On The Fringe

Journal of the Native Plant Society of Northeastern Ohio

2003 Annual Dinner

Our 21st Annual Dinner guests enjoyed beautiful weather, elegant surroundings in the Dinosaur Hall of the Cleveland Museum of Natural History, and a marvelous talk by Ann Haymond Zwinger sponsored jointly by the Museum's Explorer Series. The 500-seat auditorium was filled almost to capacity. Zwinger's subject was American alpine tundra plants, and she concentrated on those growing in the southern Rockies of Colorado where the descent from Asian roots has been unbroken by glaciation or other disruptions.

The recipients of the Native Plant Society's Annual Grant of $500 were officially recognized at the dinner. Ann Malmquist prefaced her announcement of the award with an appreciation of the CMNH and its growing importance as an intellectual and educational resource in Ohio and nearby states.

RENEW NOW

Our membership year runs from January to December.
Please renew at the highest possible level for 2004

2003 Annual Grant

Tonight we award the Annual Grant to two students at Cleveland State University, Timothy Jones and Pedro Lake. They are Seniors at CSU and former students of George Wilder. Pedro is also involved in creating a Manual of the Grasses of Ohio with completion due in Spring 2004.Timothy has worked on a independent floristic study of the Cuyahoga Valley National Park, among other things.

They are in the process of developing an interactive key of the flora of Ohio. It will include an extensive collection of photographs that will be available throughout the identification process. The photographs will show the diagnostic features enabling the user to identify plants occurring in Ohio. Unlike a paper-based dichotomous key, the interactive key will allow the user immediate feedback regarding the precision of his diagnosis.

The interactive key will be written in DELTA format and be made available on the World Wide Web. DELTA has been adopted by the International Working Group on Taxonomic Databases as a standard for data exchange. Such keys are becoming increasingly common and are extremely easy to use. The software required to view and use DELTA-based interactive keys is freely available on the internet.

Our Grant will be used to purchase a computer system dedicated to the management of immense amounts of information contained within the key in addition to functioning as the server. The system will consist of a 2.6 GHZ processor with 512 Mbytes of RAM and 128 Mbytes of video memory. Upon completion of the project, the computer system will be donated to the Cleveland Museum of Natural History. Serving as advisors to these students are Jim Bissell of the Museum and Dr. Barbara Andreas of Kent State.

Cleveland Museum of Natural History

The Dayton Museum of Natural History is no longer collection-based and has fired all of its curators. The Cincinnati Museum of Natural History has moth-balled all of its collections and has laid off the curatorial staff. Columbus has NO natural history museum. Between New York and Chicago, only the Cleveland Museum of Natural History and the Carnegie Museum still operate at full tilt.

It is often difficult to tell the difference between natural history museums and "science centers". What separates the two types of institutions is the commitment to building and maintaining collections of objects from the natural world.

It is no longer possible to "build" a natural history museum because many of the necessary objects are no longer available or affordable. Maintaining collections has never been more important than now. Collections often serve as benchmarks, indicating where we have been, where we are now, and where we might be going. They allow us to reconstruct the past, be it 350 million years ago or 50 years ago.

The Cleveland Museum of Natural History's collections contain more than 4 million items. They form the foundation of this institution. There is a staff of curators that are, in many cases, world famous. Think of what this house would be like if there were no Johannes Haile-Selassie, no Shya Chitlaley, no Tim Matson. No longer would there be the world-famous collection of bones, of birds, of plants. This building is, in reality, a treasure house. It is a place to bring your children, to be entertained or to be instructed. It is a place for adults to learn and to volunteer.

But just as you are seeing your investments decline as the interest rates fall, so are the Museum's endowments weakening because of the fragile financial times. We are an affiliate society of the museum. They have been very good to us through the years. Now is the time for some of their loyalty to us to be acknowledged and returned. Give yourself or your children a Christmas gift: join the Museum. You can do it online at http://www.cmnh.org/membership/membershipform.html, or call the museum for details: (216) 231-4600.

The Journal of the Native Plant Society of Northeastern Ohio is published 4 times a year at Novelty, Ohio. Questions or comments are welcome and may be addressed to the Editor, 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

Spring Program Schedule

Where required call Jean Roche for information, maps or reservations: 330-562-4053

Jan 17, Sat: Pictures of the Bruce Peninsula. Only eight hours north of Cleveland, a narrow limestone strip of land juts out into the waters separating Lake Huron on the west from Georgian Bay on the east. This peninsula has long been known as a naturalist's paradise due to the rich assemblage of rare and interesting plant species. Enjoy travel and nature photographer Tom Sampliner's slides of this natural wonder. **Orange Library 2:30 pm**

Jan 31, Sat: **Cleveland Botanical Garden**. Our own special tour of Cleveland's newest tourist attraction. Two breathtakingly distinct ecosystems, too wondrous for words, are available for your exploration in one convenient place. Entrance fees will be discounted. **Please meet Tom Sampliner at the Garden 10:00 AM**

Feb 21, Sat: **Lichen Workshop**. Barbara Andreas, Kent State University Professor, and expert Diane Lucas will do a companion to last year's moss workshop especially for the NPS. This lichen workshop will discuss terminology associated with lichen identification. Lichen samples, scopes and dissecting equipment will be available in the lab. The class will meet at KSU in Room 111, Cunningham Hall, located on the east end of the campus, directly east of the library (the only "skyscraper" on campus). Parking will be off Summit Street, next to the math building. Limited to 20 participants. Registration required. **Kent University Campus 9:30 – Noon**

Mar 6, Sat: **Travels to Brazil**. Join Board members, Sarah and Ami Horowitz as they share slides of the beautiful flora and fauna observed on their recent trips to Brazil. A warm tropical break during our long March. **Orange Library 3:00 pm**

Mar 21, Sun: **Members Slide Show**. Members share their best slides including field trips from 2003 in the beautiful new **The West Woods Nature Center** in Geauga County. Directions: Take St Rt 87 east from Rt 306 approx. 2 miles to the park entrance on south side of the road. **2:00 pm**

A Very Special Place

Jean Roche

On August 10, our members were privileged to see the newest park site in Portage County. Stanley Stine, Twinsburg City Naturalist, [*ed note*: who bears an astonishing resemblance to Hagrid, Harry Potter's favorite naturalist] led us on a delightful field trip to this not yet open-to-the-public park in Twinsburg. The City, after a bond issue equal to 1.68 mills was approved by voters, paid $11 million for Twinsburg Park and Nature Preserve, 900 acres east of Liberty Road in Twinsburg Township. It was one of Ohio's first community-based efforts to curtail development by buying park land. The Old Stone House (a lovely piece of history) off Liberty Road is the only permitted public access to the preserve. The Portage County Park District has purchased an adjoining 535 acres to the east.

Starting off from the Old Stone House, Stanley led us into the park itself. The Park's key feature is a cliff of sandstone conglomerate almost 1½ miles in length and from 60-80 ft high. The ledges are comparable to those at the Kendall Ledges and the Hinckley Reservation. The cliffs are covered with rock polypody, marginal shelf fern, and other wood ferns and mosses. We were treated to stands of pawpaw and gray birch. At this time of year, we did not expect to see many wildflowers but we did see a surprising collection. Black snakeroot, also known as bugbane, herb robert, dogbane, wild leeks or ramps and Deptford pinks were in blossom. Doll's eyes were in fruit and we saw the last vestiges of such spring species as blue cohosh, trillium, jack-in-the-pulpit and hepatica.

Unfortunately, we did not find the rare *Carex arctata* known to exist on the property or the Eastern massasauga rattlesnake that Stanley believes could be found there someday. This did not dampen the enthusiasm for the area at the end of a beautiful day. The people of Twinsburg have done us all a service by saving this very special place for all of us.

D-Day on the Beaches of Ashtabula

By Jean Roche

On Sunday, September 21, Bob Bartolotta, Outdoor Education Coordinator for the Cleveland Museum of Natural History, led a trip for the Native Plant Society in conjunction with the Ohio Lake Erie Commission's "Coastweeks." As luck would have it, there was a re-enactment of the D-Day Invasion in full swing as we hit the beaches! As we worked our way along the beaches and the wetland areas around Conneaut Beach, rifles and canon were sounding all around us. We even had members of a mock-rescue unit demonstrating their heroic, life-saving tactics. What a day!

And that was only the beginning. As we alighted from our vehicles at Conneaut Beach, we were surprised to see what we had thought to be trashy hillsides reveal a large population of Fringed Gentian. We took this as an omen that our day would be an exciting one and were not disappointed. There were beach plants galore. Among them were Slender Flat-sedge, potentially-threatened Seaside Spurge, and Alpine Rush. As we moved toward the shores of Lake Erie, we found more than just plants. Toad Bugs and Tiger Beetles were in evidence as well as a fungus, Buried-stalk Puffball. Bob told us that the latter was really a significant finding. Also at Conneaut were potentially-threatened Purple Sand Grass, Cocklebur and Russian Thistle. The ever-present *Phragmites australis* gave Bob the opportunity to explain that in the future every population of this invasive tall grass would be checked to see if it contained what is now believed to be a native species of *Phragmites*.

At Ashtabula's Walnut Beach we discovered the threatened American Beach Grass, potentially-threatened Inland Sea Rocket, Common Sandbur Grass, the threatened Inland Beach Pea, Saltwort, Sand Dropseed and Wild Bean. It was really a botanist's dream.

After a lunch during which we struggled with yellow jackets for our food, we moved on to Geneva State Park. Once again, we found more threatened or potentially threatened plants. Of special interest was the endangered Northern Poison-ivy. This plant has the three-leaved taxonomy that is so familiar to all of us, however, its leaves are entire. Several of us had never seen this particular species before. Also at Geneva we found the endangered Coastal Little Bluestem, another pleasure in a long and interesting list for the day.

The day was fascinating and fun for everyone involved and I take this opportunity to thank our "Coastweeks" friends, NPS coordinator, Tom Sampliner and to add a big thank you to Bob Bartolotta for a truly memorable day.

Mulch "Volcanoes" Endanger Trees and Shrubs

Have you noticed more and more tree trunks surrounded by thick mounds of bark mulch circling their bases? If you've been wondering about these mountainous mulch "volcanoes" during fall planting season, then take the following quiz: Cones of mulch carefully banked up against the tree trunk are:

a) An epidemic of good landscaping

b) A harmless copycat practice that has become the latest trend in suburban taste

c) Potentially very harmful, seriously weakening, and eventually killing the tree

Alarmingly, the answer is "c"!

Many homeowners and landscapers have recently developed the mistaken notion that mounding bark mulch directly against the bases of trees and shrubs is good for the plants. It is not! In fact, these "volcanoes" are making the trunks of trees and shrubs susceptible to rot from fungi, microorganisms, and insects. The mulch also promotes the growth of secondary roots, which can encircle the trunk and choke off the tree's main roots. Tree and shrub trunks are designed by nature to be exposed to the air, not to the constant moisture of bark mulch.

