



On The Fringe

Journal of the Native Plant Society of Northeastern Ohio

The Terebinths of Texas – Part 2

by Perry K Peskin

The Visitor Center's parking lot at Lost Maples was virtually empty when we arrived early in the afternoon. Somewhat naively, I asked the naturalist behind the counter, "Is this winter or spring?"

"This is winter," he emphatically replied, handing us a map of the nature trails along the Sabinal River. Unfortunately at this time of year, he added, there would be no naturalist-guided tours, but if we followed the map, we would reach the groves of Big-Toothed Maples *Acer grandidentata* that the park was named for. They weren't actually lost, merely separated by hundreds of miles from the main body of the maple population of the Rockies, the nearest of which were growing in the Trans-Pecos region of West Texas. Evidently climatic changes during and after the glacial period created a refuge for northern plants in the Edwards Plateau: first, cold temperatures attracted these relatives of sugar maples into central Texas; then, warmer temperatures isolated them in the cool canyons of the Sabinal River, the only refuges where they survived.

By the high limestone banks of the Sabinal, we found the groves of maples already in leaf. Oddly

enough, clumps of *Tillandsia recurvata*, another type of ball moss, of the pineapple family, seemed to prefer boughs of maples to those of other trees on which to anchor their roots. With the unconventional combination of the maple and pineapple families dominating the scene, what other unusual plants would we find?

Because of its heavily alkaline soil, easily eroded limestone topography, and extensive underground caverns, the Edwards Plateau is the center of endemic plants and animals in Texas. Underground reservoirs shelter the world's most diverse array of cave animals: two blind catfish, a blind salamander, and many invertebrates, all now at risk with increased urbanization and water pollution.

Beside the Sabinal Trail, the park naturalists had labeled many typical plants, including such endemics as Texas Barberry *Berberis swayseyi*, with its five toothed leaflets per compound leaf, and Texas Red Oak *Quercus texana*. Industriously digging up acorns were fox squirrels – which we hadn't seen since we left Cleveland – of a race found only in northern Mexico and central Texas.

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ANNUAL DINNER

On October 28th we have Dr. Mariano Ospina coming to us from Bogota, Colombia to talk about his efforts to preserve the over 3000 species of wild orchids growing in his country. Dr. Ospina is a visiting fellow at Harvard University and a Harvard Research Associate at the Oakes Ames Herbarium. His father and grandfather were Presidents of Columbia and his grandmother founded the Berta H. Ospina Foundation which sponsored the Taky-Hualia Preserve for promoting the study and conservation of Colombia orchids. Dr. Ospina is internationally famous for his projects and is well worth hearing.

The dinner attendance has declined each year for the past several dinners.

It is coming to the point of deciding if the dinner/speaker tradition is what the membership really wants. A tremendous amount of work goes into putting on the whole affair. You can register your opinion one way or another by attending this year's dinner. There is plenty of time to put this on your calendar to keep the evening free. We very much hope that you will be in attendance.

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Summer Program Schedule

JUNE 11th, Sat: Chagrin River Land Conservancy Plant Survey 9:00 AM (note date change) Assist the Chagrin River Land Conservancy in a plant survey of this recently acquired property in Moreland Hills. This 30-acre forested parcel with steep ravines is rich in flora. Sturdy footwear is recommended. Directions: Meet at the polo field parking area in South Chagrin Reservation on the east side of River Road south of Rt 87. **Call Judy to register: 440-564-9151 (H) or 440-286-9516 (W).**

JUNE 18 & 19, Sat/Sun: Northeast Ohio Bog Stomp w/Cincinnati Wildflower Preservation Society –Join ODNR Division of Natural Areas & Preserves botanist Rick Gardner and the Cincinnati Wildflower Society for a weekend of botanizing to several bogs and fens throughout northeast Ohio. Agenda is as follows:

Sat., 6/18

10:00 a.m. - 3:00 p.m. White Pine Bog Forest and Burton Wetlands State Nature Preserve – Burton Township, Geauga County. Take St. Rt 44 south of St. Rt 87 approximately 1 mile to Burton Heights Blvd. Turn left, continue east crossing Hotchkiss Road. Parking for Burton Wetlands State Nature Preserve is on the left.

4:00 p.m. Kent Bog – Kent, Portage County. From Burton Wetlands take Pond Rd west to Rt 44. Take Rt 44 south to either Rt 82 or Rt 303. Turn right and head west to Rt. 43. Take St Rt 43 south through Kent, crossing Rt 621. Turn right at next road, Meloy Rd. Continue west about 200 yds. to parking area on left.

Sun., 6/19

9:00 a.m. – 11:00 a.m. Triangle Lake Bog, Ravenna, Portage County. From I 76 take St Rt 44 exit North to Sandy Lake Road. Turn left and travel approx 1.4 miles to drive on left (road curves around Little Muzzy Lake and the drive is about 0.2 miles from the curve.) Turn left into preserve drive. Park in parking lot.

JULY 9, Sat: Old Woman Creek Estuary 10:00 AM Old Woman Creek is one of Ohio's few remaining examples of a natural estuary. As a transition zone between land and water, the site contains marshes and swamps, upland forests, open waters of the estuary, tributary streams, barrier beach and near shore Lake Erie. Fledgling eagles and beautiful Goldenseal are at home here. Old Woman Creek estuary is the only National Estuarine Research Reserve on the Great Lakes. **Call Diane to register or arrange carpool: 440-603-7195**

AUGUST 11, Thurs: What's Bugging Your Trees? 7:00 p.m., The West Woods Nature Center, Russell Township, Geauga County. - From the Emerald Ash Borer to Beech Bark Disease to the Asian Long-horned Beetle, invasive insects are attacking our local trees. Join the Division of Forestry as we learn how to recognize these pests and what can be done to prevent their destruction from spreading. Co-sponsored with the Geauga Park District. Directions: Take St Rt. 87 east of St. Rt. 306 approx. 2 miles to park entrance on south side of road.

AUG 27, Sat: Doan Brook, Shaker Lakes Nature Center 9:00 AM Hike along the lower Shaker Lake and into the Doan Brook Gorge, an urban setting originally farmed by the Shakers. We will see native woodland species and prairie plants and will learn about the history of the brook and its geology. Meet at **Shaker Lakes Nature Center. Please call Diane for information or reservations. 216-691-1929 (H) 440-603-7195 (W)**

SEP 10, Sat: Plant ID Series: Goldenrods/Asters 9:00 AM (Part of our ongoing Plant Identification Series – families welcome) From the rich yellows of the goldenrods to the purples, blues and whites of the asters, these members of the Composite family abound in the meadows and fields of late summer and fall. Discover how to tell them apart by leaf, flower and habitat. **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. **Call Judy to register: 440-564-9151 (H) or 440-286-9516 (W).**

(Terebinths – continued from page 1)

Nearby was a small understory tree with compound leaves resembling those of a sumac, but lacking the characteristic ovate, toothed leaflets one associates with northern sumacs, such as poison ivy. Since I didn't recognize the smooth, untoothed margins nor the obovate shape (with narrow end toward the base) of these leaflets nor the spike of hard, squarish nutlets – northern sumacs have clusters of berries – I took a few pictures of the tree and continued on the trail.

Ashe Juniper or Rock Cedar, sometimes called Texas Cedar *Juniperus ashei*, grew everywhere. In Texas, thickets of this tree, locally called cedar brakes, provide cover and nesting space for many birds, including two very rare migrant songbirds: the black-capped vireo, nesting in northern Mexico through central Texas into Oklahoma, and the golden-cheeked warbler, nesting only in the Edwards Plateau. The fate of these two federally endangered species depends largely on the strict enforcement of regulations preventing developers from chopping down cedar brakes before filing environmental impact statements.

A large tree from the heath family, the Texas Madrone *Arbutus xalapensis*, was actually in bloom, with small reddish flowers. It represented a past migration of species from Arizona and the Pacific Coast into Texas.

After spending the night at Kerrville, we were ready for our last full day in Texas at Eagle Lake, west of Houston. For a town whose motto, proclaimed in conspicuous signs, is "The Goose-Hunting Capital of the US," a national wildlife refuge set up nearby to protect a rare bird seems a contradiction in terms. But for birders, Eagle Lake is just about the only certain place to see the Attwater subspecies of the greater prairie chicken, and even here it is barely hanging on. Again, loss of habitat combined with uncontrolled hunting of this grouse-like bird on private property appears to be the cause of the decline.

I felt fortunate in seeing the grouse's dancing ground, or lek, as it is called, through a telescope mounted in the Visitor's Center, and watched a male grouse display its fine feathers while strutting to attract a mate. In a few years this bird, once numbering in the millions along the Gulf Coast, may quite likely join the heath hen – another sub-species of the greater prairie chicken occurring once in huge numbers along the Atlantic Coast – on the downward path to extinction.

The Visitor Center sat in the middle of the flattest terrain we had seen in Texas or anywhere else, part of the Blackland Prairies, 12 million acres of tall grass and extremely fertile, now shrunk by agriculture to less than 5,000 acres. Not a tree or bush stood between us and the horizon. I almost felt as if I were in a ship sailing a sea of grass with the earth's curvature in the distance. Looking down, I realized that it wasn't too early for the early spring wildflowers, even under these cool conditions, and again they proved to be an array of species different from those along the Gulf or the Rio Grande. The Ten-Petaled

Anemone *Anemone heterophylla* with blue or white petals, some short and stubby, others long and tapering, seemed to predominate over the others: the bright yellow Carolina Buttercup *Ranunculus carolinianus*, the White-Flowered False Garlic *Nothoscordium bivalve*, a lily resembling a typical onion but lacking the garlicky smell in the bulbs; and a Pale Yellow Corydalis *C. crystallina*, closely related to Dutchman's Breeches and more distantly to the poppies. Like the Golden Corydalis of the West *C. aurea*, it probably contains alkaloids distasteful or even poisonous to grazing animals and therefore can thrive in a prairie habitat.

The next (and final) day, driving back to the Houston airport, we calculated we had driven over a thousand miles through four out of the ten vegetation zones of Texas but had merely scratched the surface of this giant state.

Back home in Cleveland, I spent much of the following two months looking at my developed Texas slides and trying to identify the more than 160 wildflowers and trees I had photographed. The only tree that resisted identification was the sumac-like tree at Lost Maples. I had to consult a complete flora of Texas, published in 1970, to determine that no sumacs of the genus *Rhus* in the Edwards Plateau have obovate leaves and nutlike fruits.



