



On The Fringe

Journal of the Native Plant Society of Northeastern Ohio

The Terebinths of Texas – Part 1

Perry K. Peskin

And Abraham moved his tent, and came and dwelt by the terebinths of Mamre. Genesis 13:18

I have always been impressed by the Bible's strange combination of the commonplace and the mysterious. The above passage, which has stuck in my memory ever since I first heard it, is a case in point. A nomadic chieftain moves his family, his flocks, and his tent to greener pastures. This is the commonplace, everyday part, practiced by pastoral people, like the Bedouin, from ancient times to the present. But what about those mysterious terebinths? Were they some kind of rock formation or perhaps a natural region like the wilderness of Zin? Neither, I was told. Terebinths were actually a kind of tree, most likely an oak.

But I kept wondering. Was there a reason for moving all one's family and belongings over a great distance just to dwell next to a grove of oak trees? And why did these particular oaks have to be mentioned at all, running counter to the usually spare, unornamented style of the Book of Genesis? It was only in 1991 when I stumbled upon a small grove of native terebinths in Texas, that the mysterious trees, which are not oaks at all but members of the sumac family, leaped out of the legends and became, for me, at least, a part of the real world.

On February 18, 1991, when my wife Carol and I disembarked from the plane at Houston airport, our main intention for the next two weeks was to drive down the Gulf Coast, up the Rio Grande Valley, and across the Edwards Plateau and the tall-grass prairies back to Houston to observe wintering birds, especially the whooping crane and the Attwater prairie chicken. Along the way, we might see some rare trees, like the Texas Sabal Palm protected in an Audubon sanctuary near Brownsville, and, if we were very lucky, a few early wildflowers on the roadsides, the kind made famous by Ladybird Johnson in her campaign to use native plants to beautify Texas highways.

Little did we realize when we planned our itinerary that Texas has a huge native flora and fauna distributed over 10

distinct vegetational zones with elements drawn from the Deep South, the Great Plains, the Southwest, Northern Mexico, and even the Caribbean. From a naturalist's viewpoint, Texas, like Alaska, is a bridge between continents, almost a subcontinent in its own right, and yet, due to over-development, reduced to a series of very fragile, dwindling habitats for its wildlife.

We also didn't realize that one of our basic assumptions about the trip – that we would bask in warm temperatures under sunny skies – was about to be challenged. As the winds howled down the beach at Galveston, our first stop, and brought temperatures into the thirties, we were glad that we still had the sweaters and heavy jackets, worn when we boarded the plane in frigid Cleveland. We had discovered that Coastal Texas is not another California.

Luckily the plants and birds don't know this. At Galveston Island State Park, across the road from a field of foraging sandhill cranes (with their heads and long necks in the grass, looking for all the world like a flock of sheep), we found a few scattered specimens of our first Texas Bluebonnet *Lupinus texensis*, a small, blue-and-white lupine famous for covering large areas of prairie as far as the

eye can see – in the right season. We never did see this State Flower of Texas in all its glory, but even the few sparse specimens here and there said that spring was around the corner, even on this wintry island.

Taking the cold, breezy car ferry out of Galveston to Port Bolivar, Texas, we saw flocks of white pelicans flying over the Gulf. On the road to Anahuac National Wildlife Refuge, we noted the armies of wintering snow geese, blue geese, and white-fronted geese, the latter a bird that hardly ever strays to Ohio. Texas' reputation as a birder's paradise was certainly well deserved.

(Continued on page 3)



Pistacia terebinthus

Save the Date
Annual Dinner: October 28th, 2005
Dr. Marino Ospina, Speaker

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Spring Program Schedule

MAR 20, Sun: Members Slide Show 2:00 PM In the beautiful **West Woods Nature Center** in Geauga County, members share their best slides, including field trips from 2004. Directions: Take St. Rt 87 east from Rt 306 approx. 2 miles to the park entrance on south side of the road. **If you are bringing slides to share, please call Ami Horowitz to add your name to the program. 216-921-9242.**

APR 23, Sat: Plant ID Series: Wildflowers 2:00 PM (*Part of our ongoing Plant Identification Series-families welcome*) Trilliums, violets, wild ginger and more abound in the lush valleys of **Swine Creek Reservation**. Discover the diversity of spring wildflowers and characteristics for telling them apart in this wildflower workshop. We'll begin indoors before heading down the trail to discover the great diversity of flowers including early saxifrage and the unusual green violet. Directions: Take Rt 87 E through Middlefield past Rt 528 approximately 2 ½ miles to Hayes Road. Turn right (S) approximately 2 miles to park entrance. Bear left to Lodge. **Call Judy to register: 440-564-9151 (H) or 440-286-9516 (W).**

MAY 7, Sat: Grand River Terraces, 9:00 AM Jim Bissell will lead this combined field trip with Northeast Ohio Naturalists. Located in Ashtabula County, the Grand River Terraces is a 700-acre natural area with one mile of frontage along the Grand River. Three hemlock swamps occur on the property. The mixed-mesophytic forest within the ravines and floodplain terraces on both sides of the river is one of the best examples of this forest type in Ohio and a spectacular diversity of wildflowers. Space will be limited. **Please call the CMNH Botany Office 216-231-4600 X3505 for reservations and directions.**

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 Chagrin River Road south of Rt 87. **Call Judy to register: 440-564-9151 (H) or 440-286-9516 (W).**

January program: Cleveland Museum of Natural History Herbarium

About twenty persons showed their interest in the January program, including five brave souls from Buffalo, New York! They are members of the Western New York Native plant society and were very impressed by the expansiveness of Cleveland's Herbarium.

Jim Bissell provided a brief history of the Herbarium, which began in 1977 under his direction. In 1987, four donors each donated \$5,000 to create the Botany Department Endowment, which supports the work. There are five herbariums in Ohio; the Cleveland Natural History's being the third largest, following Miami and Ohio State. An herbarium is a repository of

preserved and labeled plant specimens. The Museum's herbarium contains specimens from all over the world, with a concentration of plants found in northern Ohio and northwestern Pennsylvania.

The mission of the herbarium is to preserve and document the diversity of plants in our region and to serve as a conservation tool. An herbarium specimen preserves a wealth of valuable information. Local botanists use it for comparison and identification, professional researchers find information for their papers or publications and students use it as a learning tool since live materials are not always available.

[More on herbaria in a later issue]

----Diane Police

(Terebinths – Continued from page 1)

As for the plant world, Anahuac was a place of extremes. Mostly a marshland, it contained the tallest grass in the U.S., the giant cane *Arundinaria gigantea*, a native bamboo that shoots up to 30 feet in height; and one of the smallest flowering plants, Mud Midget or Bog Mat *Wolffiella lingulata*, a type of duckweed floating on the water's surface in huge numbers, each clump no more than a half-inch across. Looking more like one of the algae than a flowering plant, it nevertheless claims as its relatives the aquatic members of the jack-in-the-pulpit family and, oddly enough, the palms.

The next day, traveling south from Galveston to the Aransas National Wildlife Refuge near Rockport, we had no choice but to pass through a dreary industrial region paralleling the coast – oil refineries, chemical plants, and gasoline storage tanks everywhere we looked. We wondered what sort of habitat had been displaced, and in a roadside thicket near Palacios, where the highway met the Gulf, we found our answer.

A nopal, or Texas Prickly-Pear *Opuntia lindheimeri* was growing next to a treelike lily, the Spanish Dagger *Yucca treculeana*. The nopal, over six feet tall, had the largest flat joints (which in a prickly-pear take the place of stems) that I had ever seen, almost a foot long, and also the wickedest spines (which take the place of leaves). The Spanish Dagger, which was branched from the base and in full bloom with a big panicle of white flowers topping each branch, was over eight feet tall and could have reached 15 feet, somewhat like a Texas version of the Joshua tree of California. Both plants, natives of both northern Mexico and southern Texas, indicated that the coastal prairie was gradually changing to a coastal desert.

The birds were mirroring this transition as well. At Tivoli we saw our first crested caracara, perched on a telephone pole and gazing calmly down on us. Although this large, black-and-white raptor has an eagle-sized beak and feeds on carrion like a vulture, it is related more closely to the falcons. In Mexico, where it is much more common, it has become the national emblem.

As we approached Rockport, a small fishing village on the Gulf and famous as the headquarters for all birders who wish to see the whooping cranes at nearby Aransas, we noticed that the bird life had begun to take on a transcontinental cast. Shorebirds and ducks migrating to the Arctic, such as ruddy turnstones and pintails, occurred in great numbers along the coasts and inland wet spots, while typical Western species, such as roadrunners and long-billed curlews, were found on the prairies, along with Eastern species, such as the flocks of wild turkeys.

We spent the following afternoon on a sight-seeing boat, the **Skimmer**, slowly drifting by a chain of small islands in

Aransas Bay. In the distance we could see the larger barrier islands that sheltered us from the rougher waters of the Gulf. This was a trip that anyone concerned about endangered wildlife dreams about – to view the last flock of whooping cranes in America, about 150 of them, on their only wintering grounds. On this calm, clear, almost warm afternoon, as each little island came into view, there would be a pair of whooping cranes on territory; both male and female would be in dazzling white plumage with black wingtips and a red crown, and would often be accompanied by an immature crane hatched the previous summer in their breeding grounds in the far north of Alberta, Canada. The young crane was white, splotched with brown feathers.

Before the boat returned to Rockport harbor, we had seen perhaps 50 of these magnificent birds, their presence a tribute to the Endangered Species Act of 1973 as well as the pro-conservation movements leading up to it. In part, the plight of this flock of birds, at one time down to a tiny remnant, was one of the sparks, along with the DDT scare, contributing to the Act of 1973 and to their own tenfold increase, as well as to the timely recovery of many other animal and plant species.

If it hadn't been for that legislation, I doubt that we would have seen the single osprey flying over the bay, the flock of roseate spoon-bills out towards the Gulf, or the American oystercatchers busily feeding on the muddy shores of the islands – not to mention the alligators floating in the ponds of the Aransas refuge. These had all been in danger of extinction at one time.



Pistacia terebinthus

Continuing south the next morning, we bypassed Corpus Christi and, turning inland, found ourselves on the vast King Ranch, a private estate the size of Connecticut, where low prairie plants had wrested control over the thornscrub of the coastal desert. The roadside tapestry usually seen in March had begun to fill in with the pink, cuplike flowers of the showy Evening Primroses *Oenothera speciosa*, the large scarlet bracts of the Texas Paintbrush *Castilleja indivisa* easily the most beautiful of its genus I had ever seen; the light blue-violet of the Purple Phacelia *Phacelia patuliflora*; and the intense yellow of the daisy-like Texas Squaw-weed *Senecio ampullaceus*.

Wherever trees had been planted, as at rest stops, a typical Texas bird, the black-crested titmouse, might be seen on the same tree as the green jay, a green, yellow, and black Mexican species, showing its affinity to our blue jays in its gregarious behavior and loud, raspy calls.

Close to Harlingen at the famous coastal wildlife refuge of Laguna Atascosa near the Rio Grande delta and the Mexican border, we reached a watershed of sorts. Gone were the short grasses and colorful plants of the prairie. In their stead, a strange-looking collection of thorny shrubs, vines, and creepers, mostly from tropical families, dominated the

landscape. Virtually every plant was unfamiliar to us. This would be the norm for the next week as we ascended the Rio Grande Valley.

