other plants were purchased from a variety of sources.

Lowell Croskey and Chester Williams, of the KSU administrative staff, secured University approval for the project, including selection of the site. Because the site is low, drainage pipes were laid in parts of the area. Substantial flat-topped hills were built on which to plant the trees, in order to keep their roots above the water table. Russell Foldessey, Manager of Grounds, provided the heavy equipment and labor to lay the drainage pipes, construct the hills, and plant the larger trees. Chris Rizzo supervised all the planting and did much of it himself.

Native Ohio Species

Today, in the small area, visitors can walk about and see all the woody members of the Subclass *Magnoliidae* native to Ohio. These species are listed in the Seventh Catalog of the Vascular Plants of Ohio (3).

The four Ohio species of the Magnolia Family head the list. All are deciduous trees. Cucumber-tree or Cucumber Magnolia (*Magnolia acuminata*), native throughout eastern Ohio, has fragrant, greenish-yellow flowers. Bigleaf Magnolia (*Magnolia macrophylla*), true to its name, has leaves three

feet long. Native in extreme southern Ohio, it has large, fragrant, white flowers. Umbrella Magnolia (*Magnolia tripetala*), native to south-central Ohio, has white flowers that are somewhat ill-scented. Tulip-tree (*Liriodendron tulipifera*), also called Tulip-poplar or Yellow-poplar, is native throughout most of Ohio. It has lightly fragrant, yellowish-green flowers reminiscent in form and size of cup-shaped tulips.

Three Pawpaw trees (*Asimina triloba*), already mature, were moved in and planted using heavy equipment. A member of the Custard-apple Family, Pawpaw has brownish-purple flowers with a slightly fetid odor. The edible gamy-tasting fruit is highly prized by some. Pawpaw is native throughout Ohio, but more frequent in the southern counties. The three initial trees have given rise to a number of saplings, producing a "pawpaw patch" like those in southern Ohio.

Sweet-shrub or Carolina-allspice (*Calycanthus floridus*), native in southeastern Ohio near the Ohio River, is the state's sole representative of the Strawberry-shrub Family. Its flowers are reddish-brown and have an unusual fragrance, variously described as being similar to the odor of cantaloupe, pineapple, or strawberry.

The plantings include two species of the Laurel Family that range throughout most of Ohio. Spice-bush (*Lindera benzoin*) is a shrub. Sassafras (*Sassafras albidum*) is a small tree. Both have small fragrant flowers.

Three of the Ohio species above, the Bigleaf Magnolia, Umbrella Magnolia, and Sweet-shrub, are included in the current list of Rare Native Ohio Plants (4).

Magnolias of the Southeast

The Gardens also include two species of magnolias that are native to southeastern United States, but whose ranges do not extend as far north as Ohio.

There are several plantings of Sweet-bay (*Magnolia virginiana*). Sweet-bay is a small tree with semi-evergreen leaves and very fragrant white flowers. It blooms from late spring into early summer and often again from late summer into autumn.

There is a single specimen tree of the storied Southern Magnolia (*Magnolia grandiflora*). The tree, with large glossy evergreen leaves, grows outdoors in a protected site near the Herrick Conservatory north of Cunningham Hall. Although far from its home territory, the tree blooms regularly each summer. Its flowers have large creamy white petals and a strong lemony fragrance.

Asian Magnolias

Visitors to the Gardens can also see living representatives of several Asian magnolias, species and hybrids, from the north temperate zone in China and Japan. All are small deciduous trees.

The trees' floral display varies from year to year. A few untimely warm days in early spring followed by a night with a hard frost can leave the trees with a large crop of dead, brown flowers. But in years with a more fortunate warming sequence, the display can be spectacular.

Two magnolias in the Gardens have colorful, fragrant flowers that bloom in late spring. One is the Chinese species Lily-flowered Magnolia (*Magnolia liliiflora*) that has purple flowers. The other, with pink flowers, is a hybrid called Chinese Magnolia or Saucer Magnolia (*Magnolia x soulangiana*). This hybrid is from a cross of two Chinese species (*Magnolia denudata x Magnolia liliiflora*).

The showpiece of the Gardens is a group of white-flowered magnolias of Japanese origin. On a low broad hill are five trees of Japanese Magnolia (*Magnolia kobus*) and six trees of a hybrid (*Magnolia x loebneri*). This hybrid is from a cross of two Japanese species (*Magnolia kobus x Magnolia stellata*). All eleven trees bloom at approximately the same time. Because the trees are still bare of leaves and their flowers large, the floral show can be striking. Viewed from the top (12th) floor of the nearby KSU Library, the area appears to be covered with a cloud of white flowers. On a recent warm day in April, a student standing among the lower branches and looking up at the blue sky through hundreds of fragrant white flowers remarked, "I feel like I'm in heaven."

On an adjacent hill are seven small trees of the hybrid's other parent, Star Magnolia (*Magnolia stellata*). Its flowers are scarcely to slightly fragrant and have numerous, spreading white petals.

Dedication

On September 17, 1996, a dedication ceremony at Kent State University honored my long-time colleagues and friends, J. Arthur Herrick and Margaret Hatton Herrick. The dedication encompassed several botanical features of the area, among them "the magnolia garden on the north side of Henderson Hall." This article is based on my remarks at that ceremony.

Acknowledgments

Funds to purchase the drainage pipe, topsoil, and plants and to cover other expenses were contributed by KSU faculty, staff, students, and alumni and friends at the Davey Tree Expert Company.

I thank the many people involved in this project, especially Chris Rizzo. I thank also Miwako Cooperrider for editing and processing the manuscript.

References

1. Flora of North America. Vol. 3. Magnoliophyta: Magnoliidae and Hamamelidae. Flora North America Editorial Committee, editors. Oxford University Press, 1997.
2. Hortus Third. Bailey Hortorium Staff. Macmillan, 1976.
3. Seventh Catalog of the Vascular Plants of Ohio. Tom S. Cooperrider, Allison W. Cusick, and John T. Kartesz, editors. Ohio State University Press, 2001.
4. Rare Native Ohio Plants. Ohio Division of Natural Areas and Preserves, compilers. Ohio Department of Natural Resources, 2006.

Tom S. Cooperrider was a faculty member at Kent State University from 1958 to 1993.

Book Review

An Illustrated Guide to the Vascular Flora

By Michael Homoya

The Plant Life of Kentucky By Ronald L. Jones. 2005. The University Press of Kentucky. 856 pages, 7 x 10", Cloth. $75.00. ISBN 0-8131-2331-3.

The Plant Life of Kentucky is described as the first comprehensive guide to the ferns, flowering plants, and woody plants of the state, and indeed it fulfills that description, and much more. The author clearly has a passion for the flora and a desire to instill it in others. The 105-page introduction, full of fascinating and useful information, could almost stand alone as a separate publication. The state of Kentucky has a rich history of botanical exploration, and Jones follows it from the Antebellum Period (prior to 1860) to the present day. I found the biography of Charles Short (1794-1863) especially interesting, as he was the discoverer (and eponym) of the federally endangered Short's goldenrod (*Solidago shortii*), a plant we just recently discovered in Indiana.

Most of Kentucky's approximately 2,600 taxa of vascular plants are addressed in the text with scientific name, common name, habitat, distribution in the state, a statement of abundance, and assigned wetland category. They are arranged in the text alphabetically by family, and then alphabetically by genus and species. I find this arrangement to be especially helpful because it allows for quick look-up but still places plants in a family context to show genetic relationships.

Jones accepts all species for which herbarium records are known to him. Also included are those based on reliable literature references and a "to be expected" category. Sometimes this gets confusing. For instance, Jones cites the occurrence of the bristly club-moss *(Lycopodium annotinum)* for Kentucky—using a report by Wagner and Beitel (1993) in Vol. 2 of *Flora of North America*—then goes on to state that its current status is unclear but is to be expected in the state. Why is the status unclear? Did Jones not consider the report reliable, did he not find a specimen, or did he determine that the specimen was misidentified? Similarly, Jones states that a species of mermaidweed *(Proserpinaca pectinata)* is to be expected in Kentucky, but he fails to mention the report of it in the *Aquatic and Wetland Plants of Kentucky* by Beal and Thieret (1986). Specific critical analysis would have been helpful.