Leaves

*Pistacia texana*

Seedpods

However, my reference also listed a one-species genus in the same family that fit the mysterious specimen like a glove. The American Pistachio *Pistacia texana* had untoothed, obovate leaflets and small, dry fruits and was a small tree or shrub native to northern Mexico and the EDWARDS PLATEAU! The riddle was solved!

But I was curious about the pistachio. Were the small fruits actually pistachio nuts? From my references I learned that of the nine species of *Pistacia*, one is North American, another is Chinese, and the rest occurring from the western Mediterranean to the Middle East. Only the fruit of *P. vera*, a native of Iran but cultivated widely in countries with a Mediterranean climate (cool winters and hot, dry summers), qualifies as the true pistachio nut, the one that supplies the green flavoring to certain candies and spumoni ice cream.

As members of the sumac family, though, all the *Pistacias* produce a resin in their wood that apparently served originally as an antibiotic defense against insects, molds, and fungi, similar to the resins of pine trees, the tannins of oaks, and the alkaloids of poppies and other families. In the case of the Middle Eastern *Pistacia* species, many, if not all, produce a resin that was called terebinthinus in ancient times and shortened to turpentine in medieval England; therefore, the trees producing this resin were called terebinths. In the ancient Mediterranean world, turpentine extracted from the species *P. terebinthus* was especially prized as a solvent for paint pigments, varnishes, and medicines until superseded by the resins of pines and other conifers. The fine old name of terebinth also fell into disuse; I believe it should be revived as the common name for trees of the genus *Pistacia* that do not produce edible fruit.

Perhaps because their powerful resins combat disease and decay, many terebinths in the Eastern Mediterranean are famed for their long life span, up to 1,500 years, and, for a desert tree, grow to a large size. In the days of Abraham, before maps and compasses, groves of these long-lived, imposing trees were highly esteemed as landmarks, indicating oases – well-watered, grassy, well-shaded places to stop at for the night. The terebinths of Mamre, therefore, were not just any grove of trees, but an important landmark that could be seen from far away in the desert by merchants leading camel caravans.



Montezuma Cypress



Texas Sabal Palm

The sumac family is ancient, with leaf fossils going back to late Cretaceous times, when the modern families of flowering plants first evolved. Like the Texas Sabal Palm, the Montezuma Cypress, and many other native trees of South and Central Texas, the American terebinth perhaps existed long before there was a Rio Grande or an Edwards Plateau.

As a member of an economically useful group of plants, it deserves study for its fruits, its resins, and its long life free

from disease. As a rare Texas tree, it deserves protection, along with all the other plants and animals in that beleaguered state that qualify under the Endangered Species Act. Perhaps one can still hope that a flourishing population of formerly endangered Texas plants and animals will some day in the future serve as landmark of enlightened conservation practice, much as the terebinths of Mamre, now no longer mysterious, once guided travelers in ancient days.

EPILOGUE – 1998

Many things have happened on the conservation front since I last visited Texas in 1991.

South of Laguna Atascosa National Wildlife Refuge, another preserve called the Lower Rio Grande NWR has been established. These two refuges now support the largest remaining populations of ocelots in the state, estimated at 50 to 100 animals.

The Sabal Palm Sanctuary has continued to purchase additional lands as part of the Wildlife Corridor system. This concept still receives the highest priority in South Texas. In the four counties of the Valley between Brownsville and Falcon Dam, where the federal government would like to acquire 8% of the land, or 250,000 acres, already 60% of that goal has been reached. However, the price of land has soared so high in recent years that an unbroken corridor paralleling the Rio Grande may not be immediately feasible. Instead, a series, or network, of corridors, following resacas and tributaries, may be the next best plan, unless Congress provides additional funds.

Many private donors, including Mr. MacWhorter, have helped speed the project along, and his Llano Grande, with its Montezuma Cypresses, has proved invaluable, especially since very few researchers have yet been successful in starting these conifers from seed.

Proof that the Wildlife Corridor is succeeding lies in the wildlife itself. Recently two Mexican parakeets, the green and the redcrowned, have established breeding populations on the Texas side of the river, where formerly they were uncommon visitors. A very rare tree from the citrus *Esenbeckia runyonii*, the Limoncillo – known from scattered locations in Mexico and thought to be extinct in Texas for the last 30 years, has made a comeback on federal land in the Corridor, where 15 individuals have been discovered.

Cactus protection in Texas is still hampered by weak laws and no manpower allocated to protect endangered and threatened species. There is no category in Texas to correspond to "potentially threatened" or "species of special concern," as there is in other states. Cactus species in this class, such as ornamentals and the peyote, are simply not listed. Also, most of the over-collecting of peyote takes place on private land, and cactus raiders seldom incur any penalty. As populations of peyote dwindle, competition among collectors is becoming more intense, resulting in the current practice of digging up the whole plant, roots and all, rather than cutting off the tops. Almost a hundred years ago market hunters methodically exterminated the passenger

pigeon; plants with a potential medicinal value are now methodically being eradicated in defiance of the spirit of the Endangered Species Act, and apparently no one lifts a finger.

Cave species in the underground streams and limestone caverns of the Edwards Plateau have reached the public consciousness with the discovery of the extremely rare Barton Springs salamander within the city limits of the state capital of Austin. Perhaps publicity in the news media will bring about some beneficial changes in the protection of this hitherto unnoticed species, as well as other Edwards Plateau animals and plants.

On the Blackland Prairies around Eagle Lake and two other areas in eastern Texas, the number of Attwater prairie chickens in the wild reached an all-time low of 42 in 1996 in contrast to over a million birds estimated at the turn of the century to be inhabiting the Gulf Coast from South Texas to the Mississippi River. But all is not lost. Captive breeding programs brought back the whooping crane when it was down to 15 individuals at one time. The Department of the Interior in 1996 released 69 prairie chickens, which had been raised in its captive breeding program, and 46 birds, at this writing, have survived, with a survival rate of 67%. Perhaps with strict enforcement of protection laws, and the cooperation of private land-owners, the Attwater race can recover some of its lost ground in the next century.

The Texas terebinth was on my mind when I visited Israel alone on an ecotour in the spring of 1996. I had read that two of the Middle Eastern terebinths, *Pistacia lentiscus* and *P. palaestina*, are among the commonest trees in the oak forests of the Golan and Galilee regions of the North, and that these species are planted around the graves of Muslim holy men, probably because their great longevity symbolizes immortality. However, my English-speaking guides were more interested in taking my group hiking, swimming, and kayaking than observing the plant life.

In the Southern desert called the Negev, which has a climate and topography similar to Death Valley in California, we had been seeing many species of desert birds, mats of wild flowers in bloom, and flocks of Nubian ibexes, the "wild goats" of the Bible, which are making a comeback under Israel's strict protection laws. One afternoon, as the rest of the group went hiking in the stark Red Canyon area inside the immense collapsed Ramon crater south of the Wilderness of Zin, I elected to stay around the bus. Armed with some well-illustrated field manuals, I was having a great time photographing the thorny plants (almost all in the composite family since there are no native cacti in Israel)

and the rather tame songbirds (desert skylarks, black wheatears) when I noticed a fairly wide wadi, or dry river bed, leading away from the road.

About 500 yards down the wadi, a large date palm *Phoenix dactylifera* – without a trunk and with its huge head of leaves, shaped like a green haystack, touching the ground – attracted my attention. Curious as to whether the palm had an injury to its trunk or was just immature, I reached out to part the leaves when the voice of sanity prevailed.

"Idiot!" it bellowed. "Do you have any idea of what kind of animals are hiding in here? There may be leopards or hyenas taking a siesta before waking up to prey on some nice, tender Nubian ibexes. And how far away are the nearest people in case of emergency?"

With that advice ringing in my ears, I wasted no time returning to the bus, climbed the bank of the wadi above it, and picked a spot under a large, shady tree, where I could see in all directions. The tree, which I hadn't noticed before, had a wide crown like an oak and a thick trunk with sturdy side branches, all heavily loaded with wide, glossy, compound leaves. It was much older, bulkier, and healthier looking than the scrawny tamarisks and acacias down below, which, with their small leaves, hardly cast any shade.

I was going to photograph it when the rest of the group came back from their hike, and we all had to get on the bus to ride to the ruins of the ancient walled city of Avdat. En route, after consulting with my tree manual, I concluded that only one desert tree had compound leaves like a legume and cast a deep shade: *Pistacia atlantica*, an Atlas Mountain species that extends along the Mediterranean shore into the Middle East and is reported to have a life span exceeding 1,000 years. I had found another terebinth.

I have often thought about this tree. Since there were no other terebinths in the immediate neighborhood, perhaps it had been planted deliberately centuries ago to act as a landmark for caravans traveling along the wadi toward nearby Avdat and other commercial cities farther north. Perhaps the wadi hadn't always been dry. Perhaps a small village where date palms were cultivated stood on the banks of a stream where only one stunted descendant remains.

Long-lived trees intersect with history. In the New World an emperor once sat under an ancient bald-cypress. Some day we may know how far back the terebinths of Texas go and what stories they can tell.

Part 1 appeared in the March 2005 issue

Perry Peskin is a long-time member of the Native Plant Society of Northeastern Ohio and a frequent contributor to the Journal.

Kudzu May Have a Medicinal Use

Kudzu was introduced to the South as a shade plant in 1876 and reduced to weed status by the USDA in 1972 after a 100-year battle with its propensity for uncontrolled growth.

However, Harvard Medical Center has come up with a medication made from kudzu that may please everyone. For

reasons as yet unknown, Kudzu pills apparently cut alcohol consumption in half in all drinkers, from alcoholics to social imbibers, without their noticing the reduction.

If these preliminary results are confirmed, and the pill proves to be safe, it could be sold over-the-counter as an herbal supplement, available to everyone.

Best Plant Finds 2004

Rick Gardner, Natural Heritage Botanist, DNAP

Ohio's botanists had another productive year in 2004. Last year's seek-and-find activities resulted in finding one new species, two presumed extirpated and many new sites for some of Ohio's endangered and threatened plants.

Many of last year's exciting rare plant finds occurred in Ohio's botanical hotspots, such as the Oak Openings. Located in Lucas County and stretching into neighboring Fulton, Henry and Wood counties, the area is arguably the most floristically rich in our state.