According to both Dr. Greg Lowenberg, education director of the New England Wild Flower Society, America's oldest plant conservation organization, as well as experts at the National Arborist Association, too much mulch can even smother a tree's root system. So, what's the proper way to apply mulch? First, keep any mulch at least six inches back from the trunk. Add a two- to four-inch layer of organic matter over the plant's root system (woodchips, bark mulch, and compost are all good). The roots of most trees and shrubs extend out to at least the drip line of the branches, but if you want some lawn under the tree, then just make the circular band of mulch cover as large an area as you can. Adding a layer of mulch over tree and shrub roots helps conserve moisture and keeps the soil cooler in summer, but more of a good thing is not necessarily better! Remember, no more than four inches of mulch is needed, kept well away from the trunk. If your tree is already mounded with mulch, you can carefully excavate and pull back the material, clipping away any small secondary roots that have formed.

For more information on horticulture, botany, and conservation concerns, contact the Education Department, New England Wild Flower Society, Garden in the Woods, 180 Hemenway Road, Framingham, MA 01701; (508) 877-7630, ext. 3303. or visit the website at www.newfs.org. If you want more information on planting, mulching, or care of trees contact the National Arborist Association at (800) 733-2622 or www.natlarb.com

Reprinted from the New England Wild Flower Society news release, September 2003

THE OLDEST NATIVE FOREST OF OHIO, U. S. A.

By Shya Chitaley, Ph.D.
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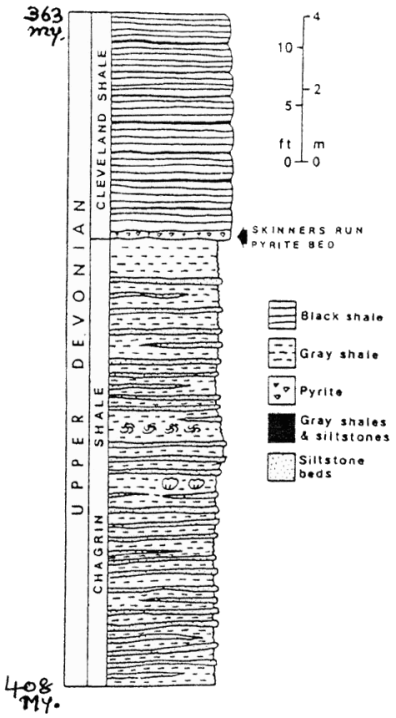
Who would believe that a forest as old as 363 million years was growing on the Northeastern Coastal Land of Ohio, when the state was covered with a shallow sea. Geologically this period 1s known as the Famennian or Upper Devonian as will be seen in the following stratigraphical sketch (text- fig. 1). During this time the Ohioan Sea was close to Cleveland (personal communications with Drs. Michael Hansen and William Hlavin of the Geol. Survey of Ohio) and was covered on the northeastern coastal land (Pl. 1, fig. 17) with a luxuriant forest of large lycopod (club moss) trees mixed with other evergreens, fern-like trees of progymnosperms. The native forest was dominated by clubmosses of at least a dozen different species. It can be called a Clubmoss Forest!

Present day or modern club mosses called lycopodiums are small herbaceous plants (Pl. 1, figs. 1-4) growing prostrate on wet floors under the cover of large trees. These club mosses occasionally produce upright forked branches terminating in cones. The branches are covered with scaly leaves looking very much like hairy caterpillars (Pl. 1, fig. 3). The cones are with small sac-like sporangia borne on a slender central axis, in the axils of leaf-like scaly structures, bearing spores inside for reproduction.

As against this, the ancient 363 million year old clubmosses were large trees called "lycopsids" (Pl. 1 fig. 5). The form and structure are more or less similar in both, but the modern ones are miniatures of the past ones which are found now as fossilized plants. The trunks of these were normally 1-2 feet in diameter, (Pl. 1, figs. 8-10) growing 40-60 feet tall bearing large cones 3-6 inch thick and 6-18 inches long (Pl. 1, figs.7, 11-13). The trees had forked branches like the modern ones. My twenty-year study of plant fossils available from the sediments of the Late Devonian age exposed at many places around the greater Cleveland area (text-fig. 2) has been very fruitful in exploring these lycopsids (clubmosses) from the grayish black Cleveland Shale.

This fragile shale with some siltstones spread in, is geologically known as the Cleveland Shale or black shale of Cleveland, which is the topmost layer of the Ohio Black Shale (text-fig. 1). These sediments were formed in the Ohioan Sea close to Cleveland and the broken pieces of the coastal trees and shrubs and herbs fallen down in sea waters drifted westward and were deposited in the marine sediments near Cleveland. Most of them are preserved as compressed structures but a few permineralized pieces in the siltstone reveal internal structure for critical study.



Text-fig. 1. Geological Stratification of the rocks.

Well-preserved plant fossils were exposed when I-71 (text-fig. 2) route was being constructed through Cleveland, Ohio, during 1965-68 when fresh shale was exposed and good specimens were dug out. Almost all of them are now in the Cleveland Museum of natural History, the only repository for such beautiful plant fossil collection! Each and every specimen is magnificent and provides valuable information about the plant life in the Late Devonian Period. This adds to our knowledge of the evolution and phylogeny of the land plants from their origin in the Upper Devonian beds and the type of environment under which they grew.

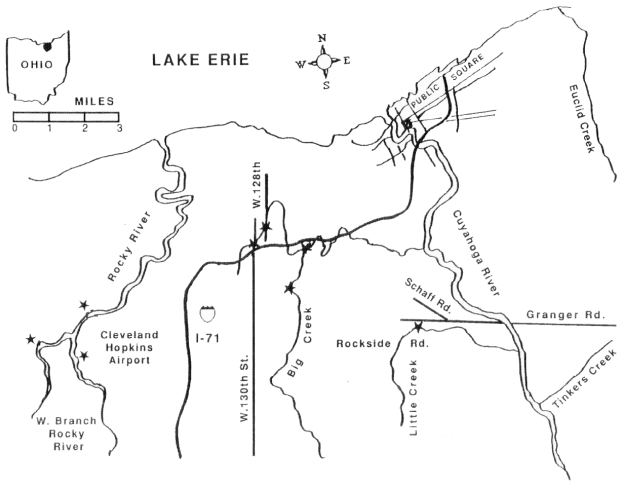
Clevelandodendron ohioensis, Chitaley & Pigg (1996) a beautiful small, slender clubmoss tree, is the only specimen of its kind in the world (Pl. 1, figs. 14-16). It has been found preserved in its entirety from the basal appendages with a straight vertical, unbranched stem bearing at its top a fertile cone. The cone has a central axis on which leaf like sporophylls with attached spore sacs (sporangia) borne on their surfaces (a general pattern in lycopsid cones). This specimen from the upper Devonian of Ohio is related to another specimen of a clubmoss called *Pleuromeia* corda from the Early Triassic beds of other parts of the world, thus showing that the later clubmosses of today, like modern *Isoetes* (Quillwort) had their origin in the upper Devonian *Clevelandodendron ohioensis* Chitaley & Pigg. This happened by retrogressive evolution (See text-fig. 3) During this process the form of a plant becomes reduced in structure, while in progressive evolution smaller plants

grow into larger ones over a time period of millions of years.

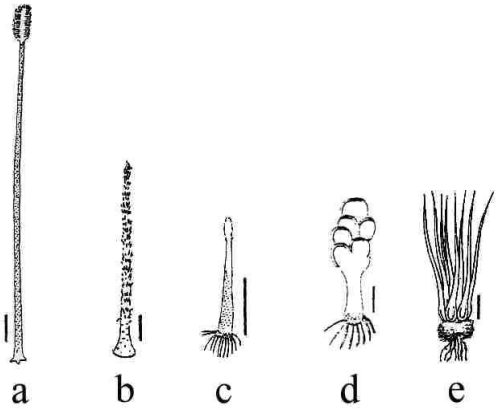
The larger old giant tree club mosses of the Upper Devonian age gave rise in time to their miniatures, the present day small herbaceous ones (lycopods) by becoming smaller and smaller and developing prostrate growth habit rather than vertical/upright growth.

Beside the large clubmosses, there were also other large trees (Pl. 1, fig. 6) known as *Archiopters*, (antique fern, *archi* means antique and *pteris* means fern). These trees found in this late Devonian Forest of Ohio looked like tree ferns because of their large fern like fronds (leaves) bearing spore sacs on their body. But the internal structure of their trunks resembles that of a conifer (gymnosperm). Thus it is in the making of a gymnosperm, a higher plant group of evergreens like conifers, in the systematics of plant kingdom. That is why they are called pro-gymnosperms. Besides these large trees, small and large brown algal patches of *Protosalvinia* and *Prototaxites* grew as under-cover on the wet forest ground. Also some fern-like small shrubs of *Stelloxylon* type called *Polyxylon* were present in this Upper Devonian Forest. The plants growing on the sea coast were thus all halophytes grown in marshy saline waterlogged soil. The large size of the clubmoss trees and those of pro-gymnosperms was naturally acquired because of the hot and humid environment under which they grew. Ohio during the Late Devonian period was close to the equator.

Whao, what a beautiful and exciting landscape (Pl. 1, fig. 17) can be restored from the study of the Cleveland Shale plant fossils, a property of the Cleveland Museum of Natural History. Not just magnificent but also most significant and valuable in displaying the phylogeny of land plants. Our museum alone can provide this evidence because of the availability of these exceptional Cleveland Shale Plants.



Text-fig. 2. A part of Greater Cleveland sketch map, showing the exposures of the Cleveland Shale (stars).



Text-fig. 3. Showing retrogressive evolution in growth habit of *Pleuromeia* -like lycoposids. Modified from Grauvogel-Stamm and Lugardon 2001. (Scale bar equals 10 cm for figures a, b, c and equals 1 cm for figures. d and e.

1. ***Clevelandodendron ohioensis*** Chitaley and Pigg 1996. 363 my Devonian USA.
2. ***Chaloneria cormosa*** Pig and Rothwell 1983. 320 my Pennsylvanian USA.
3. ***Pleuromeia sternbergii*** Fuchs et al 1991. 245 my Lower Triassic, Germany.
4. ***Pleuromeia sanxiaensis*** Meng 1995. 240 my Early Middle Triassic, China.
5. ***Isoetes brochoni*** Motelay 1893. Modern plant

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Newberry, J. S. 1889. Devonian Plants from Ohio. Cincinnati Society of Natural History, Vol XII, pp. 48-56.

Plate I, figures 1-17

Figs. 1-4. Photos of modern club mosses (Lycopodium).
1. A complete herbaceous plant with prostrate rhizome and a branched stem above ground with apical cones. X 0.35.
2. Two cones. X 0.75.
3. A piece of stem with scaly leaves. X 1.
4. Photo showing habitat of modern clubmosses

Fig. 5. Fossil tree clubmoss (lycopsid) roots prostrate, the thick trunk with scars of dropped off leaves and the top forked branches bearing cones. X 0.004

Fig. 6. **Archaeopteris**, a progymnosperm, tree with roots, trunk, and fern-like fronds. A piece of leaf a & b shown bearing sporangia with spores (no cones). X 0.004

Figs. 7-8 Some of the Fossil Lycopsids from the Cleveland Shale.
Fig. 7. A large cone with central axis and leaf like sporophylls bearing sporangia. X 0.35
Fig. 8. A piece of trunk showing forked branching. X 0.08.
Figs 9 & 10. Pieces of trunk showing leaf scars. X 0.045 & 0.08.
Figs. 11-13. Fossil lycopsid cones. X 0.21, 0.25, & 0.10.
Figs. 14-16. *Clevelandodendron ohioensis* Chitaley and Pigg 1996.
Fig. 14. A complete specimen of *Clevelandodendron ohioensis* Chitaley and Pigg 1996 with basal appendages, slender unbranched stem ending with apical cone. X 0.06
Fig. 15. Cone of *C. ohioensis*. X. 0.3
Fig. 16. Basal portion and a part of stem with scaly leaves. X 0.6.
Fig. 17. A landscape restored of the 363 million year old native forest of Ohio.