A very nice feature of the book is its illustrations. Almost all the species treated are illustrated with line drawings borrowed from the 1913 Britton and Brown *Illustrated Flora.* While several leave much to be desired—many are quite stylized—they are nonetheless valuable in species identification. Not all species are illustrated; just a few extra illustrations would round out the book and perhaps avoid some identification problems. For example, Jones offers an illustration of the blunt-lobed grapefern *(Botrychium oneidense),* an endangered species in Kentucky, but not one of the sparse-lobed grapefern *(B. biternatum),* a widespread species. The latter is similar in appearance to the blunt-lobed grapefern and difficult to distinguish from it (and from the common form of *B. dissectum).* While excellent keys are provided for identification of these (and all species) in the book, illustrations of both would have provided a much clearer depiction of the differences (and probably result in fewer false alarms about the discovery of the endangered species).

Species range within the state is given by physiographic region, namely the Mississippian Embayment, Interior Low Plateaus, and Appalachian Plateaus. While this is good science, it's not always so useful in understanding the actual range of a species. For example, the Interior Low Plateaus make up a huge physiographic region, within Kentucky occurring northeast to Ohio, south to Tennessee, and westward to Illinois. Although Jones indicates "widespread" for some species within a region, he commonly omits any annotation for the uncommon or local ones, leaving this reader desiring more precise location information.

Following the heading of most plant families is a section entitled “Family Notes.” In most cases I found the information there of interest, but much of it is general in nature and can be found in other sources. I would have preferred more commentary on the species as they occur in Kentucky, such as detailed habitat information and species associates, collecting history, detailed range, etc. I especially thought the toxicological information could have been omitted to free up page space.

Despite its limitations, the book is one well worth owning, especially for those Hoosiers who live in and/or botanize in southern Indiana. Being a "plant hunter," I think one of the more useful aspects of the book is for generating a wish list of expected species that might occur in our state. Although the book doesn't have an atlas, it is nonetheless quite helpful in providing clues about species to look for. And even though it is a technical work, I would recommend it to any and all interested in developing a better understanding and appreciation of our wonderful plant life.

Michael Homoya is a botanist/ecologist with the Indiana DNR Division of Nature Preserves and author of Orchids of Indiana *(IU Press, 1993).*

Reprinted from the newsletter of the Indiana Native Plant and Wildflower Society, Spring 2006

Ohio's Sphagnum Peat Bogs
Showcasing Members of the Heath Family

Guy Denny

Ohio's peatlands—bogs and fens—are "living relicts" of the Ice Age. They support numerous species of northern peatland plants more common to the boreal forest region far to our north. Boreal species were forced southward into Ohio by the advancing Wisconsin Glacier approximately 24,000 years ago. This was the most recent of 3 or more continental glaciers to reach Ohio during the Pleistocene or Ice Age. As warmer weather returned and the Wisconsinian Glacier melted northward making a final retreat from Ohio about 12,000 years ago, most of these northern species disappeared from our landscape. However, disjunct isolated pockets of northern peatland species remain in Ohio long after the glacier receded. These glacial relict peatland plants occur around glacial, kettle-hole lakes and fen seep where special environmental conditions have enabled them to persist to this day. Northern members of the heath family (Ericaceae) are especially characteristic of sphagnum peat bogs here in Ohio with an even greater diversity of ericaceous species represented in bogs occurring in latitudes much farther north.

The distinction between a bog and a fen can be quite confusing, especially to the uninitiated. For example, neither Cedar Bog in Champaign County near Springfield, nor Jackson Bog State Nature Preserve in Stark County near Massillon, is technically a bog, but rather a fen. Bogs and fens are both types of peatlands, each of glacial origin, yet, they are very different ecosystems. However, since both are peatlands, historically they were just simply and collectively referred to as "bogs." The term "fen" is of European origin, and has long been used to describe alkaline wetlands in Great Britain. It wasn't until 1943 that the term "fen" was used in this country, in a paper appearing in *American Midland Naturalist* by W A. Anderson to describe an alkaline wetland in northwestern Iowa. Since then, the term has been used routinely to label such wetlands in the United States as well. Fens are alkaline wetlands associated with flowing springs and seeps that continually supply clear, cold, oxygen-deficient ground water rich in bicarbonates of calcium and magnesium. The pH of a fen typically ranges from about 7.5 to 8.5. Fens are alkaline ecosystems based on a calcium carbonate rich mud substrate known as marl over which graminoid peat accumulates. Such peat is comprised of partially decomposed narrow-leaved grasses, sedges, rushes, and similar species as opposed to sphagnum moss peat typically associated with acidic sphagnum peat bogs. Although fens may share a few of the same plant species as sphagnum peat bogs, fens are generally dominated by members of the sedge family (Cyperaceae) and the rose family (Rosaceae), especially shrubby cinquefoil *(Potentilla fruticosa),* one of the most characteristic of fen species.

Sphagnum peat bogs, in comparison with fens, are acidic wetland ecosystems associated with deep glacial lakes where there is little flow of water in or out. These waters tend to be dark brown stained by humic acid, cold, oxygen-deficient and low in nutrients. The pH of a sphagnum peat bog in Ohio ranges from about 6 to 4. Peat bogs are based on a deep blanket of acidic sphagnum peat of which only the top few inches consist of living sphagnum. These ecosystems are largely dominated by several species of sphagna or peat moss of the peat moss family (Sphagnaceae) and members of the heath family (Ericaceae). It is also important to point out that according to the international classification system of peatlands, Ohio's sphagnum peat bogs are actually classified as "oligotrophic bogs" or "poor fens" since they are much less acidic than are the northern coastal bogs and only 400 to 500 feet wide. With the coming of the Ohio & Erie Canal, the Big Swamp provided an excellent site for the construction of a canal feeder reservoir to furnish water needed to lift canal boats and barges through a series of locks over the divide between the Licking and Scioto Rivers. When an earthen dike was finally completed around the west end of the swamp between 1830 and 1832, water levels rose and the Licking-Summit Reservoir came into existence replacing the Big Swamp. As water backed up behind the dike, the swamp was inundated and disappeared under about 8 to 9 feet of impounded water except for approximately 50 acres of the youngest and therefore most buoyant portion of sphagnum bog mat. Although still connected below the surface, this buoyant piece of mat stretched and expanded, rising to the surface to form a sphagnum moss island. No longer was there a sphagnum bog mat around the shore of the lake as is usually the case with bog lakes, but now the lake surrounded this "floating" bog mat island. This is the only known such occurrence of its kind in the world, which is why in 1968

Cranberry Bog was designated by the U. S. Department of Interior National Park Service as one of the first National Natural Landmarks in the country. Shortly thereafter, in 1973, Cranberry Island was also formally dedicated as a state nature preserve by the Ohio Department of Natural Resources. In 1894, near the close of the canal era, the Ohio General Assembly changed the name of the Licking-Summit Reservoir to Buckeye Lake and declared it a public park which we know today as Buckeye Lake State Park.