Many exciting finds occurred at the site restored from a former pig farm within The Nature Conservancy's Kitty Todd Nature Preserve located in the Oak Openings region of Lucas County. DNAP botanist Rick Gardner and Kitty Todd Preserve Manager Gary Haase found 18 state rare plants including four endangered species—spathulate-leaved sundew (*Drosera intermedia*), tall grass-like beak-rush (*Rhynchospora recognita*), twisted yellow-eyed-grass (*Xyris torta*) and northern appressed club-moss (*Lycopodiella subappressa*). The latter species is globally threatened, meaning there are less than 20 occurrences worldwide.

Other finds at Kitty Todd Included a new population of the endangered small purple fringed orchid (*Platanthera psycodes*) found by The Nature Conservancy's (TNC) Terry Seidel and a new population of the endangered dotted horsemint (*Monarda punctata*) in an area being restored to oak savanna. Dotted horsemint was thought to be extirpated from Ohio until its rediscovery in 1996.

Nearby, Ted Witham, from Toledo Metroparks, found a large population of dotted horsemint on the Oak Openings Preserve Metropark. John Jaeger, also from Toledo Metroparks, found a large population of the endangered blue toadflax (*Linaria canadensis*). But Metropark's staff wasn't done finding botanical goodies as Bob Jacksy found three populations of the threatened Gattinger's foxglove (*Agalinis gattingeri*) This species has been making a comeback in the Oak Openings with several new sites recorded in recent years.

What was the biggest plant find of 2004? The rediscovery of least grape fern (*Botrychium simplex*). This tiny fern, about the size of a dime, is one of the hardest to find and was last seen in the Oak Openings in 1984. Former DNAP Botanist Jim McCormac coordinated a group search for this miniature fern. Those helping him included volunteer Ann Lighthiser, AEP Biologist Ray Showman, Dennison University's Warren Hauck and Jordan Smith, plus DNAP staffers Barb Burkholder and Melissa Campbell. After hours of diligent searching, the group discovered a total of eight plants.

Other rarities found in northwest Ohio included a new population of the threatened three-bird's orchid (*Triphora trianthophora*) in Wood County by Robert Huber and Jan Hunter. Gardner and Marshall Moser, a biologist from Auglaize County, found the endangered inland rush (*Juncus interior*) in a small prairie remnant in Defiance County.

To those familiar with the extensive past finds of Jim Bissell, a botanist with the Cleveland Museum of Natural History, 2004 was no different. Bissell had a day in the field a botanist could only dream. Working with interns Ben Gaglioti, David Kriska and Loretta Neal at TNC's Crystal Lake Preserve in Portage County, Bissell found Torrey's bulrush (*Schoenoplectus torreyi*), which was presumed extirpated as it had not been seen in Ohio for more than 100 years.

Other Bissell finds at Crystal Lake included the endangered white-buttons (*Eriocaulon aquaticum*) and the endangered small bur-reed (*Sparganium emersum*) along the lakeshore. It was the second site ever recorded for white-buttons in Ohio and the first in northeast Ohio. Overall, there are eight rare species at this natural lake, making it one of the most important natural lakes in the state. At another natural lake, East Twin Lake in Portage County, Gaglioti, Kriska, and Neal found the state endangered western mountain-ash (*Sorbus decora*). This is the fourth site for this species.

Bissell found rarities elsewhere in northern Ohio. He and Rob Curtis, a biologist from Metroparks Serving Summit County, relocated northern wood-reed (*Cinna latifolia*) at Gorge Metro Park. This species was thought to have disappeared from the park, which was the last recorded site for this species.

In central Ohio, McCormac found a new site for the globally rare spreading rock cress (*Arabis patens*) in Franklin County. This species has seen drastic reductions in populations, making new populations extremely important.

Adams County in southwest Ohio is the state's second-most diverse area. Larry Henry of Highlands Nature Sanctuary had one of 2004's best finds—he discovered prairie gentian (*Gentiana puberulenta*) at the Sanctuary's new preserve, Ka-ma-ma Prairie. This endangered species has never been found in the cedar barrens or xeric limestone prairies of Adams County before, although it occurs in similar habitats in Kentucky and further west. Prairie gentian is only one of 43 state listed plants growing at this 80-acre preserve.

Barbara Lund of Adams County, who finds something good every year, found a large population of endangered Carolina leaf-flower (*Phyllanthus caroliniensis*). After discovering Ohio's first occurrence of twining screwstem (*Bartonia paniculata*), Botanist Dan Boone of Hamilton County found another population at Stonelick State Park in Clermont County. Botanist Marjie Becus, also of Hamilton County, found yet another population at Indian Creek Wildlife Area in Brown County. This endangered species was added to Ohio's rare plant list in 2004.

A botanist for TNC, Dave Minney, and DNAP's Gardner found the endangered long-flowered alum-root (*Heuchera longiflora*) for the first time in Scioto County. Edge of

Appalachia Preserve Manager Rich McCarty and Gardner found another population of this species in Adams County.

Not all of the best finds were plants—Mark Zloba of the Cincinnati Museum Center, found a new lichen for Ohio: the yellow-edged frost lichen (*Physconia enteroxantha*). Found in Adams County, this species occurs primarily west of the Mississippi River.

Moving to south central Ohio, University of Michigan's Tony Reznicek, a leading expert on sedges, found a new state record for frightful sedge (*Carex molestiformis*) in the Hocking Hills region. This sedge is found primarily in Missouri and adjacent states and was described to science by Reznicek in the early 1990s. He found it growing in a dry field at Crane Hollow State Nature Preserve with ecologists Gary and Holly Coovert as well as McCormac and Gardner.

Naturalist Paul Knoop, Jr. of Hocking County made another great Hocking Hills find. He found the threatened yellow fringed orchid (*Plantanthera ciliaris*) for the first time in the county. This beautiful orchid is known from only a few sites in Lucas, Scioto and Washington counties.

Further south in Lawrence County, U.S. Forest Service's Cheryl Coon and Gardner found a new population of the endangered tubercled nut-rush (*Scleria ollgantha*) at Wayne National Forest. Minney and Gardner found another of this species there as well.

The division relies heavily on the contributions from botanists around the state to keep Ohio's Natural Heritage Database current. The division thanks all of the botanists, naturalists and other professionals who contribute to Ohio's botanical knowledge. Good luck in finding more of Ohio's hidden botanical treasures in 2005!

More Noteworthy Plant Finds of 2004

Adams County

- Carolina shield lichen (*Canoparmelia caroliniana*—endangered)—Ray Showman
- Few-flowered nut-rush (*Scleria pauciflora*—threatened)—Dave Minney, Jennifer Windus, Warren Stoutamire, Marjie Becus and Rick Gardner
- Leafy goldenrod (*Solidago squarrosa*—threatened)—Rich McCarty and Rick Gardner

Athens County

- Featherbells (*Stenanthium gramineum*—potentially threatened) —Scott Horzen

Brown County

- Deam's three-seeded mercury (*Acalphya deamii* – threatened)—Rick Gardner

Defiance County

- Yellow Vetchling (*Lathyrus ochroleucus*—threatened) —Rick Gardner & Marshal Moser

Geauga County

- Small bur-reed (*Sparganium emersum*—endangered)—Jim Bissell, Rick Gardner, Judy Barnhart, David Kriska and others

Hamilton County

- Running buffalo clover (*Trifolium stoloniferum*—endangered)— Dan Boone

Highland County

- Mountain-rice (*Oryzopsis racemosa*—threatened)—Dave Minney, Rick Gardner and Larry and Nancy Henry

Marion County

- Pale umbrella sedge (*Cyperus acuminatus* – threatened)—Jim McCormac

Montgomery County

- Timid sedge (*Canex timida*—endangered)—Marjie Becus and Dan Boone

Ottawa County

- Wapato (*Sagittaria cuneata*– threatened)—Bissell, Kriska, Garrett Ormiston and Jennifer Windus

Pickaway County

- Carolina leaf-flower (*Phyllanthus caroliniensis*—endangered)—Rick Gardner

Seneca County

- Few-flowered spike rush (*Eleocharis quinqueflora*—endangered)—Rick Gardner Walt Jinks, Melissa Moser, and Greg Schneider

Summit County

- Few-flowered spike rush (*Eleocharis quinqueflora*—endangered)—Rick Gardner and Melissa Moser

Since 1976, ODNR's Division of Natural Areas & Preserves has maintained the Ohio Natural Heritage Database (<http://www.ohiodnr.dnap/heritage/default.htm>) – a vital collection of data that includes records for more than 13,000 locations of the state's rare plants and animals. This information leads to a better understanding of plant distribution and frequency, more research opportunities, as well as habitat protection. In fact, annual rare plant finds, such as those in 2004, have been the basis for creating several of Ohio's 127 state nature preserves.

Chelone: The Turtleheads

by Gene Bush

Chelone is one of the few plants where the scientific name and the common name agree with each other. The word "Chelone" is from the Greek word for tortoise and refers to the resemblance of the top of the flower to the shell of a tortoise. The common name of turtlehead refers to the entire flower resembling the head of a turtle with its mouth open. You can amaze all your friends and relatives, especially the young and more gullible ones, by squeezing and releasing the sides of a blossom to make it "talk"

If you have a backyard habitat, or simply enjoy butterflies in your garden, white turtlehead provides foliage for egg-laying and larval food for the Baltimore Checkerspot.

Turtleheads provide color in the garden during late summer and early fall. Depending upon the species you choose for your garden, you can have turtleheads blooming from July through October. There are some six species native to eastern North America and quite a few cultivars and forms to choose from. Of the six species, at least three are not difficult to locate in catalogs and garden centers. So, while the plant is just a bit out of the ordinary, it is obtainable. I do wonder at times why this hardy perennial native is not seen more often in gardens.

Depending upon the species, Chelone is hardy from zone 3 through 8 - at the very least 5 through 8. In all the years I have grown turtlehead I have never seen a disease or insect problem on foliage or flower. The stems are mostly stiffly upright and carry blossoms at the top of the foliage. Leaves are in pairs with serrated edges.

In native habitats Chelone can usually be located growing in moist to wet soils. However, the additional moisture is not an absolute must in gardens. Turtlehead will perform just fine in decent garden soil with a bit of

compost added, then topped off with an organic mulch such as chopped leaves or hardwood fines. The farther south one gardens the more protection from full sun is needed, and/or more consistent extra moisture. If they are allowed to stay dry too long the leaf margins will curl and brown. Turtleheads need all the light they can get, without being in the late afternoon sun, for strong stems and good flowering.

