



On The Fringe

Journal of the Native Plant Society of Northeastern Ohio

Peskin's Book Arrives In Time For the Holidays



Our own Perry Peskin, a charter member of NPSNEO, has published a beautiful book: *The Search for Lost Habitats, 30 years of Exploring for Rare and Endangered Plants*.

What started out as a visit to a bog near Erie to search for the *Arethusa* orchid ended up a quarter of a century later as 30 magazine articles concerned with the importance of saving our native plants by saving their habitats. The book is illustrated with over 450 colored pictures, taken by the author as he explores the flora of the Lake Erie dunes, the fens and bogs of northeast Ohio, and the prairie and rocky outcrops near the Ohio River.

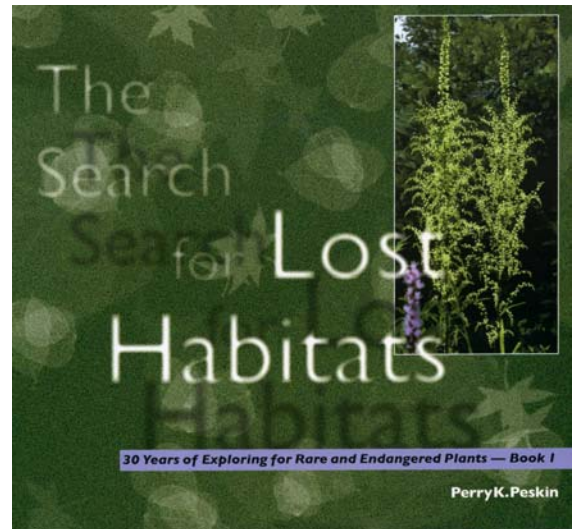
Soon he branches out to include other regions around the upper Great Lakes such as Ontario and the limestone barrens of Manitoulin Island, southeast Minnesota's Driftless Area, and many other locations.

Occasionally Peskin studies a single plant family, such as orchids, gentians, and mallows and the excitement of finding the rare habitats of these colorful species.

Although written in a journalistic, easy-to-read style that avoids much of the technical botanical terminology of textbooks, these first-person narratives are factual and accurate. In addition, all the photographs are on the same page as the plant description, making it easier to read about the plant.

What a wonderful Christmas gift to the amateur botanist in your family or for that matter anyone who enjoys a good yarn about adventures in the natural world. A second book is in the works, this time with a wider range of areas visited.

Lost Habitats will be released shortly after the first of December. The Cleveland Museum of Natural History's Ark in the Park is going to carry the book and may be reached at 216-231-4600. Other distribution points are being established. Contact Perry Peskin at 216-561-4665



Your 2007 program schedule card will be mailed separately. If you have not yet renewed your membership for 2007, you will find a renewal application and return envelope included with the schedule.

Board

President	Judy Barnhart
Vice President	Ami Horowitz
Secretary	Bill Oberdick
Treasurer	Jonathan White
Membership	Ann Malmquist
Education Chair	Tom Sampliner
Program Chair	Diane Police
At-Large	Kathy Hanratty
At-Large	Diane Police
Newsletter	Jane McCullam
Co-editors	Ann Malmquist

The Journal of the Native Plant Society of Northeastern Ohio is published 4 times a year at Novelty, Ohio. ISSN 8756-6087. Questions or comments are welcome and may be addressed to Jane McCullam, 9880 Fairmount Road, Newbury, Ohio 44065, 440-338-3253; npsOhio@hotmail.com; or to Ann Malmquist, 6 Louise Drive, Chagrin Falls, Ohio 44022; 440-338-6622, inky5@juno.com

2007 Spring Program Schedule

Jan. 21, Sun: Plant Id Series: Winter Tree Identification - 2:00 PM. - **The Rookery, Munson Township, Geauga County.** Joint program with Geauga Park District. From buds to fruit to bark, learn the ins and outs of identifying trees in winter. Begin indoors looking at various twig characteristics before hitting the trail to ID trees by bark. Winter Tree Finder booklets will be available for sale for \$3.75 to aid in twig ID. Directions: Take Rt. 322 east out of Chesterland approximately 3 miles to Rockhaven Road. Turn right and head south to the stop sign. Bear to the right and continue south on Rockhaven to Cedar Road. Turn right on Cedar continuing to the park entrance at the end of the road. **Call Judy to register: 440-564-9151 (H) or 440-286-9516 Ext 2011 (W).**

Feb. 3, Sat: Plant Id Series: Mystical Mosses Workshop, Kent, Ohio – 9:00 A.M.-12:30 P.M. – Dr. Barbara Andreas, Kent State University professor, uses moss samples to help participants learn skills in moss identification. Workshop held at Kent State University in Room 111 of Cunningham Hall off Summit St. Park in lot near

KSU greenhouse; enter NE corner door. Hot beverages provided. Call Judy for reservations: 440-564-9151 (H) or 440-286-9516 Ext 2011 (W).

Feb. 25, Sun: Members Plant Showcase – 2:00 P.M. – Beachwood Public Library, 25501 Shaker Blvd, Beachwood, 44122. – Corner of Richmond & Shaker Blvd. Discover the diversity of flora found around Ohio and elsewhere as members share their best photos, including field trips from 2006. ***If you are bringing slides/photos to share, please call Ami Horowitz to add your name to the program: 216-921-9242.***

Mar. 3, Sat: Skunk Cabbage Walk – 2:00 PM. - South Chagrin Reservation Polo Field parking area, Rt. 87 entrance. Skunk cabbage blooms long before other spring wildflowers. Search the wetland areas near the Chagrin River for this unusual plant. Snow date: March 4th. Directions: Take Rt. 271 to the Chagrin Blvd. exit. Head east on Rt. 87. Continue just past Chagrin River Road to the parking area on the right. Call Ami Horowitz to register: 216-921-9242.

USDA Expands Emerald Ash Borer Quarantine

WASHINGTON, Nov. 21, 2006--The U. S. Department of Agriculture's Animal and Plant Health Inspection Service today announced the expansion of its emerald ash borer (EAB) quarantine to include the entire states of Illinois, Indiana and Ohio. The new quarantine becomes effective on Dec. 1 following the issuance of a federal order. In October a positive identification was made in the southwest Cleveland area near I-71.

Eastern American Trilliums: Part 2 of 4

(Part 1 appeared in On The Fringe, September 2006)

by Fredrick W. Case Jr

Trillium flexipes Raf.

Known as *T. declinatum*, and *T. gleasonii*, this much misunderstood plant is really quite distinctive and, in its best forms, a most useful horticultural subject. The plant is a large one, up to thirty inches tall when growing in rich soil. Flowers, borne on three to five-inch peduncles, may be stiffly erect or declined at various angles below the large, rhombic leaves. Petal texture is usually quite leathery, making the blooms of the best forms long lasting. The three-inch flower may be quite flat with rather broad, ovate petals or the petals may be narrow and reflex badly, with curled margins on a recurved peduncle. The finest forms for garden use which I have seen come from the limestone country near Louisville, Kentucky, where the species is abundant.

Flowers of good forms last for up to three weeks or more in cool weather, making it the longest lasting pedunculate trillium in the garden. The pyramidal fruits, as large as crabapples, rich pinkrose in color and strongly six-angled, emit a fruity fragrance.

T. flexipes, as currently understood, ranges in the American midlands from northern Alabama to Wisconsin and Minnesota, thence eastward into New York and Maryland. In the driftless areas of Wisconsin and Minnesota I have seen plants which appeared to be intergrades with *T. cernuum* var. *macranthum*.

Where the range of this species overlaps that of the red-flowered *T. erectum*, and where acid and limestone soils occur in proximity, extensive hybridization occurs between these species. Some of the hybrid patterns occur so frequently that they were first considered to be distinct forms and were named *T. flexipes* f. *walpolei* and *T. flexipes* f. *billingtonii* Farwell.

Where suitable conditions occur, in Michigan, Ohio and Kentucky, large hybrid swarms and their backcrosses produces a delightful array of plants. Flowers in a variety of maroons, rose, speckled, spotted, and shaded colors abound. Because, as mentioned, there are multiple genes influencing the various parts of the petals, hybrids appear which are white basally with distally red petals, or the reverse, mimicking the painted trillium. In my garden, wholly new color variations have appeared. Through controlled pollination, my wife and I have produced garden hybrids identical in color patterns with some of the wild forms. When we crossed the large, heavy textured erect

flowered types of *T. flexipes* from Kentucky with *T. erectum*, superior, erect flowered forms with excellent carriage and color resulted. Even picotee forms — cream, margined with purple flecks — have appeared. These hybrids merit a place in the garden. We are trying to find ways to propagate these desirable types more rapidly.

Trillium grandiflorum (Michx.) Salisb.

This magnificent species is the best known and best loved of the trilliums and is indeed a favorite spring flower of all outdoorsmen in the Northeast. In cultivation, it can be as large as any species and is always truly showy. Great masses of this plant fill the woodlands of the Great Lakes Region, Ontario, and parts of New England in the spring. It ranges southward in upland regions of the Cumberland Plateau and Appalachians to North Carolina and Tennessee, but becomes local southward. The species occurs in all but the waterlogged soils of bogs and floodplains, but thrives best on sandy or loamy hillsides.

Standing eight to over twenty inches tall, with leaves up to eight inches long and less rhombic than in the *erectum* complex, the plant bears a relatively large flower on a three inch peduncle. The flowers are more deeply cupped than in many pedunculate species, almost funnel-form at their bases, but widely spreading at their distal ends. Petals, each up to three inches long and half as broad, are thin-textured but very white with deep and conspicuous veins. In spite of the thin texture, the petals last long and gradually turn from white to pink to deep rose with age. The fruit is six-angled, green and inconspicuous.

T. grandiflorum is larger and in every way showier than its western counterpart *T. ovatum*. It has also the advantage of being far more winter-hardy.

In European gardens, the plant is grown with considerable light and fertilizer; with such a treatment very large plants develop. There is no doubt that this is the one best species for massing and landscape effect in the woodland garden. It is a long-lived, clump-forming species.

Like other species, it has various forms. Various hose-in-hose double types occur, and rock gardeners know of the magnificent form with about thirty petals. Double forms have appeared many times in the wild

and both highly symmetrical, lovely forms and rather ragged petaled doubles exist.

There is a form in which the backs of the petals are pink, even in the bud, which has been reported and is coveted. I have been fortunate not only in obtaining such forms from horticulture, but in finding my own very good pink-backed form in southern Michigan. Seedlings of these are appearing in my woodland garden with better color than in the wild forms. I have not, however, found a form in which the face of the petal opens in a good pink. Such a form would be a real find!