From the moment a bog lake is formed, it begins filling with peat. This natural process of vegetation encroaching upon the open lake begins with those bog species that have the ability to extend their growth outward over nothing more than open water. Typically, this is the role of swamp-loosestrife *(Decodon verticillatus)* and leatherleaf *(Chamaedaphne calyculata)*. Both species can produce roots suspended in water from their floating stems which, in turn, give rise to additional rooting stems thus establishing small "rafts" of stems. Within this protective framework of stems, other bog plants can now become established. The most characteristic and abundant species of peat bogs are those of the various species of sphagnum moss. These rootless plants require the protection of a vegetative framework of leatherleaf and swamp-loosestrife in order to initially become established. Sphagnum moss is the primary species that keeps the special environmental conditions of the peat bog community intact, thus enabling northern bog species hundreds of miles south of their normal range to persist long after the glacier and its effects disappeared. Sphagnum has the ability to modify its environment by removing and binding nutrients and, in return, releasing acids as by-products of the chemical processes associated with its growth. Sphagnum moss also acidifies its environment with the release of humic acids as dead sphagnum tissues start to break down. This rootless moss continually grows from the top few inches while dying back beneath. This dying back below surface levels not only accounts for the additional release of humic acids, but also is a major factor in the formation of sphagnum peat which eventually fills in a bog lake. Peat is simply partially or incompletely decomposed plant matter. Bacteria, fungi, and other decay-producing organisms that would normally decompose dead tissues are virtually non-existent in the cold, waterlogged, oxygen-deficient peat mat. Sphagnum moss also modifies its environment as a result of its specialized sponge-like cell structure that enables some species of sphagna to hold more than 25 times their own dry weight in water. Sphagnum therefore makes an excellent blanket of insulation, keeping root temperatures significantly lower than surface temperatures, which, in turn, shortens the length of the growing season, affects seed germination and impedes the ability of bog plants to take up water. When the living top level of sphagnum moss dies, the entire bog ecosystem breaks down as the chemistry of the bog is altered enough to allow more southern wetland species to replace the bog species.

Because sphagnum has no roots with which to anchor itself, it needs the protection of the rafts of swamp-loosestrife and leatherleaf stems just to get a foothold. Within this protective framework and around the base of each cluster of floating stems, sphagnum moss becomes established, creating small floating hummocks of vegetation. Eventually, hummock merges with hummock forming an extensive floating bog mat or "sphagnum lawn" as it is sometimes called, upon which many other bog species also become established, thus adding to its strength. In time, this bog mat will become strong enough to support the weight of a person, although, even then the floating mat may bounce or "quake" with each step taken, an experience similar to that of walking on a waterbed. Many of the most fascinating bog plants occur on the sphagnum bog mat, including a number of ericaceous species, most notable of which is large cranberry *(Vaccinium macrocarpon)*. This native, ground-level, trailing evergreen shrub is the same cranberry of commerce that is extensively cultivated on Cape Cod as well as in New Jersey and Wisconsin. Reportedly, it was the first crop sent back to the Old World by the colonists. The name "cranberry" is thought to be a corruption of the word "crane berry" or "craneberry," an original reference to the flower of this species that has a superficial resemblance to the long-billed head and long neck of a crane. Another origin of the name "craneberry" is attributed to the colonists who, upon seeing "cranes" feeding in the peatlands along the Atlantic Coast, mistakenly assumed these big birds were eating the "berries" of this species.

Leatherleaf plays a major role in initially forming the floating bog mat and is therefore especially abundant around the edges. Yet, it also occurs sporadically throughout the entire mat. Leatherleaf, like large cranberry, is an evergreen member of the heath family and one of the most characteristic and abundant species of sphagnum peat bogs. It is the very first bog plant to bloom, with its urn-shaped white flowers making an appearance in very early spring, often while ice is still present. In order to conserve nutrients in the very nutrient-poor environment of a bog, the leathery,

brownish evergreen leaves of leatherleaf persist for nearly two seasons and are only gradually shed as new leaves appear. This conserves nutrients that would otherwise be used up in the annual renewal of leaves while extending the opportunity to maximize photosynthesis year-round.

There are a number of other relatively short ericaceous shrubs the size of leatherleaf that share the bog mat, including Labrador-tea *(Ledum groenlandicum),* bog-rosemary *(Andromeda polifolia* var. *glaucophylla),* swamp-laurel *(Kalmia polifolia)* and sheep-laurel *(Kalmia angustifolia).* These are species very common to peat bogs in states north of Ohio, but rare or absent in our bogs. Bog-rosemary was last seen in Ohio in 1929 growing in a bog located in Ashtabula County. Labrador-tea is a state endangered species still known in Ohio from just one small population in Portage County. Neither sheep-laurel nor swamp-laurel has ever been reported from Ohio. Small cranberry *(Vaccinium oxycoccos),* the more common species of cranberry in bogs north of Ohio, is a state-listed rare species here and known from only a few sites in Ohio. Likewise, creeping snowberry *(Gaultheria hispidula),* an ericaceous species somewhat resembling cranberry, is very common in more northern bogs but last seen growing in Ashtabula County Ohio in 1932. It is now believed to be extirpated from Ohio. One of the most fascinating characteristics shared by all of these woody ericaceous species, in addition to their bearing evergreen leaves to conserve nutrients, is that they all possess many of the same physiological features as plants growing in desert ecosystems. These features include narrow leaves with turned under edges, leaves with recessed stomata or respiratory pores, and leather-like leaves coated with fine hairs and/or waxy substances. Such features are designed to minimize the loss of water through evaporation and transpiration. It was once believed that these leaf adaptations to conserve water were present since acidic bog water was difficult for plants to absorb. This was the theory advanced by German scientist Andreas Schimper in 1898. He attributed these adaptations to the plant's ability to withstand what he termed "physiological drought conditions" occurring in the highly acidic waters of peat bogs. More recent experiments have demonstrated that, for the most part, bog plants are capable of absorbing acidic water. Others now attribute these adaptations to enable bog plants to withstand nutrient deficiencies, especially phosphorus. Another explanation, one that I find most plausible, is that cold temperatures at root levels reduce the ability of roots to absorb water. During the heat of summer, temperatures beneath the sphagnum mat at root level can be easily 40 degrees cooler than surface temperatures. Cold alters the viscosity of cell protoplasm, decreases cell membrane permeability, and retards root growth and root hair formation, all of which impede the plant's ability to absorb water. If plants growing on the open bog mat in full summer sunshine, but rooted in cold peat, couldn't reduce the loss of water being drawn from them by the sun's heat and by the flow of hot dry air blowing over them, they would soon dry out and perish. This being the case, Dr. Schimper may have been correct in his assumption that sphagnum peat bogs are a sort of "soggy desert."

Other fascinating plants of the sphagnum peat bog mat include grass-pink or calopogon orchid *(Calopogon tuberosus),* rose pogonia *(Pogonia ophioglossoides),* tawny cotton-grass *(Eriophorum virginicum),* round-leaved sundew *(Drosera rotundifolia)* and northern pitcher plant *(Sarracenia purpurea),* just to name a few of the more showy and characteristic species. Since peat bogs are nutrient-deficient, especially in nitrogen, phosphorus, and potassium, only those species that have adaptations to address such harsh growing conditions can survive. Sundews and pitcher plants supplement their nutrient uptake by baiting, trapping, and consuming insect prey. Orchids, on the other hand, typically utilize thread-like fungal hyphae that penetrate their root hairs. This symbiotic root/fungus relationship is known as mycorrhiza or a mycorrhizal association. The mycorrhiza fungal hyphae are root-like conductive filaments much more capable of absorbing nutrients from peat than roots hairs. These absorbed nutrients are then exchanged with the host plant. The orchid or host plant, in turn, unlike the fungus, has the ability to manufacture carbohydrates through photosynthesis which it then shares with the fungus. Most members of the heath family, including cranberry, are also mycorrhizal which, just like the orchids, enable them to take up nutrients out of peat soil that they could not otherwise access by their roots alone. Members of the heath family occurring in bogs have a significant advantage when it comes to surviving in a nutrient-poor environment. In addition to being mycorrhizal, many also tend to be evergreen, therefore doing a good job of conserving nutrients while maximizing the production of carbohydrates.