Chelone glabra, or the White Turtlehead, is the most widespread of our native species. Count on at least three feet in height in the garden, and up to four feet when grown in a damp to wet soil. Blooms begin in August and end sometime in October.

Chelone lyonii, the Pink Turtlehead, is native to Tennessee and North Carolina, so a good selection to withstand heat in more southern gardens. However, it is perfectly hardy into at least zone 5. There is a cultivar named "Hot Lips" with red in the stems, glossy foliage and rose-pink flowers. Bloom period is from July through September.

Chelone oblique, or Rosy Turtlehead, has more narrow, longer, leaves and reaches only two feet, or so, in height. Stems often have some arch to them.

Some of my favored companion plants in the garden are Cardinal Flower and the Great Blue Lobelia, and Obedient plant. Some native asters and Joe Pye weed would make great tall statements.

© Copyright 2003 Gene Bush. *Gene Bush is owner/operator of Munchkin Nursery & Gardens, LLC in Southern Indiana. The plants and gardening experiences described in this article are from his hillside woodland garden. Gene can be reached at: www.munchkinnursery.com Hard copy catalogs are \$3. Mail to 323 Woodside Dr. NW, Depauw, IN 47115-9039.*

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White turtlehead



Pink turtlehead

Indiana Ferns and Their Haunts: Part IV**Ferns of Wetlands**

by Mike Homoya

Got swamp water? It may not be your beverage of choice, but to some species of ferns, water found in swamps, bogs, and fens is a recipe for fine living. Ahhh, nothing like a cool, saturated muck! Indeed, swamps and other wetlands are important habitats for many species of Indiana ferns.

Wetlands come in all shapes and sizes, from shaded, woodland pools to sunny marshes. Some wetlands accumulate water from direct precipitation or overflow, but others are fed by an upwelling of subterranean water, such as occurs in fens. The water in a fen may not be evident, but typically "seeps," flowing in a slow, diffuse manner throughout the organic or marly substrate. Looks can be deceiving. The surface of a fen may appear dry and firm, but very likely it's quite soupy just under the surface. Watch your step!

Fens may be either forested or open, the latter typically referred to as a graminoid fen. A graminoid fen is one that is dominated by plants that have the structure of grass, i.e., long, narrow leaves. It may indeed be that a fen's dominant plants are grasses, but more often than not it is of sedge species, usually of the genus *Carex*.

Perhaps the most common fern in graminoid fens is

the marsh fern (*Thelypteris palustris*). This medium-sized fern thrives in the open, but can be found in shaded habitats as well. Found mostly in the northern half of the state, it occurs sporadically in southern Indiana in a few seep springs and shallow, ephemeral pools in flatwoods and floodplain forests. Of course, marsh fern also occurs in marsh environments.

A diminutive species found in most graminoid fens is the meadow spikemoss (*Selaginella eclipses*), which is not a moss but a fern ally. Its lime-green stems and leaves form mats on the hummocks formed by other plants of the fen. It resembles a moss, but remember, ferns and fern allies, including our *Selaginella*, have vascular tissue. You can't see the latter with the naked eye, but trust me, spikemoss has it.

It is mostly in fens that the giants of Indiana's ferns occur – cinnamon fern (*Osmunda cinnamomea*) and royal fern (*O. regalis*). These two are most at home in forested fens, although they can also occur in graminoid fens. In the latter habitat, however, their size is not nearly as impressive as those in the forest. I have seen cinnamon ferns in Indiana forested fens tower over my six-foot frame! Our royal fern doesn't get quite so tall, although it does in other parts of the world. One



Marsh Fern
(*Thelypteris palustris*)



Cinnamon Fern
(*Osmunda cinnamomea*)



Crested Shield Fern
(*Dryopteris cristata*)

of the few familiar species I saw on a recent trip to Spain was the royal fern, and its enormous size startled me. It was more reminiscent of a tropical tree fern than our plant!

Two species of wood fern, namely crested fern (*Dryopteris cristata*) and spinulose wood fern (*D. carthusiana*), prefer fen environments. The crested fern is more at home in open to partially shaded areas, whereas the spinulose wood fern prefers shade. Both of these species can occur outside fen habitats, especially the spinulose wood fern. Spinulose wood fern can even be found growing on sandstone cliffs, although its near twin, glandular wood fern (*D. intermedia*), is the more likely one in such habitats.

No discussion of wetland ferns would be complete without the mention of horsetails, genus *Equisetum*. These odd plants are so prehistoric looking that they appear as if they've been lifted from fossils. Five species have been recorded for Indiana. Two of the most common are field horsetail (*E. arvense*) and scouring rush (*E. hyemale*). The former is quite branched, like a small tree, whereas scouring rush has a single, unbranched stem. Both species are common, and the scouring rush can be downright weedy. Some populations of the latter form solid stands so dense that few other plants can survive.

A favorite wetland fern group of mine is the quillworts, genus *Isoetes*. Quillworts look like tufts of onion leaves popping up out of the ground. We have two species, the black-footed quillwort (*I. melanopoda*) and Engelmann's quillwort (*I. engelmannii*). They both like shallow, ephemeral pools, either in woodland or

full sun. Early in the spring the plants may be submersed, but usually have their leaves above the water's surface as the pools dry down. One of the more interesting habitats for the Engelmann's quillwort is small stream pools such as can be found in Clark State Forest.

The ultimate in "wetness" preferences of our native ferns is exhibited by the mosquito fern (*Azolla caroliniana*). This plant is really better described as an aquatic. Although it will root in the mud along shorelines, thus qualifying it as a wetland fern, its typical habit is floating on the surface waters of a pond or deep swamp. This unusual fern is about the size of a dime, but it can reproduce prolifically to the point that it forms a nearly complete mat over the water's surface.

A final note to those who fancy chasing after these interesting plants: keep in mind that your comfort level may be challenged. Wetland habitats offer plenty of biting insects, poisonous plants, and difficult hiking terrain. Concerning the latter, I have seen on several occasions a boot sucked into the quagmire, or even worse, a person unable to struggle free from the muck's tight grip. But as we all know, the challenges make it all the more worthwhile, right? Enjoy!

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Cleveland Museum of Natural History Herbarium

January field trip report continued:

Volunteers are responsible for maintaining the strict process of preparing the species for the herbarium. The specimens are dried for several days on the Museum plant dryer. Then the specimens are frozen for 48 hours in an effort to kill any bugs that may be on the plant. These steps are critical since the bugs can proliferate and destroy the entire collection and any moisture will eventually turn to mold. After this process, plants are then mounted onto rag paper using linen tape or Elmer's glue. A label is affixed to the rag paper containing the Latin name, the geographic location from which it was collected, date collected and the name of the collector (if a specimen is missing any of these data it will not be entered into the herbarium). Ideally, the humidity in the herbarium should be 67 percent and the temperature 70 degrees. Some of the orchids actually received cotton batting to keep the flower from being crushed and to hold the lips together. Many of these specimens actually held their color! It was an incredible site to see.

The data label preserves valuable information about plant habitats. Many herbarium specimens record the existence of plants in habitats now developed and lost. Some species considered extirpated in the state have been relocated through the use of historic herbarium specimens and subsequently their status is changed on the Ohio rare plant list. For example, swamp cottonwood was thought to be extirpated in Ohio until it was located by Jim Bissell in Lake County. Jim based his research on a historic record of swamp cottonwood in the Museum's herbarium.

If properly stored, a herbarium specimen will last for centuries without much deterioration. Evidence of this is the *Astragalus excapus*. It was collected from Mont Cenis, France in 1745; that's before the French Revolution! This was actually gotten through an exchange, which is a common practice in herbaria. Basically, museums trade specimens in an effort to obtain species from around the world.

Diane Police

Are today's paper-based dichotomous keys a dying breed?

T.M.Jones

"Keys are compiled by those who do not need them for those who cannot use them." A. L. Lobanov

Soon today's botanists and taxonomists will have the ability to identify unknown taxa from sources other than paper-based dichotomous keys. Many fine examples of interactive keys and image-based keys are now available online. Being computer based, they are easily updateable resulting in keys that are increasingly robust and accurate. Interactive keys' adaptability allows them to remain continuously current and reflect the ever-changing nomenclature without the associated publishing expenses. Additionally, the low cost of digital photography allows for the ample use of digital imaging without breaking the bank. Thankfully, interactive keys serve the growing need for more standardized data in this age of constant habitat loss and most importantly, extinction.

Since the writing of Jean Baptist de Lamarck's, *Flore Française* in 1778, dichotomous, monoentry and polytomous keys have been the primary option for the taxonomist wishing to identify unknown taxa. Monoentry and polytomous keys deal with only one to 'few to many' questions, respectively. All three are used at present but dichotomous keys are currently the most widely accepted botanically.

The paradigm is simple; dichotomous keys use systems of questions called couplets. Incorporated into these couplets are contrasting and/or contradictory statements that utilize one to a few character(s).

A botanical example:

1a. Leaves pubescent or nearly so.....	2
1b. Leaves glabrous or nearly so.....	4
2a. Petals purple.....	3
2b. Petals pink	9
3a. Petals usually fringed, rarely entire	6
3b. Petals entire, rarely serrate	14

We must answer couplet 1a and 1b in order to progress to couplet 2 or 3. As these questions are answered, they lead the user to further couplets.

Each step is reliant upon the previous one. Therefore, the series of sequential linear choices determine the identification of the unknown taxa.

Dichotomous keys work reasonably well under this linear arrangement unless the specimen has a feature not present in the couplet. An example, suppose the user's specimen lacked a flower, thus its color could not be determined. Without an answer, the user must now follow both questions to completion. Time wise a prohibitively expensive practice. Similarly, the plasticity of many plant traits lends itself to couplets that use ambiguous terminology such as "pubescent or nearly so". Yet, expert users can often achieve correct identifications with a high percentage of certainty because of their familiarity with all the nuances of the key. However, these indistinct terms often lead to confusion for those unfamiliar with a particular key resulting in inaccurate determinations.

The brief history of interactive keys is in its infancy yet holds much promise. In 1954, prior to the widespread availability of computers, Z. P. Metcalf prepared an annotated index card key system for the *Actinomycetales*, based upon a data matrix. Subsequently, A. L. Lubanov and R. Pankhurst, among many others, published papers on the subject of the future of computer-based interactive keys. These works and the ubiquitous personal computer now permit the further expansion of the use of technological tools in bringing Bioinformatics and Systematics to the scientific mainstream.