Overlooking the Laguna Madre and the high-rise hotels on South Padre Island (Texas' challenge to Miami Beach), we found large clumps of nopal and Spanish Dagger, joined by the bushy, spiny huisache or Sweet Acacia *Acacia farnesiana*, with its fragrant, intensely yellow-orange flowers arranged in ball-shaped inflorescences. It represents a group of woody legumes that has been around since the Cretaceous Period, the last age of the dinosaurs, and can be found in almost every hot, dry habitat throughout the world, especially in Africa, Australia, and South America, the three continents joined in the original Gondwanaland, where acacias perhaps evolved.

Among the other very thorny, impenetrable shrubs at Laguna Atascosa, barbed-wire cactus *Cereus pentagonus* in big, sprawling clumps fully lived up to its name. Found from the Rio Grande Valley into northern South America, it also occurs in South Florida, where three years before, we had unwillingly made its acquaintance. Whenever we gingerly sidestepped the cactus, we frequently found Allthorn *Koerberlinia spinosa* and Goatbush *Castela texana* lying in wait. The former, belonging to a one-species family ranging from Arizona through Texas and northern Mexico, has no leaves at all, only short-lived tiny scales and intricately branching green stems. The latter represented the first member of the Manthus, or Tree-of-Heaven, family that we had seen native to the U.S. Its tiny, brilliantly red flowers seemed to be issuing a warning, "Stay away," both to goats and people alike, but what nourishment the average goat could get from its dime-sized succulent leaves I couldn't imagine.

Just when we were getting discouraged by seeing so few of the thorn-scrub species in flower, we came upon two very attractive exceptions. The first was Redbud *Menodora heterophylla* not the beautiful leguminous tree with purple-pink flowers that blooms so profusely in the Appalachians, but a ground-hugging, woody creeper of the olive family with red buds that opened up into large yellow flowers. Resembling Forsythia of the same family, it blooms throughout the year. A glamorous member of the snapdragon family similar to the gerardias and probably one of the few woody members of its family native to the U.S., the cenizo *Leucophyllum frutescens*, with its large, pink trumpet-shaped flowers lined on the inside with purple "honey-guide" spots, obviously had evolved to attract hummingbirds. But where were they? All we saw at Laguna Atascosa were golden-fronted woodpeckers; the hummingbird season in South Texas would not begin for another two months, or so we thought.

The following day at the Sabal Palm Grove Sanctuary, 40 miles away, next to the Rio Grande, we saw at a bird feeder our first and only wintering hummingbirds, the buff-bellied species: tiny bronze-green, emerald-throated, brown-tailed Mexican birds, common in the U.S. only in the Rio

Grande Valley around Brownsville. By no coincidence, nearby several clumps of Scarlet Sage *Salvia coccinea* were in full bloom; South Texas is the only part of its large range where this brightly colored hummingbird-flower blooms all year round.

The sanctuary, run by the Audubon Society, shelters most of the U.S. population of the Texas Sabal Palm (*Sabal texana*, formerly classified as *S. mexicana*), a close relative to the cabbage palmetto *S. palmetto* of the Southeast and Florida; however, it rises tall and slender like the royal palm, and its trunk is covered by a soft, fibrous, gray bark.

At one time the Rio Grande was hedged in on both sides by extensive grasslands, dotted with palm groves, so much so that it was sometimes referred to as "Rio de las Palmas." No more. The Mexican side has been almost completely cleared for agriculture while the American side has only a few federal, state, and private preserves to protect this unique subtropical ecosystem. The puma and jaguar are thought to be extinct on the Rio Grande, and the ocelot is seldom seen; as for the Texas Sabal Palm, this sanctuary and one other guard it from extinction.

At the sanctuary headquarters we were told that new hope has arrived from both government and private sources in the "Wildlife Corridor" concept, a plan to keep the river valley completely wild and prevent further development by connecting present-day preserves with private holdings. This idea is not new. The Nature Conservancy for many years has been adding bits and pieces of land holdings to provide a corridor along the Connecticut River in four New England states. Also, the national Wild River system has been doing the same on fast-flowing streams all over the country.

Because of the strong need for flood control in the past, much of the Rio Grande is now restrained by a huge system of earthen levees. It is hardly visible in its natural state and looks more like a long series of canal locks. However, peculiar wetland habitats, called resacas, running parallel to the river but barely connected to it, have survived. They consist of a series of oxbow lakes, which in the Deep South would be called bayous, each lake resulting from the overflow of the river in flood-time, perhaps many years before, and connecting temporarily once again in the next flood. Nevertheless, since the Falcon Dam and other controls have been built, there has been little flooding, and what wildlife is left is found in gallery forests clustered around the resacas, much like desert wildlife around oases.

In one of the resacas at the sanctuary we found a pair of least grebes, small, black, tropical diving birds that occur in the U.S. regularly only in Texas and breed all year long in the Rio Grande Valley. From the shore we saw one swimming slowly; the moment that it eyed some prey, probably a small fish or frog, it suddenly dove and began swimming rapidly under water. Because the water was so clear, we were able to see how it moved its wings and big lobed feet, surprisingly similar in motion to a swimming turtle. Now we could understand why evolutionists trace the ancestry of birds back to reptiles.

The staff at the sanctuary had been thoughtful enough to place labels along the main trails. This was lucky for us, because most of the woody plants were not in bloom, and the few plants in flower looked unfamiliar. Two tropical mallows stood out: the Turk's Cap, or Sleeping Hibiscus *Malvaviscus arboreus* var. *drummondii*, a bright scarlet hibiscus, whose tube-shaped flowers never open completely and are perhaps pollinated by humming birds; and the Rio Grande Mallow *Abutilon hypoleucum* with cup-shaped yellow flowers. This is a native plant very similar to the Velvet-leaf of the Eastern U.S. *A. theophrasti*, a weed of waste places, introduced originally from India.

Pigeon-Berry *Rivina humilis*, a bushy tropical plant with small rose-colored flowers, was the first relative of the common Pokeweed *Phytolacca americana* I had ever seen. Found in the Deep South from Florida to Texas, it is not common anywhere, possibly because its edible berries were greatly relished, and their seeds were presumably propagated, by the great flocks of passenger pigeons that became extinct nearly a century ago.

At Santa Ana National Wildlife Refuge near Alamo, Texas, we found the same situation: a wonderful variety of tropical trees, but hardly any plant in flower. Trees with unpronounceable Hispanic names abounded: granjeno, anacua, ebano, retama, and tepeguaje, among others, most of these profusely armed with thorns, and many in the legume family. However, I felt more at home with the olmos, or Cedar Elm *Ulmus crassifolia*, a tree found as far east as the Florida panhandle, it can reach 75 feet in height but has the smallest, most delicate leaves of any native elm. At Santa Ana the most beautiful forest we saw in Texas consisted of Cedar Elm and Sugar Hackberry *Celtis Laevigata*, covered almost completely with long strands of Spanish Moss *Tillandsia usneoides*.

Besides showing us around the trails, Santa Ana's naturalists gave us some important information about a rare Mexican tree – the Montezuma Bald-Cypress (*Taxodium mucranatum*), found only in the U.S. in a remote section of the park, closed off to visitors, and at a few places along the river, outside the park. When I expressed an interest in seeing this rare conifer, they gave me the name of Mr. Bill MacWhorter of Weslaco, a retired city planner, an amateur naturalist, and an authority on the Rio Grande thorn woodland, who could give us directions.

That night I called Mr. MacWhorter, who in a very friendly manner invited us over to Weslaco to see his garden of Rio Grande plants; Llano Grande, a private preserve of his by the river; and lastly, the site of one of the largest Montezuma Bald-Cypress in Texas.

All the next morning was a plant-hunter's dream – a personal guided tour of areas that the public ordinarily never sees. Mr. MacWhorter's garden, kept in immaculate condition, could have been lifted out of *Horticulture*

magazine. A large legume, the Mexican Poinciana *Caesalpinia mexicana*, which is also a Texas native, towered over the house, its branches loaded with heavy panicles of golden flowers. Runyon's huaco *Polianthes runyonii*, a very small agave, or century plant, had put out a rosette of narrow green leaves. It is a rare Texas endemic found only in the Rio Grande Valley. A Mexican Orchid Tree *Bauhinia congesta*, one of a very beautiful group of legumes, was just coming into bloom and showing its large white flowers. One small population of this tree grows mostly on one ranch in the limestone hills northeast of Del Rio on the Texas side of the river. Mr. MacWhorter also pointed out Baileys Ball Moss *Tillandsia baileyi*, an epiphyte like Spanish Moss, from the pineapple family, but without stems, merely a cluster of leaves.

At Mr. MacWhorter's Llano Grande, or "great plains," a few miles south of Weslaco, I was hoping we might actually see the river in its original state, unencumbered with earthen walls, but his private preserve also bordered on a resaca, and not on the Rio Grande itself. However, the wildlife was spectacular. Large flocks of roseate spoonbills, white pelicans, black-bellied whistling ducks, and green-winged teal gathered in the wetlands, and an occasional green, or Texas, kingfisher would splash into the water.

Threading our way down to the extensive grasslands that gave the preserve its name, we were rewarded with a view of a young Texas Sabal Palm and our first Montezuma Bald-Cypress, now just a skinny sapling growing in a cattail marsh, but capable of expanding into a mature tree similar to the giant specimens that still exist in parts of Mexico. In fact, the historic bald-cypress in the state of Oaxaca is considered the largest tree in the country and perhaps the oldest (over 2,000 years), not surprising since bald-cypresses are closely related to California Redwoods. Legend has it that under a similarly ancient tree still standing in Mexico City, Montezuma, the last emperor of the Aztecs, surrendered to the Spanish. The species gets its name from this incident.

Returning to the bank sloping up from the river, we found a strange mixture of plants occurring elsewhere in the U.S. only in southern Arizona, plus a few Caribbean types known from South Florida and the Keys. One of the most conspicuous was *Opuntia leptocaulis*, the tasajillo, or Desert Christmas Cactus. This was not the well-known houseplant but a cholla-type prickly pear, with cylindrical joints instead of flattened ones, and large red fruits that last through the Christmas season and give it the common name. As it crept along the ground, the spiny stems bearing the red fruits wound around each other in such a tangled manner that any fruit-loving animal, such as a coyote, would have to risk getting a noseful of spines as the price to pay for tasting the fruit.



Pistacia terebinthus,
flower and fruit

One of the several small cacti belonging to the Night-Blooming Cereus group, *Cereus poselgeri* was represented by an immature specimen with the characteristic habit of the weak main stem leaning against a tree for support. Sad to say, even if we came back in March or April to see its gorgeous pink or red-purple blossoms flaring out like a trumpet, quite likely it wouldn't be there to greet us.

Commercial collectors of ornamental plants have denuded large portions of the Southwest of their native cacti, since they are much cheaper to gather in the wild than to grow to maturity in greenhouses, a process that sometimes takes up to a decade or more for the larger species. In addition to these raiders, drug cartels comb the area, searching for hallucinogenic cacti, especially *peyote* *Lophophora williamsii*. Arizona has set up a system of "cactus cops," who have halted the looting to a great extent, but unfortunately Texas has not enforced its endangered-species regulations. Truckloads of the rare, smaller species, dug up mostly from private land, reportedly leave the state every month. For this and other reasons, Mr. MacWhorter plans to donate Llano Grande to the federal government, to be added to the Wildlife Corridor system.