As one moves shoreward from open water to bog mat and then to shoreline, peat deposits become older and thicker, thus able to support larger, heavier plant

species such as tall shrubs and ultimately trees. The closer one gets to shore, floating sphagnum bog mat gives way to denser stands of short shrubs like leatherleaf, then to taller shrubs such as black huckleberry *(Gaylussacia baccata)* and highbush blueberry *(Vaccinium corymbosum)*. Both have edible fruit, but it is highbush blueberry that is commonly cultivated for its tasty berries. It is interesting to note that even though they do not have evergreen leaves, both huckleberry and highbush blueberry are also members of the heath family. Just like other members of this family, they are mycorrhizal and therefore able to thrive in nutrient poor soils as well as in very dry soils. Highbush blueberry is also known to grow on dry gravel deposits surrounding bogs while black huckleberry growing on water saturated sphagnum peat mats is the same species as that growing on the driest ridges of the Appalachians. As we have seen, even though water is readily abundant in a bog, it is difficult for plants to absorb that water just as if they were growing in very dry soils. A few other typical tall bog shrubs include poison-sumac *(Toxicodendron vernix),* catberry *(Nemopanthus mucronatus),* winterberry holly *(Ilex verticillata)* and speckled alder *(Alnus incana* ssp. *rugosa)*. Ultimately, as we continue shoreward, tall bog shrubs give way to trees that create a canopied tree covering such as tamarack *(Larix lamina),* yellow birch *(Betula alleghaniensis)* and red maple *(Acer rubrum)*.

With the passage of time, a concentric ring or zone of floating sphagnum mat will close in over the entire lake until there is no longer any open water exposed. The shrub zone will continue to encroach upon the sphagnum mat until the mat is mostly replaced by bog shrub thicket. As the basin fills with a solid core of peat, shrub thicket will be squeezed out by bog forest trees which will then shade out what is left of the shade-intolerant bog mat and bog shrub species. When this finally happens, not enough sphagnum can survive to keep these sphagnum-generated bog ecosystems functioning. The special environmental conditions that have enabled these northern bog species to survive will break down, allowing bog forest to be replaced by an elm-ash-maple swamp forest typical of these more southern latitudes. This is why only a handful of the deepest of glacial lakes remain in Ohio and continue to support sphagnum peat bogs. These lakes are so deep that they have yet to be totally filled with peat and shaded out by trees. But the process is ongoing, and open lake water will eventually be replaced with peat deposits, even in these very few remaining deep glacial lakes.

Perhaps the best bog in central Ohio to visit is Cranberry Bog State Nature Preserve at Buckeye Lake. It is managed by the ODNR Division of Natural Areas and Preserves. Visitors are welcome by special permit, and a boardwalk traverses the sphagnum mat that supports the largest populations of large cranberry, northern pitcher plants, and grass-pink orchids in the state. Since Cranberry Bog Island was created by an act of man with the flooding of the Big Marsh to form a canal feeder reservoir, it is an anomaly that has a very limited life expectancy. The island has already deteriorated from its original 50 acres to less than 15 acres today. Eventually the island will break up and disappear altogether, but for now at least, it is ours to visit, study and enjoy.

Another bog worth visiting and one of the very best kettle-hole lake bogs remaining in Ohio is Triangle Lake Bog State Nature Preserve in Portage County near Ravenna. While there, you may also want to visit nearby Tom S. Cooperrider Kent Bog State Nature Preserve just south of Kent. Kent Bog is an outstanding example of a closed-over kettle-hole lake bog dominated mostly by leatherleaf and highbush blueberry, and has what is perhaps the largest southernmost stand of tamarack trees in the continental United States. Both of these bogs have boardwalks running through them and are open to the public without a permit. For visitor information contact the Division of Natural Areas and Preserves at 2045 Morse Road, Building F1, Columbus, Ohio 43229-6693, (614) 265-6453.

Experience a step back into time for yourself. Visit and explore Ohio's sphagnum peat bogs, living relicts of the Ice Age. They showcase marvelous displays of northern bog species notably including those belonging to the heath family.

Guy Denny is a well-known naturalist and an expert on both wetlands and prairies. He developed nationally recognized programs for Ohio's nature preserves and scenic rivers during his tenure as Chief of Natural Areas and Preserves for the Ohio Department of Natural Resources. In addition, he served as executive director of the Ohio Biological Survey.

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Northeast Lakeshore Ohio State Nature Preserves

Headlands Dunes

Headlands Dunes State Nature Preserve is one of the finest natural beach/dune communities remaining on the Ohio shoreline of Lake Erie, and is as biologically diverse as it is beautiful. The windswept sand dunes, driftwood covered beach, and grassy inter-dunal areas host an array of uncommon Atlantic coastal plain species such as sea rocket, beach pea, beach grass, and purple sand grass, which migrated to the great lakes at the close of the Ice Age. An abundance of species not typically found in northeastern Ohio, such as wafer ash and Canada wild rye, as well as many western xerophytes such as winged pigweed, sand drop-seed and four-o'clock, can also be found growing at Headlands Dunes. The preserve attracts a tremendous variety of birds in all seasons, and has become-one of the most popular bird-watching locations in Ohio.

Headlands Dunes is located west of Fairport Harbor at the northern terminus of State Route 44 and the eastern end of Headlands Beach State Park, and is open year-round during daylight hours.

Mentor Marsh

Occupying an ancient abandoned channel of the Grand River, Mentor Marsh Nature Preserve is the largest coastal wetland between Sandusky Bay and Presque Isle in Pennsylvania, and has been designated as a National Natural Landmark. The preserve is co-owned and managed by the Division of Natural Areas and Preserves and the Cleveland Museum of Natural History, and has long been a favorite haunt of naturalists. Although the more than 600-acre preserve has become dominated by giant reed grass or Phragmites, it still contains remnants the herbaceous wetlands and swamp forests of days gone by, and teems with wildlife. A handicapped-accessible observation deck, boardwalk, and trails through the well developed beech-sugar maple forests that border the marsh are open to visitors year-round.

The Carol Sweet Mentor Marsh Nature Center is located in Mentor Headlands, west of the Village of Grand River, and can be accessed from State Route 44 by proceeding west on State Route 283, and ½ mile north on Corduroy Road.

Hach-Otis

Hach-Otis is a remnant mature hardwood forest perched upon bluffs above the Chagrin River. Among the more than 30 species of trees found here are red and white oak, sugar maple, beech, tulip poplar, white ash, sassafras, bigtooth aspen, cucumber magnolia, wild cherry, yellow birch and hemlock. Spring wildflowers such as yellow mandarin, Solomon's seal, mayapple, Jack-in-the-pulpit and large-flowered trillium abound in the preserve. Along the back side of the preserve, a spectacular view of the surrounding landscape can be observed from atop an extensive clay bank promontory overlooking the Chagrin River 100-150 feet below. Kingfishers and a large colony of bank swallows nest in the steep sides of this bank cut.
Located 1 mile east of Willoughby Hills on U.S. Route 6, 200 yards north on State Route 174, then east on Skyline Drive to the dead-end and preserve parking lot. A trail system starts at the parking lot. Owned by the Audubon Society of Greater Cleveland, the preserve is dedicated as a state nature preserve and co-managed by the Division of Natural Areas and Preserves.

Pymatuning Creek Wetlands

Pymatuning Creek Wetlands Preserve is a highly diverse complex of fen springs, sedge meadows, shrub wetlands, swamp forests, and dry, upland kames which contains at least 18 state threatened or endangered plant species. Among these are hooded ladies' tresses, small purple fringed orchid, Hill's pondweed and Ohio's largest population of spreading globe flower. The small fen spring which occurs in the preserve is the only fen spring known in Ashtabula County and the only one of its kind in Ohio. Spotted turtles, a nesting population of common snipe, and a federally endangered mussel, *Pleurobema clava,* also call the wetlands and adjacent creek home. Owned by the Cleveland Museum of Natural History and managed by the Division of Natural Areas and Preserves, Pymatuning Creek Wetland is open by permit only, due to the delicate nature of the habitat and lack of visitor facilities. The preserve is located along a stretch of Pymatuning Creek, in northern Wayne Township.