Interactive keys can take many forms. They may be entirely image-based, where the user selects between images, interrogative text based (resembling dichotomous keys in this respect) or both. Typically, a text based interactive key will possess both quantitative and qualitative characters, as in the over-generalized beetle example below, which is only intended to illustrate a basic interactive key layout.

Simple Beetle Interactive Key

<p><u>Characters available</u></p> <p>1. Length ___ mm long 2. Width ___ mm wide 3. Thickness ___ mm thick 5. Number of stripes ___# 6. Habitat ___ aquatic ___ terrestrial 7. Wings ___ absent ___ present</p>	<p><u>Remaining Taxa</u></p> <p>Taxa A Taxa F Taxa C</p>
<p><u>Characters used</u></p> <p>4. Color <input checked="" type="checkbox"/> white ___ blue ___ brown</p>	<p><u>Eliminated Taxa</u></p> <p>Taxa E Taxa D Taxa B</p>

Though enumerated for sake of clarity, with an interactive key the user can decide whichever character to use first. There is no set hierarchy. Working in reverse is possible. As any character is chosen, ex: 'white' is selected thus 'brown' and 'blue' are eliminated. It is through this "selection/elimination" that the identification is achieved.

Interactive keys can be personalized to varying degrees. The user may choose that the characters be enumerated by statistical relevance and when these are followed numerically, typically render faster identifications by orders of magnitude. Then again, the user may choose to only pick the characters they feel comfortable using.

In the future, it is probable that the user will merely scan an unknown specimen and then rely on image recognition software or chromosomal region mapping. Until this time however, taxonomy will require copious amounts of fieldwork and academic rigor. Interactive keys are not a panacea, they require that the user of any key possesses a strong taxonomic background and strong familiarity with accepted terminology. However, with these skills, computer-based keys show

significant promise by allowing for faster determinations in otherwise complex taxa.

Most keys will require the viewer or associated software provided on their websites as free downloads

Examples can be seen at these URLs:

Requires free Lucid player

<http://asstudents.unco.edu/students/lucid/>

Requires Java enabled console

http://insects.ummz.lsa.umich.edu/beemites/vk_bees/key.html,

Requires free Lucid player

http://www.biosci.ohio-state.edu/~molluscs/OSUM2/the_key.htm

Delta

<http://delta-intkey.com/www/programs.htm>

Lucid

<http://www.lucidcentral.com>

Tim Jones was a recipient of the Native Plant Society's Annual Grant in 2003. He has used it to facilitate his development of an interactive key of the flora of Ohio. He is currently doing graduate work in botany at Kent State.

Visit our website for news of the Society, wildflower pictures, and more.
Please add your botanical observations and news to our Web Journal.
<http://groups.msn.com/NativePlantSocietyofNortheastOhio/>

Sidewalk Garden is Native Plant Treasure at the Cleveland Metroparks Zoo

Jean Loria and Pebbles Bush

Most people know about the wildlife inside the Cleveland Metroparks Zoo. But few know about the garden just outside the gates filled with native plant species. Slated to be an amazing 300 yards when complete, this border garden runs along the Fulton Parkway portion of the Zoo's All Purpose Trail. So far more than a hundred yards of the improved Zoo Perimeter Landscape Plan are established and flourishing. The hope is to finish renovating the unimproved length of the existing bed by 2006.

Cleveland Metroparks Zoo, formerly part of Brookside Reservation, is located on Cleveland's West Side. The Zoo, founded in 1884 on Wade Oval in University Circle, was moved to its current location in 1907. Cleveland Metroparks assumed operation of the Zoo in 1975 and dedicated it to responsible stewardship of our natural environment through exhibition of living animals and plants. The Zoo grounds cover 165 acres of rolling hills and high terraces drained by Big Creek. They're beautifully landscaped and well maintained. Vegetation harvested on site supplements feed for the animals. Both plant and animal exhibits are popular and enjoyed by large numbers of visitors to the Zoo each year.

Pebbles Bush, Zoo Horticulturist, began work on the plant border bed in 2002. The All Purpose Trail isn't an interpretive trail, but it's accessible and free to the public. To her credit, Pebbles elected to plant native woody and perennial species, making it a prime opportunity for passersby to get a feeling for our native plant heritage. Pebbles also chose to model the bed after a dynamic plant community rather than using the format of a plant collection.

The perimeter garden spans the space between the sidewalk along Fulton Parkway and a seven-foot barbed wire fence on the east side. The Zoo Perimeter Landscape Plan, drafted by Landscape Architect John Cardwell, was modified by Don Krock, Manager of Zoo Horticulture, with evergreen tree species substitutions and the addition of large boulders for hardscape. For Pebbles, the beauty, complexity and diversity of plants native to Ohio, rarely profiled in public or private gardens, offered a perfect palette for her design requirements.

The garden is in full sun and is windy. The sheer size and backdrop-like site of the border demand a bold show. Native prairie plant species account for 50% of the species planted, with the balance representing other biome ecologies. Evergreens expected to mature to

heights of 15 to 20 feet and the boulder arrangements interspersed throughout the garden provide microclimate niches that Pebbles used to good advantage. The bed was prepared by adding topsoil and compost to the existing soil and installing an irrigation system. So far the garden suffers moderate but less than anticipated insult from litter and animal waste.

The completed section of the Zoo Perimeter Landscape Plan begins south of the Employee parking lot off Fulton Parkway. Continuing south along the sidewalk, you'll see a stand of five Chokeberries (*Aronia melanocarpa*) planted again the fence. They are covered with white blooms in late spring that mature to a glossy black fruit midsummer. The berries persist through the winter, providing a feast for cedar waxwings and robins.

Sweet Black-eyed Susans (*Rudbeckia subtomentosa*) bloom all summer long next to the Chokeberry. This striking species is remarkably different from *Rudbeckia* cultivars popular in ornamental gardens. It tends to be taller, softer looking with finer petals, and the foliage is a cool, light green. It holds up better than *Rudbeckia goldstrum* in heat and drought. And although it seeds in freely, in three years it has not run rampant in the border.

Purple Prairie Clover (*Dalea purpurea*), barely reaching a foot in height, has lanceolate leaves and is covered in July/August with one-inch, purple flowers. Pebbles encourages this species to weave throughout the border, filling in spots around boulders and close to the sidewalk. Its ability to fix nitrogen augments the fertility of the bed on a seasonal basis.

Blooming in May/June in concert with Columbine (*Aquilegia canadensis*) is Prairie Smoke (*Geum triflorum*). This diminutive groundcover has feathery pink seedheads not to be missed before they disperse in July. It works well in the drier soil edge of the sidewalk. Two Prairie Fire Crab trees add to the spring show. Clustered in front of the first are four Virginia Sweetspires (*Ilea virginica* 'Little Henry'). Another May/June bloomer is Winterthur Smooth Witherrod (*Viburnum nudum* 'Winterthur') with multiple stems and beautiful shiny foliage with good fall color. Also along the back of the border is Nannyberry (*Viburnum lentago*), a bonus for wildlife food and carefree maintenance. The entire bed benefits from the three season appeal of Fothergilla (*Fothergilla gardenii*). These plants provide the bulk of the spring bloomers.

Purple Coneflower (*Echinacea purpurea*) and Pale Purple Coneflower (*Echinacea pallida*) stand with the Sweet Black-eyed Susans. The more difficult to cultivate Pale Purple Coneflower, although not spreading, is holding its own. This spring, Pebbles plans to try both *Echinacea tennessensis* and *Echinacea angustifolia*. False Indigo (*Baptisia australis*) adds an impressive four-foot stand, fixing nitrogen, resisting drought, and sporting interesting seed pods long past the growing season.

Kalm’s St. John’s wort (*Hypericum kalmianum*) is another drought-tolerant native that is attractive in its own right for its pretty yellow flowers and dried-capsule seedheads that persist through the winter. It’s a herbaceous plant rarely seen. In fact, it was listed as Extirpated from Ohio until it was reported by staff members of the Cleveland Museum of Natural History at Singer Lake. [See “On the Fringe” Vol. 19 No. 2, June 2002.] This species differs from the more widely cultivated *Hypericum calycinum* in that the flowers are smaller and the leaves narrower, and it has the distinguishing feature of exfoliating bark.

Wet spots in the deeper soil along the fence are exploited by the huge white to pale pink flower with blush red eye of Marsh Hibiscus (*Hibiscus moscheutos*). This hardy native plant can grow to four feet in height and circumference—a pleasant surprise for the unacquainted. Further down the border before the second Prairie Fire crab is another moisture lover, Blue Vervain (*Verbena hastata*). It seeds freely, is four to five feet tall and is considered a valuable medicinal. In front of this second crab is Foxglove Penstemon (*Penstemon digitalis*). It has white flowers and differs from more common cultivars in that the stems and leaves are not burgundy.

Mixed throughout is Sullivant’s Milkweed (*Asclepias sullivantii*). Fragrant blooms in June/July/August attract insects, including monarch butterflies. Happily, this species is not a concern for spreading. Sullivant’s and Swamp Milkweed (*Asclepias incarnata*) are part of ongoing habitat trials in this multipurpose bed.

From July to September, three Silphium species, Prairie Dock (*Silphium terebinthinaceum*), Cupplant (*Silphium perfoliatum*), and Rosinweed (*Silphium integrifolium*) bloom on the fence-side, south end of the border. These spectacular species tower to 7 or 8 feet and tolerate average garden soil. Pebbles used five species of grasses for their bold architecture as well as their contribution to food for wildlife and ability to hold soil. Noteworthy for gardeners looking for a plant to thrive in dry shade is Bottlebrush grass (*Hystrix patula*). Goldenrods and Sweet Fern (*Comptonia peregrina*), a sub-shrub with a pleasant fragrance and texture, end the border along the All Purpose Trail.

The Zoo All Purpose Trail border garden conforms to the concept of a natural garden in the exclusive use of native plant species—species that the public rarely has an opportunity to observe and enjoy in an urban area. In addition, it is a good example of an ecological garden. Irrigation water requirements are minimal. Fertilizer and chemical pesticides are simply unnecessary. The site was carefully designed, assembling species that work well together to protect the soil from erosion, conserve moisture, boost soil fertility and attract wildlife. It is dramatic and tough with close-up appeal. This is a garden well worth watching.