For the last leg of his tour, Mr. MacWhorter drove us to a concrete retaining wall of an irrigation canal to view a single huge Montezuma Bald-Cypress growing at the edge. From a distance, it resembled an oak with its wide, rounded crown, certainly nothing like the Bald-Cypress *Taxodium distichum* of the Deep South, which is usually much taller than wide. Except that they both were conifers of the same genus, they didn't appear to have anything in common – until I had an idea. Looking over the top of the wall, I could see protruding up from the water the typical "cypress knees," strange structures shaped like woody stalagmites, which supposedly bring oxygen to the roots if the tree is growing in deep water. Although the tree looked ancient with its thick, gnarled trunk, it dates only from the '40's. The national champion, dating from the '20's, is located near San Benito.

Back at Weslaco, we said a reluctant good-bye to Mr. MacWhorter and thanked him once again for all his kindness to two complete strangers. On the road once more, we realized that to reach Laredo by nightfall, we would have to curtail our sight-seeing schedule and take only a quick look at Bentsen State Park in the nearby community of Mission.

The park is famous to all birders as the home of the most visible concentration of *chachalacas*, noisy turkey-like birds of the curassow family, the tropical American equivalents to the Old World pheasants. Luckily it was the breeding season, and many of the male *chachalacas*, in their gray, olive, and rusty plumage, were in full view setting up territories.

We reached Laredo after dark and left fairly early the next morning on the long journey through the Edwards Plateau, the "hill country" of central Texas, on our way to Lost Maples State Park. For much of the morning, the road wound through uninhabited short-grass prairies, roughly paralleling the Rio Grande. We noticed that the carpet of roadside plants differed almost completely from that of the Gulf Coast. Rose Vervain *Verbena canadensis* dominated, along with Riddell's Doze Daisy *Aphanostephus riddellii*, sometimes called Lazy Daisy. This is a white-rayed composite with yellow centers, like a tiny Oxeye Daisy. It gets its odd name from the habit of its buds to droop tightly closed until midday, when they slowly assume their normal position and open up.

At Uvalde, one of the first really attractive small Texas towns we had visited, with its old, tree-lined residential neighborhoods of solid, Victorian houses, we felt homesick for Ohio. Also, we seemed to have made a break with the semi-tropical Rio Grande valley; the air felt cooler, and in the distance range after range of hills lent a third dimension to the horizon. We had reached the Edwards Plateau.

Long before we arrived at Lost Maples, near Vanderpool, about 50 miles north of Uvalde, we had dug out our winter coats and sweaters. Despite the bright sunshine, the air was freezing! It was like the Gulf Coast all over again. I could hardly wait to return to the car when I got out to photograph a beautiful stand of Redbuds (the northern tree this time, not the Gulf Coast creepers), incongruously in full bloom with their leafless branches smothered in purple-pink blossoms. Later I found this was a Texas subspecies – *Cercis canadensis* var. *texensis*.

Part 2, the final part, will appear in the next issue

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

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Web Sites of Interest

This Week at Hilton Pond, in York SC. Weekly updates on phenology at the Piedmont Natural History center. An interesting website, and an active society.
<http://www.hiltonpond.org/ThisWeekMain.html>

The U.S. Environmental Protection Agency has created a public restoration project data. base. There are currently approximately 300 projects in the database, but the EPA is hoping to receive thousands of entries detailing any kind of restoration projects, at any location, in any stage of implementation or development. To view the database, see

www.epa.gov/owow/wetlands/restore and click on the Restoration Inventory link.

Wildflowers of Ontario in photographs by name or color.
<http://www.wildflowers.reach.net/>

Gallery of Illinois Plants. Lists of Families, Species, Common Names, and Non-native plants. Each plant has several photographs, distribution map, and other pertinent data.
http://www.inhs.uiuc.edu/cwe/illinois_plants/

WOODLAND WILDFLOWERS IN THE WINTER

by Jane Rogers
Fourth in a Series

Does your mind wander to thoughts of spring? Dream on. . . . The warmth of the spring sunshine is just around the corner but it may be weeks before the earliest woodland wildflowers actually appear. The abundant moisture from winter's snow encourages these beguiling blossoms to push upward through the leaf litter on the forest floor. Even though next season's garden catalogs arrive to capture your imagination during the winter months, tending to practical matters now encourages these native plants to put on their best show.

Woodland wildflowers usually get sufficient nutrients from the ongoing decay of leaves, bark and animal droppings mixed together in Mother Nature's recipe for adequate food. Using native plants in your shade and woods should require little effort once they are established, but there are a few things you can do over the winter months to help them look their best when the temperatures rise and spring officially begins.

Many natives dislike any amendments or fertilizers until they are dormant. The time to sprinkle a little compost or granular organic fertilizer with a composition close to 5-5-5 near your Jack-in-the-Pulpits is from October to March in my Zone 5 Ohio garden. Adjust the timing to whenever your Jacks have disappeared. The melting snow can help your amendments dissolve before the emerging foliage is burned or damaged. If your Jacks already receive adequate moisture, these additional nutrients can reward you with more female plants and, therefore, more decorative red berries next autumn.

If your soil is acid or neutral, sprinkle a little medium-coarse limestone where you know your Hepatica, Merrybells, White Trillium, Dutchman's Breeches, or Squirrel Corn grow. I sometimes find these plants growing profusely in limestone rock so dense a shovel cannot penetrate or find a crevice filled with earth. Of course, testing your soil is important even though most wildflowers thrive or adapt to a wide range of pH.

Now is a good time to decide where paths or even a few stepping stones could be added or redesigned. Woodland plants do not like foot or animal traffic that can result in soil compaction or crushed foliage.

When you visit your native plant area in winter, notice if animals have uprooted your wildflowers or any plant has heaved during a winter thaw. A quick repair can help avoid a loss. Add leaf litter where needed.

Make a list of plants that might profit from a move to a new location with more or less shade or moisture. Perhaps division or transplant could shift certain plants to a more desirable spot. Spring repositioning can awaken your woodland garden with a new energy. Consider siting early spring bloomers near a front door or a kitchen window to reward you with an ever-changing display. Each year I anxiously await the Pepper and Salt, Spring Beauty, Hepatica, Toothwort, Bloodroot and Wild Ginger that all unfurl one by one in a one-foot square patch near my front walk. I was inspired by the individual touch created by a friend's tiny wildflower area brightly blooming by her condominium's front door – in an otherwise completely impersonal public area.

Warm winter days are an ideal time to investigate the shape and growth habits of many woody native shrubs or small trees that grow in your shade. You can now easily recognize what should go or stay. When the temperature is 40 degrees or above, a little pruning can correct and improve branch patterns. Limbing up or selectively removing a few tree branches, where appropriate, could help some natives succeed in an area where shade is now too dense.

Do rabbits make your plants a feature on their menu each spring? Rabbits used to regularly maim my emerging Trilliums. I now plant Wild Ramp near wildflowers that deer and rabbits relish to avoid damage to my Trilliums and other favorites. I have also prevented rabbits from feasting on my woodland plants with a deer and rabbit repellent spray called "Liquid Fence". This all-natural product is available at many garden centers and can even be used safely in the vegetable garden.

As winter weather wanes and spring beckons, I enjoy frequent excursions to check for any signs of awakening in my woodland garden – but it's important to know what you are looking at. For instance, can you tell an underage *Uvularia* from a baby Bloodroot? Here is a wildflower quiz that might help sharpen your identification skills and help you pass the time until spring:

Spring Quiz:

1. What plant looks pale gray, has long downy fuzz, and resembles a newborn baby bird until it unfurls its stems and blossoms?
2. If you find a tight roll of green leaves looking like a green cigar sticking out of the earth, what plant is it?
3. If you spy a 1" tall rounded dull purple thumb emerging, what plant is it?

4. If you see a grayish-white miniature flower sprig looking like a tiny piece of dried *Statice* tossed on top of leaf litter, what is it?
5. If you come upon soft grayish-green folded triangles of new leaves lying flat on the ground with the texture of Lamb's Ear, what plant is it?
6. If a pair of long smooth leaves emerges looking somewhat like those of Lily-of-the-Valley, but narrower, what plant could it be?
7. If you see a matted tangle of yellowish-tan bumpy growths that look like a crowd of 1" horizontal roots (but are not), what plant is it?
8. What plant looks like a deep maroon, narrow, pointed sheath as it emerges up to 5" or more?
9. What plant appears as a cluster of thin dusky-mauve stems with swollen tips?

The answers can be found at the bottom of page 19. In the meantime, dream on-----spring will be here soon!

Jane Rogers, a wildflower enthusiast and photographer, is dedicated to raising public awareness of the plight of native plants and hopes to encourage others to preserve and value woodland wildflowers. She speaks to garden clubs and conservation groups and also volunteers with wildflower rescues and related efforts.

Spring Beauty: Weed or Wild Flower?

Charles Heiser

When people learn that I work with weeds I am often asked, "What is a weed?" Definitions abound. I rather like "a plant out of place" or "a plant whose virtues have yet to be discovered." Dictionaries usually emphasize that weeds are worthless plants and of rank growth. My definition, which I came up with many years ago, states that weeds are plants that grow in areas in some way disturbed by people, such as roadsides, railroad yards, vacant lots, gardens and lawns. For the most part weeds are not aggressive away from disturbed areas and do not compete with native plants. The exceptions are now known as invasive plants.

Some people are surprised when they learn that I include the spring beauty (*Claytonia virginica*) as a weed in my book, *Weeds in my Garden: Observations on Some Misunderstood Plants* (Timber Press, 2003), for they know it as one of our early and very attractive wild flowers. It is a native and is found in natural woody and clear areas but it also grows along roadsides and in yards, both of which are the result of human disturbance. The answer, of course, is that spring beauty is both a wild flower and a weed.

My acquaintance with the plant began in 1942 when I was a student at Washington University and the spring beauty served as my term paper topic in an undergraduate botany course. Two things I remember learning are: first, how deep the "bulbs" (properly corms) are buried in the ground; (I dug them to transplant to the greenhouse, not for eating, although



Spring Beauty

they are listed as edible in some books); and second, that the seeds are explosively dispersed. I was measuring the flowers and I left some plants in a glass of water under a lamp on my desk. Later I heard strange ping sounds in my room which I finally traced to the spring beauties. As the capsules dried under the heat of the lamp they more or less exploded to shoot out the seeds. The landing of the seeds on the desk, I think, caused the ping sounds I heard. Later at

Indiana University the spring beauty served as the subject for the doctoral dissertations of two of my students.

After we bought a house in Bloomington in 1956 the spring beauty was an early intentional introduction to my wild flower garden. I don't have a record of how long it took for them to spread to the lawn areas but once they were established there I refused to mow the lawn until after they had ceased blooming for I enjoyed their appearance and wanted them to spread.

I think they did well for I didn't use herbicides on the lawn and refused to worry about the occasional dandelion and plantain. I know that spring beauty will not compete with zoysia and I suspect that it will not survive for long in a "well-kept" lawn.

Charles B. Heiser was born in Cynthiana, Indiana, in 1920. A Distinguished Professor Emeritus of Botany, Indiana University, he has written, in addition to Weeds in my Garden, five other books, including The Gourd Book, The Sunflower, and Plants and People. Reprinted from the Indiana Native Plant and Wildflower Society News, Summer 2003.