Pallister
Pallister State Nature Preserve is an excellent example of mixed swamp forest, typical of those which formed in ancient, post-glacial lakebeds along the Grand River in Ashtabula County. The preserve contains several well-developed, large vernal pools, a central beaver swamp, a variety of mature forest types, and a rich display of wildflowers and ferns. Among the most interesting plants reported from this site are northern species such as robin-run-away, goldthread, spotted coral root, and lesser bladderwort.
Due to a lack of visitor facilities, Pallister Preserve is open by permit only, but is easily traversed and often visited by groups willing to plan ahead. Pallister Preserve is located on Callender Road about 2 miles west of Rt. 45.

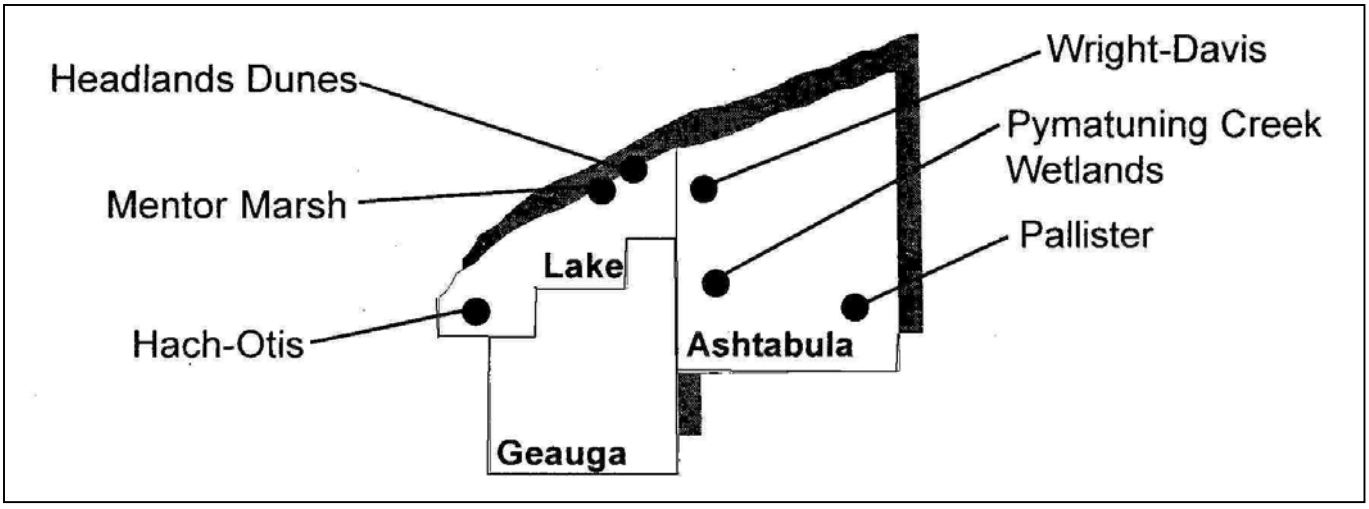
Wright-Davis
Wright-Davis Preserve is the only property along the Grand Wild and Scenic River which is owned by the Division of Natural Areas and Preserves. The site offers a rich display of wildflowers and inspiring views of the river from high, wooded bluffs of hemlock, red oak, and beech. The preserve also contains a large vernal pool set in a floodplain forest and a beautiful, deep ravine with several cascading waterfalls. Access to this preserve is by permit only until visitor facilities can be developed.
Wright-Davis Preserve is located in Harpersfield, just south of the Grand River on the east side of Route 534.

SCENIC RIVERS

Chagrin Scenic River
The Chagrin River, in close proximity to the highly populated and developed Cleveland metropolitan area, has maintained much of its natural appearance. Large wooded tracts give way to shale and sandstone cliffs along much of this beautiful waterway. The Chagrin has three designated segments. Portions of the Aurora Branch, East Branch, and Chagrin Main Stem are located in Lake, Geauga, Portage, and Cuyahoga counties.

Grand Wild and Scenic River
This river represents one of the finest examples of a natural stream found anywhere in Ohio. Physiographic features such as broad floodplains, vast wetlands, and steep shale cliffs have largely prevented the encroachment of civilization and have given protection to the stream's well-forested corridor. The Grand has two designated segments; the scenic portion is found in Ashtabula County and the wild section is in Lake County.

Reprinted from a brochure published by the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, 1998. Call **(440) 563-9344 for further information about any of these preserves.**



Quillwort Update: First of all, what are quillworts?

Rebecca D. Bray

[Ed. Note: Appalachian quillwort, *Isoetes Engelmannii*, was found in Ohio in Clark and Trumbull counties after 1980.

They are one of the fern allies (looking nothing like a fern), superficially resembling a young sedge or rush plant. Their leaves range in length from an inch or two in some of the outcrop species to almost 2 feet in some plants of mountainous ponds or lakes. To develop an eye for finding them, plan to go initially with someone who already knows how to spot them; they are really nondescript!

Most of our species here in Virginia are amphibious perennials. They begin their growing season in late fall as emergents, become submergent in winter through early spring, becoming emergent once again in late spring or early summer. Depending on rainfall amounts, they usually die back by mid-summer. This regime is altered in those species that inhabit our tidal rivers where they are inundated and exposed twice a day.

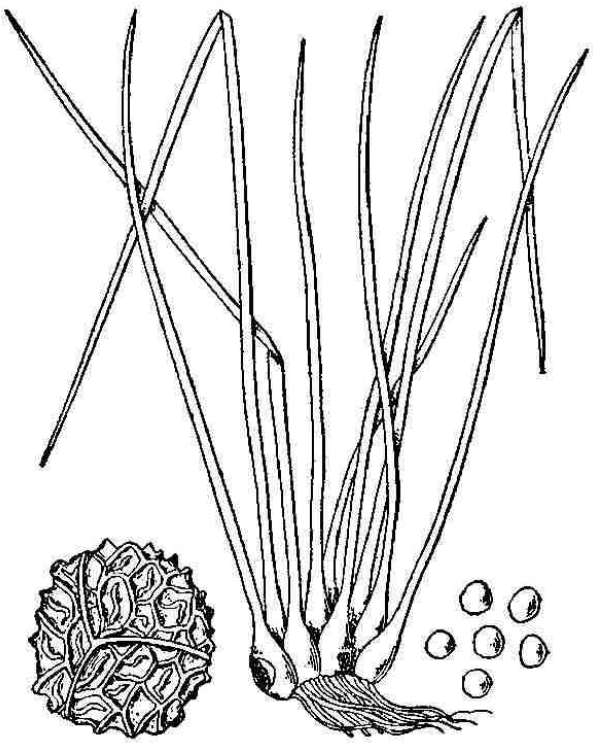
To identify quillwort plants, it is essential to collect mature plants that have completed making reproductive cells called megaspores. In many of our coastal species, that means collecting plants in May or June. For others growing in mountain streams, the appropriate time to collect is in September and October.

Quillworts are in the genus *Isoetes;* its closest extant relatives are the ground pines & spikemosses in the genus *Selaginella.* Worldwide, there are roughly 150 quillwort species; here in Virginia, our initial survey in the early 1990's included six species and one hybrid. Our revised count is currently at eleven species, four hybrids and several populations whose identity is questionable. The following synopsis will give you an idea of the progress we've made in the last decade.

A quillwort common to mountain streams and lakes, *Isoetes caroliniana,* was renamed *I. valida* in 1996. It occurs in approximately 20 counties in Virginia.

Isoetes engelmannii occurs throughout the state and lives in a diversity of habitats, from the banks of streams and tidal rivers to the shores of reservoirs. Not surprisingly, it is one of the parents in all four of our hybrids in the state. We have records of *I. engelmannii* from 38 Virginia counties.