Zoo Perimeter Landscape Plan

Perennials and Grasses

Common Name	Botanical Name
Big Bluestem	<i>Andropogon gerardii</i>
Blue False Indigo	<i>Baptisia australis</i>
Blue Vervain	<i>Verbena hastata</i>
Blue-Stemmed Goldenrod	<i>Solidago caesia</i>
Bottlebrush Grass	<i>Hystrix patula</i>
Columbine	<i>Aquilegia canadensis</i>
Cup plant	<i>Silphium perfoliatum</i>
Dogtooth Daisy or Sneezeweed	<i>Helenium autumnale</i>

Foxglove penstemon	Penstemon digitalis
Heart-leaved Blue Wood Aster	Aster cordifolius
Indian Grass	Sorghastrum nutans
Ironweed	Vernonia fasciculata
Little Bluestem	Schizachyrium scoparium
Marsh Hibiscus	Hibiscus moscheutos
Meadow Blazingstar	Liatris ligulistylis
Nodding Onion	Allium cernuum
Ohio Goldenrod	Solidago ohioensis
Pale Purple Coneflower	Echinacea pallida
Prairie Dock	Silphium terebinthinaceum
Prairie Smoke	Geum triflorum
Purple Coneflower	Echinacea purpurea
Purple Prairie Clover	Dalea purpurea
Rosinweed	Silphium integrifolium
Smooth Aster	Aster laevis 'Blue Bird'
Stiff Goldenrod	Solidago rigida
Sullivant's Milkweed	Asclepias sullivantii
Swamp Milkweed	Asclepias incarnata
Sweet Black-eyed Susan	Rudbeckia subtomentosa
Switch Grass	Panicum virgatum

Woody Plants

Black Chokeberry	Aronia melanocarpa
Dwarf Fothergilla	Fothergilla gardenii
Eastern White Pine	Pinus strobus
Kalm's St. Johnswort	Hypericum kalmianum
Little Henry Dwarf Virginia Sweetspire	Itea virginica 'Little Henry'
Nannyberry	Viburnum lentago
Northern Bayberry	Myrica pensylvanica
Prairie Rose	Rosa setigera
Sweet Fern	Comptonia peregrina
Winterthur Smooth Witherrod	Viburnum nudum 'Winterthur'

Jean Loria lives in Cleveland Heights and is a long-time member of the Ohio Native Plant Society. Pebbles Bush has been a Horticulturist at the Cleveland Metroparks Zoo for 6 years. She is currently working on a degree in Environmental Science at CSU and was recently awarded Trailblazer by Hard Hatted Women in recognition for her role as a woman in non-traditional jobs.

Rain Gardens: Let the plants do the cleaning

Lisa Billow

What is a rain garden? Rain gardens are landscaped areas designed to capture storm water runoff, remove pollutants, and restore groundwater. They capitalize on the natural biochemical activity in mulch and soil to remove toxins from polluted water. Rain gardens prevent non-point source pollution from entering streams.

Forests maintain clean water

The rain garden is modeled after the ecological functions in a forest. Trees intercept precipitation before it reaches the forest floor. Organic material absorbs water and allows it to percolate through the soil, replenishing the groundwater table. Plants restore water to the atmosphere through evapo-transpiration. In the forest floor, biochemical activity breaks down organic matter

and transforms toxins. Nutrients are made available in the root zone for plant use. This results in clean streams and water bodies in the forested watershed.

Pollution from the suburban landscape

The suburban landscape contains oils and metals from vehicles, animal waste from pets, fertilizers, herbicides, and pesticides. Storm water running off impervious surfaces such as parking lots, walkways, and driveways carries pollutants into storm drains and ditches, and eventually into streams and rivers. Pollution originates from many sources and is carried into waterways by rainfall and storm water. Pollution from runoff is called non-point source because it does not come out of a pipe from a single point source such as a treatment plant or industrial process.

Traditional engineering practice requires grading to accelerate the flow of water to prevent flooding. This results in erosion and stream sedimentation. Impervious surfaces on roadways, parking lots, driveways, and walkways contribute to runoff volumes. Street curbing channels surface flow and further increases runoff volumes.

Landscaped areas containing trees, shrubs, groundcover, and mulch have higher water retention value than lawns due to the increased surface areas of the plants, and the porous quality of soil and mulch. Lawns are less pervious than mulched plant beds, and receive chemicals and fertilizers that end up in storm water runoff. Reducing non-point source pollution from developed landscape dominated by impervious surfaces is our greatest challenge in restoring water quality.

Rain garden design

The rain garden is a recessed planting bed, shaped like a saucer or shallow bowl. It is located and designed to receive runoff from impervious areas or sheet flow from lawns. The highest concentrations of pollutants are in the first half-inch or first flush of a storm. The first flush of storm water is retained in the depressed area of the rain garden. Ponding is no greater than six inches. Excess water flows into traditional storm water outfalls or ditches. Water recedes in a few days through evapotranspiration and infiltration.

Standing water should remain for no more than four days except in winter when plants are not transpiring.

The rain garden is underlain with sandy loam. It contains three planting zones. The lowest zone will have periods of standing water and extended soil saturation. The middle zone will have periodic soil saturation, and the upper edge will be dry. Plants for the lowest zone are selected for their tolerance to wet conditions and fluctuating water levels. Plants in the middle zone must also tolerate fluctuating soil moisture. Plants in all zones will be subject to drought spells as well. A diversity of

trees and shrubs native to local wetlands and stream banks are most suitable for the lower and middle zones. They are adapted to having "wet feet," but also tolerate drought. The upper rim of the garden can be planted in perennials. Berry and nectar-producing plants can be incorporated into the design to create food sources for songbirds and butterflies.

Two to three inches of shredded hardwood mulch is an important component of the pollution removal function. Analysis of the effectiveness of rain gardens indicates that 90 percent of metals is removed from storm water, primarily by uptake in the mulch. Sixty to 80 percent of phosphorus, some forms of nitrogen and ammonia are removed in the soil. A dense groundcover can replace a mulch layer.

During extended droughts, plants in the rain garden need water. Drainage paths need to be kept clear to the rain garden so that water can flow unobstructed. Mulch is replaced, and accumulated fallen leaves and dead vegetation removed in the fall.

Retrofitting a rain garden

Rain gardens are constructed in new development to receive water from an area no larger than an acre. However, opportunities to retrofit a rain garden into the existing landscape include capturing runoff from parking areas, driveways, walkways, decks or roofs. Downspouts can be directed to discharge away from a building foundation into a rain garden. A section of curb may be cut allowing water to flow into a rain garden. The rain garden is sized to be five to seven percent of the runoff area. When retrofitting a rain garden, the original site grading and storm water controls are retained so that excess water can move off the site during large storm events. A low-lying area that retains sheet flow off a lawn can be converted to a rain garden instead of growing grass in a wet zone.

Other ideas to reduce runoff

There are other methods to reduce storm water runoff. Pervious surface materials are available to construct walkways, patios, and driveways. Water can be collected from the roof into rain barrels or cisterns and used to water plants during drought. Nontoxic mosquito dunks are available at garden supply stores and mail order catalogs to float in the barrels to prevent breeding insects. Simply replacing lawn with beds of trees, shrubs, groundcover and mulch contributes to improving water quality.

For more information, contact the author of this article: Lisa Billow, 1720 Blair Avenue, Norfolk, VA 23509, Billowl@pwcnorva.navy.mil or 757-444-3009 ext. 371.

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Erie Sand Barrens State Nature Preserve

A blast of cold air roared off the sloping face of the melting glacier, raising whitecaps on the lake of frigid water at its foot. Pushed by the wind, the waves broke against the southern shore, piling sand winnowed from the melting ice against the beach.

This was the view across much of northwestern Ohio during the retreat of the Wisconsin ice sheet approximately 13,000 years ago. North-flowing drainage ponded against the great expanse of ice, rising until it reached a gap in the low walls of its basin. Through this outlet the captured waters escaped. As long as the amount of water leaving the lake roughly equaled that coming in, the lake level remained stable. During this time, waves and offshore currents distributed sand and gravel washed from the melting glacier and the lake shore into beaches, bars and sand spits similar to those being formed today in Lake Erie. As the glacier melted back farther to the north, lower outlets were uncovered and the lake level dropped. The old beaches and sand bars were left high and dry, and new ones formed at lower levels.

At least seven such lakes formed before the ice finally retreated from the Erie Basin, leaving behind Lake Erie and a series of abandoned beaches like concentric bathtub rings around its western end. Erie Sand Barrens State Nature Preserve occupies a small portion of the remnant beach of Lake Warren, the fifth ancestral Lake Erie.

Cool conditions at the edge of the great ice sheet and on the shores of its vast meltwater lakes supported vegetation similar to the spruce forest now found in Canada. With the retreat of the glacier and return of a milder climate, deciduous forest much like that now found across Ohio replaced most of the northern vegetation.

Then, about 4,000 years ago, Ohio entered the Xerothermic Period, a time of warmer, drier climate than

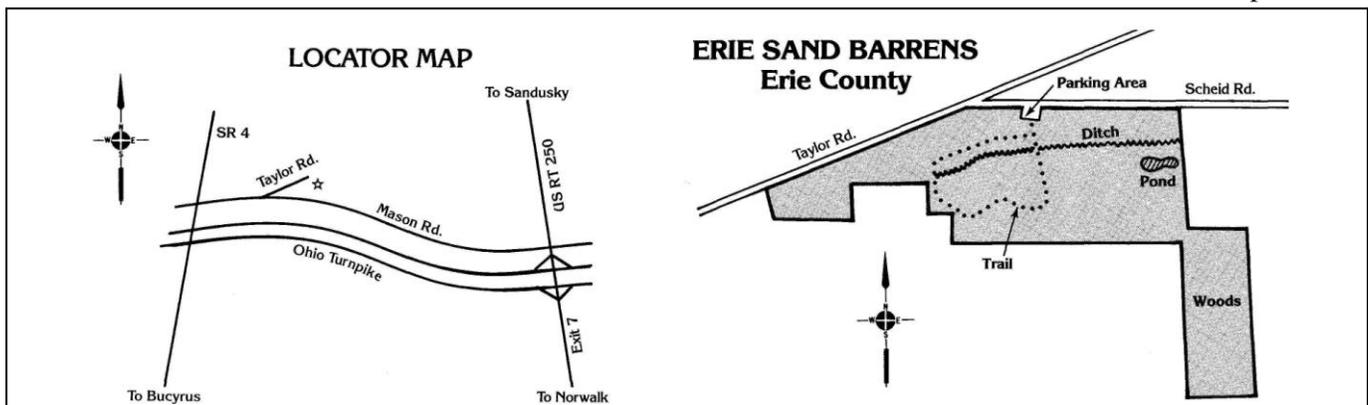
at present. The forest retreated and tallgrass prairie expanded from the west into Ohio. In time, the climate cooled once again and the forest returned, shading out the prairie. Only in places where conditions made it difficult for trees to sprout and survive was the prairie able to hold its own.