Other Spring Programs

5th Annual Ohio Botanical Symposium

Ohio Department of Transportation Auditorium,
1980 W. Broad St., Columbus, Ohio

Friday, April 1 2005

The Ohio Botanical Symposium was first presented by the Ohio Division of Natural Areas & Preserves (DNAP) in 2000 to inform interested botanists about Ohio's Natural Heritage Program. Since then, the Symposium has diversified to include a range of topics on Ohio's native flora.

The Symposium brings together people who are interested in Ohio's native plants and natural history to hear speakers on botanical topics. The upcoming Symposium has another slate of interesting speakers and topics.

This year's topics include Best Plant Finds of 2004, Milkweeds, Ferns, Emerald Ash Borer, and Chaparral Prairie and Crane Hollow state nature preserves. We hope you will join us on April 1!

New for 2005: This year the Symposium will feature displays and materials in a special area. Lunch will extend longer for people to view the displays, collect materials and interact with other participants. For more information contact Rick Gardner, 614-265-6419, or email: rick.gardner@dnr.state.oh.us

Tennessee Spring Wildflower Pilgrimage April 25th to May 1, 2005.

The 55th Annual Spring Wildflower Pilgrimage is an annual seven-day event in Great Smoky Mountains National Park consisting of a variety of wildflower, fauna, and natural history walks, motorcades, photographic tours, art classes and indoor seminars. Inquire at <http://www.springwildflowerpilgrimage.org/>

Kentucky Wildflower Weekend May 5th to 8th, 2005

The Natural Bridge area is home to hundreds of species of native plants. Our field trips are for all levels of participation, from beginners to advanced wildflower enthusiasts and from short easy walks in Natural Bridge to longer hikes in Red River Gorge. Our speakers will focus on the native plants of the region. Registration is \$5 for adults and \$2 per child. This is an annual event. For more information on Wildflower Weekend, please contact Zeb Weese at 1-606-663-2214 or jason.weese@ky.gov.

West Virginia Wildflower Pilgrimage

Blackwater Falls State Park, Davis WV
May 5 to 8, 2005

44th annual event. Each year approximately 300 people, professional and amateur botanists as well as bird watchers, attend from some 13 states.

To help identify particular plants, point out interesting flora and answer visitors' questions, specialists will be on hand from West Virginia University, West Virginia Division of Natural Resources, West Virginia Garden Club Inc, and various colleges.

A dozen different tours will depart Saturday and Sunday from Blackwater Lodge. Speakers, interesting programs, entertainment, and exhibits will be featured throughout the evenings.

Fees include \$15 for registration and various prices for lodging, depending on number of nights and accommodations (about \$25-\$35 per night). Saturday night banquet is \$17. Registration deadline is April 25, 2005.

Please call Emily Fleming or Vickie Hash at (304) 558-3370 or write to Environmental Resources, WV Division of Natural Resources, State Capitol Complex, Building 3, Room 732, Charleston WV 25305; or e-mail at enviroresources@wvdnr.gov

Virginia Spring Wildflower Symposium May 13 to 15, 2005

The 22nd Annual Spring Wildflower Symposium held May 13 -15, 2005 at Wintergreen Resort will help you answer your questions. We have something for everyone - from the gardening novice to the outdoor enthusiast!

Spend a day or the entire weekend with our renowned instructors in a beautiful setting, the Blue Ridge Mountains. Walk away from the Wildflower Symposium with a new understanding of your surroundings and a renewed enthusiasm for your outdoors.

Register early. This event is sure to fill up. For more information or to register, call 434-325-7451 or go online to www.twnf.org.

*Botany 101 eighteenth in a series***Phototropism, Geotropism, and Nasties – Plant Movement****by Dr. Rebecca Dolan**

When you ask folks the difference between plants and animals, most will mention that animals can move around but plants can't. Well, plants can't do a 50-yard dash, but they do manage to respond to their environment by moving parts that can be moved through cell growth and elongation. This movement is termed tropism. Movement in response to light is phototropism. Movement in response to gravity is geotropism. We'll get to nasties later.

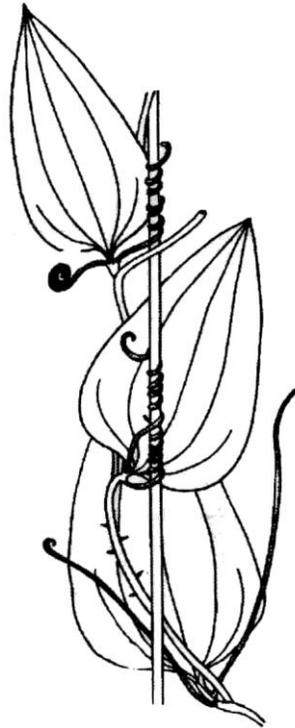
We all know, especially from observing our houseplants, that plants tend to grow towards sunlight. This is accomplished with the help of the plant hormone auxin (subject of a fascinating column earlier this year). When a plant's growing shoot is exposed to light coming from a particular direction, the shoot will show positive phototropism and bend or grow toward the light. This happens because auxin accumulates in the cells on the shaded side of the plant. Auxin then works its magic to trigger cell elongation. By having larger cells on the side away from the light, a flexible shoot will bend toward the light. This helps plants optimize the production of energy via photosynthesis.

Shoots also need to know which way is up, especially when a seedling is growing up through the soil. Auxin and gibberellin are involved. If the concentration of these hormones differs between the upper and lower sides of a horizontal stem, the imbalance causes the stem to elongate on the side needed to grow up. A vertical stem has a balance of hormones on both sides and keeps growing up.

Roots grow into the ground. How do they know which way is down? They may exhibit negative phototropism if exposed to light, and grow away from it.

What about when a root is entirely underground already. How does it know down from sideways? Some believe starch grains in the root cap (remember the root structure column?) play a role. The root cap is the place where root cells are dividing and growing. Starch grains are pulled down by gravity to the lowest

points of cells. As the cells get bigger on the opposite side, the root bends down toward gravity. The exact hormone mechanism is not known and several other theories for negative geotropism in roots have been proposed.



Smilax

How plants would respond in outer space, without the influence of gravity to help them know how to grow has been investigated during NASA experiments.

If future space explorers need to grow their own food, these questions will have practical applications.

Some plants have other parts that move and actually have a sense of touch! The coiling of vines and tendrils has interested biologists for a long time. Darwin did some famous studies of the phenomenon. Tendrils wrap around supports by elongating cells on the side away from the support, the side not "feeling" the support. Differential growth rates on the inside and outside of the tendril cause it to curl. As you have no doubt guessed, auxin is thought to be involved.

It's interesting to note that coiling can be species-specific, whether clockwise or counterclockwise. If you have coiling vines or plants with tendrils in your garden, please look to see if they consistently coil one way or the other and let me know at rdolan@butler.edu or 317940-9413.

Okay, so the term has fallen out of use since my introductory botany class in college, but these movements used to be called nasties. A **nastic** movement is "movement of a plant part caused by disproportionate growth or increase in turgor pressure in one surface," according to my Webster's New Collegiate Dictionary.

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

Illustrator Jan Glimm Lacy is a botanical illustrator. The illustration of Smilax is from her book Botany Illustrated.

Kitty Todd Nature Preserve

Gary Haase

The Nature Conservancy's Kitty Todd Nature Preserve protects one of the finest remnants of Northwest Ohio's Oak Openings Region, a region which harbors more rare plant species than any other area in Ohio. To date, 580 native plant species have been located on the preserve – 91 of which are state listed. Of the wildlife living at Kitty Todd, 20 are state listed, including Ohio's only population of the federally endangered Karner blue butterfly.

Originally named Schwamberger Prairie, the preserve is home to globally rare black oak savanna and wet prairie habitats. The first purchase of land was a 26 acre parcel in 1972 which harbored a remnant prairie and several rare orchid species. In 1980, it was renamed in honor of Kitty Todd, one of the region's earliest conservationists. Located in Lucas County, the 700 acre Kitty Todd Preserve is owned and managed by the Ohio Chapter of The Nature Conservancy.

Approximately 13,000 years ago a large area of Northwest Ohio was covered by a series of vast lakes. The water in these lakes was impounded by dams of glacial ice located to the north in Canada. For hundreds of years these glaciers oscillated back and forth causing the lakes and their associated beaches to rise and fall. Ultimately the glacial ice retreated northward and the lake levels fell to the elevation of present day Lake Erie. Today, these predecessors to Lake Erie are gone but their beaches and sand bars remain an influence on the landscape. Four ancient beach ridges were deposited within the Oak Openings Region, running through Lucas, Henry and Fulton counties. Small windblown dunes which formed on the ridges are the most obvious features of this region. These dunes occur sporadically throughout the Oak Openings Region and excellent examples can be seen at the Kitty Todd Preserve. Beneath the beach ridges is a layer of clay-rich till. Unlike the well drained sand, the clay inhibits water drainage. As a result, standing water is common in the swales between the dunes and ridges, where the sand is thinnest and the clay is near the surface. In the Oak Openings Region, these conditions created habitats that support five globally rare plant communities.

Before European settlement, the Oak Openings region was a landscape of scattered oaks and open prairies, vastly different from much of Ohio's dense forest cover. The combination of a high water table, sandy soil and periodic wildfires kept the area open. These three factors promoted a balance between the

growth of trees and shrubs and the grasses and wildflowers.

After European settlement, fires were suppressed and much of the land was drained. The result was a dramatic increase in the growth of trees and shrubs. Heavily shaded woods and thickets replaced many of the sunny, open oak savannas and wet prairies.

To reverse the process at Kitty Todd, The Nature Conservancy is working to recover the natural landscape by mowing woody vegetation, thinning trees, restoring drainage patterns, conducting prescribed burns and removing non-native invasive species. This on-going process has restored much of the preserve's original vegetation, evident by the abundance of unusual plants and animals found at the preserve.

The Kitty Todd Preserve protects all five of the globally rare natural plant communities found in the region, all of which contain their own unique flora and fauna. The Black Oak/Lupine Barrens Community is composed of widely spaced black oaks (*Quercus velutina*) and white oaks (*Quercus alba*) which grow on top of ancient wind-blown sand dunes. Under this light canopy of oaks grows a mixture of sun-loving, drought resistant prairie plants and grasses including wild lupine (*Lupinus perennis*), plains puccoon (*Lithospermum caroliniense*), hoary puccoon (*Lithospermum canescens*), little bluestem (*Schizachyrium scoparium*), June grass (*Koeleria macrantha*), rough blazing star (*Liatris aspera*), New Jersey tea (*Ceanothus americanus*), western sunflower (*Helianthus occidentalis*), porcupine grass (*Stipa spartea*), butterfly milkweed (*Asclepias tuberosa*), prairie fern-leaf false foxglove (*Aureolaria pedicularia* var. *ambigens*), smooth false foxglove (*Aureolaria flava*), prairie thimbleweed (*Anemone cylindrica*), upright bindweed (*Convolvulus spithameus*), the globally rare Missouri rockcress (*Arabis missouriensis* var. *deamii*), woodland sunflower (*Helianthus divaricatus*), sky blue aster (*Aster oolentangiensis*), smooth aster (*Aster laevis*), cow wheat (*Melampyrum lineare*), goat's rue (*Tephrosia virginiana*), running serviceberry (*Amalanchier stolonifera*), early low bush blueberry (*Vaccinium pallidum*), late low bush blueberry (*Vaccinium angustifolium*) and bracken fern (*Pteridium aquilinum*). Three endangered butterflies found in this community include the Karner blue, frosted elfin and Persius' duskywing butterflies, all of whose larvae feed exclusively on wild lupine. Unusual

birds typical of this habitat include the red-headed woodpecker, eastern towhee and orchard oriole.