Dr. Chitaley is Curator and Head of Paleobotany at the Cleveland Museum of Natural History. She has many international awards for her work, and she is widely published.
Color illustrations courtesy of Shya Chitaley.

Cut-Leaved Grape Fern
(Botrychium dissectum)

Daisyleaf Grape Fern
(Botrychium matricariaefolium)

Least Grape Fern
(Botrychium simplex)

The Grape Ferns

By Barbara Plampin

The **grape ferns** *(Botrychium spp.)* grow year round in the Indiana Dunes. The green or bronze fronds of cut-leaved grape ferns *(B. dissectum)* delight the eye in fall and winter, while summer's rattlesnake fern *(B. virginianum)* can be downright common.

At May's end comes a challenge: finding the approximately three-inch, variously named daisy-leaved moonwort, daisy-leaved grape fern, chamomile grape fern or just plain grape fern *(B. matricariaefolium).*

Grapefern can be written as a single word.

Called a "weed fern" by the late Dr. Warren Wagner, the daisy-leaved grape fern is, nevertheless, state threatened (six to ten known sites in Indiana, the southern end of its range). Its approximately eleven-day above ground appearance (officially, May 23 to June 3) and its low stature make it hard to spot amid the surrounding leaf litter. Furthermore, plants often appear singly or are scattered.

The common names offer identification clues: “grape” indicates sporangia clustering around the fertile frond branches; “chamomile” describes the single sterile leaf better than “daisy.” The less useful “moonwort” tells us that the small Botrychium leaf lobes are often almost moon-shaped. Whereas some chamomile lobes are oval, others are variable. The fertile and sterile components together form a “V” atop a single stalk.

B. matricariaefolium plants can be found: I once found myself sitting next to one on a black oak slope. Other habitats in or near the Dunes include a boreal flatwoods; a restored cornfield; and a red maple/spice bush woods, where companion plants include wild garlic *(Allium tricoccum),* woodland knotweed *(Polygonum virginianum),* and starry false Solomon's seal *(Smilacina stellata).* Perhaps it is the varied habitats of this species that caused Dr. Wagner to use the epithet "weed."

Having found the elusive chamomile grape fem, do you need a further challenge? Then hunt for the smaller dwarf or least grape fern (*B. simplex).* It last appeared in Indiana in June, 1990, sheltering under willows on a gentle slope above a Duneland marsh. It was found there by Myra Newgent.

Note: Botrychium classification is fluid. Helpful books include Deam's *Flora of Indiana,* Lellinger's *Ferns & Fem-Allies of the United States and Canada,* Swink and Wilhelm's fourth edition of *Plants of the Chicago Region,* and Wiley's pocket-sized *Ferns of Northeastern United States.*

Barbara Plampin is a trustee of the Shirley Heinze Environmental Fund and a member of Save the Dunes Council. She has a Ph.D. in English literature from the University of Michigan. Botany has been her avocation all her life

Reprinted from the *Indiana Native Plant and Wildflower Society News,* Summer 2001

Hemlock Woolly Adelgid,
Adelges tsugae Annand
Homoptera: Adelgidae

By James F. Stimmel

The hemlock woolly adelgid (HWA) is presently the most important pest of forest stands of hemlock in Pennsylvania, where it can severely weaken and disfigure even large trees. In ornamental plantings, it shares this distinction with the elongate hemlock scale, *Fiorinia externa* Ferris, also a severe pest of hemlocks. New compounds have been developed to fight this devastating insect but the high cost of materials and labor for application will likely keep these compounds from seeing extensive use. This circular is an update of Entomology Circular # 72, originally published in 1982.

Hosts and Distribution: Hemlocks *(Tsuga* spp.) are the only trees affected. This serious pest is found in states in and east of the Appalachian mountain chain from Virginia to southern New England. In Pennsylvania, its range has spread from the southeasternmost counties of Bucks, Delaware, Montgomery, and Philadelphia, to currently include all counties south and east of an imaginary line roughly drawn from Wayne County to Fulton County. Beyond this line, it has also been recorded from Allegheny and Centre Counties. It is steadily spreading westward, even against prevailing winds.

Identification: Hemlock wooly adelgids appear as small, white, wooly masses at the bases of needles on small twigs.Inside these woolly masses are the tiny, slate-gray, sedentary females. The newly hatched nymphs look much like dark reddish-gray scale crawlers, and can be seen crawling on the white waxy tufts of the adult females. Settled nymphs can be found on the twigs at the bases of needles, and appear as tiny, black creatures shaped like an orange section, surrounded with a white margin of wax. Heavy infestations of hemlock woolly adelgid can be spotted from a distance because the trees take on an unhealthy grayish pallor, in addition to an unusually thin canopy.

Life History: Hemlock woolly adelgids overwinter as mature females, which typically begin to lay eggs in late March. Eggs begin to hatch about the middle of April. This first generation feeds and matures by early July. These newly matured females soon begin to oviposit, and the resulting crawlers can be found about mid-July. Many of these migrate to the new growth to feed The second generation, however, enters an unusual "summer diapause" or dormant period in which development seems to cease. This diapause lasts into the cool weather of early October, when the insects mature and enter the winter season.

Damage: Host trees are injured because of the removal of sap from small twigs. Hemlock woolly adelgid sucks sap from the host and, in doing so, injects an injurious saliva. Trees lose vigor, drop their needles prematurely, suffer poor growth, dieback, and possibly succumb to attack. Hemlocks both in wild stands and ornamental plantings are attacked. In other areas of the country - particularly southern New England - researchers have stated that all hemlocks infested with hemlock woolly adelgid will ultimately be killed by this pest, most often within four years of initial infestation. This has not been the case in Pennsylvania. While HWA certainly has a negative impact on trees and *can* cause mortality, we have seen a relatively small percentage of our hemlocks succumb to this insect. The theory is that an otherwise unstressed, healthy hemlock can withstand HWA attack, and that a tree that dies from apparent HWA infestation has likely been severely stressed by some other factor, such as drought. Certainly, a heavy HWA infestation will at least have a significant negative impact on a tree, however. The fact that the southeastern area of Pennsylvania – which has endured the presence of this pest longer than any other area of our state – still has an abundance of hemlocks, is encouraging.

Control Strategies: While several methods of control are effective in combating HWA on individual trees, our arsenal contains nothing that is effective in eliminating this pest from the vast stands of hemlocks common to our forested areas. More traditional approaches to HWA control involve contact-type insecticides, including horticultural oils and insecticidal soaps. These compounds are intended for use against active crawlers or actively feeding and metabolizing nymphs. Note that the growth stages present during the inactive "summer diapause" period essentially cannot be controlled. You should consult your current listing of chemicals registered to control HWA, available from Penn State Cooperative Extension personnel, or from the PA Department of Agriculture.

A major obstacle in controlling this pest on very large specimen hemlocks is simply that of applying sprays to such large trees and getting complete coverage. An

encouraging avenue of control has emerged within the past few years. This involves soil incorporation of Merit® (imidicloprid) insecticide in the root area of infested trees. The systemic action of this insecticide has proven effective in controlling HWA, and this application technique is a practical way to treat very large trees that are too big to spray.

Much work has been done to find and encourage natural enemies to combat HWA. A small lady beetle, *Pseudoscymnus tsugae,* has been imported from HWA's native range in China, and is currently being tested for control purposes. It is interesting to note that the adelgids, as a family, have no parasites associated with them. Here in Pennsylvania, at the time of this writing, HWA has no significant natural enemies to hold it in check.

Hemlock woolly adelgid cannot withstand periods of extremely cold weather. It is thought that temperatures of -20°F are lethal to this insect.

Ornamental hemlocks that receive nitrogen fertilizers are more susceptible to heavy outbreaks of HWA than those that do not. Apparently, nitrogen-rich sap is beneficial to the adelgids, and the very "healthy" females produce a maximum number of eggs, allowing populations to explode. Therefore, excessive nitrogen fertilization of hemlocks is not recommended. Ensuring that your hemlocks have sufficient water is more important than fertilizing them.

Some other strategies may help control these destructive insects. Since HWA crawlers can be spread by birds, discouraging birds from visiting your trees may help. Washing unsettled immature adelgids with a water stream will reduce the population somewhat. Some western and Chinese species of hemlock are resistant to the feeding of these insects, and it may be possible to incorporate some of these resistant species in the landscape.

As undesirable as this insect is, our hemlocks will likely survive its onslaught. *Pseudoscymnus tsugae,* the lady beetle mentioned earlier, appears to hold promise as an effective natural enemy. I have observed that, in forest stands of hemlock infested with HWA, some trees are not infested, while their immediate neighbors may harbor a significant infestation. Perhaps the area of genetic resistance needs to be investigated more thoroughly, and a resistant variety of our state tree will emerge and dominate our landscape.

Reprinted from *Regulatory Horticulture* [Vol.26] Entomology Circular No.198 Pennsylvania Department of Agriculture, Bureau of Plant Industry, 2000

So far there have been two outbreaks in northeastern Ohio, both involving trees imported from out-of-state nurseries and both rapidly controlled. For the latest information on HWA infestations in Ohio, see http://www.dnr.state.oh.us/forestry/Health/hemlock.htm and http://www.dnr.state.oh.us/forestry/Health/hemlocksrisk.htm.

American Chestnut As an Allelopath In the Southern Appalachians

D.B. Vandermast, David H Van Lear, and B.D. Clinton

Prior to the chestnut blight (*Cryphonectria parasitica*), American chestnut (*Castanea dentata* (Marsh.) Borkh.) was the most common overstory tree in eastern deciduous forests. Chestnut's dominance has often been attributed to its resistance to fire and subsequent propensity to sprout vigorously and grow rapidly. Its role as an allelopath has rarely been studied.

Allelopathic qualities of chestnut leaves were tested with five native co-occurring tree species: red maple (*Acer rubrum*), sugar maple (*A. saccharum*), eastern white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), yellow-poplar (*Liriodendron tulipifera*), a native shrub rosebay rhododendron (*Rhododendron maximum*), and a bioassay species lettuce (*Lactuca sativa* var. "black seeded Simpson"). For each species, six replicates of 100 seeds each were stratified for 90 days in distilled water or chestnut leaf extract, then germinated for 21 days. Six additional replicates of red maple, eastern hemlock, yellow-poplar, and rhododendron were germinated without stratification. Lettuce seed was not stratified. When germination percentage peaked, seeds were removed from the experiment and radicle length was measured. Chestnut leaf extract lowered germination rates of extract-treated lettuce, stratified and unstratified eastern hemlock, and unstratified rhododendron seeds. Radicles of extract-treated lettuce and unstratified rhododendron were significantly shorter than radicles of water-treated seeds. In general, radicles of extract-treated seeds were thinner, broke more easily, and were less likely to have developed secondary roots than radicles of water-treated seeds. This study suggests leachate from American chestnut leaf litter could have suppressed germination and growth of competing shrub and tree species and that allelopathy was a mechanism whereby American chestnut may have controlled vegetative composition and dominated eastern forests. Current vegetative composition in southern Appalachian forests may be attributable, in part, to the disappearance of American chestnut as an allelopathic influence.

