The Lady-Slipper

Kentucky Native Plant Society | Number 19:2 | Summer 2004

A Message from the President:

I HOPE EVERYONE had a great spring. We had a teriffic Wildflower Weekend at Natural Bridge State Resort Park and great weather on Saturday. I was one of the few who also led a hike on Sunday morning when it rained, but I had four brave souls who nonetheless, endured the wet conditions. Otherwise, the other hike leaders and nightly speakers were great and the t-shirts were a hit as usual.

We have just successfully completed the first two courses in our Certification Program in native plant studies at Northern Kentucky University. Basic botany and basic plant ecology were taught to an enthusiastic group of students. For the Fall semester, we will be offering courses in plant taxonomy and trees and shrubs of Kentucky. Watch the newsletter and website for details.

We now have several new officers and board members. I'd like to welcome our new Secretary, Lela McKinney and our new board members, Dave Luzader and Zeb Weese. Many thanks to those who previously served in these positions.

Additionally, I'd like to note that this issue of *The Lady-Slipper* wraps up six years of newsletters designed and prepared for the printer by Charles Chandler, our Communications committee chairperson. Charles has done an incredible job with our newsletter, and I suspect he is looking forward to a well-deserved break. I'd also like to welcome Amy McIntosh as she begins taking over publishing responsibilities for the next issue.

Well, the cicadas have finally begun to arrive around here, so at least in some places we will be in for quite a noisy time. Enjoy your summer and please take some time to enjoy at least some of the natural wonders Kentucky has to offer.

Landon McKinney

KNPS Fall Get-Together at Shakertown

The Kentucky Native Plant Society has reserved a meeting room at Shakertown at Pleasant Hill in Mercer Co., Kentucky, for 10:00 am on Saturday, October 30, 2004.

The day's activities will include an open board meeting (all members are welcome and encouraged to attend), a guest speaker or slide program, and a botanical field trip through Pleasant Hill's 2,900 acres of inner bluegrass farmland, forests, and Kentucky River palisades. Box lunches from the Trustees' Office dining room will be available, and Shaker Village dining and accommodations can be reserved for all who choose to come early, stay late, or spend the weekend.

Stay tuned to the KNPS website — *http://www.knps.org* — and *The Lady-Slipper* for lunch choices and program details!

Back Issues of *The Lady-Slipper*
and
KNPS Grant Application
details are posted on the KNPS Website—
http://www.knps.org

Ecology Squeakers Needed at Red River Gorge Planning Workshops!

From KNPS board member, Zeb Weese:

AS SOME OF YOU MAY KNOW, the US Forest Service is having a series of public workshops to determine how the Red River Gorge will be managed to alleviate overuse. The first workshop was heavily attended by user groups such as rock climbers and off-roaders, and I would just like to encourage all who enjoy the Gorge because of its ecology (birders, botanists, herpers, hikers, etc.) to attend any of the remaining workshops. We all know that the squeaky wheels get the greasin' and the plants, wildlife, and cliffs can't squeak for themselves.

Most of the workshops will be held on weekday evenings at the Clark Co. Extension Office in Winchester, but there will also be some Saturday field trips in the Gorge. Schedules and background materials are at —

http://www.southernregion.fs.fed.us/boone/lac/

In this Issue—

President's Message – 1
KNPS Fall Get-together – 1
Red River Gorge Planning Workshops – 1
Polygonaceae: The Smartweed Family – 2
French's Shooting Star – 4
Eastern Red-cedar – 5
Lifestyles, III – Hydrophytes, Epiphytes, & Saprophytes – 9
Flora of North America: The Latest Volumes – 11
Calendar of Events – 12

The Lady-Slipper

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POLYGONACEAE: The Smartweed Family

by Landon McKinney

THE SMARTWEED FAMILY is characterized by a sheathing membrane covering the stem nodes (joints). These are called ocrea. The flowers are small and not particularly showy and, thus, wind pollinated. Most of you are familiar with smartweeds (genus *Polygonum*), but you may know them by one of the other common names such as tearthumb, lady's thumb, or water-pepper. Smartweed seems to be one of the earliest common names based on the European *Polygonum persicaria*. It is said that the sap or plant juices will irritate or "smart" the eye or nose tissue. Imagine that, all this time I thought the common name meant that you got brainy by eating the stuff.