The Midwest Sand Barrens Community is located in extremely dry sites and can contain areas of bare sand. Dominant plants include: little bluestem, purple triple-awn grass (*Aristida purpurescens*), eastern prickly pear (*Opuntia humifusa*) sand milkweed (*Asclepias amplexicaulis*), Muhlenberg's sedge (*Carex muhlenbergii*), low sand sedge (*Carex rugosperma*), in-line sedge (*Carex siccata*), Greene's rush (*Juncus greenii*), prairie wedge grass (*Sphenopholis obtusata*), Canada frostweed (*Helianthemum canadense*), Bicknell's frostweed (*Helianthemum bicknellii*), Maryland tick-trefoil (*Desmodium marilandicum*), blue toadflax (*Linaria canadense*), lyre-leaved rockcress (*Arabis lyrata*), western sunflower (*Helianthus occidentalis*), round-headed bush clover (*Lespedeza capitata*), sessile-leaved tick trefoil (*Desmodium sessilifolium*), dwarf dandelion (*Krigia virginica*), rough pennyroyal (*Hedeoma hispidum*), hairy pinweed (*Lechea villosa*), dotted horsemint (*Monarda punctata*), Cleland's evening primrose (*Oenothera clelandii*), mountain phlox (*Phlox latifolia*), racemed milkwort (*Polygala polygama*), sand cherry (*Prunus pumila* var. *cuneata*), pasture rose (*Rosa carolina*) and sweet-fern (*Comptonia peregrina*). The grasshopper sparrow and state endangered lark sparrow nest in this habitat.

Mesic to wet sites within the savanna contain the Mesic Sand Tallgrass Prairie Community. This habitat contains few trees and dominant plant species in this community vary with the elevation. Mesic sites support tallgrass prairie plants including big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), prairie brome (*Bromus kalmii*), slender wheat grass (*Elymus trachycaulis*) the globally rare Skinner's foxglove (*Agalinis skinneriana*), tall coreopsis (*Coreopsis tripteris*), yellow wild indigo (*Baptisia tinctoria*), tall green milkweed (*Asclepias hirtella*), purple milkweed (*Asclepias purpurescens*), fireweed (*Epilobium angustifolium*), colic-root (*Aletris farinosa*), wood lily (*Lilium philadelphicum*), grass pink orchid (*Calopogon tuberosa*), orange-fringed orchid (*Platanthera ciliaris*), soapwort gentian (*Gentiana saponaria*), Gattinger's foxglove (*Agalinis gattingeri*), purple gerardia (*Agalinis purpureus*), showy goldenrod (*Solidago speciosa*), large yellow lady's slipper (*Cypripedium calceolus* var. *pubescens*), showy tick trefoil (*Desmodium canadense*), Canada hawkweed (*Hieracium canadense*), Leggett's pinweed (*Lechea pulchella*), whorled loosestrife (*Lysimachia quadrifolia*), wood betony (*Pedicularis canadensis*), prairie rattlesnake root (*Prenanthes recemosa*), prairie

willow (*Salix humilis*), meadowsweet (*Spiraea alba* var. *alba*) and steplebush (*Spiraea tomentosa*).

Wetter sites within the tallgrass prairie which hold water for several months in late winter and spring support spatulate-leaved sundew (*Drosera intermedia*), cross-leaved milkwort (*Polygala cruciata*), field milkwort (*Polygala sanguinea*), dwarf bulrush (*Lipocarpa micrantha*), few-flowered nut-rush (*Scleria pauciflora*), the globally rare northern club-moss (*Lycopodiella subappressum*), giant sunflower (*Helianthus giganteus*), Culver's root (*Veronicastrum virginicum*), Atlantic blue-eyed grass (*Sisyrinchium atlanticum*), lance-leaved violet (*Viola lanceolata*), twisted yellow-eyed grass (*Xyris torta*) and sensitive fern (*Onoclea sensibilis*). Animals found in this habitat include the state threatened silver bordered fritillary butterfly, the woodcock, the sedge wren and the willow flycatcher.

The Twig-rush Wet Prairie Community is located in the areas of lowest elevation and can have standing water for much of the year. This community has few trees and contains alkaline soil conditions which allow for the growth of many plants that are not found in the acidic savanna areas, including many species more typical of fens. Slender sedge (*Carex lasiocarpa*) and twig-rush (*Cladium mariscoides*) are dominant species in the wet prairie along with blue-joint grass (*Calamagrostis canadensis*) and northern reed grass (*Calamagrostis stricta*). Other plants found here include tussock sedge (*Carex stricta*), Sartwell's sedge (*Carex sartwellii*), little yellow sedge (*Carex cryptolepis*), brown bog sedge (*Carex buxbaumii*), dense blazing star (*Liatris spicata*), swamp milkweed (*Asclepias incarnata*), prairie milkweed (*Asclepias sullivantii*), tubercled rein orchid (*Platanthera flava*), fen orchid (*Liparis loeselii*), Great Lakes goldenrod (*Euthamea remota*), Riddell's goldenrod (*Solidago riddellii*), Michigan lily (*Lilium michiganense*), large fringed gentian (*Gentianopsis crinita*), bottle gentian (*Gentiana andrewsii*), swamp thistle (*Cirsium muticum*), Kalm's St. Johnswort (*Hypericum kalmianum*), spiked lobelia (*Lobelia spicata*), winged loosestrife (*Lythrum alatum*), cowbane (*Oxypolis rigidior*), swamp lousewort (*Pedicularis lanceolata*), Virginia mountain mint (*Pycnanthemum virginianum*), purple meadow rue (*Thalictrum dasycarpum*), Missouri ironweed (*Vernonia missourica*), alder-leaved buckthorn (*Rhamnus alnifolia*), Bebb's willow (*Salix bebbiana*), slender willow (*Salix petiolaris*) and marsh fern (*Thelypteris palustris*). Animals found here include the state threatened spotted turtle, the state endangered blue-spotted salamander and the rare snipe.

The Great Lakes Pin Oak-Swamp White Oak Flatwoods Community is dominated by pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), black gum (*Nyssa sylvatica*) and red maple (*Acer rubrum*) and has standing water for much of the year. Plants found growing here include lake sedge (*Carex lacustris*), wheat sedge (*Carex atheroides*), blue joint, small purple fringed orchid (*Platanthera psycodes*), whorled pogonia (*Isotria verticillata*), button bush (*Cephalanthus occidentalis*), bishop's cap (*Mitella diphylla*), cardinal flower (*Lobelia cardinalis*), green dragon (*Arisaema dracontium*), rough-leaf goldenrod (*Solidago patula*), red baneberry (*Actea rubra*), turtlehead (*Chelone glabra*), lopseed (*Phryma leptostachya*), swamp saxifrage (*Saxifraga*

pensylvanica), common woodreed (*Cinna arundinacea*), cinnamon fern (*Osmunda cinnamomea*) and royal fern (*Osmunda regalis*). The rare four-toed salamander is located in this community.

The Kitty Todd Nature Preserve is open weekdays May through October from 9 a.m. to 5 p.m. as well as the first full weekend of the month. Visitors may hike the .5 mile savanna trail, the .4 mile cactus loop trail or stroll through the Oak Openings Natives Demonstration Garden. To learn more, contact the preserve office at 419-867-1521 or visit www.nature.org/ohio and www.oakopen.org.

Gary Haase is the manager of the Kitty Todd Nature Preserve.

Book Reviews

Reviewed by Lorraine Johnson

Wily Violets and Underground Orchids. Revelations of a Botanist by Peter Bernhardt

(Chicago: University of Chicago Press, 2003. 256 pages, soft cover, \$17, ISBN 0-226-04366-5)

Orchids are lucky plants – they seem to attract great writers who engage in passionate missions to share arcane lore and outright bizarre botanical facts, all in an effort to get the reader enthused about the natural world. Drawing on decades of experience in places as diverse as El Salvador, Australia and the U.S., Peter Bernhardt has written a collection of essays united by wonder – the wonder of evolutionary adaptation, the wonder of pollination and interaction, quite simply, the wonder of life in the plant world. Orchids are represented in five chapters, but Bernhardt also explores Amazonian giant water lilies, the common violet, prairie grasses, mistletoe and – in a delightful chapter called "Pollinating Possums" – climbing rodents.

Ferns for American Gardens by John T. Mickel

(Portland: Timber Press, 2003. 370 pages, soft cover, \$24.95, ISBN 0-88192-598-5)

I confess to fern fanaticism. It's as close to snobbery as I get in the garden: while others are drawn to bold flowers, I swoon for spores, a more specialized obsession. Ferns are, quite simply,

fascinating at all stages in their lives-- from their first perky unfurling through to their winter drooping (or, for the evergreen ferns, their tidy green poking through snow).

Ferns for American Gardens was unavailable for many years, but it's now back in print in an updated edition that will delight fellow fern fanatics. (While the bulk of the book contains the original edition's text, the resource material has been updated.) Liberally illustrated with striking colour photos and line drawings, this book will banish the novice's fear of ferns; indeed, Mickel's approach to fern cultivation is based on the principle of benign neglect, perfect, as he says, for a procrastinator's schedule.

If Mickel makes fern propagation sound almost too easy (why, he makes me wonder, have I killed so many maidenheads?), he provides plenty of examples of ferns that are more difficult to grow – and more difficult to find in the nursery trade. (A nice touch, he includes a commercial availability rating for each species.)

The book includes 530 kinds of ferns in 50 genera, with an emphasis on natives. Along with cultivation and propagation information, Mickel also provides excellent design ideas, suggestions for plant combinations, and – unusual for fern books – excellent information on the natural hybridization that occurs among ferns. Highly recommended.

Reprinted from *Newsletter of the North American Native Plant Society*, Winter 2004

Marsh Marigold: An American Cowslip

Gordon Mitchell

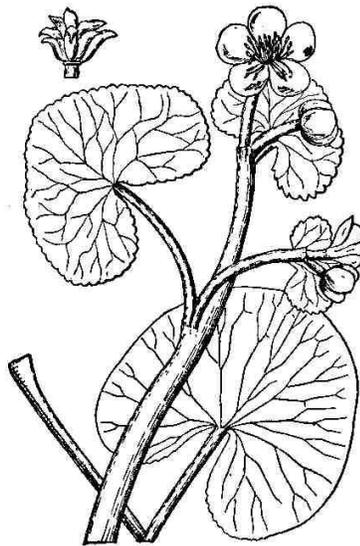
After enduring a long and dreary winter, most people would look forward to seeing the first signs of spring. They especially like to look for the early spring wildflowers that have bright colors. One early spring wildflower that definitely has bright colors is the Marsh Marigold (*Caltha palustris* L.).