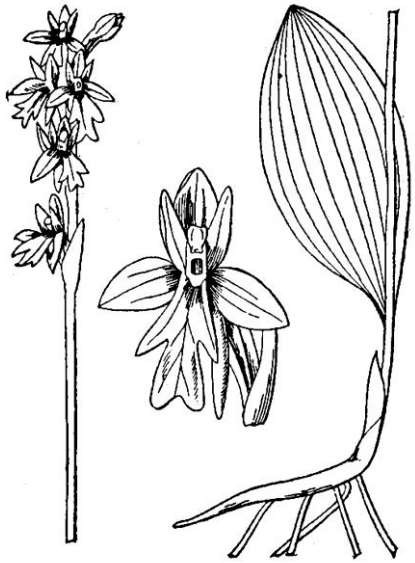
Forest Ecology and Management, 165 (2002) 173-181.

Thanks to the *Newsletter of the Southern Appalachian Botanical Society*, Winter 2002, for calling attention to this article.

On The Road To Nowhere

A New Color Form For Small Roundleaf Orchid

by Tom Sampliner



Heading east out of the town of Jasper in Alberta, Canada, within the provincial park bearing the name of the aforementioned town, we traveled eastward along highway 16 towards Edmonton. We soon began to parallel the Snaring River. Typical of rivers in these parts, the water was a milky silver-grey as a consequence of the silt load being carried. All around you in any direction, the horizon is dominated by snow-capped mountain peaks. At any moment you expect and are often rewarded with seeing local resident critters such as: elk, bear, mountain goat, big horn sheep, and several others we can all name.

We encountered an unpaved road parallel to both the highway and the river. Based upon information furnished to us by orchid hunter acquaintances who had previously scouted the area, we knew this was a road to spend some time upon. The condition of the side road had not been communicated, so that the potholes, ruts, large chunks of gravel and other obstacles made us quite happy to be in a high riding SUV rental as opposed to say, my low riding compact from back home.

No doubt the road was created by utility and/or logging workers using appropriate equipment and to whom comfort was not a high priority. However, the disturbance their activities wrought has proven in the past to be a sign of rich orchid populations. One may argue as to whether this merely opens an area to free the orchids of larger growing competitors or if it has more to do with easing the symbiotic union for a fungal partner into the soil where the orchids have been patiently waiting, or something else entirely.

This trip into the Canadian Rockies occurred during June 16th-22nd of 2003. The time window was also based upon information from a fellow orchidophile. We were hopeful of finding all of his sites as well as finding more species and sites previously unknown. As a necessary corollary in our case, we would spend considerable time photographing all we saw – not limited to orchids either.

Certainly one of our goals was to find and photograph a boreal species known as the small roundleaf orchid (*Amerorchis rotundifolia*). It should immediately be mentioned that modern orchid experts comment on the misleading nature of the nomenclature. The species name does not reflect the actual appearance of the leaf. The solitary basal leaf is certainly rounded at the tip but the overall shape is clearly elongate and best described as oblong-ovate. This denizen of the north hardly makes any penetration into the states. It is especially rare in eastern North America. Noted experts, R.E. Whiting & Paul M. Catling of *Orchids of Ontario* fame paraphrase from their predecessors, Morris & Eames (1929) when they comment upon how fortunate are those who reside north of the border to have this little gem of an orchid species to look at.

So what does this reclusive orchid look like anyhow? The flowering scape is in raceme format typically with from 8-15 florets. A smooth brownish stem is without either bracts or leaves other than the earlier mentioned solitary basal leaf. The two lateral petals are connivent with the dorsal sepal to form a hood over the column. The lateral sepals spread away from the central portion of the floret. A tripartite lip as well as the interior of the five other floret parts is white dotted with madder spots in typical form. The lip is lowermost, wedge shaped, with the central lobe being much larger than the two side lobes. It makes a nice landing platform for pollinator visitors.

Now that we have the typical color form described, we turn to renowned orchid expert, Dr. Carlyle A. Luer (1975) for color variations. One is where the madder dots have elongated into lines and have therefore been given the name of "*lineata*". Another is for flowers that lack the madder either as dots or lines. This has been given the name of, "*beckettiae*". It should be noted that several orchid experts comment that when they have seen these color variations, they often find such plants growing slightly separated from those of the typical color form. Query why this is given the name *beckettiae*. Elsewhere in his writing, Luer uses the term albino if he believes it applies. Therefore the named color form *beckettiae*, though all white, is somehow to be

distinguished from a true albino. As to what the distinction may be I will have to read and research further as it is not apparent. Several orchid authors comment that when they have encountered color forms of Amerorchis, they have found them in groups separated from the normal color form.

Orchid authors describe a variety of habitats for the species. Whiting and Catling for example, cite coniferous forests, bogs, fens, and some tundra near Hudson Bay for a dwarf plant population. Frederick W. Case Jr., author of, *Orchids of the Western Great Lakes Region*, calls the species locally abundant throughout the Canadian Rockies, Yukon, Alaska, but rare in the Great Lakes and further eastward, especially south of Canada. Case further points out that even within known populations the orchids seem to jump around; present one year perhaps not others and always seeming to be on the move. In any particular site, he points out the species can be found in either sun or shade as long as the soil remains suitably cool and the competition is not over powering. He downplays the importance of moist soil as he has observed healthy populations growing upon dry spruce litter.

Before disclosing what we found, it is appropriate to talk about the growing companions. If these are any indication of how one can find these orchids we could have merely rolled down the windows and sniffed the air for the overpowering, almost sickly sweet fragrance of the most frequently encountered companion shrub, silverberry (*Elaeagnus commutata*). In appearance one could at first glance easily mistake the plant for its genus mates Autumn and Russian Olive. While the latter two are aggressive pests here in the East, the former, though common, does not seem to be so. Ovate leaves are silver in overall appearance due to liberal covering of hairs and some rusty glandular spots. Tubular pale yellow flowers cluster in the leaf axils. I observed that it prefers habitats rather open and sunny. Another commonplace shrub, rare but present in our region, is buffaloberry (*Shepherdia canadensis*). Only the upper leaf surface is green while underneath we again encounter white hairs as well as rusty resinous gland dots.

Flowering-plant-sized Heartleaf arnica (*Arnica cordifolius*) seemed plentiful enough. In fact it seemed a rare roadside stretch without it. Perhaps more often shrub-size than flowering-plant-sized, but ever-present in open habitats, was shrubby cinquefoil (*Potentilla fruiticosa*). One could almost surmise the neighbors had come out into the wilderness for a mass planting, so popular has this shrub become back home. Tearing at our clothes constantly was *Rosa acicularis*. The sight of the large pink blossoms and some of that sweet perfume helped take away the hurt.

Smaller in stature but quite showy were the death camas (*Zigadenus elegans*). Another lily so thin and small it hardly made an impression was false asphodel (*Tofieldia glutinosa*). A local shooting star still held forth a few purple blooms (*Dodacatheon conjugens*). Mostly yet in bud were pink pyrola (*Pyrola asarifolia*) and northern parnassia (*Parnassia palustris*). Less common but taking up space were the tall tasseled flowers of a meadow rue (*Thalictrum venulosum*).

Enough now of this talk of everything else but our quarry. So far I see no reference in the literature to a color form of Amerorchis wherein the inner surface of each floret was lined with pink rather than madder. If one were to select a match for the type of pink coloration, peach would be a good choice as the four of us unanimously concluded. There were only a couple specimen plants. We saw them at no other site. We did encounter both the white flowered and madder lined florets elsewhere on this trip. Now maybe we were intoxicated by the sickly sweet perfume of the silverberry. However, we certainly were not by any liquid substances as this was morning and happy hour was over half a day away. Maybe after a week of orchid hunting one goes a little giddy. But there were four of us, all seeing the same thing at the same time. No one had prejudiced our sighting by suggesting any such color combination was out there. A more logical explanation may well be that in prime habitat, within a large healthy population, any orchid species can put on an unexpected variation much like any other species in nature can do. We certainly enjoyed the show and photographed both this variation, the others mentioned earlier, as well as the standard. It just happened to be our privilege to be present to observe the great beauty that nature can serve up unexpectedly in a novelty. Here's hoping to see many more.

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Tom Sampliner is a past president of NEONPS and an avid native orchid photographer. Tom leads orchid–viewing trips all over the US, Canada, and beyond.

Hach-Otis Sanctuary State Nature Preserve

Emliss Ricks, Jr.

Hach-Otis Sanctuary is an 81-acre forested tract overlooking the spectacular Chagrin River Valley. Located in Willoughby Hills and within 20 miles of downtown Cleveland, the preserve has been protected as a bird sanctuary since 1944. The generosity of two local families preserved this beautiful bluff-top forest of native hardwoods and hemlocks. The woods was originally donated to the Cleveland Bird Club (a forerunner to the Audubon Society of Greater Cleveland) by Mr. and Mrs. Edward A. Hach and by Harold T. Clark, a philanthropist who bought 56 acres of choice forest from Harrison G. Otis. It has been visited by thousands of Ohioans over the last 60 years. The sanctuary was dedicated as an interpretive nature preserve in 1977. This dedication ensures that the area's scientific, educational, and aesthetic values will be preserved for future generations of Ohioans.

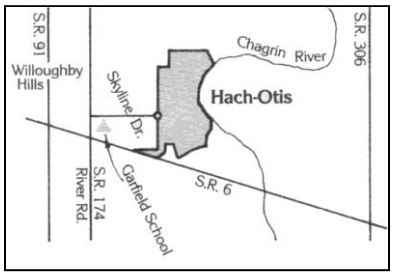
Hach-Otis Sanctuary is one of a statewide system of nature preserves established under the Ohio Natural Areas Act of 1970. Preserves are set aside for the protection of their natural plant and animal communities.

The topography around the preserve is spectacular. Bluffs overlook a stream recutting an old valley that was completely filled with glacial drift during the last ice age. The ridges stand more than 150 feet above the streambed of the ever-changing Chagrin River. The unstable hillsides of glacial clays and sands perched above shale are constantly being eroded by the meandering arm of the river.

Along the edge of the bluffs, the tall trees have a tenuous existence, standing above their fallen brethren whose inert forms eventually are carried by mudflows to the river itself. The unstable nature of the cutbank is evidenced by the lack of vegetative cover from river to bluff. With the exception of coltsfoot and a few small weeds, the hillsides stand bare and with each rain retreat even farther from the river. From the overlooks along the trail one can see five miles eastward all the way to the virgin white pine stands on top of Little Mountain.