Anyway, the genus *Polygonum* is divided into several sections with common names like knotweeds and bindweeds. Bindweeds are vine-like and look similar to morning glory vines but with

Charles Chandler

the small, smartweed-like flowers. Many of the knotweeds are exotic weeds occurring in fields, waste places, and roadsides. Japanese knotweed (*P. cuspidatum*) is an invasive, shrubby member of the genus. It is currently known from approximately 36 of the lower 48 states and can be seen in extensive stands along some roads in eastern Kentucky. Probably the greatest threat it poses is to riparian areas. It can survive severe floods, colonize rapidly, and it is extremely persistent once established. As with many other invasives, it was introduced in the late 1800s as an ornamental and for erosion control. Japanese knotweed is considered edible. The young shoots can be steamed and served like asparagus.

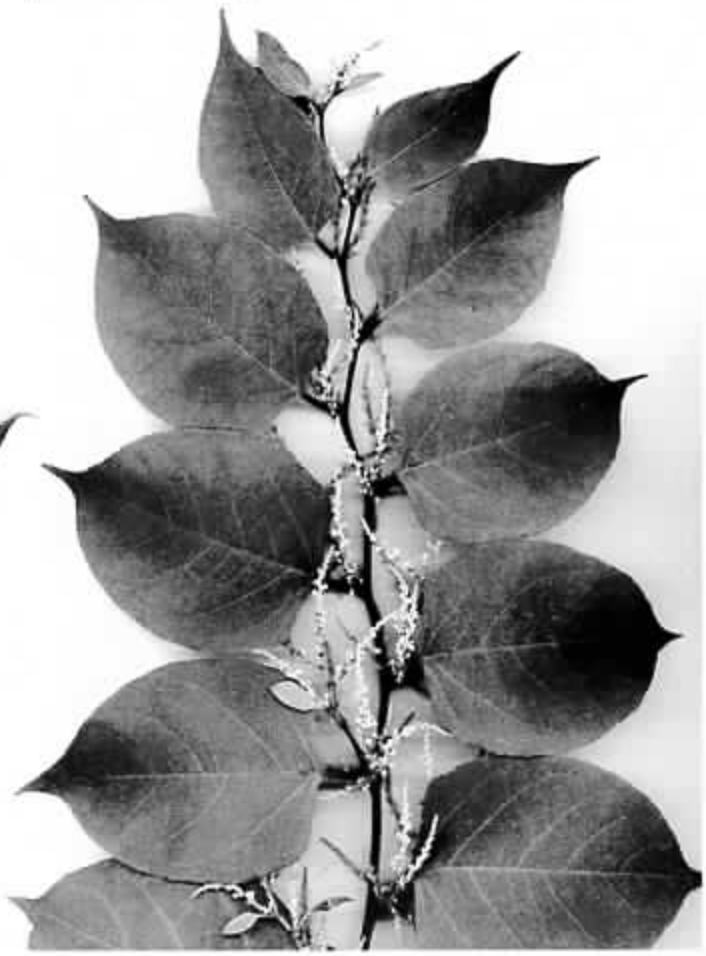
The smartweeds give us several native wetland species such as false water-pepper (*P. hydropiperoides*), dotted smartweed (*P. punctatum*), and the arrow-leaved tearthumb (*P. sagittatum*) which is my favorite. It has a reclining, almost vine-like growth habit, 4-angled stem, and reflexed (pointing downward) prickly hairs on the stem.