In recent years a vogue has developed in rock gardening and other horticultural circles for local forms of *T. grandiflorum* which occur with green-striped petals, blotches, or other aberrations which include alteration of the plant body form itself: clusters of leaves replacing the flower, or a knot of petals, white and green streaked, without leaves, or very commonly, long, narrow petiolate leaves — sometimes several sets of such — and highly distorted flowers. I have seen one such in which there were long-petioled leaves at ground level, a long stalk bearing a much variegated and distorted flower, with miniature three-petaled but distorted blooms emerging from the stamen tips. Earlier botanists considered these strange plants as "mutations," or teratological forms. Some gardeners have spent a goodly sum trying to obtain as many of these as possible. Although some are beautiful, they result from a disease. Dr. Gary Hooper, Michigan State University, and myself (Hooper, Case, et. al. 1971) have demonstrated that the condition originates not from mutation, but from the presence in the tissues of mycoplasma organisms. These organisms, larger than viruses, seem capable of producing on developing tissues an influence similar to that of genes. The infection spreads slowly in wild populations until entire colonies show the disease symptoms. Infected plants turn maroon-red months early and die down. Weakened plants gradually disappear in wild colonies.

This mycoplasma disease can spread to other species: we have seen it in *T. erectum* and *T. undulatum*. However unfortunate it may be that gardeners have invested considerable sums for these showy but diseased plants, no sensible gardener ought to harbor them. Certainly, diseased clones ought not to be spread around the world under the guise of horticultural forms.

***Trillium persistans* Duncan**

In 1971, Duncan described a new trillium from the mountains of northeast Georgia. Known thus far only

from a four-mile-square area in which the plant is rare, local, and difficult to approach even in sites where it is present (because of TVA damming of rivers), this plant has been given endangered status under federal laws.

A distinctive, small trillium, the plant has lanceolate, somewhat drooping leaves with three conspicuous large, light-colored veins per leaflet. The flower resembles somewhat a depauperate first-blooming seedling of *T. grandiflorum* or *T. catesbyi*; and is distinguished by the failure of the petals to spread very widely at first. The blossom diameter is about one to one-and-a-half inches, the petals individually quite narrow, somewhat undulate. The small, flattened ovary is strongly six-ribbed. As the flower ages, the distal portion gradually deepens to a dark rose purple. The proximal area near its attachment retains its white coloration in the form of an inverted V. This color pattern of the aging flower is diagnostic for this species.

Plants as rare as this species should not be collected any longer by amateur botanists or gardeners. Since there will always be avid collectors and plantsmen who "must have the plant at any cost," it is my personal view that seeds of this and other extremely rare species should be raised by botanical gardens or university gardens, and that cultivated material ought to be introduced into the horticultural trade at the earliest possible moment. This, I think, would provide a source of plants for the specialist-collector-grower, but would not put pressure on wild populations through illicit collecting.

The specific epithet "*persistans*" refers to the long lasting nature of the plant, which remains healthy and green until late in the autumn. Persistent Trillium is also one of the earliest of the trilliums to appear, blooming in February and March (into early April) in its wild haunts. Through a quirk of fate, I collected three plants of this species with some *T. catesbyi* near the type locality some years before the plant was even described. They are fully hardy at Saginaw, Michigan, but its seeds have not produced seedlings.

As a garden subject, I would rate the species as second class, although in size it is a good plant for the rock garden. *T. persistans* was honored with a painting on the U.S. Endangered Species Postal Stamp series

***Trillium nivale* Riddell**

If I could choose but one pedunculate trillium for the rock garden, I would not hesitate to choose the snow trillium. Firstly, one of its preferred habitats is on limestone outcrops and the talus slopes below. It is thus a true rock plant. Secondly, it is tiny, like many of the

best rock plants, but with large and conspicuous flowers for its size. Thirdly, it is the earliest wildflower to bloom in our region, often commencing bloom ahead of the skunk cabbage which is traditionally considered our earliest wildflower.

T. nivale grows mainly on limestone soils and outcrops, or secondarily, on rich, limy river bank soils in a narrow band from western Pennsylvania through Ohio and Indiana to Iowa and southern Minnesota. It is rare and local over much of its range, but is said to be abundant in parts of its western distribution, even persisting in fence rows after the woods have been lumbered.

At first only two or three inches tall, the plant enlarges in bloom, (as does its relative the painted trillium) and may in vigorous plants attain a height of six inches. Blossoms, surprisingly large and showy for the size of the plant, are usually a clean white with conspicuous yellow stamens. Blossom spread is up to two inches. The ovary, six-angled in most trilliums of this group, is instead obtusely triangular in cross section; The two- to three-inch-long, ovate leaves are a glaucous bluish green and distinctly petiolate. The peduncle, erect in flower, reflexes strongly as the flower ages, and is strongly reflexed before the petals deteriorate.

Because snow trillium blooms from early March into April, it frequently is subjected to very cold night temperatures. The plant often freezes solid, in bloom, night after night without apparent harm.

The snow trillium requires a site free of competition. It inhabits eroding limestone ledges, ravine summits where continued erosion keeps sunny areas free of grass, or loamy flood plain soils where only occasional flooding prevents development of dense woodland vegetation. For it to be permanent in the garden, one must simulate the competition factors of the plant's wild habitat. Give it a slightly open, flat area, mulched with lime chips, a crevice in a limestone boulder, or a spot free of plants at its base. Under these conditions, the snow trillium can be one of the best of the American rock plants, long lived, and freely seeding about.

We had the pleasure, this year, after a forty-year search, to be a part of the rediscovery of *T. nivale* in abundance in Michigan. The plant had been considered extinct here.

***Trillium pusillum* Michaux var.**

In Coastal Plain, Piedmont, and southern Cumberland Plateau woods from Maryland and Virginia to Alabama and Kentucky grow several taxa

of charming dwarf trilliums which are all very rare, local, and largely unknown to gardeners. Many of these populations may now or will soon have legal protection as threatened or endangered species owing to their discontinuous and very local occurrences. It would be my hope, however, that these taxa could be legally brought into cultivation and made available commercially, for they have traits that make them ideal subjects for the rock garden.

Trillium pusillum grows more stiffly erect than *T. nivale*, averaging just slightly larger, from about four to eight inches tall. The somewhat drooping, narrowly oval, blunt-tipped leaves are green to bluish or maroon green. The flower is quite large for the plant, upfacing, white, or white on the face with a rose back to the petal. Blossoms reach to over two inches across, spread widely, and have very undulate petals.

Races of *T. pusillum* bloom just after *T. nivale*, early in the season, and well ahead of most other trillium species. Thus, they fill a need in the garden schedule. Flowers persist a long time. Since, like *T. grandiflorum*, they gradually turn rose, they also provide a touch of color before they fade.

T. pusillum generally grows in acid-soil swamps and stream bottomlands, in soggy soils at the upper limits of the floodwater level, and occasionally in upland swamps. Where colonies occur, plants are generally abundant.

In my garden, it grows and blooms well without the moisture of its native habitats. So far, at least, it has been completely winter hardy. For "purists" it is not a rock plant in any sense. But in size and charm, it is perfectly suited for a featured spot in a rockery. It grows well in a neutral to slightly acid pocket of not too fertile soil.

The discontinuous distribution of *T. pusillum* with lack of gene-flow between populations for a long time has led to structural differences among colonies. Most of these are minor, but plants from the north of its range in northern North Carolina, Virginia and Maryland have been given varietal status as *T. pusillum* var. *virginianum* Fernald.

In this variety, the flower peduncle is either vestigial or absent, the flowers sessile or subsessile. These blooms face stiffly upward giving the plant a different aspect from any other pedunculate trillium. This carriage, coupled with the usually rose backing to the petals and the smaller size of the plant, make it completely charming and horticulturally desirable. It is, however, a very rare and local plant. Like other rare species, arboreta or botanical gardens ought to

propagate and distribute the plant to dealers so that it may be legally and safely available to gardeners.

***Trillium ozarkanum* Palmer and Steyermark**

Botanists formerly considered the Ozark trillium to be a variety of *T. pusillum* but now generally give it specific rank. It differs from *T. pusillum* in being taller, up to ten inches or so, with more ovate pointed leaves, which have generally five prominent veins instead of three as in *T. pusillum*. Early in the bloom period, the leaves also tend to have a deep maroon undertone largely absent from typical *T. pusillum*. Flowers, on strong peduncles, average larger than those of *pusillum*, with distinctly wavy-undulate margins and very conspicuous recurved yellow stamens. Bloom time in my garden is just reaching its peak as *T. pusillum* varieties fade.

T. ozarkanum habitat differs from that of *T. pusillum*. It grows on rocky hillsides, in open fields, open oak or mixed deciduous forest-pine woods, or in shaley, rocky, dry steam beds. It occurs in the Ozark Mountains of Arkansas and Missouri, and in Kentucky, often in areas where grow mountain laurel, arbutus, sourwood trees and other acid soil plants. Plant collectors and wildflower nurseries of the Ozark region occasionally offer it. Its size and manner make it highly desirable for the rock garden.

Ozark trillium grows well for me at Saginaw, Michigan and is one of my favorite plants. It is completely winter hardy. It has not seeded about here as have many other species.

Trillium texanum

Texas Trillium was also formerly united with *T. pusillum* by most botanists and is clearly a close relative. It is the only eastern trillium which I have not seen in the wild, although I have seen the plant in John Lambert's Mountain Fork River Arboretum at Mena, Arkansas. In general aspect it resembles *T. pusillum* but is narrower in all respects. The almost linear petals are undulate, clear white, and spreading. The narrowly linear leaves, blunt-tipped and green, spread rather than droop as in *T. pusillum*, and tend to fold or reflex toward each other across the upper surface, giving the leaves a slight "boat" shape.

Native to the coastal plain, wetter regions of east Texas, this trillium grows in acid woods and boggy ground, often in company with osmunda ferns. It, like other relatives of *T. pusillum*, represents local, disjunct variants of a once uniform and widespread species. If it proves to be winter hardy here, it will be a worthy garden subject as a variation on a theme.

***Trillium undulatum* Willd.**

The painted trillium can be the beauty of the genus, or it can be disappointing. This apparent paradox stems from the manner of development. *T. undulatum* plants emerge from the ground relatively late in the season and develop rapidly. Buds open when the plant scarcely has grown four inches tall. Growth and expansion continue for several more days until the plant reaches full size, a height of from fifteen to twenty-four inches. At this time, the full blown flower may be three inches across, with thin-textured, white petals beautifully blotched and penciled with deep red at the base. If plant development has proceeded as above, the plant is a great beauty. But, if the flowers are pollinated before expansion is complete, a hormone reaction occurs, the petals turn watery and translucent, the colors fade rapidly, and the petals wither and fall. A prematurely pollinated plant disappoints, to say the least.