In early spring, after the ice has broken on the Chagrin, the upland forest comes to life with a bright and colorful display of wildflowers. Hepatica, harbinger of spring, Dutchman's breeches, trillium (both white and red), bloodroot, several species of violets, yellow mandarin, Solomon's seal, and wild geranium are but a few of the many blooms to enjoy. This carpet of spring color is one of the most popular attractions at the sanctuary. The brilliance of fall colors is also quite spectacular.

The trail system begins at the parking lot. There are two loop trails: one going north and the other south. Both offer scenic views of the river valley and stretch through mature forest and around the deep ravines. Although the scenery is dramatic, the trails are easily negotiated and are generally dry. Insects are seldom a nuisance at the sanctuary.



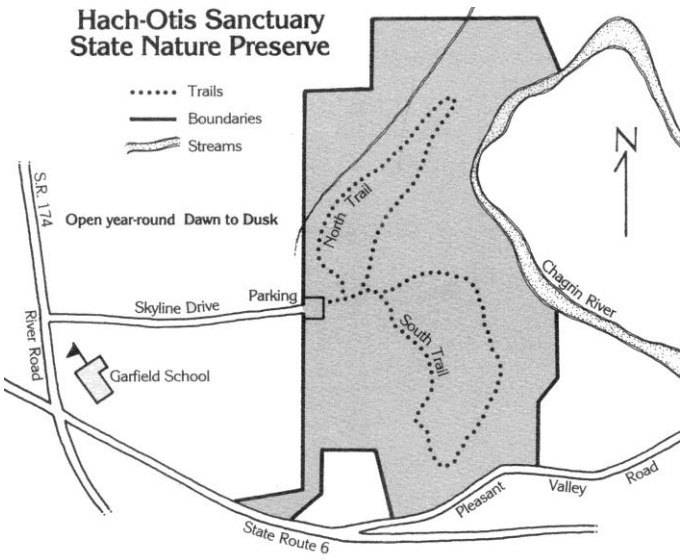
Visitors are cautioned to be extremely careful at the cliffs, which are unstable. Footing can be hazardous, especially when wet and icy. STAY WELL BACK FROM THE RIM!

When the early settlers arrived here, they discovered a region of lush upland forest laced with deep, cool ravines. Game was bountiful and much of the land was ideally suited for vineyards and orchards. During the last century a sawmill, a gristmill, and a woolen mill were located on the river adjacent to the sanctuary. Remnants of the old millpond dam still exist. On some of the old beech trees along the bluffs remain the initials and trail signs of early trappers.

Primarily a beech-maple-oak mixed mesophytic forest with deep ravines of eastern hemlock, Hach-Otis Sanctuary is home to some unusual and interesting species of plants including trailing arbutus, pink moccasin flower, and red trillium. There are a few young American chestnut trees along the bluffs.

Many of the ancient beech trees have completely hollow trunks and provide “apartments” for a number of different species of animals. Squirrels can be heard barking among the treetops, and pileated woodpeckers, great horned and barred owls, white-tailed deer, foxes, and raccoons are some of the other animals found within the preserve. The clay banks above the Chagrin River are ideal nesting spots for bank swallows and noisy kingfishers.

Reprinted from an Ohio Division of Natural Areas and Preserves State Nature Preserve information sheet. Map by Jim Glover.



Apples in Ohio

David Vermilion

As we come to the close of the state's bicentennial year, how many of us realize that something as commonplace as the apple holds a place in Ohio history? Undeniably, apples were a practical necessity and contributed to the survival of the settlers. When George Washington advertised for tenants to occupy his landholdings in the Ohio Valley, he asked for no immediate rent payments but required settlers to plant apple and other fruit trees.

General Rufus Putman collected apple tree scions from New England to be planted at Marietta, the first permanent settlement in the Northwest. The Ohio Land Company required that all homesteaders plant 50 apple trees during the first year on their land. Numerous Ohio settlers planted apple orchards from seeds or pips they carried with them or had obtained from residents east of the Appalachian Mountains.

Apples are members of the rose family and are well suited to Ohio as the trees require a change of climate (apple trees need about 1,200 hours per year below 45ºF.) to trigger flowering and fruit producing cycles. Easy to grow, apples provided a good source of complex carbohydrates, vitamins, minerals, and dietary fiber. Although pioneer settlers did not know the specifics that made apples a salutary food, one of the most popular proverbs of the 19th century, "an apple a day keeps the doctor away," clearly indicates the widespread belief that eating apples promoted good health.

Found in every county in Ohio, apples proved both practical and versatile. Apples were used in pies, cobblers, dumplings, sauce, fritters, butter, jelly, and vinegar. For drinking, settlers made apple juice, cider, and spirits. If a well ran dry, apple cider could be consumed. Stored, dried, or preserved, apples would last for months and became a staple in the settlers' winter diet.

The Rambo apple was a good all-purpose apple and prized because it was delicious for winter eating. The Baldwin apple, with its crisp texture and excellent keeping qualities, was prized for fresh eating as well as for cooking. The Summer Pearmain was known for its excellent flavor and was popular for making applesauce. The Golden Russet, a popular cider apple, was good eaten out-of-hand as well as for drying.

Early Ohioans grew an amazing variety of apples and an estimated 1,000 apple varieties were known in this country by 1872. Why were there so many varieties of apples? Like roses, apples cross-pollinate, resulting in the seeds that grow up to produce apples different from the parent plant. Thus, Ohioans learned to graft for desired apple varieties.

Names were needed to distinguish the many varieties of apples growing across the country. Some varieties were named after people: Jonathan, Ben Davis, and Mother to name a few. Other apples were named for places, such as the Rome or Rome Beauty variety, named not for the ancient city but after the location of the apple's discovery in Rome Township, Lawrence County, Ohio. Apples were also named for their taste or appearance: Golden Sweet, Sops of Wine, Red Astrachan, and the very descriptive Sheepsnose apple. Still, other names were the product of sheer poetic imagination: Maiden Blush (one of the oldest American apples), Fallawater and Seek-No-Further.

However, with the commercialization of the fruit industry, many of the old varieties were lost. Apples became standardized; varieties that produced well, have a long shelf life, ship well and are uniform in appearance were promoted.

No discussion about apples in Ohio would be complete without mentioning John Chapman (1774-1845), commonly known as Johnny Appleseed. A self-styled nurseryman, Chapman gave and sold apple seeds and saplings to pioneer settlers. Often preceding the settlers, Chapman established orchards throughout present-day Ohio and further west with apple seeds he obtained from cider mills.

Although much of what we know about Chapman is infused with legend, he helped hundreds of settlers establish their own apple orchards. He was also a businessman, and owned and leased land for his nurseries. Chapman tended to his widespread orchards on foot. It is believed that he walked barefoot in worn-out clothes, hundreds of miles each year, for over 40 years until his death at the age of 71.

Today apples are the second most consumed fruit in this country (bananas are first) and are considered not only good eating but as traditional and dependable as Grandma's apple pie. So the next time you bite into an apple or slice a piece of apple pie, enjoy your taste of history.

Reprinted from *The Dawes Arboretum Newsletter,* November 2003

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For more about the history of the American apple, read this:

The Botany of Desire: A Plant's-Eye View of the World

Michael Pollan

Random House, 2001, Softcover, ISBN: 0375760393, $13.95

Pollan has given us an entertaining and highly readable account of four plants dear to American hearts (well, many American hearts): apples, tulips, potatoes, and cannabis. These plants share a long history of vigorous human manipulation of their genetic characters, and they now have little resemblance to their wild forebears. Their social and technical histories make fascinating reading. You will be amazed.

Winter Botanizing in Maryland

By Meghan D. Tice

There are many interesting plants to observe even on the coldest winter days. In fact, a good way to learn to distinguish some native plants is to study the ones that persist throughout the winter months. Besides the well-known evergreens such as American holly, pines, hemlock, cedars, and spruces, there are several shrubs that keep their green in the winter. One is the commonly occurring mountain laurel *(Kalmia latifolia),* which can be seen throughout Maryland. Mountain laurel is a member of the Heath Family *(Ericaceae),* which contains several evergreen species. The sheep laurel or lambkill *(Kalmia angustifolia)* is a rare, watch list species in Maryland. It tends to grow near bogs in acid soil and is a much smaller shrub than the mountain laurel. Another evergreen shrub of the Heath Family is rosebay or giant laurel *(Rhododendron maximum)* that occurs in the mountain zone and upper piedmont of Maryland. Their large, glossy leaves droop under the weight of ice and snow. One of the rarest plants in Maryland, the box huckleberry *(Gaylussacia brachycera),* is listed as endangered but may now be extirpated. The last known site for this small shrub was in Anne Arundel County. Box huckleberry is the only evergreen huckleberry that existed in Maryland as a glacial remnant. Anne Arundel County also contains some examples of the natural community known as the northern or quaking bog. Within these bogs grows another ericaceous evergreen, the large cranberry *(Vaccinium macrocarpon),* a rare, watch list species that is also found in bogs in Garrett County. Garrett County is also home to the state-threatened small cranberry *(Vaccinium oxycoccos).* The Heath Family also contains some smaller evergreens. One is the well-known wintergreen, teaberry, or checkerberry *(Gaultheria procumbens),* which can be seen in acid woods throughout Maryland. Another member of the genus, the creeping snowberry *(Gaultheria hispidula),* is a state-endangered species that only occurs in Garrett County. One last, small evergreen member of the Heath Family is trailing arbutus or mayflower *(Epigaea repens),* found uncommonly throughout the state in dry, acid woodlands, often on slopes.

Not to be confused with the previously mentioned wintergreen is the spotted wintergreen *(Chimaphila maculata),* which is a member of the Wintergreen Family *(Pyrolaceae).* Spotted wintergreen is a common, small evergreen that can be seen in woodlands throughout Maryland. A highly state-rare member of the genus is pipsissewa or prince's pine *(Chimaphila umbellata).* Pipsissewa lacks a pale stripe on the leaves and has leaves that occur in whorls. Round-leaved pyrola *(Pyrola rotundifolia)* and other *Pyrola* species are uncommon members of the Wintergreen Family that have round, glossy evergreen leaves that grow from basal rosettes.

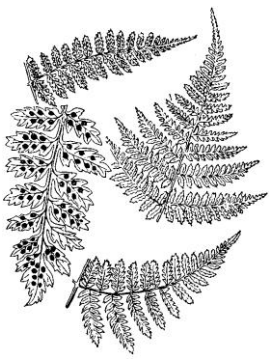
Wintergreen
Gaultheria procumbens

Partridgeberry *(Mitchelia repens)* is a low, creeping evergreen that is common throughout the state. It forms small mats of tiny, opposite, dark green, glossy leaves that have pale midribs and has bright red berries. Partridgeberry is in the Madder Family *(Rubiaceae).*

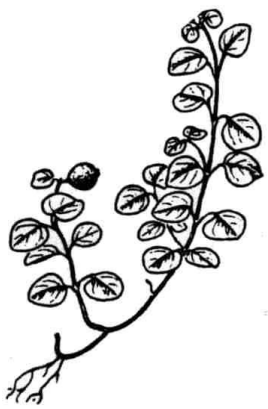
Mistletoe is a popular holiday tradition, but it might surprise some to learn that there is mistletoe native to Maryland. American mistletoe *(Phoradendron flavescens)* can be found throughout southern Maryland and on the eastern shore. Mistletoe is parasitic on several species of deciduous trees, especially oaks. Some call the species oak mistletoe, though it can also be found in maples, gums, and elms. The popularity of mistletoe stems from the Druids who believed that the spirit and power of the oak resided in the mistletoe during the winter months. It has been thought of as a symbol of fertility; hence the kiss.