Hey, when was the last time you sat down to a hot, heaping stack of buckwheat pancakes? In this same family the genus *Fagopyrum* is buckwheat. In fact, in some wildflower books and manuals, the family is referred to as the buckwheat family. Not into buckwheat pancakes, how about a good old-fashion rhubarb pie. Yep, Rhubarb (*Rheum rhaponticum*) is a member of this family. I believe I talked my wife Lela into making me at least one rhubarb pie a long time ago. However, neither she nor my kids liked it (probably the tartness) and I ended up having to eat to whole thing, and since I'm supposed to stay away from most sweets, I've never asked for another one. The tartness probably comes from the presence of oxalic acid in the stems that could bother some people. The calcium and potassium oxalates in the leaves can really be disturbing to some people even though in some of the older European botanical texts, the leaves were mentioned as a pot-herb.

None of the smartweeds are thought to be poisonous. The leaves, except for the youngest ones, apparently have a peppery taste (plant juices are described as acrid). The young leaves can be chopped and added to mixed green salads or cooked as a pot-herb. Historically, some species were reportedly used medicinally for internal bleeding.

Other members of this family are the docks and sorrels (*Rumex*). Red or sheep sorrel (*Rumex acetosella*), bitter dock (*R. obtusifolius*), and curly dock (*R. crispus*) are non-native weeds of fields and wasteground. Swamp-dock (*R. verticillatus*) is native and occurs sporadically across the state in wetlands. Most docks or sorrels are edible as young leaves in salads or as potherbs. The leaves are somewhat sour, and sheep sorrel leaves are even said to be a thirst-quenching, sour snack while hiking. The leaf juices of curly dock have been used to treat ringworm and other skin conditions.

The smartweed family, while not known for showy flowers, is an interesting plant family with several species that are important to Kentucky's wetlands. As with many other plant families, it has its edible, medicinal, and weedy components. The species of *Polygonum* and *Rumex* that are part of the state's native flora should be appreciated, if for no other reason, for the added diversity they provide to Kentucky's natural communities.



At left, a bouquet of exotic Polygonaceae from a farm in the Powell/Montgomery/Menifee tri-county hinterlands: cultivated rhubarb, weedy curly dock, and tangy sheep sorrel. At right, from a Lexington cemetery, a relatively harmless smartweed, and from a planted bed downtown, an ornamental (but menacing) cultivar of invasive and persistent Japanese knotweed. In England, it has been illegal to spread this plant since 1981. All plant pieces, even as small as a penny, are "controlled waste" and soil contaminated with roots can only be moved from a site if it is enroute to a licensed landfill to be buried at least 5 meters (16.4 feet) deep!

Rare Species Spotlight: French's Shooting Star

Text and photos by Michael W. Thompson

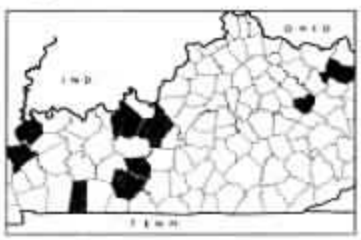
When the oaks in Kentucky are in their early leaf stages, the appearance of the rocket-like flowers of shooting star is a highlight of the early spring. Most of us are familiar with our common shooting star, *Dodecatheon meadia*. However, Kentucky also has another species of shooting star, known as French's shooting star [*Dodecatheon frenchii* (Vasey) Rydb.], that can be found in a few locations throughout the state. The species is named for George French, who first described this odd species in the Shawnee hills of southern Illinois in the late 19th century.

Members of the genus *Dodecatheon* are perennials with a hollow stem and a basal rosette of leaves. The flowers are nodding and found in clusters at the top of the stem; they are white to pink, and fused at the base, with a purplish-black ring present. The tips of the filaments of the stamens form a cone-like shape around the pistil, giving the flower an overall rocket-like appearance (Hill 2002). When mature, a thin brown capsule-shaped fruit forms and becomes more upright. It contains many tiny seeds which are wind-dispersed, but do not appear to travel very far from the parent plant (Post 1996). French's shooting star differs physically from the more familiar shooting star by having leaves that narrow very abruptly at the base, rather than gently tapering to the petiole as in *D. meadia* (Hill 2002). The leaves are also much thinner and paler than the leaves of *D. meadia*. A cytological examination of *D. frenchii* revealed that it contains half the number of chromosomes of *D. meadia* (Olah & DeFilipps 1968). Thus, the two species cannot be crossed because plants of this genus with different chromosome numbers cannot reproduce (Thompson 1953).