Erie Sand Barrens is such a place. Early settlers found here a large area of prairie grasses and stunted oak and hickory trees. To them, such places were "barrens," third-rate land hardly fit for agriculture. Even such barrens eventually were plowed and farmed, however, as better soils were exhausted by inefficient cultivation.

E.L. Moseley, a local botanist living at the turn of the twentieth century, studied this area which he called Oxford Prairie. He realized that many of the rarer plants found in Erie County grew on the sand ridges of the prairie. His studies played an important part in bringing attention to this interesting place.

During World War II, the United States Army purchased much of Oxford Prairie, then largely cultivated, as a site for the production of high explosives. In 1958, the National Aeronautics and Space Administration (NASA) took over the 6,000 acre tract and established Plum Brook Station, a research facility. In the early 1980's, 1,600 acres of the station's buffer zone was declared surplus. Recognizing the botanical importance of the area, the Department of Defense, with assistance of The Nature Conservancy, transferred 32 acres to the Division of Natural Areas and Preserves as Erie Sand Barrens State Nature Preserve.

The sandy soil of the preserve is well-drained. Plants which survive here are adapted to its dry conditions. On the highest, driest ridges and knolls, prairie plants such as prairie milkweed (*Asclepias hirtella*), partridge-pea (*Chamaecrista fasciculata*) and sand panicgrass (*Panicum oligosanthos*) thrive. Wet depressions between the rises hold wet meadow communities where plants



more commonly found along the Atlantic and Gulf coasts occur. These include lance-leaved violet (*Viola lanceolata*), Virginia meadow-beauty (*Rhexia virginica*), twisted yellow-eyed-grass (*Xyris torta*) and the only known Ohio population of least St. John's wort (*Hypericum gymnanthum*).

Many of the preserve's rare plant species thrive in open, wind-swept conditions such as those found on the sand barrens. The Division actively manages the preserve to ensure that such disturbed areas remain

open. Removal of invading woody species, mechanical disturbance of the soil and controlled burns all are used to maintain the preserve in a condition approximating that found by Moseley.

Erie Sand Barrens State Nature Preserve is open daily from sunrise to sunset.

Additional information may be obtained from the Ohio Department of Natural Resources (ODNR), Division of Natural Area and Preserves, 1889 Fountain Sq., Bldg. F-1, Columbus, OH 43224

Multiflora Rose: The Tenacious Invasive

By Marilyn Ortt, Marietta Natural History Society

The invasive, non-native plant species that has had the most impact on life, the environment, and the economy of southeastern Ohio is probably multiflora rose. For this reason, its name is not usually spoken by landowners without a few carefully selected and heartfelt adjectives.

This rose is a native of East Asia and was introduced to this country in the 1940's. It soon became the darling of several agricultural agencies and departments of natural resources here in the eastern part of the country.

Farmers can remember being sent bundles of whips to plant – this was going to be the ultimate “living fence”, which is how it was promoted by nurseries, and back covers of magazines. No more barbed wire – instead lines of this beautifully mounded rose would delineate the perimeter of the pasture.

The arching canes would provide cover for wildlife and the abundant fragrant white flowers in spring would be aesthetically pleasing. Even better, those abundant flowers develop into abundant rose hips that provide winter food for wildlife. Beats dealing with barbed wire any day.

And everyone likes plants that are easy to grow. Unfortunately, it is sometimes a thin line between “easy to grow” and “rampant, aggressive growth” – something to consider when buying nursery stock.

Removed from the natural controls such as predators, climate, and diseases in its homeland, there was no holding it back.

A few recipients did exercise caution.

A friend once told me his multiflora plants arrived when he didn't have time to plant them so he heeled them in near a shed and sort of forgot about them. When he saw how enthusiastically they were growing later in the year, he eradicated them then and there. Just the rate of growth alarmed him.

But that did not stop multiflora rose from becoming a dominant plant in the fields he allowed to go fallow. Many of his neighbors didn't recognize the threat so there was a ready source of seed.

Germination studies evidently raised no red flag but apparently no one thought to scarify the seed coating, which is what happens when the seeds pass through the craw of birds. The smooth hard covering of the seed is scarred sufficiently that the seeds sprout readily. This does not just happen in the fencerows but in the middle of pastures and in woodlands – wherever the bird happens to be when it is eliminating the seed from its digestive system complete with a small packet of fertilizer. Scientists say it takes food an average of ten minutes to pass through the digestive system of a bird so the species probably spread in 10-minute flight-distance increments.

In woodlands, the plants tend to be gangly and not develop into quite the dense mound that it does in the open. It does continue to grow and if there is sufficient light can clamber up into surrounding trees – I have seen it fifteen feet above the ground. It can certainly crowd out woodland wildflowers by physical displacement and by altering the amount of sunlight or nutrients.

In the open, however, multiflora rose develops to its full potential. Forming impenetrable mounds of thorny canes cascading from the center, up to ten feet tall and ten feet wide, it becomes a monster.

Several of these monsters in a pasture can impact forage production for livestock.

The threat to local farmers was not readily understood in agency offices most of which are located in the glaciated part of the state. They were advised that control could be achieved by mowing pastures once a year. Good advice on flat land but not a safe option in the hill country. Besides there was all the fallow land

where the rose was becoming established and providing a seed source.

Hand-to-hand combat is time consuming and usually results in loss of blood on the warrior's part. An easier way was to use herbicide. Hundreds of thousands of tax dollars as well as personal investment have been spent trying to control multiflora rose. The species is usually resistant to a number of herbicides and it is sobering to examine the history of herbicides recommended during the past fifty years.

Many are no longer on the market because of extreme toxicity to aquatic life and surrounding vegetation. Some apparently caused health problems for the person applying them. Barbed wire is looking better all the time.

The good news is that as multiflora rose moved westward it reached an area that had a latent virus that native roses have developed resistance toward but multiflora has none. The virus is spreading by a mite so small that twenty of them could stand side by side on a pinhead according to one source. The mites are most often spread by wind so warm sunny summers are more

conductive to its spread. Once infected, a multiflora plant will usually die within three years.

Beginning in 1985, the rose rosette disease, as it is called, began to be tracked working its way eastward and northward from Missouri through populations of multiflora.

It reached our area in the late 1980's and more of the typical red, stunted spring growth of the leaves and red canes is apparent each year.

New plants are still getting started so it is not unusual to see the huge mounds of dead shrubs with younger plants nearby that have not yet contacted the virus. Their time will come.

After fifty years of battle, tons of herbicides and hundreds of thousands of dollars spent on research and possible solutions, we may be saved by a mite!

One more bit of irony – there is concern in Japan about what will happen to their roses if the virus should arrive in that country.

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Oswego Tea: A Non-Prairie *Monarda*

Gordon Mitchell

Those of us who are familiar with prairie plants are probably aware of the Wild Bergamot (*Monarda fistulosa* L.). Many of us may also know that the Wild Bergamot has non-prairie relatives. One such non-prairie relative is the Oswego Tea (*Monarda didyma* L.).

The Oswego Tea is a member of the Mint Family (*Labiatae* or *Lamiaceae*) and of the *Lamioideae* or *Stachyoiodeae* Subfamily. The generic name, *Monarda*, was named for Dr. Nicholas Monardes, the 16th Century medical botanist of Seville, Spain. The specific epithet, *didyma*, is Latin for *didymous*, which is Greek for “double” “paired” or “twinned”, which refers to the paired leaves or to the paired stamens.

Other common names for this plant are American Bee Balm, Bee Balm, Fragrant Balm, Gold Melissa, Horsemint, Indian Nettle, Indian Plume, Low Balm, Mountain Balm, Mountain Mint, Oswego, Red Balm, Red Bergamot, Rose Balm, Scarlet Balm, Scarlet Bee Balm, Scarlet Monarda, Square Stem, and Sweet Mary.

Oswego Tea was named for the Oswego Indian tribe, who inhabited the Oswego River area near Lake Ontario in upper New York. In 1743, John Bartram, an American botanist from Philadelphia, first recorded the



Monarda didyma

Oswego Tea. Bartram was at Fort Oswego as part of a peace treaty delegation when he observed the Oswego Tribe using this plant. He took a few samples back home and later shipped some samples of this plant to other botanists, including Peter Collinson of London.

Oswego Tea had some medicinal uses. Both the Native Americans and the Europeans, especially the Shaker communities, used this plant for those purposes. A tea was brewed from both the leaves and flower heads. This tea was used to treat bronchitis, colds,

colic, fever, heat ailments, insomnia, muscle spasms, nosebleeds, sore throats, and stomach aches. The tea was also used as an antibacterial, an antifungal, an antihelminthic, an antipyretic, an antiseptic, a carminative, a diaphoretic, a diuretic, a rubefacient, and a sedative. A poultice made from parts of this plant was used for treating headaches, insect and stings, and various skin ailments. Inhaled fumes from this plant were used for treating sinus ailments. Oswego Tea contains thymol, an aromatic antiseptic. The Oswego Tea was listed in the *U. S. Pharmacopoeia* from 1882 to 1950 and in the *National Formulary* since 1950.

Oswego tea had other uses as well. This plant was also used as meat preservative and as perfume. The early European settlers drank this tea and made it their first choice as a substitute for imported tea. After the Boston Tea Party of December 16, 1773, imported tea became scarce in the American Colonies.

Description Of The Oswego Tea

Perennial

Height: 1-5 feet.

Stem: Square-shaped.

Leaves: Simple. Opposite. Each pair of leaves is oriented at right angles to its adjacent leaf pair. Each leaf is about 3-6 inches long and is lanceolate or ovate. The leaf margins are coarsely toothed. These leaves emit an aromatic mint odor when crushed.