Several species of ferns can be seen throughout the winter, which is helpful in learning to identify them. Perhaps the most frequently seen, and familiar, is the aptly named Christmas fern *(Polystichum acrostichoides).* Others to be noted in winter are wood ferns such as the spinulose wood fern *(Dryopleris spinulosa),* commonly seen in the mountain zone, intermediate wood fern *(Dryopteris intermedia),* found in the mountain and

Marginal Wood Fern
Dryopteris marginalis



Intermediate Wood Fern
Dryopteris intermedia



Partridgeberry
Mitchelia repens

midland zones, and the marginal wood fern *(Dryopteris marginalis),* which can also be seen in the mountains and midlands. Marginal wood fern is named so because the sori, or fruit dots, occur near the margin, or edge, of the leaflets. Spinulose and intermediate wood ferns have more serrated leaflets and sori that occur close to the midrib. Intermediate wood fern has sori with stalked glands that can be seen with a hand lens. Log fern *(Dryopteris celsa)* is a watch list species that is tracked by the Maryland Natural Heritage Division. Common polypody *(Polypodium virginianum)* is found throughout Maryland growing on rock outcrops, rocky soil, or the trunks of trees. Walking fern *(Asplenium rhizophyllum)* is an interesting fern that grows on rock outcrops in the piedmont, though not commonly. The walking fern spreads by rooting at the tip of its leaves. Ebony spleenwort *(Asplenium platyneuron)* is an evergreen fern that can be found throughout the state in well-drained, sandy or rocky soils. Its leaves are narrow, fairly short, and have a shiny black stipe. Mountain *(A. montanum)* and maidenhair *(A. trichomanes)* spleenworts occur infrequently in western Maryland, growing on rock outcrops. There are several other species of evergreen ferns that can be found in the state, including two spleenworts that are currently listed as endangered.

A very attractive family of plants, especially during winter, is the Clubmoss Family *(Lycopodiaceae). Lyco-* means wolf, *-podium* means foot, and some common names given to the lycopods are ground pine, running pine, ground or running cedar, wolf's claw, bear's claw, and crow's foot. Over the years, clubmosses and partridgeberry have been collected for holiday decorations and good luck charms, but this should not be done because they are very slow-growing plants and can be easily decimated by such practices. Some fairly common species in Maryland are tree clubmoss or ground pine *(Lycopodium obscurum),* ground cedar *(L. digitatum),* and shining clubmoss *(L. lucidulum).*

Orchids *(Orchidaceae)* are a family of plants that many wouldn't expect to see on a winter day. However, there are some species that produce their leaves in the fall instead of the spring. These leaves persist throughout the winter and then wither before the plants bloom in the spring or summer. Light is made available to such plants because of the open canopy of leafless trees. One species, the cranefly orchid *(Tipularia discolor),* has a beautiful leaf that is green on the top with occasional purple spots, and bright purple underneath. Another orchid of winter is the puttyroot *(Aplectrum hymale),* with its long, oval, striped leaf. Perhaps the loveliest of orchid leaves are those of the downy rattlesnake-plantain *(Goodyera pubescens),* which are dark green with a network of white nerves and veins, grow in a basal cluster, and can be seen during the winter and throughout the rest of the year.

As early as February (or even in December this winter), skunk cabbage *(Symplocarpus foetidus)* flowers can be seen blooming in wet woodland depressions. Skunk cabbage is in the Arum Family *(Araceae)* and its members have dense flowers on a spike, or spadix, and in some species (such as skunk cabbage) the spadix is surrounded by a hood, or spathe. The large, cabbage-like leaves emerge after the plant blooms.

The days may be short during winter months, but when the leaves and the snows fall, the earth seems to be a brighter place. There are many beautiful things to take notice of during winter, such as the sparkle in an icicle, or the many sparkles on the surface of a snowfall, or even in the frost we have to scrape off of our cars. If you look at them carefully as the sunlight strikes them, you can see all the colors of the spectrum. Things that you may overlook during the other seasons will start to stand out, like the greens of mosses, the reds of berries, the many kinds of pods and nuts that autumn left behind, the openness and colors of the sky that are less visible during greener months, or the stars on a cloudless night. Enjoy the season.

Reprinted from Marilandica, Journal of the Maryland Native Plant Society, Winter/Spring 2002

Rattlesnake-plantain
Goodyera pubescens

Botany 101 – thirteenth in a series

Name That Conifer

by Rebecca Dolan

There are four major groups of conifer trees in our region: pine, spruce, fir and hemlock. From a distance they may look pretty much the same, but there are a few features that allow them to be easily distinguished.

Fir needles are flat and leave a little depression on the branch when they fall off. Cones point upwards on the branch. They are papery, rather than woody, and fall apart as seeds are released.

The American hemlocks are trees, like in the poem *Hiawatha*, not like the poisonous European herb Socrates drank. Our hemlock's needles are short and borne in double-ranks along the branches. Each needle has a double white line on its undersurface. The top branch of a hemlock tree tends to droop to one side. Hemlock cones are the cutest ever, only reaching one inch in length.

Pine trees bear their needles in clusters, or fascicles. White pine has five needles per fascicle, red pine two. Pine needles are round in cross-section and you can roll them through your fingers. Pine cones hang down from the branches.

Spruce needles are 4-angled. They are borne singly on little pegs and leave bumps on the stem when they fall off. Cones hang down.

According to Deam's 1940 flora, the only conifers native to Indiana are:
Prostrate juniper *(Juniperus communis)*
Eastern red cedar *(Juniperus virginianus)*
Northern white cedar *(Thuja occidentalis)*
Tamarack or larch *(Larix laricina)*
Jack pine *(Pinus banksiana)*
White pine *(Pinus strobus)*
Virginia pine *(Pinus virginiana)*
Eastern hemlock *(Tsuga canadensis)*
Canada yew *(Taxus canadensis)*
Southern cypress *(Taxodium distichum)*

Hemlock and Canada yew are plants with northern affinities. They are thought to survive in Indiana only in relictual populations on deep north-facing slopes of creeks where they have held on since soon after the glaciers retreated.

Interestingly, with the possible exception of red cedar, no conifers are native to Marion County.

Becky Dolan is Director of the Friesner Herbarium at Butler University.

Eastern Hemlock
Tsuga canadensis

BOOK REVIEWS

80 Great Natural Habitat Plants.

Ken Druse

Clarkson Potter, NY, 1998
ISBN 060980085X

Reviewed by Nancy Cleaver

Here is a handy pocket size guidebook to take to nursery and yard with you. It is well designed and organized, with all eighty plants sensitively photographed, plus more as chapter openers. This little book is a great resource for beginner natural garden designers or new native plant enthusiasts. Druse emphasizes plant communities and ecosystems, discussing garden conditions based on rainfall. He encourages practices such as leaving dead trees in place.

Culled from the author's more general work, *The Natural Habitat Garden*, and organized according to eco-system, including grasslands, woodlands, and wetlands, this is a portable guide to the best native plants for the garden. Chapters include: Plants for Meadow and Prairie; Wildflowers of the Woodland; Plants for the Water's Edge; and Berries, Pods, and Seeds for Ornament and Wildlife. Each plant selection includes a full-color photo and description with information on plant origin, pronunciation of Latin name, soil and light conditions, hardiness and size.

Ken Druse, *House Beautiful*'s garden editor since 1979, knows how to use words and images to encourage, educate and motivate his readers. His respect for nature and native plant gardens and gardeners is evident through- out this lovely little book.

Reprinted in part from *Notes of the Pennsylvania Native Plant Society*, Apr-Jun 2003

Follow the Blue Blazes:

A Guide to Hiking Ohio's Buckeye Trail

Robert J. Pond

Ohio University Press, published in association with the Buckeye Trail Association, 2003, 299p, illus with maps and photos.
ISBN 0-8214-1489-5 (paper) $19.95

Three dozen side trips from the Buckeye Trail (BT) are described in a wealth of ecological, geological, and historical detail. Pond has divided the BT into 12 sections, with three additional hikes from each part. Meticulous maps and tantalizing photographs accompany the lucid and engaging text. Maps of the 1200-mile Buckeye Trail itself are available from the Buckeye Trail Association and not offered here except at a very small-scale – just enough to orient the reader (hiker) to the general locality. Pond has selected stopping places on the BT from which interesting short excursions can be made, in the 2- to 6-hour range. Most are easy, leisurely walks leading to scenic landmarks and other places of interest.

The Buckeye Trail circles Ohio, with a short loop extending from Akron to Headlands State Park. It goes through parkland and abandoned railroad rights-of-way as much as possible, but there is still a great deal of it that has to follow public roads of varying degrees of improvement. Pond's guide to adjoining off-road trails is a valuable addition to the BT trail maps, and it will be a potential source of activities on one's Ohio road trips.

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The Buckeye Trail

Wintergreen Orchids

Summer Flowers and Winter Leaves

By Carolyn Davis

I recognized the purple-black green leaves at once. Spotted with strange little purple bumps, they could only be the cranefly orchid, *Tipularia discolor,* We were previewing a field trip into Blackbird State Forest, Delaware, and here, next to one of those strange, moisture-filled craters called "white wallows" by the locals and "Carolina bays" by those more scientifically oriented, was a wonderful little clump of this wintergreen orchid.

Further investigation revealed many more stands of this native orchid which is rare in its northern realms (Pennsylvania through southern Massachusetts) but abundant through the rich woodlands of inner coastal regions in the southeastern states. It, like puttyroot, *Aplectrum hyemale,* is called a wintergreen orchid because the leaf appears in late summer, continues green through the winter months, and disappears in the spring, to be followed by a leafless flower stalk in summer. Actually, cranefly orchids bloom typically from late July into August, while puttyroot, the only other wintergreen orchid of the northeast, blooms about mid-June.

Puttyroot, whose leaf is a similarly ovate but pointed shape, is easily distinguished by the white thread-like striping of its parallel veins. Cranefly orchid, to use quilting terms, has a green top tacked with purple ties to a purple backing; puttyroot has two pale, almost gray, green surfaces stitched neatly with white threads that are almost parallel but converge to a point at the top and bottom of the leaf.

Puttyroot I have watched for years at Bowman's Hill Wildflower Preserve, Pennsylvania, but never seen in bloom. At Shenk's Ferry I've seen the six-inch-high flower stalks budding but not yet open in late May. The cranefly orchid is named for the long spread-out spur and petals that resemble the insect known as a cranefly, family Tipulidae.

These orchids, like most, spread more easily by corms vegetatively dividing than by seed. Orchids are curious when it comes to seed, One pod may contain 60,000 to one million seeds. Each seed is so minute that the embryo contains as few as ten cells and is surrounded by no food-storing cotyledons or endosperm, but only the minimal seed coat.