The most intriguing feature of *Dodecatheon frenchii* is its unique habitat. The species is found only along the floors and rock outcrops of sandstone rock houses (Walck et al. 1996). This habitat is characterized by reduced light levels, reduced temperatures, increased humidity, and thin soils that remain moist during winter and spring (Hill 2002). Few other species occur in these rather harsh conditions. While it is known only from this specific habitat, French's shooting star is tolerant of other habitats, because it is sometimes found in nearby open areas (Olah & DeFilipps 1969) and can be cultivated. Furthermore, little difference in soil conditions was observed between *D. frenchii* habitat and *D. meadia* habitat (Voigt and Swain 1955), indicating that although *D. frenchii* is capable of growing in more favorable habitats, it is probably restricted to the former because it competes poorly with other species.

Many theories abound regarding the origin of this species. One theory is that *D. frenchii* and *D. meadia* migrated from the west, with *D. frenchii* becoming much less vigorous on an evolutionary time scale (Fassett 1944). Another theory is that *D. frenchii* evolved as a chromosome-reduced version (haploid) of *D. meadia* (Olah & DeFilipps 1968).

Currently, French's shooting star can be found in Kentucky, southern Indiana, and southern Illinois, with a few sightings recorded in Missouri, northern Arkansas, and northwest Alabama. The U.S. Forest Service considers *D. frenchii* a G3 species, indicating that it is rare and at risk. In Kentucky, it is listed as a species of special concern, and occurs in only nine counties: Breckinridge, Carter, Crittenden, Edmonson, Hardin, Menifee, Todd, Union, and Warren (Hill 2002).



While most *D. frenchii* populations are within the boundaries of national forests or other protected areas, the long-term survival of this species is of concern. Human activities, such as rock climbing and artifact collection, may cause

trampling of fragile seedlings (Starkey 2001). Browsing by herbivores may also contribute to seedling mortality. Since it has been suggested that cross-pollination is required for seed production (Hill 2002), the highly fragmented distribution of habitat may reduce the overall fertility of individual populations. Thus with its lack of vigor, its reproductive isolation from other populations and other shooting star species, and its very specific habitat requirements, French's shooting star is a species that is worthy of our protection.

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The History of Use of Eastern Red-cedar

by Robert Paratley, Curator, Univ. of Kentucky Herbarium

> *"There is a red wood which, being burned, smells very agreeably: when men sit by the fire on benches made from it, the whole house is perfumed by it."*
> — 1625, Nicolaes Wassener, New Netherlands

Eastern red-cedar, *Juniperus virginiana*, is a widespread and very familiar conifer, especially abundant in Central Kentucky. Fifty-nine other junipers are found on all Northern Hemisphere continents. Most *Juniperus* species thrive in dry climates or in thin, rocky, droughty soils in moist climates. Eastern red-cedar is the common juniper species east of the Mississippi, ranging north into Great Lakes Canada, New York, and New England, west to the Great Plains of Nebraska, Kansas, and Oklahoma, and south in all the Gulf States almost to the Atlantic and Gulf of Mexico. In these southern states a named variety *silicola* differs slightly from the common type (i.e. drooping branches) and is found with loblolly pine, cabbage palmetto, and live oak (Preston and Braham, 2002). Western U.S. and Mexico are home to a number of junipers, inhabiting drier conditions and extending to lower elevations than the vast conifer forest belts of the montane West. They are important co-dominants in the widespread western pinyon pine–juniper woodlands.

Eastern red-cedar is most abundant in Kentucky on limestone, although not restricted to this parent material. It is quite tolerant of the alkaline soils and their poor moisture retention in limestone country. A red-cedar analog, *J. chinensis* is likewise common in China on limestone, and the widespread common juniper *J. communis*, a shrubby species, is common on rocky windy slopes often at high elevations in both Europe and in North America.