The Marsh Marigold is a member of the Buttercup or Crowfoot Family (*Ranunculaceae*) and of the *Helleboroideae* Subfamily. The generic name, *Caltha*, is Latin for *calathos*, which is Greek for “chalice”, “cup”, or “goblet”, because the flower resembles a cup. *Caltha* may have also been named from a character in Germanic folklore. (Caltha was a young maiden who loved the sun god. She lived in the open field so that she can be near him. When Caltha finally died, a Marsh Marigold appeared in that field.) The specific epithet, *palustris*, comes from *paluster*, which is Latin for “marsh” or “swamp”. Previous scientific names for this plant were *Caltha arctica* R. Brown, *Caltha asarifolia* de Candolle, *Caltha flabellifolia* Pursh, *Caltha minor* Millspaugh, and *Caltha radicans* J. R. Forster.

Because the Marsh Marigold is native to a very large portion of the Northern Hemisphere, it may go under several different common names. At different times and places, other names for this plant have been Ahklingquank, American Cowslip, Boots, Bouts, Bublican, Bullflower, Bulls Eyes, Capers, Chrits’s Eyes, Coltsfoot, Coltsroot, Cowbloom, Cowflock, Cow Lily, Cow’s Lips, Cowslip, Cowslop, Crazies, Crazy Bet, Crowfoot, Drunkards, English Marigold, *Fearaban*, Gallands, Gools, Great Bitterflower, Ground Ivy, Horse Blobs, House Blobs, King Cup, Leopard’s Foot, Mare Blebs, Mare Blobs, Marsh Buttercup, Marsh Golden Flower, Marsh Horsegowl, May Blobs, Mary Buds, Meadow Boots, Meadow Bouts, Meadowbright, Meadow Buttercups, Meadow Gowan, *Meargealla*, Molly Blobs, Palsywort, Populage of the Marshes, Soldier’s Buttons, *Solsequia*, *Solsequium*, *Sponsa solis*, Spring Cowslip, *Verrucaria*, Water Blobs, Water Bouts,

Water Bowls, Water Buttercup, Water Caltrop, Water Crowfoot, Water Dragon, Water Fennel, Water Goggles, Water Gowan, Water Starwort, Wild Bachelor’s Buttons, and Yellow Marsh Marigold. Marigold either originated with “Mary’s Gold”, named for the Virgin Mary, or because the prefix came from *Mere* or *Mersc*, which is Anglo-Saxon for “marsh”, which then becomes “Marsh Gold”.

Ahklingquank is a Native American name for the plant. Blob, which may also be blab, bleb, or bleh, is a local dialect for “blister” or “bubble”, either because the buds resemble swellings or because the sap from the roots can cause skin blistering. Cowslip is from *cuslyppe* (*cu* is “cow” and *slyppe* is “slop”), which is Anglo-Saxon for “cow slop” or “cow dung”. Cowslip may have also originated from its wet habitat, where cows may have stepped upon this plant and slipped and fallen. Crazies and Crazy Bets probably originated from children believing that staring at the plant made one crazy. Drunkard comes from the fact that this plant consumes much water and from the old English belief that this plant’s scent would encourage drunkenness. *Fearaban* is Scottish Gaelic for “coward” or cowardice”, probably originating from “cow”. Gowan (also Gowlan, Galland, or Golland) are local Old Norse dialects for “gold” or “golden flowers”. *Meargealla* is Anglo-



Marsh Marigold *Caltha palustris*

Saxon for “horse blister” (*mearh* is “horse” and *gealla* is “gall” or “blister”). Populage is a common French name for this plant. *Solsequia*, *Solsequium*, and *Sponsa solis* are all Latin for “sun follower”, because the flower opens in the morning and closes at night. *Verrucaria* is Latin for “a cure for warts”.

The Marsh Marigold is mentioned in some works of English literature. William Shakespeare’s 1597 comical play, *Cymbeline*, makes reference to this plant. In Act 2, Scene 3, Line 22, Shakespeare wrote:

“And winkin Mary-buds begin
To ope their golden eyes;
With everything that pretty is,
My lady sweet arise!”

In poet Alfred Lord Tennyson's 1832 poem, *The May Queen*, he made reference to this plant in the 8th stanza. In this poem, Tennyson wrote:

*"And the wild marsh marigold shines like
fire in swamps and hollows gray,
And I'm to be Queen o' the May, mother, I'm
to be Queen o' the May."*

In poet Jean Ingelow's 1863 poem, *Songs of Seven*, she made this reference in the 5th stanza of *Seven Times One: Exaltation*:

*"O velvet bee, you're a dusty fellow,
You've powdered your legs with gold!
O brave marsh marybuds, rich and yellow,
Give me your money to hold!"*

The English had also used the Marsh Marigold during their May Day (May 1) celebrations. On the day before (April 30), the English peasants gathered these flowers and then placed them on their doorsteps or wove them into garlands. This was done to protect them from witches.

Shortly after their arrival in America, the Europeans began studying the Marsh Marigold. The first recording of the Marsh Marigold in America was probably done in 1784 by a New England botanist, Manasseh Cutler. Cutler is best remembered in Ohio as one of the founders of Marietta and of the Ohio University. The Marsh Marigold was also observed and studied by the Philadelphia botanist, Constantine Samuel Rafinesque. Rafinesque mentioned this plant in his 1828-1830 book, *Medical Flora of the United States*. Cincinnati pharmacists John Uri Lloyd and Curtis Gates Lloyd also mentioned the Marsh Marigold in their 1884-1887 book, *Drugs and Medicines of North America*.

Some references list the Marsh Marigold as a toxic plant. Other references list it as both an edible and a medicinal plant. Actually, this plant is all three.

The Marsh Marigold contains the glycoside ranunculin. If the plant is damaged, this toxin can be broken down by enzymatic process and will become aglycone protoanemonin. Protoanemonin is both a volatile and irritating yellow oil. This plant also contains other toxins, such as flavone, helleborin (a glucoside), jervine (an alkaloid), and saponin. If consumed in large quantities, these toxins may cause irritation of the mucous membranes, burning of the throat, irritation of the digestive tract, convulsions, dizziness, fainting, hypotension, and seizures. If the

plant contacts the eyes or skin, these toxins may cause external irritations, burnings, and even blisters. Even sniffing the injured plant may cause sneezing.

Livestock and many species of wildlife, such as the White-tailed Deer (*Odocoileus virginianus*), usually avoid the Marsh Marigold because of its acrid taste. Consumption of this plant by dairy cows may give their milk an unpleasant taste. Excessive consumption of this plant can be fatal to an animal.

Despite this plant's toxicity, there are parts of it that are used for medicinal purposes. A tea made from different parts of the plant was used as an anti-spasmodic, diaphoretic, a diuretic, an emetic, an expectorant, a purgative, a rubefacient, and a sedative. Sometimes, parts of the plant were used as a poultice for treating other ailments. The plant was also used for treating anemia, heart ailments, swollen neck glands, tumors, and warts. In ancient Scottish Celtic folklore, this plant was good medicine for bones and joints.

Aside from medicinal uses, there are parts of the Marsh Marigold that are edible if they are properly prepared. Drying the plant may convert the harmful protoanemonin into harmless anemonin. In the spring the young greens are edible as a potherb if they are boiled for 3-60 minutes (depending upon which reference is used) in 2-3 changes of water. These greens are rich in both vitamins A and C and in iron. The immature flower buds may be used as caper substitutes if boiled for at least 10 minutes in 2-3 changes of water and then pickled in pickle juice, salt water, or vinegar. The boiling of this plant should remove the toxins. The younger plants are more likely used because they are less toxic than the older plants. This plant should never be eaten raw.

Because of the flower's deep yellow color, some early European settlers boiled the sepals, along with a little alum, to make a yellow dye for their yarn. However, the yellow color was prone to fading and did not last.

Description Of the Marsh Marigold **Perennial**

Height: 6-30 inches.

Stem: Hollow. Stout or thick. Succulent. Erect or reclining. Quadrilateral (furrowed or ridged). Branching near the top.

Leaves: Simple. Its color is deep green on the top and lighter below. Glossy. Leaf margins are shallowly crenate or dentate. Rounded, cordate (heart-shape), or reniform (kidney-shape). The leaf veins may be angled. Basal leaves are long-petioled and are about

2-7 inches wide. The stem leaves are alternate and are either sessile or are nearly sessile.

After the flowers and seeds are gone, the leaves usually enlarge. This enlargement facilitates more photosynthesis, which enables the plant to manufacture more carbohydrates for its use during its long dormant season.

Flowers: Bright waxy yellow. Flowers may be green when young. There may be 2 flowers per flower bract. The flowers are usually located at the top of the stem or in the upper leaf axils. Each flower is about 1-2 inches wide and is radially symmetrical. When young, the flower may appear cup-shaped. Each flower also has no petals, has about 4-10 sepals with greenish veins (especially on the underside), has about 4-15 pistils with short styles, and has about 10-40 yellow anthered stamens that open outwardly (with the outermost anthers opening first). The pistils and the stamens are shaped in that way to favor cross-pollination over self-pollination. Some of these flowers may be entirely staminate (male) flowers. These flowers close at night and on some cloudy days. Flowering season is usually March to June.

Over 40 species of insects may pollinate this flower. These pollinating insects, which can see ultraviolet wavelengths, may see the bright yellow only in the center of the flower. The rest of the flower appears purple to them. These unique colors are present to guide them to the flower's nectar. If the

waxy yellow color is removed from the sepal, that sepal will then appear translucent.

The flower's sepal also has two scent marks located at its base. This scent also attracts the pollinating insects. However, humans are unable to detect this scent.

Fruit: Whorled. Spreading. Arranged in heads of 6-12. Each fruit is a shiny green, dry, papery pod or capsule (follicle). Each follicle is elongated, about 1/2 inch long, and has a prominent beak. The follicle opens at its tip to release its numerous tiny, red, purple, brown, or black seeds. These seeds are usually arranged in 2 rows within the follicle.

Seeds: These seeds are spongy on one side and are irregularly ribbed and pitted on the other side. This oddity is to facilitate water dispersal of the seed. These seeds are also elliptic, oblong, or ovoid.

Roots: Short. Stout. Coarse. Fibrous. Clumped. Spongy.

Habitat: Marshes, swamps, bogs, fens, and streams. Usually found in clumps. This plant favors sunlight over deep shade. During the plant's dormant season it can survive long dry spells.

Range: North Central and Northeastern United States, Canada, and northern Eurasia. The Marsh Marigold does better in the northern areas.

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

Pest Plants on the Web

Federal Noxious Weeds. You can download a list of pest plants, classified by the United States Department of Agriculture (U.S.D.A.) as noxious weeds. Many of these species do not occur in the United States but are known to cause problems elsewhere. To prevent their invasion, they cannot be cultivated or imported to the United States without a special federal permit. The U.S.D.A. created the list to safeguard agricultural ecosystems, but some noxious weeds also disrupt native ecosystems.

<http://www.aphis.usda.gov/ppq/permits/fnwsbycat-e.html>

State Noxious Weeds. At the U.S.D.A. web page noted above, you can link to state-designated noxious weed lists. Noxious weeds on a state list cannot be cultivated in or brought into that state without state permits.

State Prohibited Aquatic Plants. Additional listings exist for states that face pest-plant problems in lakes, rivers, and marshes. Florida, with its mild climate and abundant waterways, is particularly vulnerable to invasive aquatic plants and prohibits many species.

Other Lists. Regional lists vary, because an invasive exotic plant in one state may be mild-mannered elsewhere. The

Australian umbrella tree (*Schefflera actinophylla*) is a houseplant in most of the country, but an invader in the rare scrub habitat of central and south Florida, where it thrives outdoors.