Wide ranging, the painted trillium occurs from Quebec and central Ontario southward in acid soil regions to the mountain tops of the Great Smoky Mountains and the Blue Ridge of the Carolinas and Georgia.

It requires cool soils, hence its restriction to higher elevations southward. In New England, the plant is widespread at most elevations in suitable acid soils. Westward, the species reaches into the "Thumb" of lower Michigan, where it is a very rare, protected plant. Reports from north and west of these Michigan stations lack specimen documentation and at least some of them result from misidentifications of the *T. erectum* x *T. flexipes* hybrid segregates having basally red-blotched petals. See *T. flexipes* f. *blillingtonii* Farwell, discussion in Case and Burrows, 1960.

Growing this demanding species can be difficult if one lives and gardens outside its natural areas of occurrence. Not only must it have suitable cool temperatures and pH, but it nearly always grows in deep brown peaty forest duff.

Although painted trillium is not native in my immediate area, I have grown it for years in the deep shade under beeches and oaks by excavating a large area to a depth of about ten inches. On the bottom of the excavation I place about three inches of washed silica sand (which can be purchased at builder's supply houses as sandblaster's sand). On this sand I place the trillium rhizomes, for in the wild, in Michigan and in North Carolina, they invariably grow with the rhizome in contact with mineral soil but deeply covered with acid duff. Over the rhizomes I place a mixture of sand, Canadian peat and oak and pine duff, bringing the mix up to the level of the surrounding soil. This shaded bed

should then be mulched with oak leaves or pine needles.

Wildflower dealers offer this species. It is worth a try, but I am uncertain as to how it will perform in the hotter American midlands.

When current research is completed, other pedunculate trilliums may be recognized. Nomenclature may change, but the wild populations I have referred to are distinct from the horticulturalist's point of view, and these plants deserve a place in the

world's gardens if it can be done without endangering wild populations.

Frederick Case is the retired chairman of the Biology Department of a High School in Saginaw, Michigan and is the author of *Orchids of the Western Great Lakes Region*.

This article originally was published in the *Bulletin of the American Rock Garden Society*, Vol. 39, Nos. 2. & 3

Weed Alert: Lesser Celandine **Issued by the Louisville Olmsted Parks Conservancy Herbarium**

Lesser celandine (*Ranunculus ficaria*), also known as fig buttercup and spring messenger, is an herbaceous perennial that was introduced into the United States as an ornamental groundcover. Native to Eurasia, this attractive member of the buttercup family has bright buttery-yellow flowers that are produced on long stalks and blooms in February through April. The leaves are shiny, dark green and heart-shaped, about two inches wide and appear as early as January. By June, the above-ground parts die back and totally disappear from sight.

The root system consists of a mass of small, finger-like tuberous roots and tiny, light-colored bulblets which easily break off from the parent plant either by flooding, animal, or human activities. These new bulblets readily take hold and once established, even small infestations can spread rapidly, invading forested floodplains, wet fields, stream banks, moist limestone ledges and upland woods. This species' greatest impact is on flowering plants which are unable to penetrate the dense, thick carpet of leaves.

Lesser celandine has been reported in four counties in Kentucky: Jefferson, Gallatin, Campbell, and Lewis, all located along the Ohio River, but suspected in others. At Cherokee Park, in Louisville, acres of land have been heavily infested, especially in the woodlands and fields along Beargrass Creek.

Control is limited and the window for effective treatment is timely. Individual plants or small clumps may be dug up by hand or trowel, but it is essential to get all the underground roots. For more information, visit

<http://www.nps.gov/plants/alien/pubs/midatlantic/rafi.htm>,

or contact Alan Nations, the Conservancy's Staff Naturalist, at Alan.Nations@olmstedparks.org, for information concerning control practices currently underway in Cherokee Park.

To help prevent, or minimize the spread and establishment of new infestations, the Louisville Olmsted Parks Conservancy is alerting concerned personnel to be on the watch for this aggressive exotic plant. For any questions on the identity of lesser celandine or to report any sightings, please contact Patricia D. Haragan, botanist, who is documenting the spread of this species in Kentucky at Patricia.Haragan@olmstedparks.org.

Reprinted from *The Lady Slipper*, newsletter of the Kentucky Native Plant Society, Summer 2006.



Witch Hazel *Hamamelis virginiana* L.

by Marion Jackson

Witch hazel, which ranges in size from a large shrub to small under-story tree, is notable among woody species of forestlands of eastern North America for being the last to flower in most regions. The bright yellow, delicately fragrant flowers, each with four to eight ribbon-like, crinkled petals, grace the tree's aromatic branches in late October, November, or even December, as or after the leaves fall.

Also noteworthy is the mode of seed dispersal from the nut-like fruiting capsules of the previous year, which mature alongside the fall flowers. When fully ripe, the fruits violently—and audibly—eject their shiny, hard black seeds for a distance sometimes exceeding 25 feet. Seeds are dispersed, mortar-like, from the fruiting capsules much as one might discharge a moist apple seed by pinching it between thumb and forefinger. Apparently seed viability and germination are quite high, judging from the rather widespread occurrence and reproductive success of witch hazel.

The leaves are borne alternately on slightly roughened, yellowish to brown twigs. Leaves are broadly oval with coarse, rounded irregular teeth, unequal bases, and conspicuous parallel veins. In the fall, the leaves turn a bright yellow, then a warm brown. The inner bark of twigs is a distinctive dark reddish-purple.

Both leaves and twigs are the source of an aromatic essence that has been added to an alcohol base to produce mildly astringent liniments or aftershaves that have enjoyed a rather wide acceptance and use, especially in years past. The distinctive fragrance of witch hazel is recognizable and pleasant to most people, and is also apparent when the wood is burned in camp-fires.

The wood is hard, close-grained, and moderately heavy, weighing 43 pounds per cubic foot, but trees generally are too small to be of economic use. However, in years past, youngsters in nature camps found the wood excellent for making small brooms and toothbrushes in their camp craft activities.

Witch hazel is tolerant of a range of soil and site conditions, including rocky hillsides, but it grows best

on moist, fertile soils. It is often found at forest and woodland borders, but it may also occur in deeper woods as an understory tree, or occasionally along streams. Tree-sized individuals are more likely found in the southernmost counties here in Indiana.

Of interest is the origin of the species' common name. The plant is not a hazel at all, but is the type genus of the Family Hamamelidaceae (which also includes the very common Indiana tree, sweet gum), hence the Latin name *Hamamelis virginiana*. More curious is its common name.

Early settlers (and likely dating back to Europe) widely believed that twigs from the witch hazel conferred special abilities to certain individuals to dowse (or "to witch") for water flowing under ground, or even to locate hidden gold. For this use, a forked *Hamamelis* branch is carried with one prong of the fork in either hand, and with the main stem pointing forward from the dowser's body. According to this widely held supposition, while walking across the landscape, when a "vein" of underground water is encountered, the forked

branch will automatically—and even against the dowser's will—turn and point downward. Believers firmly attest to the ability of witch hazel to select the proper location for water wells, but there is no scientific evidence that dowsing works.

Perhaps more plausible is the purported origin of the word *switch* being from the use of witch hazel twigs to discipline unruly children. I can imagine an exasperated parent saying, "You wouldn't stop doing that, so now I have to s-witch you." The author can vouch, from his own youthful misbehavior, that supple, wiry witch hazel twigs are effective for that purpose!

Marion Jackson is author of 101 Trees of Indiana: A Field Guide, published this spring by Indiana University Press.

Illustration by Mary Vaux Walcott

Reprinted from the Indiana Native Plant and Wildflower Society News, Autumn 2004.



Witch Hazel (*Hamamelis virginiana*)

The Seasons at the Kent Bog State Nature Preserve

by Tom S. Cooperrider

A visit to Kent Bog

A visit to Kent Bog is like a botanical trip to the north country. Tamarack and other boreal plants of the bog, such as leather-leaf, small cranberry and tawny cotton-grass grow as far north as Labrador and Newfoundland, and from there range westward across Canada to the Yukon, and on into Alaska.

Students of bogs believe that these boreal plants came south into northeastern Ohio, ahead of the last glacier in the recent Ice Age. As the climate eventually warmed and the glacier melted back, the boreal plants in most places died off, and other plants moved in to take their place.

At the site of Kent Bog, something different happened. There, a large block of glacial ice came to rest in a bed of clay particles. When the ice block melted, it produced a small lake held in a clay basin. In the wet ground at the lake's margin, a narrow band of the boreal plants survived and formed a bog. Gradually the bog spread throughout the basin, replacing the lake. Today, a low bank that once surrounded the lake, now surrounds the bog. The plants growing in the bog are descendants of those boreal plants that moved southward thousands of years ago. The most remarkable plants are the tamarack trees.

With more than 2,000 trees, the tamarack stand at Kent Bog is the largest group of tamaracks in Ohio. It is a healthy, actively reproducing population with many seedlings and saplings. At some places in the bog, a 360 degree sweep of the sky shows nothing but tamaracks. Its location adds to its significance. It is the southernmost tamarack stand of this size in the United States, making the bog a treasure of the nation as well as the state.

Tamaracks are needle-bearing trees, members of the pine family. Unlike pines and most other members of the family, tamarack trees are not evergreen. In late autumn tamarack needles turn yellow and fall, leaving the trees bare in winter. In early spring, buds on the branches open and



clusters of new, green needles emerge. Soon after, new cones appear. The needles and cones are small, both about half an inch in length. On most trees, the young tamarack cones are red, but on some they are green, presumably a genetic distinction. In midsummer both red and green cones turn brown, and then remain attached to the tree for several years.

In 1985, the Ohio Department of Natural Resources purchased a large part of the bog site and designated it the Kent Bog State Nature Preserve. A half-mile boardwalk trail runs through the Preserve. The gray planks of the boardwalk are made of recycled plastic, forming a trail that is both attractive and durable. The trail enables visitors to walk through the bog year-round.

A sea of gold

On a sunny day shortly after mid-October, the Kent Bog State Nature Preserve reaches its first peak of fall color. On the bank encircling the bog, the leaves of the maples, oaks and other hardwood trees have turned to shades of red, yellow and orange. Down in the bog, the blueberry leaves are red, as are those of the stunted red maples. The leaves of the gray birch trees are yellow.