In the wild, a fungus aids in germination by devouring the seed coat and bringing soluble nutrients within reach of the embryo. The fungus, however, does not discriminate and can devour embryo and seedling as well. Apparently those few at the edge of its reach receive nutrients without being devoured, then manage to grow and survive. The fungus, however, extends its threads of mycelia between and even into the cells of the growing plant roots, and thus begins a symbiotic relationship that continues for life. We call this partnership of intertwined organisms mycorrhiza.

Orchid seeds grown on agar, as Dr. Lewis Knudson of Cornell University discovered in the 1940's, can germinate successfully without the fungal relationship if they are provided with a balanced mixture of nutrients and sugar. Meristem culture is another matter, an asexual method of cloning orchids from cells of the mother plant.

Whether from seed or meristem piece, the first part of a new orchid will be a loose cluster of cells called a protocorm. Both *Tipularia discolor* and *Aplectrum hyemale* have several small bulbs or corms in a string. The newest will send up a leaf stalk from one side and eventually a flower stalk from the other side. Sometimes a corm sends up two leaves. Then, after forming a new corm from each leaf, the thread-like connection breaks down, and two plants, identical, are formed where there was just one. The colony has begun. Most orchid reproduction happens this way in the wild.

Much research has been done on *Tipularia discolor* at the Smithsonian Environmental Research Center in Edgewater, Maryland, by Dennis Whigham and colleagues. Their observations have shown that, unlike other orchids which germinate best near the mother plant (presumably where favorable mycorrhiza reside), *Tipularia discolor* germinates only on nurse logs. The log species vary, including *Acer rubrum, Liquidambar styraciflua, Carya* species, *Liriodendron tulipifera* (predominantly), *Pinus virginiana, Prunus serotina,* and *Quercus* species.

Two species of fungus have been found symbiotically in protocorms and young seedlings. The first is the usual Rhizoctonia-like fungus. The second is darker, non-rhizoctonious, and apparently ectomycorrhizal on the mature roots. Experimentation showed that seedlings of *Tipularia discolor* germinate best on rotting wood or soil amended with decomposing wood.

Whigham and colleagues discovered that the same plant rarely blooms two years in a row and that noctuid moths do the pollinating. *Pseudaletia unipuncta* comes for the nectar found in the spur and, while doing so, effectively pollinates the flowers. When the nectar tube is not quite full (after the flower has been open for a day or so), the moth must reach in more deeply for the sweet liquid, and pollinia stick to his eye.

Although plants are self-compatible, cross-pollination is usually effected because the pollinia, containing thousands of pollen grains in each pollinium, are topped with a thin cap which must fall off before pollen is free to find an appropriate pistil. That cap doesn't fall off until at least thirty minutes after the moth has extracted the pollinia. After the cap falls off, pollen grains adhere to the stigmatic surface of the next pistil touched.

Experimentation conducted by a team (Tissue, Skillman, McDonald, and Strain) in Duke Forest on rates of photosynthesis showed that *Tipularia discolor* leaves increase their rate of photosynthesis rapidly from emergence in late August until they reach their maximum size. Then rate of photosynthesis tapers off gradually, regardless of winter temperature, as the leaf becomes senescent by spring. The flower stalk, being red and brown in color, does no apparent photosynthesizing. *Aplectrum hyemale,* on the other hand, photosynthesizes best in autumn, slacks off during winter, and picks up again briefly in the spring with the spring ephemerals.

Bowman's Hill now has new specimens of both puttyroot and cranefly orchid. Puttyroot I have seen nibbled by deer but not devoured. White strands of veins hung into the bitten hollow, like threads of nylon. Cranefly orchid is more palatable to both deer and rodents and thus more at risk. I still hope to watch them bloom and attract those noctuid moths for many seasons to come. We invite you also to check out these specimens at Bowman's Hill, and to let us know if you find either puttyroot or cranefly orchids in the wild places you visit.

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Carolyn Davis is Head of Visitor Services at Bowman's Hill Wildflower Preserve at New Hope, Pennsylvania.
For more about Bowman's Hill, go to http://www.bhwp.org/

Sudden Oak Death

By Faith Thompson Campbell

Please consider acting to help protect native plants from another exotic scourge: "sudden oak death." Help persuade the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) to adopt regulations restricting movement of material potentially infested with the sudden oak death pathogen *(Phytophthora ramorum*) through either interstate commerce or imports of horticultural stock from Europe. Ask your representative and senator to urge USDA to prevent the spread of sudden oak death (SOD).

SOD is one of the most damaging plant pathogens now in North America. It attacks a wide variety of plants, including several oak species, rhododendrons, madrone, evergreen huckleberry, and California buckeye. To date, no cure has been found. Since the disease was discovered in 1995, it has killed more than 100,000 tanoaks, coast live oaks, California black oak, and Shreve's oaks along the California coast. In California, SOD is now found in seven counties. (For more about SOD see http://camfer.cnr.berkeley.edu/oaks/) The disease is also killing trees in southwest Oregon.

Sudden oak death threatens forests across America. Tests have shown that seedling northern red and pin oaks are also killed; scientists believe that mature trees in these species would probably also be affected. Red and pin oaks dominate forests covering a combined range from northeastern Texas to Nova Scotia.

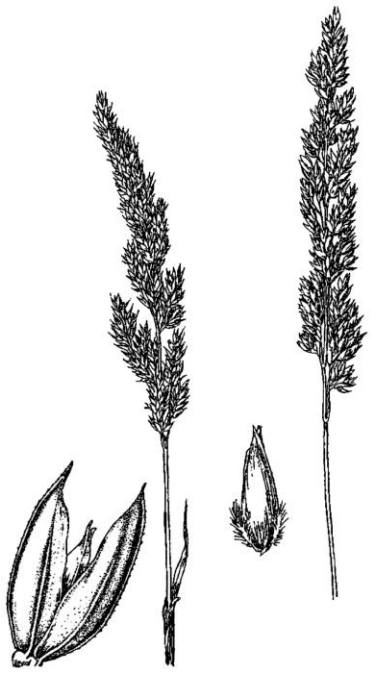
While no one yet knows where the sudden oak death pathogen originated, it appears likely that it was introduced to the United States on rhododendrons imported from Europe. Like several other pathogens in the Phytophthora genus, *Phytophthora ramorum* is easily transported in soil or on plants, stems or leaves. Unfortunately, huge quantities of potentially infested material are shipped from affected regions of northern California and southwestern Oregon. For example, in 2000, more than 177 tons of foliage, including tanoak, huckleberry, and madrone branches were put into the interstate floral trade. Rhododendrons and azaleas are also shipped across the country from nurseries in the region.

Reprinted from *the Bulletin of the Virginia Native Plant Society*, February 2002

For news on the internet, see www.suddenoakdeath.org This is the site of the California Oak Mortality Task Force (COMTF), a nonprofit organization that brings together public agencies, nonprofit organizations, and private interests to address the issue of elevated levels of oak mortality.

Invasive Plants Of Ohio

Reed Canary Grass - *Phalaris arundinacea*



DESCRIPTION:
Reed canary grass is a 2- to 9-foot tall, non-native grass with flat, rough-textured, tapering leaves from 3½-10 inches long. The stem is hairless and stands erect. One of the first grasses to sprout in the spring, reed canary grass produces a compact panicle 3-16 inches long that is erect or slightly spreading. The flowers are green to purple early in the season and change to beige over time. This grass forms a thick rhizome system that quickly dominates the soil. There is some debate as to the origin of the species. Sources document native and non-native genotypes of reed canary grass. The non-native strain is thought to be more invasive than the native strain.

HABITAT:
Reed canary grass occurs in wetlands such as marshes, wet prairies, wet meadows, fens and stream banks. This grass quickly dominates areas of wet, exposed soils and can also grow in areas of standing water by producing special roots off the submerged portion of the stem. Reed canary grass can also grow on dry soils in upland sites and under partial shade; however, it does best in full sun and moist soils.

DISTRIBUTION:
The non-native strain of reed canary grass was introduced from Europe and Asia in the early 1800s. It was selected for its vigor as a forage crop and erosion control. In Ohio, reed canary grass is widespread throughout the state.

PROBLEM:
Reed canary grass reproduces vegetatively as well as by seed. It aggressively dominates an area and displaces the native vegetation replacing it with a monoculture of grass. This species of grass produces little in the form of shelter and food for wildlife, although it has been used for bank stabilization in wetlands and waterways. Seeds are easily dispersed by means of waterways, animals and people.

CONTROL:
Mechanical: In smaller patches, hand-pulling or digging may be effective. Mowing can be used to control seed production by mowing in early to mid-June and early October before seed matures. This also exposes the soil to light which will promote the growth of other species. Discing or plowing can also be used to control a well-established population. Although prescribed burning can be effective, it must be repeated annually for 5 or 6 years. Timing may be difficult due to fluctuating water levels and the growth stage of the plants at burn time. A combination of these measures used together may improve results.
Chemical: Herbicides, such as Accord® or Glypro®, can be applied to control reed canary grass. Fusilade®, a grass specific herbicide, can be applied in non-wetland areas. Herbicide should be applied in early spring when non-target species are still dormant. Removal of the previous year's growth to expose the new green shoots aids effectiveness of the chemical and minimizes the amount needed. Foliar spray application of Glyprol® to larger monocultures of reed canary grass can be effective. Chemical treatments following mowing in the fall season can help control this grass as well.
Biological There are currently no biological control methods in use for reed canary grass.

ADDITIONAL INFORMATION SOURCES:
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Lyons, K.E. 2000. Element Stewardship Abstract for *Phalaris arundinacea.* The Nature Conservancy.

FOR MORE INFORMATION:
Ohio Division of Natural Areas and Preserves
1889 Fountain Square Dr., Bldg. F-I
Columbus, Ohio 43224
(614) 265-6453 www.dnr.state.oh.us/odnr/dnap/dnap.html
Reprinted from Invasive Plants of Ohio, Ohio Division of Natural Resources, May 2000

Meditations on Musclewood (*Carpinus caroliniana*)

by Catherine Siddall

My mother and father have always been interested in nature, and we often took family "woods walks" when I was a child. My mother in particular is a natural storyteller and passed to her children many of the stories she learned about the plants we encountered on these walks. Bloodroot, with which we used to paint our faces, and wild ginger, which we nibbled, made a particularly strong impression. I also remember fondling the bulging "muscles" of a favourite small tree with smooth bark and an arching canopy. It was *Carpinus caroliniana* also commonly known as blue beech because of its smooth, grey-blue bark resembling a beech's bark. (The simple leaves are also somewhat similar to a beech, but there the similarities end.) Mother told us it was called musclewood because of its sinewy, elongated, fluted shapes resembling muscles, especially with its smooth bark. Because it has very hard wood, it is also called ironwood. However, confusion arises with this common name because another lovely, small native tree *Ostrya virginiana* is also known as ironwood. To add to the confusion, Guy Sternberg and Jim Wilson, in their important book, *Landscaping With Native Trees,* use yet another common name, hornbeam. As I have learned since my childhood explorations in the woods, it is better to make the effort to learn at least some botanical Latin.