Isoetes melanopoda, the "black footed quill-wort," was originally thought to occur in five counties; currently, we are certain it is at two sites in only one county. It has become extirpated from two of those



Appalachian Quillwort (*Isoetes engelmannii*)

original sites. After making chromosome counts, we found that several populations were actually *I. Virginica.*

A plant of intermittent woodland streams and lowland swamps, *I. virginica* is known from only two sites in the state, one of which was logged in 1999. Prior to logging, the estimated population had consisted of several thousand plants; last year we counted four individuals. *I. virginica* was thought to be a Virginia endemic; another population has been found recently in Person Co., North Carolina.

Our only granite outcrop species, *I. piedmontana,* occurs in only one location in the Virginia foothills; the population consists of approximately 125 plants, dangerously small! In previous literature, it has been referred to as *I. virginica* or as *I. virginica* var. *piedmontana.*

Initially *I. riparia* was thought to be in 17 Virginia counties, primarily in the coastal plain. Recent research suggests that we have no true *I. riparia* populations in the state. Most of these sites represent populations of *I.*

hyemalis, described in 1994; a few represent *I. saccharata,* originally described in 1867. These latter two species are considered segregates within what is currently called the "riparia complex." The limits of the current species within the complex are unclear.

Originally thought to be a form of *I. engelmannii, I. appalachiana* was described in 1997. Found from Pennsylvania to Florida, it occurs in scattered locations throughout Virginia.

Our only submergent aquatic species, *I. lacustris* occurs at only one site in Shenandoah Co., VA. At last count, there were fewer than 10 plants in the population.

In freshwater portions of tidal rivers associated with the Chesapeake Bay, one finds *I. acadiensis* as well as *I. saccharata* and the soon-to-be described/published *I. mattaponica* (In press, ***Novon*** 2001).

Currently we know of four quillwort hybrids in the state; these were described and reported in the latter half of the 1990's. They are *I.* x *bruntonii (I. engelmannii* X *I. hyemalis), I.* x *altonharvillii (I. engelmannii* X *I. valida), I.* x *fairbrothersii (I. engelmannii* X *I. lacustris)* and *I.* x *carltaylorii (1. engelmannii* X *I. acadiensis).*

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Quillwort dispersal: Which way is the wind blowing?

D. F. Brunton

In a "Wild Ideas" article a while back *(Chinquapin*, Summer 1999) the question is asked if the distribution of species in the pteridophyte genus *Isoetes* could be facilitated by the movement of fertilized megaspores (megagametophytes). The suggestion is made that this would be *"an ideal unit for dispersal by waterfowl."* An examination of both of these points, however, raises some unforeseen problems and concludes with some startling possibilities.

For starters, megagametophytes just aren't all that common. While I have seen them on a number of collections of mature megaspores of aquatic *Isoetes* (most frequently with *Isoetes macrospora [I. lacustris]* in eastern Canada), I do not recall observing a megagametophyte on any of several thousand *Isoetes* plants examined from more amphibious Southeastern taxa. Megasporangia *are* being produced in the Southeast – there are just too many plants in too many populations – but they appear to be rare. Wet megaspores of *Isoetes* are surprisingly adhesive on human skin, so megasporangia could be expected to adhere to exposed skin, legs, and feathers of animals feeding upon whole plants. Given the apparent rarity of megasporangia, however, there would appear to be long

odds against a successful attachment, let alone a long distance dispersal resulting from such incidental contact.

Dispersal of quillwort species by the transport of megasporangia and/or entire plants along permanent and even ephemeral water courses is evidently common. Dislodged individual plants of rare and/or local Southeastern species such as *Isoetes louisianensis, I. microvela,* and *I. Georgiana,* these and other species are regularly observed drifting downstream of established populations or snagged on stream-side vegetation (pers. obs.). Could animals, however, be an important vehicle for transporting *Isoetes* megasporangia beyond the limits of their wetland of origin? Canada Geese, Mallards, and Black Ducks, for example, have been observed ripping up and consuming *Isoetes echinospora* and *I. macrospora* corms. White-tailed deer frequently browse upon the large, fleshy-leaves of emergent woodland stream and swamp species like *I. valida* or *I. georgiana,* digging up the ground about the plants in the process. It's important to remember that an *Isoetes* megasporangium is a megaspore which has split open slightly to permit the entry of microspores and to allow for the development of a new plant. Whether the more delicate material *within* the durable silica megasporangia shell could survive the digestive process of waterfowl or a large mammal, is questionable.

A significant problem with attributing substantial weight to bird migration as the primary vehicle for *Isoetes* dispersal is that the most wide-ranging North American quillwort species are not aligned geographically with major bird migration routes. The three most widespread *Isoetes* species on this continent, *Isoetes echinospora, I. macrospora* and *I. melanopoda,* are distributed across a predominantly east-west, not north-south range. The range of species like *I. engelmannii* (s.str.) and *I. riparia* (s.l.) line up better with major eastern North American migratory corridors, but disjunct populations of these taxa typically are found within complexes of disjunct eastern coastal flora. The occurrence and constitution of these complexes is usually explained as representing elements of relict, formerly more widespread communities dating from recent post-glacial times 10,000 to 5,000 years BP.

How is it, then, that Southeastern granite outcrop endemics like *Isoetes piedmontana, I. melanospora* and *I. tegetiformans* have found their way to isolated seasonal pools scattered across the Southeastern Piedmont? Even if megasporangia were abundant here and water birds heavily utilized these shallow, sterile pools (which they do not), the successful movement of a viable megasporangium from one small pool to another distant granite outcrop wetland in the few weeks each year when plants could grow there would seem to be an exceptionally slim possibility.

What regularly occurring, inanimate natural force would be capable of moving megasporangia and/or whole plants across substantial expanses of unsuitable habitat? In the case of at least the Piedmont granite outcrop species, severe wind storms—in particular tornadoes and severe thunderstorms—seem to be a likely possibility. The spring "tornado season," for example, is well-timed with the March to May peak development of reproducible outcrop *Isoetes* plants. A single pass of a tornado funnel or wind shear over an open, exposed granite outcrop would presumably collect and distribute more reproducible plant material than centuries worth of migratory waterfowl visits. As these wind storms tend to track southwest to northeast, they would eventually cover most if not all of the contemporary ranges of the granite outcrop *Isoetes* species.

In ecological terms, such storm events are not rare. The "quillwort states" of the Southeast presently experience approximately 250 each year. It is estimated that virtually any site in the Piedmont region will have such an event once every 2,000 to 5,000 years. Each of the Piedmont granite outcrops, therefore, could have had a minimum of 1,200 tornadoes in the estimated six million year history of their unique floristic associations.

Long distance *Isoetes* dispersal in the Southeast, and probably in much of North America in any direction other than downstream along a water course, is undoubtedly a rare event on a human time scale. Quillworts are ancient taxa, however, and most species likely have had many millennia in which to disperse. Rare "hitch-hiking" events courtesy of a severe wind storm or a serendipitous, temporary attachment to an animal traveling overland, may be sufficient to account for the establishment of species across watersheds and over wide areas of unsuitable habitats. Proving which process has worked for what species, however, may be more difficult than speculating on the processes involved.

Reprinted from *Chinquapin*, Newsletter of the Southern Appalachian Botanical Society, Fall 2001.

BOTANY 101, Lesson 27

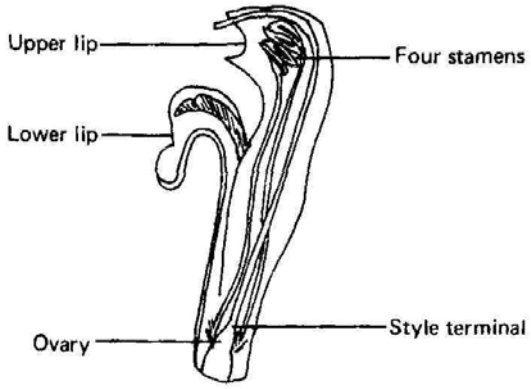
Scrophulariaceae = Snapdragon Family = Foxglove Family

Rebecca Dolan

The snapdragon and foxglove family comprises about 220 genera and 3000 species worldwide. Indiana has about 24 genera and 59 species.