Toward the end of October or in early November, the Preserve's second peak of fall color occurs; the tamarack forest at the center of the bog becomes a sea of gold. After a few days of bright gold color, the tamarack needles turn brown and

fall. Those landing on the boardwalk collect in temporary windrows on the gray planks. The others settle on the green sphagnum moss that carpets the bog floor or drift into the peat substrate.

Notes from a winter bog walk

In winter, Kent Bog is quiet and dark. Most of the woody plants are bare. The sedges and ferns and other soft plants are fallen and brown. Only the white trunks of the birch trees break the darkness.

Yet, along the Preserve trail, a hiker sees a few patches of color. The upper branches and buds of the blueberry shrubs are dark red. There is a greenish cast to the persisting brown leaves on the leather-leaf shrubs. The tamarack trees have a crust of gray-green lichens at their base. When not covered by snow or dead leaves, the sphagnum moss is bright green across the bog floor.

A few shrubs of the deciduous-leaved winterberry holly grow here and there around the bog. Usually these shrubs produce only a few berries. But in occasional peak years, their leafless branches are covered in early winter with hundreds of bright red holly berries. The berries fall in January, leaving the branches empty until spring.

Springtime at the bog

Sometime in April or May, the leather-leaf shrubs announce the coming of spring to Kent Bog. The shrubs' leaves, which were brown during the winter, slowly regain their green color. Then, overnight, thousands of small, dull white, urn-shaped flowers appear on the branches. Directly after, large numbers of insects arrive. The exact date of the event varies considerably from year to year, depending on the weather.

The bog has only a few conspicuous flowers. Nearly all are white and nearly all open early in the growing season. At about the same time that the leather-leaf shrubs are blooming, a scattering of small serviceberry trees produce their flowers, each with five, narrow white petals. Then the blueberry flowers open, whitish and urn-shaped like those of leather-leaf, fellow members of the same plant family. Last of this group are the

flowers of the chokeberry shrubs, each with five, nearly circular, white petals. At the end of spring or in early summer, the small cranberry blooms. Its four, reflexed, roseate petals give each flower the appearance of a miniature red rocket.

The bog is home to many species of birds. The common black-capped chickadee is seen frequently, flying among the trees. Occasionally an eastern towhee, with its rufous-colored sides, is sighted. The rare and secretive, brown veery, a northern bird with a song some writers describe as "ethereal", makes its own announcement that spring has come.

As spring progresses, the young tamarack needles lengthen, and the broad leaves of the birch trees and other woody plants expand. The buried rhizomes of the ferns and sedges send up new green shoots and leaves, and across the bog the silent wheels of photosynthesis begin to turn.

Shades of green

On a summer's day at the Kent Bog State Nature Preserve, a hiker sees mostly various shades of green, each shade from a different plant species. In winter nearly everything in the bog is dark; in summer nearly everything is green. But other transitory colors come along.

In midsummer the wild blueberries ripen, scores of small, bluish-purple fruits clustered on the ends of branches. Toward the end of summer and on into autumn, red-capped mushrooms show up along the trail through the tamaracks. The broad red cap is borne on a short white stalk.

Butterflies may be seen in open places, lighting briefly on one plant, then flying off to another. Two are striking in appearance. The wings of the red admiral are black and bordered with an orange-red stripe. The wings of the mourning cloak are dark brown and bordered with a row of blue spots above a yellow stripe.

Small garter snakes sometimes lounge on the boardwalk. Non-poisonous and with yellowish stripes running the length of their dark bodies, they hurry away when someone draws near. Another non-poisonous snake, the smooth green is not often seen. Camouflaged by its pale green color

and elusive by nature, this gentle snake moves quickly out of sight at the least disturbance.

The bog's most celebrated wildlife resident is the spotted turtle. Like the smooth green snake, it is rarely seen. Small, as turtles go, it is about four to five inches long and has bright yellow spots. The spotted turtle is shy and hides quickly and quietly when a hiker approaches.

In most summers, the mosquito population at the bog is small, the standing water being too acid for their larvae. But in a wet summer, the acid is diluted by the rain and the mosquitoes prosper.

On a hot day in August, the bog is humid, green, and still. Summer seems slated to go on forever.

--A shorter version of this essay appeared as part of an article in the September 2004 issue of "On The Fringe." In 2005 and 2006, the essay's five sections were published under "Other Voices" in the Portage County newspaper, the Record-Courier. The essay has been further revised for the present, final version.

Tom Cooperrider was a biology professor at Kent State University from 1958-1993. He is senior editor of the Seventh Catalog of the Vascular Plants of Ohio, published by The Ohio State University Press in 2001. This reference book lists the scientific and common names of all the plants that grow wild in Ohio, including those mentioned in this article.

Lichen Symbiosis: Is the Fungus Just a Parasite?

George Ellison

Symbiotic relationships in lichens are a tricky topic, even for the lichenologists who study them up close and personal, which is why I have, through the years, hesitated to write about them for general consumption in my newspaper column. It's not improbable, that they (the lichenologists) are missing the point that the lichen's fungus at least provides a habitat for the alga (or cyanobacterium, which has been reclassified as a bacterium instead of an alga—even into a different kingdom no less!). Were it not for the combination of the fungus with the food-producing component, I dare say neither would be located in such widespread habitats as we find them."

My lichen file (somewhat dated, as of now) consists, in part, of clips from popular articles by Vernon Ahmadian, a lichenologist at Clark University in Massachusetts, who reevaluated the symbiotic model (primarily during the 1980s). He was supposedly the first scientist to create a lichen from its fungal and algal components in a laboratory, discovering that "the lichen-forming fungus cannot survive alone except as an amorphous mass ... and that when it encounters suitable algal cells, the fungus weaves a threadlike vegetable growth around them, creating the familiar lichen body (thallus) we observe. The freeloading fungus then secretes chemicals that stimulate its algal "partner" to divert up to 90-percent of its food production to the fungus. Green algae can photosynthesize food; all fungi have to be parasitic

because they have no chlorophyll and can't produce food on their own."

Ahmadian apparently could not determine that the fungus contributed anything to the upkeep of its algal captive, but the point that "the lichen's fungus at least provides a habitat for the alga" seems to be indisputable, especially in light of discussions I had this past summer (at a general natural history workshop in Highlands, N.C.) with Gary Dillard, an algal specialist recently retired from the Center for Biodiversity at Western Kentucky. Gary is the author of "Common Freshwater Algae of the United States: An Illustrated Key to the Genera (Excluding the Diatoms)" (J. Cramer, 1999) and "Freshwater Algae of the Southeastern United States" (J. Cramer, 2000). He made the additional point, if I understood him correctly, that none of the algal or fungal components that make up lichens world-wide have been found existing as separate entities, which would seem to imply that there is a symbiotic process of some sort at work; that is, if the fungal components that make up lichen can't make it on their own, they are obviously dependent upon the photosynthetic components for their existence, and vice versa in the lichen habitats.

George Ellison, email at: george.ellison@cebridge.net
Reprinted from *Chinquapin*, the newsletter of the Southern Appalachian Botanical Society, Spring 2006.

Botany 101, Lesson 24

Mustard Family= Brassicaceae = Cruciferae

Rebecca Dolan, Ph.D.

Friesner Herbarium, Butler University

The mustard family comprises 50 genera and 1350 species found everywhere but deserts; in Indiana, ca. 36 genera with 72 species.

Characteristics

Annual, biennial, or perennial herbs with pungent, watery juice. Leaves alternate, simple, often dissected.

Flowers of 4 sepals, 4 petals (arranged in a cross) and 6 stamens (4 long, 2 short), radially symmetrical. Petals often long-clawed; the distinctive cross shape is the origin of the traditional family name *Cruciferae*. Fruit is a silique, an elongated capsule.

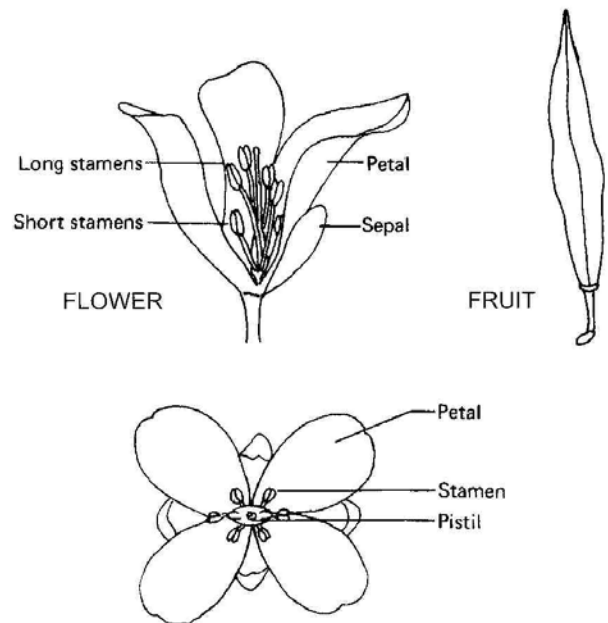
Economic Importance

Food crops: Lots of vegetables are members of the genus *Brassica*: brussels sprouts, broccoli, kohlrabi, cabbage, cauliflower, and kale are all the same species, *Brassica oleracea*, selected for different features of the plant; *Brassica campestris* gives us turnips and Chinese cabbage; other *Brassicaceae* give us mustard greens, horseradish, radish, and mustard seed.

Ornamentals: Honesty, candytuft, alyssum, money plant, dame's rocket.

Troublesome weeds: Garlic mustard and other weedy mustards, shepherd's purse, peppergrass, dame's rocket.

Plant products: Canola oil, mustard.



Reprinted from the *INPAWS Journal*, Spring 2005.

Boulevard Beauty:**Native wildflowers turn a suburban drainage ditch into a verdant oasis**

by Douglas Counter

The stories my elderly father would tell me of his exploits as a child were filled with the derring-do of young kids. Every chance he got, he would be down at Sunnyside, his neighbourhood beach, swimming in Lake Ontario, daring his chums to see who could swim out in the choppy water to the concrete breakwater and back. Those who were especially daring would dive down and swim between the narrowly spaced steel supports that held the breakwater against powerful storm-driven waves. For my dad, these stories evoked memories of a carefree time, when the entire summer could be spent at the beach in downtown Toronto enjoying one of the world's largest freshwater lakes.

Children swimming at that same beach today would indeed be taking their lives in their own hands. Not because swimming under the breakwater is any

more dangerous now than it was sixty years ago, but because the water they would be swimming in is now a threat to human health. More often than not, the beaches along Toronto's degraded waterfront are closed because of unsafe levels of *E coli* bacteria and other pollutants that flow directly into Lake Ontario, the source of Toronto's drinking water. During heavy storms, the city's sewer system is overburdened and huge volumes of storm water runoff mix with sanitary sewage; the rank mixture ends up flowing untreated directly into the lake. A series of massive, multi-million-dollar storm water holding tanks have recently been built by city engineers under the very sands of Sunnyside Beach to deal with this recurring problem. Only time will tell if this costly infrastructure helps.