The following sampling of web sites provides pest-plant lists – some with regional and some with national focus. Look online for additional information.

Southeast Exotic Pest Plant Council.

<http://www.se-eppc.org/>

Invasive Plants of the Northeast.

<http://arboretum.conncoll.edu/salt/invasives.html>

Noxious Weeds of the Northwest and Canada.

<http://invader.dbs.umt.edu/>

The Nature Conservancy: Weeds.

<http://tncweeds.ucdavis.edu>

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Indiana Ferns and Their Haunts: Part III

Ferns of Rock Habitats

by Michael Homoya

While most of our fern species occur in forest and wetland habitats, a very distinguished group of species is devoted to growing on rock. Growing on rock is so obligatory for some that you could almost eliminate them from consideration when attempting the identification of an unknown fern from a non-rock habitat. Why the need for rock? Perhaps growing in the crevices of rock provides a competitive edge over species that can't grow there. Or rock substrates might contain the perfect nutrient mix preferred by certain species, or offer the precise drainage required by the roots. Whatever the case, a rock substrate is a great environment for some ferns.

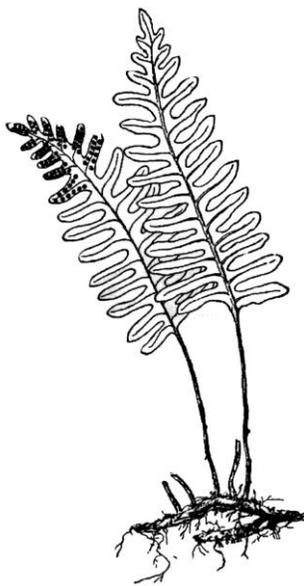
There are two general categories of rock in Indiana: limestone and sandstone. There are variations of these, as well other types (e.g., siltstone), but for our purposes we'll concentrate on the two major ones. It is often important to make the distinction, because each provides a different chemistry, and thus, different fern species. Sandstone typically offers an acidic, nutrient-poor substrate, whereas limestone is basic, and often nutrient-rich (at least when compared to sandstone).

Sandstone outcrops are found mostly in the south-central and west central parts of the state. Public properties with good examples of sandstone include the western and southern parts of the Hoosier National

Forest, Martin State Forest, Yellow Birch Ravine Nature Preserve, Turkey Run State Park, Shades State Park, and Portland Arch Nature Preserve.

Limestone is most common in south-central and southeastern Indiana. Clifty Falls State Park, Charlestown State Park, Harrison-Crawford State Forest, and McCormick's Creek State Park are good locations for limestone.

Although it might appear counterintuitive, more species of ferns are likely to occur on sandstone than limestone. A typical collection of ferns on sandstone might include marginal shield fern (*Dryopteris marginalis*), fancy wood fern (*D. intermedia*), common polypody (*Polypodium virginianum*), and one or more members of the genus *Asplenium*, with pinnatifid spleenwort (*Asplenium pinnatifidum*) being the most commonly encountered. Some rarities that might be encountered are rock clubmoss (*Huperzia porophila*), mountain spleenwort (*Asplenium montanum*), and hay-scented fern (*Dennstaedtia punctilobula*). Ferns that are generally thought of as wetland ferns are occasionally found on cliffs, including cinnamon fern (*Osmunda cinnamomoea*), royal fern (*O. regales*), and netted chain fern (*Woodwardia areolata*).



Common polypody



Marginal shield fern



Royal fern

Perhaps the most unusual of the sandstone ferns is filmy fern (*Trichomanes boschianum*). This rare fern occurs at just a handful of sites in far southern Indiana. It lives a secluded life in the dark recesses of sandstone overhangs, where climate and light are modified to provide protection for this delicate fern, whose fronds are only one cell-layer thick.

On the driest end of the moisture continuum, resurrection fern (*Pleopeltis polypodioides*) can survive considerable periods of drought on rock outcrops. The fronds curl, conserving moisture until the next reviving rain. A fern ally that operates similarly is the ledge spikemoss (*Selaginella rupestris*). This plant grows in full sun on exposed surfaces of sandstone (as well as on loose sand) to take the full brunt of late summer heat and drought. Like the resurrection fern, it also curls its leaves to conserve moisture.

Ferns on limestone cliffs may include some of the above, e.g., resurrection fern and marginal shield fern, but generally there are those (usually) specific to or preferring limestone. Again, there aren't as many as would be found on sandstone. Prime examples on limestone include wall rue spleenwort (*Asplenium*

ruta-muraria), cliffbrake (*Pellaea glabella* and *P. atropurpurea*), and bulblet fern (*Cystopteris bulbifera*). Walking fern (*Asplenium rhizophyllum*), although also occurring on sandstone, is more often found on moist limestone outcrops. It is an interesting fern, in that a new plant develops where the tip of the undissected frond comes in contact with the substrate. Perhaps one of the most unusual looking Indiana ferns is the limestone adder's tongue fern (*Ophioglossum engelmannii*). It possesses a simple blade that emerges from the dry, rocky barrens found locally in southern Indiana. It is ephemeral, disappearing as the summer's heat and drought increase.

That finishes the tour of Bedrock and Indiana's Flintstone family of ferns. In the next and final installment of the series, we will look at ferns of Indiana wetlands.

Mike Homoya is author of Orchids of Indiana, published by the Indiana Academy of Science in 1993, and is a botanist with the Indiana Department of Natural Resources, Division of Nature Preserves.

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Germinating Seeds

by Jane Murphy

I think we needlessly complicate the process of germinating wildflower seeds. Look to nature. Squirrels bury acorns (and forget what they have done with them) and the seeds sprout with the spring rains. Winged seeds such as those of *Asclepias* (milkweeds) float on the wind only to fall to the ground and germinate in the spring after the cold winter has passed. Small seeds fall at the feet of the mother plant and gain their foothold in the disturbed earth. Fruits are eaten by birds and, after passing through the digestive system, the seeds are deposited far and wide, complete with fertilizer.

The success rate of the natural process is probably nearly as good as that of the most careful plantsman. I have read more than a few books on germination and have come to these conclusions: if seed ripens in late spring/early summer, it needs a warm period followed by cold and will germinate in the next warm season; if it ripens in the fall, it needs a cold period followed by warm to have success. Amazing! That's what happens

naturally. We humans seem to think we have to make a big production out of it.

That is not to say that we cannot use our knowledge to improve our success rate. If seed is normally spread by birds, it may benefit from a detergent wash to remove surface inhibitors. Hard-coated seeds can be encouraged to sprout by sandpapering their exterior and soaking in warm water for 24 hours. Those with fleshy coats should be soaked in water overnight, have the pulp cleaned off and be washed again, then dried and planted as soon as possible.

Some seeds have very particular requirements for germination and growth. *Panax quinquefolius* (ginseng), for instance, has a fleshy coat that is removed either by passing through the digestive tract of a bird or mammal or rotting over the winter. It needs humus-rich soil, which contains beneficial fungi, and a site in shade or dappled shade. Hepatica seed, if sown fresh-collected, will produce a single

leaf in the first or second spring and a recognizable colony in the third year. *Caulophyllum thalictroides* (blue cohosh) is challenging to grow. The seed covers must be removed by soaking or abrading. I sow them outside in a "Do Not Dig" zone, since they may take two or three years to send up the first leaves. Some gardeners have had good results with this plant by whirring the seed in a blender to abrade the coat, followed by soaking overnight.

Seeds can be planted indoors or out, as long as they are given their appropriate warm and cold periods. I use moistened soil-less mix in pots or flats, and cover them with plastic bags – not freezer bags – for indoor planting. For outdoor planting I substitute row-cover for the plastic. For early-ripeners: give them warm for 90 days, cold for 120 days, then warm for germination. For fall-ripeners, give cold for 120 days and then warm until they germinate. Put them in the crisper drawer in the refrigerator, or you can do as I usually do: put the flats outside in a sheltered spot and leave them until you see growth.

Naturally, there are exceptions to the rule, and the New England Wildflower Society's *Guide to Growing and Propagating Wildflowers* by William Cullina is an excellent resource book. It not only provides propagation information but also ripening times for all seeds listed (important information to know). If you are one or two climate zones north of New England, add a week or two to the times given. Above all, give the seeds plenty of time to germinate; some will surprise you by showing growth long after the expected time-frame has elapsed.

Sharing seeds – by participating in the NANPS Seed Exchange or giving seeds to a friend – is great fun. It's rewarding to know that someone else will enjoy the beauty of wildflowers. When sharing, it's important to be able to correctly identify the plants whose seeds you collect, and *Newcomb's Wildflower Guide* is a good reference. Some seeds must be fresh-sown, such as trilliums, *Sanguinaria canadensis* (bloodroot), hepaticas, *Hydrastis canadensis* (goldenseal) and *Panax quinquefolius*. Process these quickly and urge the lucky recipient to plant them immediately. Most other seeds can be cleaned and stored in paper packets in a clean glass jar in the refrigerator or other cool place for planting at a convenient time. When packaging the seed, mark the plant name on the packet at once or you may have a great many "mystery plants" on your hands. The botanical name, common

name, year and place of collection, and germination information should be provided. It's helpful to indicate whether the plant needs sun or shade and its mature height. This may seem very basic to the experienced gardener but novices will appreciate the information. Don't be quick to discard "old" seeds. Some can survive very nicely for many years under less-than-ideal conditions. Growing wildflowers should be an enjoyable experience. Let's not tie ourselves down to rigid rules and practices so that we no longer have time to smell the (native) roses.

Jane Murphy was a nurse for 40 years but has since traded people for plants. ('Plants are quieter!') She started growing natives in her Kingston, Ontario, garden 20 years ago when she realized that some species were threatened and disappearing at an alarming rate all over the world She believes that home gardeners have a role to play in ensuring that the next generation gets to see hepaticas and other native beauties.

Reprinted from *The Blazing Star*, the Newsletter of the North American Native Plant Society, Winter 2004



(from page 8)

Answers To Woodland Wildflower Identification Quiz

1. Hepatica or *H. auctiloba* or *H. americana*
2. Trillium (various)
3. Bloodroot or *Sanguinaria canadensis*
4. Pepper & Salt or Harbinger of Spring or *Ergenia bulbosa*
5. Wild Ginger or *Asarum canadensis*
6. Wild Ramp or Wild Leek or *Allium tricoccum*
7. Wild Violets (various)
8. Jack-in-the-Pulpit or *Arisaema triphyllum*
9. Twinleaf or *Jeffersonia diphylla*

The New Suburbanites:

How America's Plants And Animals Are Threatened By Sprawl

by Kathrin Day Lassila

It was in the early 1980s, as Michael Klemens tells it now, that he started to realize that something was playing merry hell with his data.

Klemens, today an internationally known herpetologist with the Bronx, New York-based Wildlife Conservation Society, was collating and analyzing several years' worth of research on New England reptiles and amphibians. Since 1975, he had been wading streams and bushwhacking forests in search of turtles, salamanders, snakes and frogs, in order to create a definitive study of their regional biogeography – where they lived and why. But when he tried to assemble the findings into a meaningful whole, he says, "I began to see a whole other dimension. It wasn't a two-dimensional problem: where are they and what's their history. There was a third dimension. There was all this noise coming in."