Characteristics

Mostly annual and perennial herbs, although there are some woody members, such as Princess tree.
Flowers irregular with parts in 5s (sepals and petals sometimes fused and 4-lobed), usually showy. Corolla two-lipped. Stamens 4, sometimes with a 5th staminoid (modified stamen, such as the hairy, sterile staminoid that is the bearded tongue of beard-tongues).
Stem can be square, easily confused with mints, although leaves are usually alternate. Fruit a capsule.



Economic Importance

Some garden ornamentals, including snapdragon, turtlehead, beard-tongue, and foxglove.
Heart drug digitalis is from foxglove. Some are semi-parasitic on the roots of other plants.

Some Scrophs in Indiana

Native

Beard-tongues, *Penstemon* spp.
Blue-eyed Mary, *Collinsia verna*
Culver's root, *Veronicastrum virginicum*
Indian paintbrush, *Castilleja coccinea*
Late figwort, *Scrophularia marilandica* (my favorite, the family name-sake genus, always only a few plants in an area)
Louseworts, *Pedicularis* spp.
Monkeyflowers, *Mimulus* spp.
White turtlehead, *Chelone glabra*

Non-native

Butter-and-eggs, *Linaria vulgaris*
Common mullein, *Verbascum thapsus*
Moth mullein, *Verbascum blattaria*
Speedwells, *Veronica* spp. (mostly non-native, a few natives)

Rebecca Dolan, Ph.D., Friesner Herbarium, Butler University

Bog Rosemary

Gordon Mitchell

If you were to visit a bog, you might see some low, upright northern evergreen shrubs that you wouldn't see anywhere else. There is one shrub that you might even see grouped in scattered clumps or grouped in islands. This shrub might inhabit mineral enriched spots or areas where the water has altered its acidic habitat. That shrub would probably be the Bog Rosemary (*Andromeda glaucophylla* Link ex Roemer & Schultes).

The Bog Rosemary is a member of the Heath Family (*Ericaceae*). The generic name, *Andromeda*, was named for the Greek mythological character, Andromeda. In 1732, Swedish botanist, Carolus Linnaeus (Karl von Linne), named this plant and wrote about it in this passage: *This plant is always fixed on some little turfy hillock in the midst of the swamps, as Andromeda herself was chained to a rock in the sea, which bathed her feet, as the fresh water does the roots of the plant*. The specific epithet, *glaucophylla*, is "whitened or blue-green leaves". (*Glaucous* or *glaukos* is "blue or white bloom" and *phylla* is "leaves".)

The Bog Rosemary was listed under other names, too. Scientific synonyms for this plant were *Andromeda polifolia* L., *Andromeda canadensis* Cels ex Lamarck, *Andromeda canescens* Small, *Andromeda rosemarinfolia* Pursh, and *Polifolia montana* Nakai. The specific epithet, *polifolia*, is "many leaves". (*Polus* is "many" and *folia* are "leaves".) Other common names for this plant are Blue Bog Rosemary, Downy Rosemary, Dwarf Bog Rosemary, and Marsh Andromeda.

Uses of the Bog Rosemary

The Bog Rosemary contains the toxic glycoside dipertene resinoid, acetylandromedol (andromedotoxin or grayanotoxin). This toxin is present in all parts of the plant but is concentrated in both the leaves and the flowers. It is most potent in the spring. If ingested it can affect the circulatory, the digestive, the respiratory, and the nervous systems.

Because of this toxin, most herbivorous mammals will avoid this shrub. However, there have been cases of fatalities in sheep that have eaten this shrub.

Despite this plant's toxicity, there were some medicinal uses of this plant. Veterinarians have administered small doses of this plant to some animals for lowering blood pressure. Humans have used it for treating catarrh.

Bog rosemary (*Andromeda polifolia*)

A few Native American tribes also had some uses for it. Some made a tea from the leaves and the tips. Because boiling may release the toxin, these plant parts were placed in cold water. This mixture was then left in the sunlight. This tea was primarily used as a beverage. A decoction made from the fruits was used, but it had an intoxicating effect on the consumer.

Besides medicine and tea, the Bog Rosemary had another use. Its leaves and twigs were harvested for their tannin.

This plant has very few insect pests. However, the Yellow Necked Caterpillar (*Datana ministra* [Drury]) will eat the leaves.

Description

Perennial

Height: 4-36 inches.

Stem: The stem is smooth, round, and has a few erect branches. The younger stems are brown and the older stems are gray or black.

Leaves: The leaves are simple, alternate, evergreen, stiff, leathery, oblong, and narrowly oval. It is about 1-2 inches long, about 1/8 inch wide, and has a tapered base and a pointed tip. It is blue- or dark green above and has blue-white hairs below. The leaf also has a prominent midvein. The margins are smooth and are rolled inward along their entire length. Its petiole is either short or absent. Because the acidity of the bogs

affects water absorption, these leaves are adapted to reduce evaporation.

Flowers: The flowers are white to pink. These flowers are arranged in dangling or nodding clusters at the top of the stem. Each flower is radially symmetrical, is individually stalked, and is about ¼ inch long. The flower has a bell- or urn-shaped corolla with 5 small, spreading triangular lobes at its narrow mouth, and a small, 5-lobed calyx. This flower is insect-pollinated. Flowering season is usually May to July.

These flowers need 2 years to fully mature. The flowers first appear as summer buds on the shrubs' newly developed spring shoots. These same buds must overwinter on the shrub before they will bloom the following spring.

Apiarists (bee keepers) should keep their bees away from the Bog Rosemary's flowers. The nectar is poisonous and that could make their honey poisonous.

Fruit: The fruit is a dry upright capsule. This capsule is blue to red-brown, round, and splits into 5 parts to release its seeds into the air. Fruiting season is usually July to September.

Seeds: The seeds are light brown.

Roots: The root system has a horizontal creeping rootstock. This shrub often reproduces by its rootstocks.

Habitat: Bog Rosemary is found in cold acidic sphagnum bogs, acidic peat soils, and poor fens. It can also thrive in some upland habitats. This shrub is shade-intolerant and is usually found in open areas.

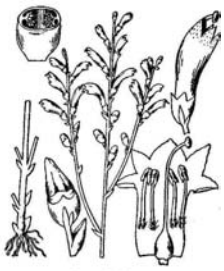
Range: Northeastern U.S., Canada, and northern Eurasia.

Gordon Mitchell works for the Columbus, Ohio, Metroparks and is a member of the Columbus Native Plant Society.

Parasitic Plants of Kentucky

by Ron Jones

Field Dodder
(*Cuscuta arvensis*)



Beechdrops
(*Epifagus virginiana*)

One-flowered Broomrape
(*Orobanche uniflora*)

The vast majority of vascular plants in Kentucky exhibit a "typical" life history, that is, they are rooted in the soil and have green above-ground parts that carry on photosynthesis. Thus, the typical plant is composed of roots, stems, and leaves, and it obtains all the necessities of life from sunlight, air, water, and soil nutrients. A number of Kentucky plants, however, exhibit atypical forms or life histories. Among these are Kentucky's carnivorous plants, epiphytes, hydrophytes, parasites, and saprophytes. In this and subsequent articles, these atypical types of plants will be described. The first to be treated are the parasitic plants.

Parasitic Plants

Parasitic plants are those plants that obtain water and nutrients from a host plant. The relationship is beneficial for the parasite and generally detrimental to the host, but only rarely fatal. There are two basic types of plant parasites — *holoparasites,* which lack chlorophyll and have an obligatory relationship with their hosts (they obtain food, water and minerals); and *hemiparasites,* which contain chlorophyll and have the ability to make their own food, but obtain water and minerals from their hosts. In order to link their vascular systems to the xylem and phloem of the host, the parasite produces special root-like organs, the haustoria.