Out in Etobicoke, in the city's west end, where my father and I share a small bungalow, the situation is equally grim. Storm water flows directly into a local stream, carrying a toxic cocktail of road salt, oil, pesticides and pet waste directly into the lake. Out of sight, out of mind, seems to be the collective opinion when it comes to dealing with suburban storm water runoff. Few people know or care where that polluted water goes once it disappears down the sewer grate.

I, for one, care. And that is why I decided to do something about it right in my own front garden.

Until 1999, the drainage ditch in front of our suburban home was just like all the others in the neighbourhood. Carpeted with turf grass and parched to a pale shade of brown much of the summer, it was a hazard to anyone attempting to mow it with a gas lawnmower, what with gravel shooting up into the paths of oncoming cars and the sides so steep it was difficult to keep a safe footing.

That was then. That once boring strip of cropped lawn is now a verdant oasis of native plants serving a host of equally important and meaningful functions. The wildflowers, grasses, and sedges my "eco friends" and I planted there provide immeasurable beauty throughout the year. They provide vital habitat for countless insects, butterflies, and birds. The plants slow the flow of storm water runoff long enough that it can seep into the ground and be cleaned and filtered by that process, thus recharging the water table. This reduced peak flow reduces the erosion of local stream banks, and it lessens the strain on the city's overburdened storm sewer system. The native groundcover requires no pesticides or lawn-mowing or supplemental watering. The attending crickets provide a most welcome summer evening symphony; a surprise visit from a firefly this summer marked the first time I had seen a firefly in the city in my life.

When planning the ditch garden, I chose short species of native plants because I was planting next to a roadway. There are now more than forty species in the ditch garden, specifically adapted to such a site and carefully chosen to provide colour and interest throughout the growing season. Spring bloomers include field pussytoes (*Antennaria neglecta*), larval host plant of the Painted lady butterfly, prairie smoke (*Geum triflorum*), wild strawberry (*Fragaria virginiana*), and golden Alexanders (*Zizia aurea*). Early summer brings the cool hues of blue flag iris (*Iris versicolor*), harebells (*Campanula rotundifolia*), hairy beardtongue (*Penstemon hirsutus*) and nodding wild onion (*Allium cernuum*). This exquisite blue palette is complemented by the intense orange of butterfly

milkweed (*Asclepias tuberosa*), one of the host milkweeds of the Monarch butterfly caterpillar. Later in the summer, the intense red of cardinal flower (*Lobelia cardinalis*) punctuates the ditch garden, and fall brings the yellow glow of the low-growing grey goldenrod (*Solidago nemoralis*).

A number of sedges provide a continuous carpet of green: Pennsylvania sedge (*Carex pennsylvanica*), foxtail sedge (*Carex vulpinoidea*), and the fascinating mace sedge (*Carex grayi*), whose seed head resembles a medieval war club. On the drier slope nearer the sidewalk, I chose two of the shorter native grasses, sideoats grama (*Bouteloua curtipendula*) and little bluestem (*Schizachyrium scoparium*). Nothing can outdo the roots of native grasses both for holding the soil against erosion and for creating a spongy topsoil that encourages the effective infiltration of rain water. I planted some taller species at the base of the ditch: swamp milkweed (*Asclepias incarnata*), great blue lobelia (*Lobelia siphilitica*) and ironweed (*Vernonia altissima*). As autumn approaches, the grasses and wildflowers put on their finest wardrobe of bronzes and golds – a spectacular season finale. And in winter they provide seed and nesting materials for birds.

Before our ditch was planted with native wildflowers, it was a barren, unnoticed patch of turf, just like the thousands of other patches of lawn in a monotonous urban landscape. But since the creation of our ditch garden, it has become an oasis visited both by butterflies on their annual migrations and neighbours on their evening strolls. It has linked the natural world to my community of neighbours. My father and I now pay a lot more attention to the posted closings of local beaches. My dad often reflects on his childhood – on his trips to the beach and swimming in the lake. It is profoundly sad for him to realize that his own grandchildren cannot do the same. Perhaps more ditches will be transformed into natural filtration systems through the use of native plants, the result being cleaner, safer water entering our rivers and lake. And perhaps in the not too distant future, children will once again enjoy the legacy of safe, swimmable beaches in the heart of Canada's largest urban centre.

[On May 22, 2003, the highest court in Ontario affirmed Douglas Counter's constitutional right to grow a controversial natural garden on the City-owned boulevard in front of his house.]

Douglas Counter is a graphic designer. His infiltration garden is the subject of a lawsuit with the City of Toronto.

Reprinted from *The Blazing Star*, Newsletter of the North American Native Plant Society, Summer 2002

Tamarack: A Deciduous Conifer

Gordon Mitchell

Most of the coniferous trees that are all familiar to us, such as the Pines (*Pinus*), the Spruces (*Picea*), and the Firs (*Abies*), are all evergreens. That means those trees do not shed all of their needles every year. However, there are a few conifers that are deciduous and do shed their needles every year. One such deciduous conifer is the Tamarack (*Larix laricina* [Du Roi] K. Koch).

Tamarack is a member of the Pine Family (*Pinaceae*). The generic name, *Larix*, and the specific epithet, *laricina*, are both Latin for "Larch". Previous scientific names for this plant were *Pinus laricina* (Du Roi) and *Larix alaskensis* (Michaux). Other common names for this tree are Alaska Larch, American Larch, Black Larch, Black Larix, Eastern Larch, Hackmatack, Juniper, Juniper Cypress, Larch, Larch Tamarack, *Meleze larican*, and Red Larch.

The Tamarack is a shade-intolerant tree and is usually the dominant tree in the stand. It is fast growing for about the first 40-50 years (especially in dry open upland areas) and it is a long-lived tree (up to 200 years).

Uses of the Tamarack

The Tamarack has some edible and medicinal uses. The tender young shoots and the inner bark are both edible. They are valued as emergency food. A tea made from the bark or from the roots was used as a diuretic, a purgative, and as a tonic. It was also used for treating colds, consumption, coughs, jaundice, rheumatism, and skin ailments. A tea made from the needles was used as an astringent or as a beverage and was used for treating dropsy, and various intestinal ailments. It was also used as a gargle for treating sore throats. A poultice made from the inner bark or from the needles was used for treating bruises, burns, frostbite, headaches, infections, inflammations, sores, and swellings. Those same parts were also boiled and were used as a fumigator or as an inhalant for treating backaches and headaches. The inner bark was used for treating melancholy. The resinous gum, arabinogalactin, was used in making baking soda, for treating burns, ulcers, wounds, and kidney and lung ailments, or was chewed for treating indigestion.

In 1672, John Josselyn, historian and naturalist for the Massachusetts Bay Colony, wrote this about the Tamarack:

The Terpentine that issueth from the Larch Tree is singularly good to heal wounds, and to draw out the malice.

Threats to the Tamarack

Like most tree species, there are many things that threaten this tree. Because of its shallow root system, this tree is susceptible to windthrow. The tree's thin bark is also vulnerable to fire. The tree is susceptible to certain fungal diseases, such as Butt Rot, Heart Rot, and Root Rot.

Some species of birds and mammals can also harm the Tamarack. The Yellow-bellied Sapsucker (*Sphyrapicus varius* L.) drills holes into the bark and opens the tree to various diseases. The Porcupine (*Erethizon dorsatum* [L.]) and the Eastern Gray Squirrel (*Sciurus carolinensis* J.F. Gmelin) both eat the inner bark. The young seedlings and needles are frequently browsed by the Eastern Cottontail Rabbit (*Sylvilagus floridanus* [Allen]) and by the White-tail Deer (*Odocoileus virginianus* Boddaert).

Probably the greatest threats to the Tamarack are the insects. The native Larch Woolly Aphid (*Adelges lariciatus* [Patch]), the native Larch Sawfly (*Pristiphora erichsonii* [Hartig]), and the non-native Larch Casebearer (*Coleophora laricella* [Hubner]) all attack the needles. Some of these insects can defoliate an entire stand in any given year. Their defoliations can severely damage or even kill the tree. A weakened tree is then much more susceptible to other pests.

Any tree that survives these defoliating insects is subject to attack by the Eastern Larch Beetle (*Dendroctonus simplex* Le Conte), which attacks the bark. This insect bores into the bark to girdle and to even kill the tree.

Description Of the Tamarack

Height: 30-115 feet.

Diameter: 10-40 inches.

Trunk: The trunk is straight and tapering.

Crown: The crown is thin, open, conical, and pyramidal. It becomes more irregular with age.

Branches: Its branches are horizontal and do not droop or sag. The lower branches may touch the ground, take up rooting, and then send up new shoots. This is a process known as layering. Layering of these branches is more common at the northern latitudes.

Bark: The bark is thin, smooth, and gray when young. It later becomes thick, furrowed, flaky or scaly, and bright red-brown. The inner bark is a dark red-purple. The bark had some uses. It contains tannic acid (tannin), which was used for tanning leather. The bark also contains oleoresins, which were used for making turpentine.

Twigs: These twigs are slender or stout, stiff, glossy or glabrous, hairless, ridged or grooved, red-yellow to orange-brown. Some of the twigs have warty, short-spurred side twigs. The tips of the twigs may be horizontal or upright.

The Native Americans had uses for these twigs. They sometimes made their arrow shafts from the twigs.

Buds: These buds are small, brown to dark red, shiny, hairless or ringed with hairs, and globose. Their scales are short, loose, and pointed.

Leaves: Needles. These needles are either closely arranged in crowded circular and spiral tufts of 10-60 upon the short side spurs or are scattered and are solitarily arranged on the young leading shoots. Each needle is soft and flexible, about 3/8-1 3/4 inches long, about 1/32 inch wide, is flat or is slightly 3-angled (1 rounded side and 2 keeled sides with lines of white dots), has a blunt tip, and is bright yellow-green or is light blue-green. The outer margins have 2 resin dots. In the fall, these needles turn a golden yellow before falling. (Naturalist Aldo Leopold referred to these yellow needles as being "Smoky Gold".)

The early European settlers had some uses for these needles. They used the needles to stuff their mattresses and their pillows.

Leaf Scars: The leaf scars have only 1 vascular bundle scar.

Flowers: The flowers are monoecious and are wind-pollinated. Flowering season is usually April to June.