Enough of names! *Carpinus caroliniana* is an understory tree found in the woods often near rivers or streams. It prefers shade (although it can be grown in sun) and is quite tolerant of a wide range of soil conditions. Its adaptability and wide range from the northeastern shores of Georgian Bay to near Quebec City down the entire eastern United States to northern Florida and eastern Texas, even being found in the mountains in Mexico is cause for awe from experienced arborists. Sternberg and Wilson say this tree is "one of the most broadly adapted of all our native trees." There has been some concern expressed in the literature about transplanting the tree due to its shallow root system. However, in my experience this can be overcome easily. My own musclewood was purchased as a tiny plant barely two feet tall in a two-gallon pot with a distinct and somewhat worrisome bend in its main trunk. It has thrived under my mature apple tree and now is approaching ten feet after three years. The bend in the trunk seems to have straightened, and the tree is developing nicely.

Carpinus caroliniana is not often seen in the cultivated landscape but it has many merits which could make it a useful addition to a small, shady yard. I have valued its tendency to grow in an asymmetrical way with a leader that bends into graceful curves. Stemberg and Wilson's description of its "serpentine growth that can give the tree a bonsai-like appearance, looking older and more venerable than it is" reminds me of my childhood tree, which seemed to be quite bent and ancient looking. The growth habits vary from specimen to specimen with some being multi-stemmed and others having one straight trunk. This tree will not grow large or quickly, usually not exceeding the height of a semi-dwarf fruit tree, according to Sternberg and Wilson.

Graceful in all seasons, *Carpinus caroliniana* often produces a luminous display of colour in the fall. My tree's leaves turn a warm orange-yellow colour nicely complementing the deep wine red leaves of the nearby flowering dogwood (not the native but the Korean one). Who needs flowers with such a lovely leaf display? "Quite a nice native tree," says Michael Dirr, who continues by noting that "This tree has a lot to offer our landscapes in subtle beauty." Dirr, the author of *Manual of Woody Landscape Plants,* has also promoted the use of these trees in an article called "The hornbeams – Choice plants for American gardens." Unfortunately, I am not aware of the tree being used much in North American gardens. The European hornbeam, however, has been used widely in landscaping in North America and Europe, and many selections with various attributes are available.

Worth seeking out, *Carpinus caroliniana* will reward you with year-round, trouble-free beauty. It is not prone to attacks from insects or disease. Its hard wood saves it from damage from ice and wind. Not likely to outgrow a small shady space in your yard, it will never need pruning. It prefers deep, rich, moist and slightly acidic soil but will reportedly withstand the worst urban soils and conditions without evidence of stress. My tree has not produced any flowers (staminate catkins) followed by winged nuts, but these are not noteworthy and perhaps only come when the tree is more mature. It is unlikely that the tree, when it does flower, will create any nuisance seedlings. So, even if you don't have a musclewood tree in your childhood memory bank, perhaps you can make childhood memories for some young person in the future. Remember – it's slow growing. No time to lose.

Catherine Siddall lives and gardens in Toronto, where she is a long-time member of the Toronto and Parkdale Horticultural Societies. Catherine's garden design, build and maintenance business is thriving and she has successfully insinuated many native plants into clients' landscapes. She is also a partner in Siddall and Cope, which offers services to groups wanting to establish community gardens or naturalization projects. She can be reached at (416) 531-2253 or rc.siddall@sympatico.ca.

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Illustration by Brigitte Granton.

How to Make Dried Plant Specimens

by Kay Yatskievych and Rebecca Dolan

Botanists have been making pressed, dried specimens from living plant material for hundreds of years. These are kept in specially designed cases in herbaria (singular: herbarium) under carefully controlled conditions to prevent damage from moisture, insects, rodents, and other potential hazards. An herbarium combines aspects of a museum and a reference library and is an irreplaceable treasure that botanists use for many different research activities.

However, there is no reason that an interested plant enthusiast can't also make plant specimens and keep them for decades in his or her home. There is a long history of people doing just that and eventually donating the specimens to an herbarium. Some of the most valuable specimens in herbaria have come to them in this way.

The simplest way to dry material for a specimen is to lay the plant inside a folded sheet of newspaper, being careful to place the material flat and to position it in the way that you want it to appear on the specimen. It's a good idea to put some leaves up and some down so that characters from both sides of the leaves will be visible. Flowers should be placed so they can be seen and if possible one of the flowers opened so the inside is visible. Put the newspaper between blotters (which can be ordered from the suppliers listed below or cut from desk blotters sold at office supply stores) and corrugated cardboard, place a heavy object of the same size on top, and put the whole thing somewhere warm and dry. Arranging the plant while it's fresh is difficult, but do the best you can. After it's been in the blotters for a day, it becomes limp and you can rearrange parts of it if necessary. Check daily and replace the newspapers and blotters if they become damp. This is especially important with fleshy plants that can mold quickly if not kept dry enough. Small plants can often be successfully pressed in a used telephone book with weights. These should be checked daily and moved to dry newspapers if not drying well. Within a few days to a week or so the specimen should be dry enough to mount.

Pressing plants as soon as they're collected gives the best specimens. However, storing them in a plastic bag in a cooler works almost as well. Keep them in the cooler or put the bag in the refrigerator when you get home until you're ready to press the plants. If you plan to collect more than just a few specimens, you might want to make a plant press or purchase one from one of the suppliers listed below.

To make a press, cut two 12 by 18inch sheets from half-inch plywood. These can be firmly tied together with the specimen and accompanying paper and blotters between them. Clothesline is an inexpensive material suitable for tying. Small presses (about 8 inches by 10 inches) can sometimes be purchased from specialty stores and are useful for pressing flowers separately. It is important that materials for mounting the specimen be acid-free. The standard herbarium sheet size is 11.5 by 16.5 inches. Acid-free herbarium paper, paper for the labels, glue, presses, and other materials can be ordered from the following sources.

Pacific Papers
15703 119th NE
Bothell, WA 98011
800-676-1151
www.pacific-papers.com

Herbarium Supply Company
3483 Edison Way
Menlo Park, CA 94025
800-348-2338
www.herbariumsupply.com

The above sources have a 100-piece minimum order for herbarium paper. If you want only a few sheets to try your hand at mounting, contact Kay Yatskievych.

Paper with a high cotton or rag content purchased at an office supply store is an acceptable substitute for paper for labels. White glue (such as Elmer's) can be used for gluing down both the specimen and the label.

When the plant material is dry, lay it on a sheet of herbarium paper and arrange it in a pleasing way. Be sure to leave space at the bottom right hand comer for your label. Dab white glue on the back of each piece of plant material and place it where you decided you want it. Lay waxed paper over it and put a light weight (such as telephone books) to keep it in position. Allow to dry thoroughly.

Sizes and contents of labels for specimens vary greatly. A convenient size is 1/8 of an 8½ by 11 inch sheet of paper (4¼inches wide by 2¾ inches tall). The title line, usually centered at the top, for specimens not collected for a particular institution is usually something like: *Flora of Indiana*, *Plants of Indiana*, or *Herbarium of Charles C Deam* (for collections kept in a private herbarium). Other

information that should be on the label (see figure for suggested placement) is the name of the plant including the authors [for example: *Proboscidea louisianica (Mill.)* Thell. subsp. *louisianica*], the county and location where collected, habitat, the name of the collector/s, the number of the collection, and the date collected. The color of the flowers should be noted, since this will not be apparent when the specimen has aged. For specimens that are only part of the whole plant, the size of the plant should also be noted. It's a good idea to number your collections as you collect them. This can be done in a field notebook, and information about collecting location, habitat, size of the plant, and who's with you when you collect the specimen can be jotted down so they won't be forgotten when you process your specimens. The number on your collection also serves to make it unique so that when it's cited, there's no doubt as to just which specimen is being referred to. The specimen on the label illustrated would be cited: *Wayne Coles and Susan Eberhoff Coles 1* (BUT, MO). The collector and collection number are usually italicized. The "BUT" and "MO" in the parentheses refer to the two institutions where copies of the specimen (referred to as duplicates) have been accessioned (BUT=Friesner Herbarium at Butler University; MO=herbarium of Missouri Botanical Garden). When Wayne made the collection, Kay asked him to make two specimens so that both institutions could have a copy.

After your specimens are dry, store them in a sturdy cardboard or wood box. Check every few months to make sure they're not infested or getting damp. If you are collecting on your own land or on the land of another private owner from whom you have permission to collect, there are no laws to prevent you from collecting anything on those private properties. However, to conserve the plants on your property, you should not collect an entire plant if it is the only one you have. If the plant is big enough, you can collect a small part of it to make a specimen and still leave enough so that the plant will continue to thrive and will set seed, but this should be done with great caution. Many botanists will not collect a plant unless there are at least 20 of them at the location. If you suspect that you might have a plant that's listed on the Endangered, Threatened, and Rare list (ETR list), please do not collect it. If possible photograph it and contact Mike Homoya of the Division of Nature Preserves, Indiana Department of Natural Resources, 317-232-4052.

Most public lands require that you obtain a collecting permit before you collect any plants on them. So if you want to collect on land other than private land, make sure that you have the necessary collecting permits.

It is possible that you might have a plant on your property that has not been found before in Indiana. If you think this is a possibility, please contact Kay Yatskievych who is working on a *Catalogue of the Vascular Flora of Indiana*. This will be a complete listing of every vascular plant known to exist or to have existed in the state.

About the authors:
Kay Yatskievych is working at Friesner Herbarium through the end of April on a grant arranged by Becky Dolan, who is Director of the Herbarium.

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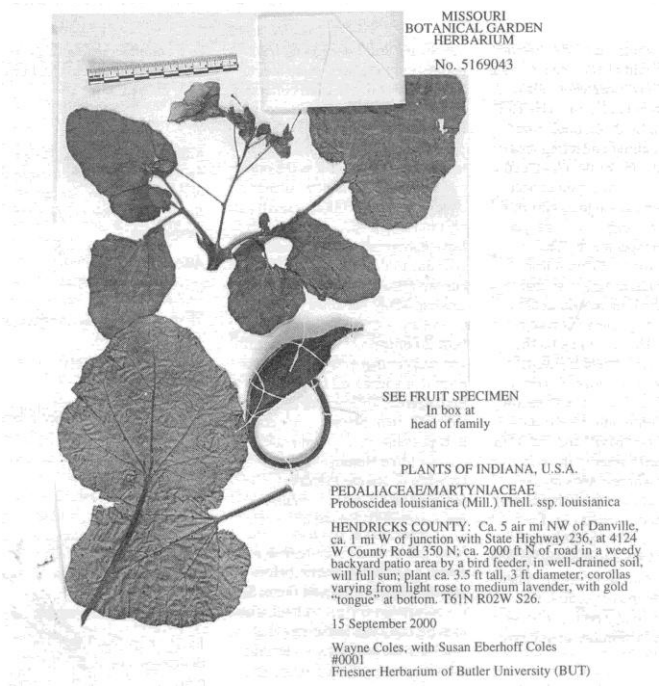

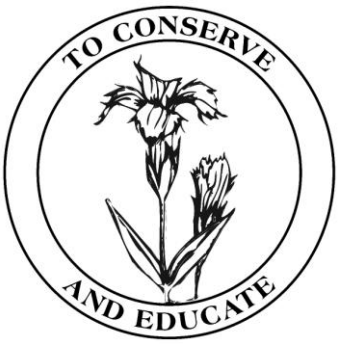

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