Holoparasites

Holoparasites in Kentucky occur in two families—the dodder family (Cuscutaceae) and the broomrape family (Orobanchaceae). The Cuscutaceae is represented in Kentucky by nine species, and all are stem parasites. These plants, yellow to orange twining annual herbs, are parasitic on a wide variety of plants, including shrubs and herbs. Some species are important as pests on legume crops. *Cuscuta* seeds germinate

American Squawroot
(*Conopholis americana*)

Conjuror's-nut
(*Nestronia umbellula*)

Buffalo-nut
(*Pyrularia pubera*)

Bluehearts
(*Buchnera americana*)

in the soil, and the growing seedling tip must then make contact with a stem of an appropriate host. As the dodder stem tip wraps around the host stem, haustoria develop, the roots die, and the dodder loses contact with the soil. These plants sometimes form dense twining masses over fields of herbs or cultivated plants.

The members of the Orobanchaceae are parasitic on the roots of deciduous trees, and include beechdrops *(Epifagus virginiana),* broomrapes *(Orobanche* spp.), and squaw-root *(Conopholis americana)*. These plants produce very small seeds that are washed deep into the soil and into the vicinity of' the host roots. Upon receiving a chemical signal from the host, the seeds germinate, and the root tip forms a disk-like attachment to the host. The root tip then pushes through the host tissues, establishing a connection to the vascular system.

Three species of *Orobanche* have been recorded in Kentucky—one-flowered broom-rape *(0. uniflora),* which is infrequent in the state; prairie broomrape *(0. ludovidana),* which is no longer known to occur in the state (considered Historical); and branching broomrape *(0. ramosa),* an introduced species from Eurasia, which is now a rare parasite of cultivated plants (tobacco, tomato, and hemp). The first serious outbreak of *0. ramosa* in the United States occurred in Kentucky, when it attacked hemp crops in the early 20th century and actually threatened the survival of the industry in the state.

Hemiparasites

Both woody and herbaceous hemi-parasites occur in Kentucky. There are three woody species in two families — American mistletoe *(Phoradendron leucarpum)* in the Viscaceae; and conjuror's-nut *(Nestronia umbellula)* and buffalo-nut *(Pyrularia pubera)* in the Santalaceae. Another parasitic member of the Santalaceae, bastard toad-flax *(Commandra umbellata),* is herbaceous, as are all the hemiparasitic members of the Scrophulariaceae—*Aureolaria* spp., *Agatinis* spp., *Buchnera americana, Castilleja coccinea, Dasistoma macrophyila, Meiampyrum lineare, Pedkularis* spp., *Schwalbea americana,* and *Tomanthera auricuiata.* .

With the exception of mistletoe, all of the above-listed hemiparasites are root parasites on a variety of native plants. American mistletoe, which is a stem parasite, is considered to be a poisonous plant, but is widely sold for Christmas decorations. A shrubby plant with opposite leaves, it produces a sticky berry that is heavily sought after by birds, which disperse the fruits from tree to tree. The fruits are mostly likely to attach to trees with rough bark, such as black walnut, black cherry, American elm, and blackgum. Upon germination, the seedling root tip then penetrates the bark in a similar manner to that described above for root parasites.

Illustrations from Britton & Brown, 1913

Reprinted from *The Lady Slipper*, Winter 2003-04

Guidelines for Obtaining and Using Native Plants

If you would like to grow native plants, we encourage you to follow these recommendations. By doing so you will be helping to preserve native flora in natural areas, white enjoying their many benefits in your own garden.

1. DO NOT DISRUPT NATIVE PLANT COMMUNITIES either in the wild or on your property.
2. Learn native plants in situ, by soil and moisture regime, and in the interplay of communities and associations.
3. Allow native soils, soil structure, and duff layer to remain rather than disturbing, amending, or "improving" soils for the purpose of making sites amenable to new plant species. Carefully treat disturbed soils, especially near structures or improvements, with the goal of returning soils and soil structure to match adjoining natural areas.
4. Obtain native plants from seed, garden, or nursery. Buy only if certified by the vendors as "Nursery Propagated." Question ambiguous phrases such as "Nursery Grown" because they are almost certainly wild-collected plants. Become aware of the methods used for propagation by vendors. We encourage propagation from seed rather than vegetative reproduction, to maintain species vigor and genetic diversity. Many vendors now propagate from local seed sources and we encourage you to support such efforts.
5. Orchids, trilliums, insectivorous plants, and other difficult- or impossible-to-propagate species should not be purchased to plant in gardens because they are almost certainly wild-collected plants.
6. Promote the cultivation and propagation of bioregionally native plants as an educational and conservation measure to reinforce and spur on the preservation of natural habitat
7. Plant bioregionally native plant species in your garden, rather than naturalized or exotic species, or named clones. Naturalized or exotic species can escape to wild habitats, suffocating and inhibiting the growth and spread of native flora and fauna. Named clones often do not reflect the range of traits of bioregionally-native species, including wildlife value, and if widely planted, can change natural populations.
8. Begin by using plants and seeds of common species that have originated in your immediate bioregion. Plants and seeds of local origin are best adapted to the local climate, soil, predators, pollinators and disease. They also serve to familiarize others with the value and beauty of common species, communities and associations.
9. Give preference to natural means of fertilizing, weed and predator control rather than synthetic chemical means.
10. Plant native species attractive to native fauna, especially birds, butterflies and moths common to your bioregion.
11. State or federally rare, threatened, or endangered plants should be collected or propagated only with a permit.
12. Transplant native flora from wild settings only when the plants of a given area are officially slated for destruction, e.g. road construction, subdivisions, pipelines, golf courses, etc. Obtain permission before removing wild flora.
13. Exercise extreme caution when studying and photographing wildflowers in order not to damage the surrounding flora and fauna.
14. Openly share your botanical knowledge with the public but ensure that native plant species or communities will not be damaged in the process.

Reprinted from a Maryland Native Plant Society flyer.

Some Sources for Native Plants (with great Fall Sales)

Baker's Acres Greenhouse
3388 Castle Road
Alexandria OH 43001
740-924-6525
bakersacres@copper.net
www.bakersacresgreenhouse.com

Earthscapes, Inc.
10403 State Rt. 48
Loveland OH 45140
513-683-0144

Native and Notable Plants
Doug Ritchey, grower and horticulturalist
10782 County Road 104
Belle Center OH 43310-0656
937-464-6394
cell phone: 937-407-1214
dcritchey43310@yahoo.com

Naturally Native
13737 St. Rt. 582
Bowling Green OH 43402
419-833-2020

Chapters of the Ohio Native Plant Society

Cincinnati Wildflower Preservation Society
Dr. Vic Soukup
338 Compton Road
Wyoming OH 45215
513-761-2568

Central Ohio Native Plant Society
Dick Henley
11800 Poplar Creek Rd
Baltimore OH 43105-9407
740-862-2406

Native Plant Society of the Miami Valley
Nancy Bain
444 Acorn Drive
Dayton OH 45419
937-698-6426

The Mohican Native Plant Society
Mike Klein
1778 Dougwood Drive
Mansfield OH 44904
419-774-0077
mklein1@neo.rr.com

Native Plant Society of Northeastern Ohio
J. Bradt-Barnhart, President
10761 Pekin Road
Newbury OH 44065
440-564-9151
bunchberry1@netzero.net

The Botanizers
The Wilderness Center
Stan Watson
4134 Shelby Circle
Wooster OH 44691
http://www.wildernesscenter.org

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Membership runs the calendar year and is not pro-rated. Membership includes invitations to all field trips, programs, the Annual Dinner, and a subscription to the quarterly journal *On The Fringe*

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Membership Types:
Individual $15; Family $20;
Sustaining $30; Patron $50
Subscription to the Journal $15

Make checks payable to:
Native Plant Society of Northeastern Ohio
and mail to:
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- Promote conservation of all native plants and natural plant communities through habitat protection and other means
- Encourage public education and appreciation of native plants
- Support proper ethics and methods of natural landscaping
- Encourage surveys and research on natural plants and publication of the information
- Promote cooperation with other programs and organizations concerned with the conservation of natural resources

On The Fringe

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