Male (staminate) flowers: The male flowers are 1/4 inch long, bright yellow-green, oblong, globular, or spherical catkins. Their short pollen scales are spirally arranged around a central axis. These sessile flowers are usually found on the twigs of the lower 1-2 year branches.

Female (pistillate) flowers: The female flowers are about 1/4 inches long, green, yellow, or red, oblong, soft, and erect. The scales are purple-red with extended long green tips and are also spirally arranged around a central axis. They are usually found on the tips of 2-4 year old branches.

Fruit: Cones. The cones are about 1/2-1 inch long, elliptical, obtuse, oval, ovoid, spherical, cylindrical, red when young but later brown, upright, and short-stalked or sessile. These cones usually mature within 1 season.

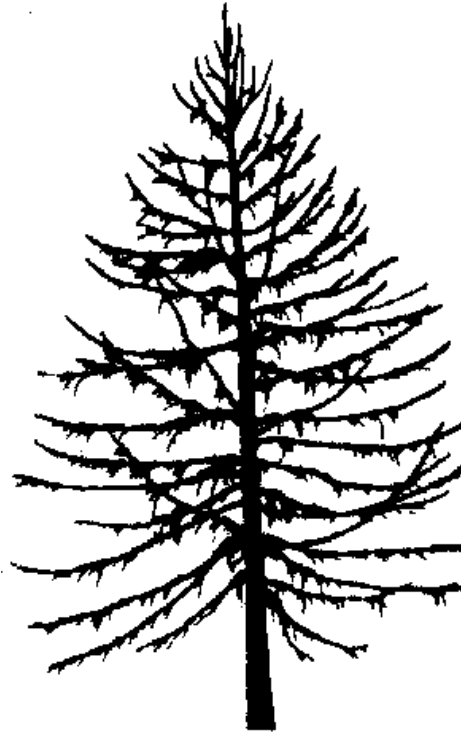
Each cone has about 10-60 thin, rounded, overlapping woody brown scales. Each scale has 2 brown, long-winged seeds. Each seed is about 1/8 inch long and is wedged-shaped.

These cones usually ripen in the fall and shed their seeds over a period of several weeks to several months. These windborne seeds may travel up to 200 feet. After they shed all of their seeds, the cones may persist upon the tree for up to 5 years.

The trees begin to produce seeds by age 12-15 with their peak productive years between ages 50-75. These trees produce good seed crops about every 3-6 years.

One fully mature tree may have up to 20,000 cones, which may produce up to 300,000 or more seeds. In a closed stand, an acre of Tamaracks may produce about 500,000 to 1,200,000 seeds. In an open stand, an acre of Tamaracks may produce about 1,500,000 to 2,500,000 seeds.

As many seeds as these trees can produce, very few of those seeds ever make it to germination. Up to 1/2 of these seeds may be eaten by birds and by small mammals, such as the Ruffed Grouse (*Bonasa umbellus* L.), the Northern-capped Chickadee (*Poecile atricapilla* L.), the Pine Siskin (*Carduelis pinus* [Wilson]), the Red-breasted Nuthatch (*Sitta canadensis* L.), the Red Crossbill (*Loxia curvirostra* L.), the White-winged Crossbill (*Loxia leucoptera* J.F. Gmelin), the American Chipmunk (*Tamias striatus* [L.]), and the Northern Red Squirrels (*Tamiasciurus hudsonicus* [Erxleben]). Other seeds are lost to bacteria, fungi, and insects. Only about 4-5% of all of these seeds ever germinate.



Wood: The wood is hard, heavy, strong, tough, spirally or coarse-grained, and highly rot-resistant (especially in soil and in water). The heartwood is light brown and the sapwood is white.

The wood is used in rough construction, such as boxes, crates, fence posts, house framing, ladders, mine timber, pilings, plywood, pulpwood, railroad cross-ties, and utility poles. Unfortunately, this wood is not highly valued for lumber. The wood also makes good fuel because it burns hot. However, exposure to the wood sawdust may cause dermatitis in some people.

Roots: The roots are usually shallow, fibrous, and widespread. They may only reach a depth of 1-2 feet. These roots may bend straight downward at right angles to form "root knees".

The bent root knees were used as joints in shipbuilding. These knees joined the ship's ribs to the deck timbers.

The Tamarack can sometimes reproduce by root sprouting. Newer roots can sprout above the older roots.

Their rootlets are tough, elongated, pliant, and slender. Some Native Americans made rope or twine from these rootlets or used them for basketry or for sewing. Some tribes used them for sewing their birch bark canoes. The longer and more slender rootlets came from trees that grew in Beaver (*Castor canadensis* Kuhl) ponds.

Habitat: Bogs, fens, wet peaty soils, dry upland areas. It tolerates a wide range of soil pH. It also tolerates temperature extremes from -75 to +100 degrees F. However, it cannot tolerate prolonged flooding. The Tamarack is a pioneer species and may sometimes be found in pure stands.

Range: Alaska to Newfoundland to northern U.S. This is the most northern tree species in North America and has the widest range of all of the conifers.

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

Hay-Scented Fern: "Can't Miss" Clue to Crisis

Reprinted from Notes of the Pennsylvania Native Plant Society, Oct. – Dec. 2006

Ferns are interesting and beautiful components of Pennsylvania's forests. But extensive single species mats of ferns, such as can be seen in many of our woodlands, indicate a serious ecological imbalance that threatens our forests' future.

Across their ancient lineage, ferns have adapted to a wide range of conditions. Some species do best in damp, boggy settings while others are acclimated to exposed rocky ledges and boulders. Some ferns, especially the hay-scented fern, *Dennstaedtia punctilobula*, are well adapted to exploit temporary gaps in forest vegetation. Once established, hay-scented fern can quickly invade and dominate forest stands where competing vegetation has been reduced or removed. The hay-scented fern produces abundant spores in late summer and autumn, some of which inevitably come to rest along roadsides, field edges, new timber cuts or other settings where there is adequate light and sufficient dryness to support their germination and growth.

A growing body of research indicates that the invasion and domination of Pennsylvania forest understories by hay-scented fern is an indirect consequence of over-browsing by deer. Deer will not eat hay-scented fern, but as they continually browse their preferred shrub and herbaceous plants, those



Hay-scented fern (*Dennstaedtia punctilobula*)

species decline and openings develop where conditions are right for hay-scented fern germination. As browsing continues, the fern spreads by sending up new fronds from an expanding network of rootstocks. Eventually the fern mat becomes dense enough to prevent germination of other plants and extensive enough to impact hundreds of acres. Botanical notes from the

early 19th century indicate that hay-scented fern occupied less than 5% of the understory in Pennsylvania forests. Researchers from the University of Pittsburgh now estimate that two-thirds of the half million-acre Allegheny National Forest has been invaded by fern stands with the potential to interfere with tree regeneration.

At Heart's Content, an old-growth hemlock northern hardwood tract in the Allegheny National Forest, researchers noted declines or disappearance of herbaceous plants in the understory compared to diversity data collected 60 years earlier. Areas showing a loss of diversity of herbaceous plants also exhibited high densities of hay-scented fern. Researchers attributed the loss of diversity to consumption of herbaceous plants by white-tailed deer, which indirectly caused domination of the site by hay-scented fern.

Such research is providing a clearer understanding of the complexity of forest health. A recent study by the U.S. Forest Service Research Lab at Warren, PA, concluded that over-browsing by deer indirectly sets up a situation in which small mammals, such as mice and chipmunks, further restrict regeneration and diversity.

Researchers found that once a fern mat became established, large seeds that fell from trees were more vulnerable to being found and eaten by small mammals. "Preliminary experiments demonstrate that seed predation by small mammals underneath the fern cover is more intense and more selective, with the mammals preferentially choosing the largest seeded species over the small seeded ones," researchers reported. Small mammals that feed on tree seeds may also find more protection from hawks, owls and other predators in the fern cover than in a diverse forest understory.

Scientists in the same study removed the fern layer in some study plots and observed a "germination burst" of hardwood trees and other species. That burst of germination eventually resulted in greater diversity in the seedling layer. Researchers noted, however, that renewed seedling diversity was greatest on sites where deer-proof fences excluded the influence of browsing.

Domination of the seedling level by ferns has been documented in forests well beyond Pennsylvania, including New England, the southern Appalachians, the Ozark Mountains and the deep south. Deer are a common factor among these widespread forests that occur at different latitudes and elevations.

The Department of Conservation and Natural Resources State Forest Management Plan acknowledges the extent and seriousness of the problem and advises deer hunters that the State Forests' ability to support deer for hunting recreation has been degraded by deer over-browsing. "Currently the forest understory across vast areas of the state has been reduced to a diminished group of species not preferred by deer, such as beech, striped maple, hay-scented fern, sweetfern, and huckleberry," the plan states. "Fewer deer are able to survive in this denuded habitat. Many species of forest plants (Canada yew, some Viburnums, pink ladyslipper, and many other shrubs and wildflowers), have been, or are on the verge of, being eliminated from our forest ecosystems. This is the present condition of much of the State Forests: unsustainable forests, a major ecological disaster."

Unlike some invasive plants, hay-scented fern is a native species. It has lived in our forests even longer than deer. But given an opportunity, it can exclude nearly all other competition, including wildflowers, valuable hardwood trees and plants that support the rest of Pennsylvania's wildlife heritage.

Hay-scented fern is easy to recognize by its bright yellowish-green color, its lustrous brown stalk, and its erect or slightly arching growth. The leaves average about 16 inches in length, feel slightly sticky to the touch and emit the pleasant fragrance of new-mown hay when bruised.

Like deer, hay-scented fern in our forests often exemplifies the maxim: Too much of a good thing.

This article was reprinted with permission from the March 2006 issue of "Resource Report a Publication of the Ecosystem Management Project." Ben Moyer and Bryon Shissler, Editors.

Monongahela National Forest Dolly Sods Wilderness

US Forestry Service

Location

Dolly Sods Wilderness is located on the Cheat-Potomac Ranger District of the Monongahela National Forest in Tucker and Randolph Counties, West Virginia.