Flowers: Scarlet red. Flowers are arranged in dense, ragged, rounded flower heads. Each head is about 1-2 inches wide. All heads are subtended with purplish or reddish bracts. Each flower is about 1½ inch long, tubular, and is bilaterally symmetrical. The calyx consists of 5 united sepals and 13-15 nerves. The corolla consists of 5 lobes or united petals that are arranged into 2 lips. The upper lip has 2 fused petals and the lower lip has 3 fused petals. There are 2 stamens and 1 pistil with a 2-parted stigma. These flowers are favored by the Ruby-throated Hummingbird (*Archilochus colubris*). Flowering season is usually June to September.

Fruit: Nutlet. The 4 single-seeded nutlets are light brown, smooth, and are oblong or oval.

Roots: Shallow or deep-rooted. Dense. The rhizome is capable of growing up to 1 foot per season.

Habitat: Stream banks, thickets, and woodlands.

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

The Dripping Ledges Along the Vermilion: Local Rainforest

By Tom Sampliner

Shale ledges form the river embankment along the Vermilion River by Schoepfle Garden, a Lorain County Metro Park. As such, they erode and fissure away in stairstep configuration. Also they are quite porous. Such formations are erratic in appearance so that they seem to be the product of some work crew who are perhaps a bit tipsy at the time. The water drips, flows and sprinkles from the heights over the embankment making for a lush hanging garden of diverse vegetation. Such a scene would be more likely associated with a tropical rainforest than one encountered exploring local flora.

Little creeklets cut and carve out wider hollows at various heights upon the embankment. These were found to be unusually rich beds of interesting plants; some harboring state listed species.

On July 20th, 2000, under the knowledgeable leadership of Jim Bissell, a group including several park district naturalists wishing to learn more about what they had, went on this creek hike for adults only.

With clear weather in the low 70's we could not have ordered up a more perfect day.

Once down at river elevation level, the first impression is one of being transported into another place elsewhere on the globe. The ledge heights were all literally dripping upon us in a steady cascade of light drizzle. We hugged the shoreline to keep our upright positions; not all were successful. Those of us with eyeglasses were bemoaning the lack of windshield wipers.

The constant wetness of the wall was just what the plant doctor ordered. The bank was literally a green hanging shower curtain of ferns and flowering plants. One of the most prolific displays was the immense colonies of light green, long curving, lacy fronded bulbet ferns, *Cystopteris bulbifera*. We especially enjoyed the healthy looking undersides of the fronds where those round bulbets grow. For those unfamiliar, the lacy cut fronds could almost pass for table linen doilies.

The walls also had a variety of mosses, lichens, and liverworts that could easily make an entire day trip working solely upon their genera. Though well out of season, the gently scalloped leaves of columbine, *Aquilegia canadensis*, were in evidence. At this season, the leaves were either madder or green and therefore quite prominent among ferns, mosses, lichens, and grasses.

Yellow was a most popular color for tall, stately, stout stemmed composites then in bloom. I was particularly impressed with the vigorous specimens of cup plant, *Silphium perfoliatum*. Those broad, connate-perfoliate leaves are so distinctive. Its genera-mate, rosinweed, *Silphium trifoliatum* was also present in impressive numbers. The mid-stem whorl of from 3 to 4 leaves is what gave rise to the common name.

If blue is a color more to your liking, this habitat offers promise, but still a few weeks hence. Clearly, giant blue lobelia *Lobelia siphilitica* was merely a couple of weeks from filling in large mats with tall blue spikes. Blue currently was to be found only in the few intriguing configurations of monkey flower *Mimulus alatus*, the less common of our two species. This species has petioled leaves and flower stalks shorter than the calyx. That touch of yellow in the throat is just the perfect contrast for these flowers. If you are willing to wait even further into the season, say Fall, the park naturalists present informed us that some great stands of fringed gentian, *Gentianopsis crinita*, await you.

White makes a nice addition to the aforesaid color scheme. It also made nice contrast to what was

becoming of our clothes; anything other than white. Boneset, *Eupatorium perfoliatum*, as well as white snakeroot *E. rugosum*, were present though not at their best. Those porcelain eye-like fruits of doll's eye, *Actaea pachypoda*, were still in their smaller green stage.

Certainly some pinks and purples are mandatory to complete any proper wildflower color palette. We accomplished this by locating a few open Joe-Pye weed, *Eupatorium maculatum*. The ironweed, *Vernonia* sp, was coming, with no flowers visible to tell which one.

To round out this quick potpourri, I will further mention only the abundant false nettles *Boehmeria cylindrica*, and at least one of the true nettles, *Urtica* sp., both of which attract a rich assortment of moths and some butterflies.

As we slipped and stumbled our way along the river edge in the water, we encountered a great diversity of insect life. It fit the visual impression of this local rainforest perfectly. A couple of samples were taken to an appropriately trained entomologist for identification. One spider in particular was most striking, with no one present having a clue as to what it was.

I encourage the fit and adventuresome among you to explore this rich area. You may want to have a buddy or two along and be cautious of your footing. Who knows what discoveries await you?

Tom Sampliner is past president of NEONPS

Pollen-free Sunflowers

by Charles B. Heiser

When I visit my local supermarket I must pass through the florist section upon entering the store. Frequently some flower attracts my attention; and I am delighted when it is an old friend, as it was last December when I saw bouquets of sunflowers. Where are these coming from? I asked myself. I picked up a bouquet, and the wrapper informed me they were from Ecuador. At another shop, the sunflowers were from Colombia. I was aware that many flowers are now grown in Latin America and shipped by air to the States. In fact, I visited a number of flower farms when I was in Ecuador two years ago, and saw lots of roses, but no sunflowers. To have roses shipped by air doesn't surprise me, but lowly sunflowers? They are not lowly today. In various shades of yellow, orange, and red, tall to short, big to small-headed, single- or double-

flowered, with or without pollen, sunflowers are very popular as ornamentals.

The sunflowers that I saw for sale were pollenless, or male sterile, the word that geneticists usually use, and these are now widely available to the home gardener. I learned of male sterile ornamental sunflowers some years ago when I had a phone call from the Netherlands. The caller identified himself as a plant breeder and asked me if I knew how the Japanese breeders were producing sunflowers without pollen. I hadn't known that they were, but I was able to tell him that they had probably introduced the male sterile factor from the cultivated oil seed sunflower into the ornamental.

This male sterile sunflower had first been reported in 1969 by a plant breeder in France, P. leClercq, and I knew a great deal about it, for I had sent him seeds of

one of the parents of the hybrid in which he found it. I remember well where I obtained the seeds: near the streetcar track running by Washington University in St. Louis. Neither the sunflowers nor the streetcar track are there today.

Many times I have brought home sunflowers cut from my garden so I am well aware that they produce a great deal of pollen, but this was never a concern to my wife or me. Apparently not everyone agrees with us, and Burpee in one of their recent seed catalogs tells us, "No pollen means no stains on your linens or furniture." At times, it may also mean no seeds for the birds, as I shall shortly explain. In any event male sterile ornamentals have become very popular. I have seen them sold in the Bloomington farmers' market in recent years.

Male sterility may be inherited through the genes carried in the chromosomes as my readers learned in their biology courses; or it may be inherited through factors carried in the cytoplasm (contents of the cell excluding the nucleus). The strict maternal inheritance of the latter has important consequences, which I shall not go into here except to mention that it has led to the development of hybrid oil seed sunflowers as well as the pollenless ornamentals.

As in corn, the hybrids greatly increase yields, and allow the sunflower to become competitive with other

oil crops of the world. To produce hybrid seed the seed company plants alternate rows of male sterile and male fertile (pollen producer) lines. The seed harvested from the male sterile rows is sold to the farmer. In order that the plants grown by the farmer have pollen, the seed company arranges for a male fertility-restoring gene to be carried by the pollen parent.

As for the pollen-free ornamentals, the seed company sells seeds of the male sterile sunflowers directly to the gardener. Unless the gardener, or someone in the neighborhood within a bee's range, grows a pollen-producing sunflower, his male sterile plants will produce no seed. If the gardener obtains seeds and plants them the following year he may secure male sterile plants unless the pollen parent carried a gene to restore fertility. What the chances of that are, I don't know. If gardeners want to grow male sterile plants like the ones they had the previous year, they have to buy more seed from the seed companies; that is what the companies are counting on.

Charles B. Heiser is Distinguished Professor Emeritus, Indiana University at Bloomington. He is the author of Weeds in My Garden (TimberPress) as well as books on sunflowers, gourds, and economic botany.

Reprinted from the *Indiana Native Plant and Wildflower Society News*, Summer 2004

Web-Based Resources for Ohio Botany

The following listing is by no means exhaustive, but provides a variety of sites that offer useful information pertinent to many facets of Ohio botany. Many of these sites also have links to other helpful websites.

American Journal of Botany. <http://www.amjbot.org/>

Castanea. The Journal of the Southern Appalachian Botanical Society.
<http://www.newberry.net/sabs/Castanea/>

Cleveland Museum of Natural History herbarium. <http://www.cmnh.org/collections/botany-what-is.html>

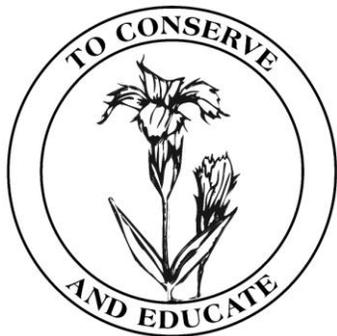
Connecticut Botanical Society. Features hundreds of outstanding plant images. <http://www.ct-botanical-society.org/galleries/galleryindex.html>

Flora of North America website. Information about the most comprehensive series of publications on North American flora. <http://hua.huh.harvard.edu/FNA/>

Kent State University herbarium. <http://dept.kent.edu/biology/herbarium.htm>

Kew Record of Taxonomic Literature. Searchable database of worldwide botanical publications, <http://www.rbgekew.org.uk/bibliographies/KR//KRhelpGeneral.html>

Miami University herbarium. <http://www.units.muohio.edu/herbarium/>



Chapters of the Ohio Native Plant Society

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

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

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

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

Native Plant Society of Northeastern Ohio
J. Roche, President
640 Cherry Park Oval
Aurora OH 44202
330-562-4053
bjroche@aol.com

The Botanizers
The Wilderness Center
Stan Watson
4134 Shelby Circle
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<http://www.wildernesscenter.org>

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- Promote conservation of all native plants and natural plant communities through habitat protection and other means
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- Support proper ethics and methods of natural landscaping
- Encourage surveys and research on natural plants and publication of the information
- Promote cooperation with other programs and organizations concerned with the conservation of natural resources

On The Fringe

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