It took Klemens a few years before he felt certain of the source of the "noise" disrupting his data. Along the way were several eureka moments. One of these took place in the back rooms of the American Museum of Natural History, where samples of animals collected over decades are kept preserved for zoological research. Klemens had spent many days mapping the fauna of a stream network in southern New York State, in which a two-line salamander filled all available ecological niches for salamanders. The streams appeared healthy, the salamanders were thriving, and that should have been that. But then Klemens examined some dusty old jars that had been stored in the museum since the 1920s, when a predecessor of his had collected salamanders from the very same area. For stream after stream, the story was the same: there was one long-dead salamander floating in alcohol labeled "two line" and another long-dead salamander labeled "dusky."

Where had all the dusky salamanders gone? Gradually, Klemens sorted out the answer. The two-lined salamander lives happily in a variety of freshwater streams and rivers: the dusky needs springs and slow-flowing streams where organic debris can settle and collect. Everywhere the dusky used to live, suburban developments had moved in, clearing the uplands, and putting down acres of asphalt. Instead of seeping into the ground, rainwater now sluiced directly off the asphalt and into the streams, where it speeded up water flows, caused floods, and scoured out stream beds. All of this was just fine with the two-line salamanders, especially when their salamander competition started to disappear – permanently, as it turned out.

This and other revelations spurred Klemens to devote the rest of his career to the impacts of environmentally damaging development on wildlife. As he notes, "We didn't call it 'sprawl' back then."

Call it sprawl, call it poor land-use planning, call it the flight from inner cities and small towns into the spread-out developments that are mushrooming ever outward over forests and plains and farmland: America's footprint on our land has ballooned. It's not merely population growth, though our national surge from 150 million in 1950 to 250 million in 1990 is a major factor. It is also, inarguably, our lousy planning skills.

When it comes to looking at a chunk of territory and choosing judiciously where to build and where to renovate, where to encourage downtown reinvestment, and where to preserve farms and the natural landscape, Americans are ham-handed incompetents. We prefer just to throw up new buildings, new malls, and new roads haphazardly, and the bigger and farther apart, the better. The real estate industry itself says, in its 1997 annual report, "Many metropolitan areas have evolved as suburban expanses with no real center of gravity. Growth is diffused. New commercial centers sprout up randomly, surrounded by jerry-built communities ... that often supplant the original central business district." And, in the 1999 annual report: "Suburbs struggle because they have let developers run amok."

In their recent book, *Once There Were Greenfields*, National Resource Defense Council (NRDC) and the Surface Transportation Policy Project note that since 1980 the suburban populations of the major U.S. metropolitan areas have grown ten times faster than their central-city populations. The consequences the authors see for our land base are grave. From 1960 to 1990, the populations of metropolitan areas grew by less than half but the amount of developed land in those areas doubled. Of all the land developed in the United States throughout its history, almost one-sixth was developed in the ten years from 1982 to 1992. In central Maryland, more land will be converted to housing between 1995 and 2020 than in the past three and a half centuries. It has been estimated that metropolitan Phoenix is developing open land at the rate of 1.2 acres per hour.

If Katharine Lee Bates were alive today, would it occur to her to write "America the Beautiful"? We are rapidly turning our purple mountains majesties and fruited plains into one endless blur of mega-houses on sodded lawns, interrupted only by asphalt oceans of parking and asphalt rivers of new road that stretch,

barren and full of traffic and shimmering with heat under that unshielded sun, from sea to shining sea.

As Michael Klemens saw in data collected as early as 1975, one of the many things Americans are losing to our land appetite is our living natural heritage. When the subdivisions advance, untold numbers of the plants and animals that shaped and filled our once-diverse landscapes go under. "It's a problem that is extremely severe for wildlife," says Klemens. Other ecologists concur. "There is no doubt in my mind that sprawl is having a detrimental effect" on flora and fauna, says Ann Kinzig of Arizona State University. Joseph McAuliffe, an ecologist at the Desert Botanical Garden in Phoenix, calls sprawl "an environmental abomination."

For the most part, the losses are not of the kind to wring the public's heart. The grizzly bears, wolves and buffalo, the great mammals that fire the imagination and easily gain admirers and sympathy, are largely not threatened by sprawl. They need so much space that they were driven out of the valleys and into remote preserves and mountaintops long ago. There are exceptions, among them medium-sized predators such as the Florida panther, whose southern Florida wetland and forest habitats are rapidly giving way to agricultural fields and residential developments. But for the most part, what is being lost to sprawl today is a different level of life, smaller, much less familiar to its human neighbors.

Their troubles come from a multiplicity of problems that accompany sprawl. More cars bring more air pollution. They create water pollution when the toxic residue of tires, gasoline, and oil washes off roadways and into streams. Streams and rivers must also cope with sewage effluent, with the larger burden of sediment that erodes off cleared land, with the loss of streamside plant communities, and with the harmful effects of large swaths of paving.

And then, of course, there are the two problems that Klemens considers particularly deadly. One is fragmentation of habitat. Roads and houses and malls break up ecosystems into parcels of land too small for their former occupants, or too far away from feeding or breeding grounds they depend on.

Suzanne Fowle of the Massachusetts Natural Heritage and Endangered Species Program points out that for amphibians, even a road across their habitat may be enough to create genetically divergent groups. For long-lived, slowly reproducing species such as turtles, even an occasional roadkill death may be enough to start a population on a downward slide.

The other problem is what Klemens calls the "generalization" of habitat. The ecosystems of this country are by nature extraordinarily diverse. But after the bulldozers leave, what's left is cleared space full of lawn grass. Norway Maples, and pachysandra. Even

when the changes are less extreme, they are damaging. Klemens points to wetlands as a prime example of the generalization of habitat. "A lot of people are mouthing the phrase 'No net loss of wetlands,' but nobody is talking about the types of wetlands," he says.

Environmental and development regulations do not protect minor wetlands, such as small vernal pools, which exist only in the springtime.

And what protection there is, is inadequate. When highways, strip malls, and housing developments are built over structurally complex wetlands - fens, bogs and other layered systems harboring a wide diversity of water-dependent life - developers must mitigate the damage. So they create ponds, which are simple systems. Says Klemens, "We are losing the complexity, the structure, the connectedness of landscape wetlands at an alarming rate." This, as Joseph McAuliffe points out, is the real tragedy of sprawl: the loss of entire functioning landscapes.

In his twenty-five years of studying what happens to native species in New England when functioning landscapes are lost, Klemens has found a pattern. The numbers of wildlife do not necessarily decline; the overall biomass may stay the same or even increase. But the numbers of species plummet. As in the case of the two salamanders, a species that needs specific and fragile kind of habitat, or that depends on more than one kind of habitat, will disappear. A competing species that can adapt to a broad array of habitats will take over.

Eventually, all that's left are what Klemens terms the "weedy species." "Call them 'subsidized species'," he explains. "They get the competitive edge. They benefit from our activity. They are suited to living in the habitats we create." The extent of the takeover depends on the degree of habitat change. Some New York streams still have their dusky salamanders. Others have passed the point of no return. Says Klemens, "There is a threshold in landscape condition where everything starts to come unglued." In other words, in some highly modified suburban developments, there may be little wildlife left but pigeons, squirrels, and raccoons.

This pattern, Klemens believes, occurs all over the country. In Sonoma Valley, California, he found precisely the same trends where seasonal reed beds have been destroyed for "gentlemen's ranches" and replaced with year-round ponds. Rare native species such as the yellowleg frog, the Pacific pond turtle, and the endangered red-leg frog are disappearing. The bullfrog, which is not even indigenous to the area, is moving in, preying on the native species, and spreading throughout the Sonoma Mountains.

Stewart Pickett of the Institute of Ecosystem Studies says that many other studies have turned up evidence consistent with Klemens' findings, though he notes that

few have studied the sprawl problem as systematically or as thoughtfully as Klemens. As one recent example, he mentions work by Helen Thompson, who found that gaps in forests near urban and suburban areas in the Baltimore region were being increasingly occupied by non-native vines.

"These problems are everywhere," comments Klemens. "It's the same basic pattern, because we're making the same kinds of choices with our ecosystems."

Is there an answer? There are many. There is no mystery about how to overhaul our lax land-use habits; the question has been thoroughly studied by many innovative planners and architects, and the solutions are well-known. *Once There Were Greenfields* describes several "guiding principles" for reforming Americans' land-use habits, including the use of greenbelts and other land preserves, "infill" neighborhoods in central cities, and compact development patterns oriented to public transit rather than roads and highways. Compact development, the authors emphasize, does not mean cities full of high-rise apartment buildings; it can mean development that mixes, for instance, single-family houses and multi-family units such as townhouses.

How to put these answers into practice is more problematic. The environmental solution of last resort is the Endangered Species Act, which throws the force of federal law behind efforts to preserve the last remaining habitat of the last remaining individuals of a particular species. In the Pacific Northwest, nine species of salmon and steelhead trout were recently placed on the federal endangered species list. Since many of these species depend on rivers that flow through metropolitan areas, the region may be forced to take steps to curb sprawl, among other problems, in order to protect the fish.

But the Endangered Species Act, vital as it is, cannot be the answer for the nation as a whole. We need to start protecting our unique species and unique places long before they reach the edge of disaster. More promising are the initiatives now springing up all over the country to bring genuine forethought and planning into land-use. A dozen metropolitan areas have now instituted "urban growth boundaries" like that pioneered in Portland, Oregon, where regional government encourages growth within the boundary and discourages growth beyond it. Maryland has adopted a set of laws that, among other steps, withholds state funding for "growth-related" projects that do not meet specific criteria for housing density and other factors. In Georgia, which has undergone a revolution in public attitude toward sprawl, the legislature recently passed a law giving the governor extraordinary power to kill sprawl-producing projects and create sprawl-fighting ones in metropolitan Atlanta.

Reining in sprawl will take years or decades, especially as the problem and the planning infrastructure

vary so much from community to community and region to region. "There isn't a single, magic answer," says NRDC attorney Kaid Benfield. "There's a need for creativity and many different approaches from communities, the private sector, the federal government, design companies. We know that the solution is smart growth. But we're still working on the policy and economic climate that will make smart growth happen."

From his own work, Michael Klemens offers the example of New York State's Great Swamp, a 4,000-acre wetland in the midst of five once-rural small towns, which are now suffering from inner decay and haphazard outward growth. For two years, Klemens' Metropolitan Conservation Alliance (MCA) has been working with the five towns to educate citizens about their wildlife heritage. Volunteers have taken part in wildlife-tracking programs, workshops, school projects and other activities. Now that community interest is high and a sound database of wildlife information exists, the project is moving to a new phase. MCA is beginning to train community officials to use detailed wildlife and habitat data in land-use planning that preserves biodiversity. Moreover, the five towns are considering setting up an inter-municipal council for wildlife conservation, transportation, and infrastructure.

Overwhelming as the sprawl problem seems, Klemens is full of optimism. Especially in New England, where the political system gives local decision-makers great power in land-use decision, he sees "a huge uncharted area" for progress through training community officials in the ecology of their area and bringing them together for regional planning. "I enjoy my work, because we've had success," says Klemens – who has seen success not only in the MCA projects, but also in his own town, where he serves as chair of the planning commission. "We have to recognize that we can't change the ecological mandate of the land. We have to work within it. And it *can* be done."

Kathrin Day Lassila is the editor of The Amicus Journal, a publication of the Natural Resources Defense Council.

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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
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