Characteristics

Dolly Sods Wilderness occupies the lower half of the drainage of the north fork of Red Creek. Red Creek begins on the high plateau of Allegheny Mountain, a flat, poorly drained area. As the stream crosses into what is now wilderness, it begins to cut down through the

plateau, creating a steep-sided canyon. As it leaves the wilderness, it joins with the south fork of Red Creek and continues on to the Dry Fork River. Because of this, the northern section of the wilderness is high-elevation plateau, wind-swept and boggy. Patches of native red spruce, alder, maple, and mountain ash mingle with plantations of pine, upland heath, and sphagnum bogs. The area is generally open, with wide-spreading vistas. Huckleberries and cranberries are common in the heath and bog areas. As Red Creek and its tributaries, Big Stonecoal and Little Stonecoal Runs, leave the plateau, they become more forested, with a number of hardwood trees including maple, birch, and black cherry. Hemlock is a common conifer along the drains as well. Underneath the trees are thickets of rhododendron and mountain laurel. Red Creek itself changes from a pleasant meandering stream to a dynamic, tumbling watercourse, with several small waterfalls and swirling pothole areas. Red Creek is well known to flash flood because the high ridge of Allegheny Mountain, the eastern continental divide, catches storms. When enough rain has fallen to lighten the clouds, they finally sail on east. Interestingly enough, Allegheny Mountain also catches storms coming from the east, most notably those associated with hurricanes, which also dump water into Red Creek.

History

The Dolly Sods area was first explored by Thomas Lewis during a survey in 1746 to find the limits of Lord Fairfax's land grant from the British Crown. The area was generally avoided as too impenetrable until the late 1800's. The exploitation of West Virginia's coal and timber resources got under way in the 1870's and by the late 1890's, the railroad had reached Davis, WV. In 1902, a band saw mill was built at Laneville, WV, with a railroad from the Dry Fork to service it. Logging camps sprang up throughout Dolly Sods as the virgin forest was cleared away to feed the hungry mills. By 1920, very little virgin forest remained in West Virginia. During this time, the Dahle family homesteaded a few acres in the area. By burning the logged areas once, they could get a good grass cover for grazing. These open fields were known as "Sods". Unfortunately, the amount of slash left behind coupled with the drying of the rich, peat-like soil, and the continual sparks from the trains contributed to repeated burning. This killed the grass and left only bracken fern to grow, no good for man or beast. The Dahle family eventually moved on, leaving only their name behind, Americanized into "Dolly Sods". The United States government purchased the first pieces of this area in 1916, adding it to the new and growing Monongahela National Forest. During the 1930's Civilian Conservation Corps enrollees planted pine in an effort to reforest the area and prevent erosion and

downstream flooding. In 1943, in a cooperative agreement with the army, the area was used as a practice artillery and mortar range and maneuver area before troops were sent to Europe to fight in World War II. The area was designated into the National Wilderness Preservation System in 1975 with the passage of the so-called "Eastern Wilderness Act". It is now managed under that law and the Wilderness Act of 1964 to be a place where protection of natural processes is the highest priority use for this area.

Trail System

Dolly Sods Wilderness is 10,215 acres in size. There are 25 miles of trails, many of which follow old railroad grades and logging roads. Trails do not have blazes and may or may not have signs. Most signs are expected to disappear over time as they are damaged and not replaced. Large rock cairns will mark major trail junctions, and smaller cairns may mark areas where the trail location is confusing. Deadfall trees will be made so that they are reasonably passable, but will not be completely cleared. This will help retain some of the naturalness of the area. No bridges are provided over streams. Please, do not remove or disturb artifacts of the past. These chunks of old glass and metal, railroad spikes, and horseshoes are a reminder of our past and that this area was once subject to human alteration. Leave them here so that all can marvel at how far the land has returned to naturalness.

Ecology

Dolly Sods is said to be a little bit of Canada placed a hair too far south. Many of the ecotypes are more typical of what one would expect to find in Canada rather than West Virginia. The upper sections of Red Creek and its tributaries display sphagnum bogs, complete with rare sundew and reindeer moss. Red spruce trees are frequently one-sided because the fierce prevailing winds stunt the growth of branches on the windward side of the tree. Huckleberry heaths occur between bogs and spruce stands. Rock outcrops are frequent in the upper sections of the wilderness and form ledges along the canyon of Red Creek. The sides of the Red Creek canyon and the slopes of its tributaries are clothed in maple, birch, cherry, and other hardwoods. Hemlock is a common conifer in these lower reaches, and rhododendron and mountain laurel clog the drainages. Lycopodium and fern are common ground covers. All these plants attest to the natural acidity of the soil and water.

Reprinted from the US Forestry Service web site for the Monongahela National Forest, Dolly Sods Wilderness: http://www.fs.fed.us/r9/mnf/sp/dolly_sods_wilderness.htm

Dolly Sods In the Rain and Fog

By Bill Grafton

September 2, 2006: Bear Rocks Trail (#522)

Emily and I debated whether the 2-½ hour drive would be worth a day in the cold rain and wind that we knew would be the weather on Dolly Sods. The skies were showing some blue in Morgantown but by the time we arrived in Deep Creek Lake, Maryland, the temperature was a chilly 55 degrees and a steady rain was falling. We reluctantly drove on and arrived at Bear Rocks Trail (#522) on Dolly Sods where, in fact, it was cold and foggy with a steady wind.

We pulled on our coats and boots and backpack and headed down the rocky road from the trailhead. It was only 2 days after Ernesto (the hurricane), so lots of water was present.

We literally walked on a carpet of three-toothed cinquefoil for several hundred feet. The dwarfed plants were already in seed which is necessary when you only have a 90-day growing season. Low shrubs of wild raisin, smooth serviceberry, black chokeberry, early low blueberry, and black huckleberry were common along the old road. The black huckleberry was covered with ripe fruits that were excellent fare.

To add to the beauty of the heath barrens were taller clumps (6-10 feet tall) of mountain holly, mountain laurel, and Minnie-bush. Very visible, even in the heavy fog, were the golden spikes of bog goldenrod flowers.

Along the road edges were dense clumps of crinkle grass and Allegheny flyback grass.

The first half-mile was down hill to an unnamed tributary of Red Creek.

Open bogs and swampy thickets straddled the stream. Yellowish-brown leafless stalks of yellow *Bartonia* were frequent, sticking their heads above the fading sedge leaves, hispid dewberry, and running clubmoss. In more open areas were the bright showy red capsules and tiny golden yellow flowers of Canadian St. John's-wort. The abundant small cranberry plants were covered with whitish green fruits on long stems that will certainly be ripe in another 2 ½ months, in time for Thanksgiving. Patches of bluejoint grass dominated small areas and many spots were flattened by the wind and rain of Ernesto.

Open sphagnum bogs showed white puffs of cottongrass, yellow spikes of bog goldenrod, and whitish blue flowers of the rare narrowleaf gentian.

Thickets of black chokeberry with shiny red and black fruits and the bright red fruits of wild holly (*Nemopanthus mucronatus*, [now *Ilex mucronata*]) hung on their 1-inch stalks. We also frequently caught the strong pungent odor of wild raisin wafting on the damp air.

The area along this small stream is a fascinating mixture of bogs, openings, thickets and dense dark green stately spires of red spruce. Clumps of mountain rosebay were scattered among the large shrubs and brought back memories of the showy deep pink flowers in late May and June of this unusual azalea that flourishes up to 4000 feet elevation. The glade St. John's-wort still had a few fuzzy yellow flowers but was mostly the small 3-5 mm long capsules. Several patches of sprawling yellowish green stems and bladdery perigynia seeds of *Carex folliculata* (Northern long sedge) gave a psychedelic look to their small niche of the landscape.

This small stream was lower and the thickets and red spruce blocked the wind so we felt warmer and the fog was more dense. We now headed westward over the ridge toward Red Creek. The trail passed through open hardwood forests of stunted and limby beech, black cherry, red maple, with a scattered understory of striped maple and beech root sprouts. There were also large patches of hay-scented fern and Allegheny flyback (*Danthonia compressa*).

Near the top of the ridge we broke into a more open landscape with scattered red maple, beech, black cherry, and red spruce outlined in the ghostly fog. Shrubby clumps of black chokeberry in heavy fruit were common along with patches of velvetleaf and early low blueberries with virtually no fruits left on the stems. Bears, birds, and humans had enjoyed the bountiful harvest earlier. Only the masses of black huckleberry fruits remained, and each tug could easily collect 6-10 delicious, but seedy, fruits. It was tempting to eat and forget the haunting though faint roar of Red Creek about ½ mile down the hill. The open hillside was covered with triangular bracken ferns, dense yellow green patches of hay-scented ferns, early low blueberry (green and blue leaf forms), and tree clubmosses. Scattered among the patches were also the rough leafy vines of trailing arbutus, running clubmoss, teaberry, and a few cow-wheat plants with their delicate yellowish white flowers.

Halfway down the hill was a springy seep that was perfect habitat for the rare American mannagrass (*Glyceria grandis*), cinnamon fern, mannagrass (*Glyceria melicaria*), and nodding sedge (*Carex gynandra*).

As we neared Red Creek, we intersected the Dobbin Grade Trail. Below this trail were lush meadows, swales, and seeps.

A small patch of broad-leaved cattails lined one swale. Silky willow, quaking aspen, and glade St. John's-wort were common shrubs in this area. Bog goldenrod was common, and narrowleaf gentian and cottongrass still provided a colorful landscape. The sphagnum moss was deeper and wetter. Two new and unusual plants found here were elliptic-leaved St. John's-wort and the round-leaved sundew.

Finally we reached Red Creek which was about 10 feet wide and could easily have been crossed but we turned back to tackle another trail. Red Creek is laden with the tannic acid of "blackwater streams" and had neat patches of foam lining the bank of pools. One final photograph of Red Creek and it was time to retrace our steps.

But it is often a small world and thus along the trail we met Fred and Carol McCullough, members of The Brooks Bird Club. They were hiking because the bad weather had "closed the nets" on the bird banding station.

Nature and naturalists: a great way to end a hike on Dolly Sods.

September 2, 2006: Blackbird Knob Trail (#511)

The next trail on our list was the always popular Blackbird Knob Trail (#511). The trailhead is very close to the Red Creek campground and the first few hundred feet are on a nice boardwalk through a dense wet thicket. The thicket is composed of speckled alder, black chokeberry, mountain rosebay, and glade St. John's-wort. The purple-stem aster was just beginning to bloom and the wrinkleleaf goldenrod was at its prime while the cinnamon ferns were turning yellowish brown.

At the end of the boardwalk we encountered an open forest on a slightly sloping hillside. Trees were black cherry, red maple, and red spruce with a shrubby understory of mountain holly, hawthorn, witch-hazel, and smooth gooseberry. Numerous patches of hay-scented fern, interrupted fern, Allegheny flyback, white flat-topped aster, and grass-leaved goldenrod filled the open gaps between the trees.

The first half-mile of Blackbird Knob trail is extremely rocky and has many flat muddy areas. As we climbed the hill, we encountered several groves of red pine and red spruce plantations. After skipping from rock to rock and walking in the mud we reached the summit and encountered a beautiful heath barren stretching westward. Also the temperature was now comfortable, and the sun even popped through the clouds once in a while. The fog had burned off or blown away and the day was becoming very nice. The magic of Dolly Sods still amazes me.

Clumps of 6-10 feet tall shrubs of black chokeberry, mountain rosebay, wild raisin, scrub oak, and Minnie-bush dotted the landscape as did shorter colonies of velvetleaf and early low blueberries. Bracken fern, running clubmoss, hay-scented and interrupted ferns were very common. The yellowish strobili (cones) of the clubmosses added color as did the somewhat similar yellow *Bartonia*. The yellow spikes of bog goldenrod stood like sentinels and the half ripe small cranberry fruits sure made me think of a roast turkey dinner. Other neat plants were hispid dewberry, Canadian St. John's-wort, crinklegrass, and teaberry.

The trail next crossed a very rocky and muddy swale where we saw a wild holly (*Nemopanthus mucronata*) literally red with fruits, very lush growth of bog goldenrods, and vigorous nodding sedges with their pendulous seeds. Also of interest were small groves of quaking and bigtooth aspens growing within a few feet of each other. Mountainash were covered with light reddish berries in large flat clusters that will put on a real show in another month. We also spotted a single balsam fir sapling that was free of the deadly Balsam Woolly adelgid insect.

The next leg of the trail was down the long dry slope to Alder Run. The trail was quite smooth and there were constant vistas to the west. At the bottom we found the 8-foot-wide Alder Run in a pure grove of pole-sized black cherry that were moderately infected by the black knot disease.

We easily crossed Alder Run and followed the trail through a dense forest to the open top of the ridge. Along the way were millions of fresh leaves scattered across the forest floor. Obviously they had suffered the wrath of Ernesto's winds. I spotted a familiar leaf and was very surprised to locate a tulip poplar tree growing at an estimated 3700 feet elevation. The ridge summit was quite open with large 20-30 foot circular clumps of early low blueberry, hay-scented fern, and Allegheny flyback. Note: Have you wondered about this Allegheny flyback grass?? The story is that the very

tough stems of the grass, defied the sharp scythe blade of pioneer farmers who tried to cut it for winter hay. Even a sharp scythe would slide over top of the grass and the grass would fly back upright. There were numerous plants of spreading dogbane, whose wonderfully fragrant flowers are a midsummer treat and aromatic treasure.

We reached Red Creek, which was much larger than where we found it 3 miles upstream on Bear Rocks Trail. Here, we were in a dense red spruce forest with lots of rhododendron and mountain laurel in the shrub layer. Red Creek would be much more formidable to cross but people were up to the challenge

as witnessed by tents on the opposite side of the creek. For us, it was time to head back to our car and lose our thoughts in memories of "blackwater", white rocks, heath barrens and fog.

May you and future generations enjoy Dolly Sods as we have so many times!!!

Reprinted from *Native Notes*, the West Virginia Native Plant Society Newsletter, Volume 14:2, October 2006

[Ed. Note: We will have more articles about the Dolly Sods Wilderness in future issues. In March we will print another September hike by the Graftons in the rain and fog.]

Liverworts

by Joan Crowe

Liverworts are the poor relations of mosses. Their common name arose because the lobed thallus in a few larger species was considered to mimic the shape of the human liver, and "wort" is an old English word for plant. (Thallus is defined as a life-like structure without distinct roots or stems.) In medieval times a belief was formulated known as the Doctrine of Signatures. For some centuries it was believed that a plant reminiscent of the shape of a body organ would contain a cure for diseases associated with it. Thus taking an extract of liverwort would cure your hepatitis. It probably worked as well as most things! However, thalloid liverworts only make up about one-tenth of the liverwort flora; the remainder are "leafy", more moss-like and generally much smaller.

Liverworts (*Hepaticae*) are Bryophytes along with the mosses, as they have the same life cycle and a similar means of reproduction. However, they differ in a number of ways. The leafy liverworts tend to be flatter, with two ranks of leaves. If there is a third rank it is hidden beneath the stem and usually those underleaves are much smaller. All liverworts are prostrate like pleurocarpous mosses, but they are generally much more translucent than mosses, because the cells are

bigger and isodiametric so more light passes through them. The leaves never have midribs. The capsules are ephemeral and much simpler than moss capsules, opening into four valves and discharging their spores quickly.

The only mosses that might be mistaken for liverworts are the *Fissidens*. These are prostrate and do have two-ranked leaves, but even under low magnification it can be seen that the leaves have midribs and the cells are narrow and dense. Some of the *Mniums* have large cells that give them the translucent look of liverworts, but the leaves have midribs and the plants are larger and more erect.

Generally speaking, liverworts are not so resistant to desiccation as mosses, but there are some exceptions. The tiny, dark *Frullanias* grow in patches on tree trunks, often at eye level, where there is a very intermittent supply of water, but they have developed lobes on the underside of the leaves that are like little jugs that catch and

retain minute quantities of water. Lower down the trunk, bright green patches of *Radula complanata* are common, also with a simpler water-catching leaf underlobe.

Liverwort leaves may be two-, three- or four-lobed. Occasionally the leaves may have minute



Leafy liverwort
Gametophyte and sporophyte

teeth or, more commonly, they may be fringed. In the latter category, the fuzziest one of all is the whitish-green *Trichocolea tomentella*. It may be found growing with *Sphagnum* in swampy cedar forests. Another extremely common fringed species is *Ptilidium pulcherrimum* found on tree trunks and rotting logs. Less common is its reddish, more robust cousin *Ptilidium ciliare*.

Of the bilobed species, probably the pale whitish-green *Lophocolea heterophylla* is the most ubiquitous, especially on rotting logs. In southern Ontario the robust three-lobed species *Bazzania trilobata* makes large patches on the forest floor. It always reminds me of a mass of brownish-green caterpillars because, when dry, the leaves and shoots curl under. When moistened and viewed with a hand lens, it can be seen that the leaves have three teeth and the underleaves are quite large.

In the north, moist decorticated rotting logs are a good place to find a variety of liverworts. More commonly, in southern Ontario you will come across such a log that appears to be covered in red velvet. This is *Nowellia curvifolia* with a strangely cupped bilobed leaf.

The only species of liverwort to which most people are exposed in high school or first-year university biology is *Marchantia polymorpha*. It is actually not very common, although it crops up occasionally in damp spots in gardens and often in recently burned-over forest areas. This is a comparatively large thallose species (7-15 millimetres wide, 4-6 centimetres long) with broad leaf-like lobes.

Of the thallose species, the cone-headed liverwort (*Conocephalum conicum*) is by far the most common. It maybe found on moist rocks or soils that are basic, never on acid substrates. It has lobes more than one centimetre (about a half inch) wide and forms large patches. It can be seen with a hand lens that the surface is covered with distinct pores.

Marchantia also has this feature, but the pores are not so prominent.

The cone-headed liverwort is generally yellowish-green but in the dolostone-dominated areas of the Niagara Peninsula it maybe bluish-green. The sporangia (the receptacles in which spores are formed) are borne in a cone-shaped structure like a small mushroom, most likely to be found in early

spring. The most interesting feature of *Conocephalum* is that it has an attractive scent when you crush a piece. That will always distinguish it from *Marchantia*.

Many liverworts produce aromatic oils and tiny clumps of oil droplets can be seen in the cells of fresh specimens under the microscope. What they do for the plant is not clear. They may slow dehydration and they may act as a deterrent to insects. You will often find tiny mites and beetles sheltering in liverworts but you never see one chewed by insects or snails, unlike higher plants.

Although liverworts have the same power of rehydration as mosses, in most cases they are less resistant to prolonged dehydration. However, a few of the thallose liverworts such as *Mannia* species, are adapted to very arid conditions, and they may be found growing in crevices in the alvars on the Bruce Peninsula or on rocky mesas in Thunder Bay, Ontario. They are even found in the Australian desert!

At the other end of the scale most liverworts tend not to be found in very wet places, although the tiny thallose *Riccias* prefer moist habitats such as lake edges and *Ricciocarpous natans*, also thallose, is actually aquatic.

Liverworts, like mosses, have few common names and they are hard to identify without a microscope (with magnification at least up to x40). Like mosses, our species are mostly circumpolar or circumboreal, so it is possible to use European books for identification purposes.

Both mosses and liverworts have a lot in common biochemically with the green algae and undoubtedly share a common ancestry. The bryophytes must have been among the first plants to move out of the water and establish themselves on land, but how or when remains a mystery. Unlike ferns, they do not fossilize well. Although there are traces at least as far back as the Devonian era, they undoubtedly evolved long before that. Like mosses, they do their bit to retain atmospheric moisture, slow erosion, store carbon dioxide and re-oxygenate the atmosphere and should be valued accordingly.

Joan Crowe is co-author with Linda M. Ley of The Liverworts and Hornworts of Ontario, available from the Claude Garton Herbarium at Lakehead University in Thunder Bay, Ontario. Illustration by Joan Crowe. Reprinted from The Blazing Star, newsletter of the North American Native Plant Society, Spring 2005.



Chapters of the Ohio Native Plant Society

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

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

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

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

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

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

MEMBERSHIP APPLICATION

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

NAME: _____

ADDRESS: _____

PHONE: (____) _____

E-MAIL: _____

Membership Types:

Individual \$15; Family \$20;
Sustaining \$30; Patron \$50
Subscription to the Journal only, \$15

Make checks payable to:
Native Plant Society of Northeastern Ohio
and mail to:

Ann Malmquist
NPS Membership Chair
6 Louise Drive
Chagrin Falls, OH 44022
440-338-6622

RENEW NOW
Don't miss an issue of ON THE FRINGE

On The Fringe
6 Louise Drive
Chagrin Falls OH 44022

NON-PROFIT ORG
U.S. POSTAGE PAID
NOVELTY OHIO 44072
PERMIT NO. 22

DATED MAIL – DO NOT DELAY



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

On The Fringe

In this issue:

Book review: *Lost Habitats* by Perry Peskin
Eastern American Trilliums, Part 2 of 4 – Frederick Case, Jr.
Weed Alert: Lesser Celandine
Witch Hazel – Marion Jackson
The Seasons at Kent Bog SNP – Tom Cooperrider
Lichen Symbiosis – George Ellison
Botany 101: Mustard Family – Rebecca Dolan
Boulevard Beauty – Douglas Counter
Tamarack: A Deciduous Conifer – Gordon Mitchell
Hay-Scented Fern
Dolly Sods Wilderness
Dolly Sods in the Rain and Fog – Bill Grafton
Liverworts – Joan Crowe

Journal
of
The Native Plant
Society of
Northeastern
Ohio

Volume 24, No. 4

December 2006