When reading historical sources discussing uses, there is some confusion when cedar is mentioned, because other conifers may also be referred to as cedars. Fortunately, only the northern white cedar *Thuja occidentalis* and the Atlantic white cedar *Chamaecyparis thyoides* are found in eastern North America. The former is mostly a northern tree of swamps and limestone ledges; the latter restricted to Atlantic Coast swamps. Neither has been used historically to nearly the degree as the junipers. The regional context usually makes it clear that it is our juniper referred to and not *Thuja* or *Chamaecyparis*. (The Old World *Cedrus* is also called cedar.)

When Europeans came to Eastern North America and encountered red-cedar, they already had a long history of using European junipers, particularly *J. communis*, also found extensively in the northern U.S. and the mountain states of the West, and a species they called savin, *J. sabina*. Savin is a shrub with a purplish cone, otherwise it is quite similar to red-cedar. Common juniper is often a low sprawling shrub. Both these Old World species were important medicinal plants, so our eastern red-cedar was quickly adopted by the colonists and in many cases considered

(Continued on page 6)

EASTERN RED-CEDAR (cont.)

Settlers familiar with Europe's savin adopted eastern red-cedar as an obvious substitute.

a substitute for savin. In Europe, savin had been used to combat lice, repel clothes-damaging moths, and in a number of medical ways. It was always known as a strong and potentially toxic plant, and had been sometimes used by women as an abortifacient to terminate pregnancy. Especially in spring, the new growth would be pruned and used in various medicines. Juniper berries (actually the mealy cones) were used in Europe to flavor gin and in perfumery. They were mentioned in Gerard's *Herbal* as a flavoring and as a diuretic (Crellin and Philpott, 1990).

Many comparisons were made between savin and red-cedar. Jacob Bigelow, an early 19th-century physician who compiled an early *Materia medica* for North America, made such a comparison:

> The botanical similarity of this tree to that of Savin...a European shrub... In their sensible and medical properties, they are equally allied... The American tree is frequently known throughout the country by the name of Savin, our apothecaries have been led to presume upon its identity with that medicine, and it has long been used in cases where the true Savin is recommended. Internally, the leaves of Juniperus virginiana have been found to exert effects very similar to those of Savin. They have proved useful as an emmenagogue, and as a general stimulant, and diaphoretic in rheumatism. They have also had some reputation as a diuretic in dropsy. (Bigelow, 1817–1820)

An emmenagogue is a "female" herb, used to regulate or stimulate menstruation. A diaphoretic makes the patient sweat, often a characteristic of strong herbal medicine. A diuretic stimulates urination. Any herb that moves fluids was (and is) considered useful in many situations, including dropsy, an old medical term for fluid retention, especially in the legs and feet.

A contemporary account in the notorious French botanist Constantine Rafinesque's *Medical Flora* (1830) was concordant in some ways but differs from Bigelow in his impression of the relative potency of red-cedar compared to savin:

> The leaves of Savin are the officinal parts. Those of our Cedars are used as equivalents with us; but they are weaker than the European Savin, and often fail as emmenagogues, because the doses are regulated upon the European prescriptions. They all have the properties of Junipers in a higher and even violent degree: they increase all the secretions, but may produce hemorraghy and abortion, acting chiefly on the uterus, pregnant women ought never to use it, but they are very useful in dropsical complaints, menstrual suppressions, also in rheumatism, gout, worms in powder, conserve or tincture. None but experienced physicians ought to prescribe them.

Hemorraghy refers to a flush of blood, often from the nose. Rheumatism covered an array of bodily aches and pains. Although Rafinesque was clear that eastern red-cedar is not as strong as savin, often failing at similar dosage, he also graphically warned of its many dangers and complications.

The U.S. Pharmacopoeia in the 1800s listed eastern red-cedar and described it as much less energetic than savin

> though advantage may, as has been asserted, have accrued from its use in amenorrhea, [blocked menstrual flow], chronic rheumatism, and dropsy, it has not gained the confidence of the profession generally. Externally applied, it acts as an irritant. (Crellin and Philpott, 1990)

An earlier report (Brickell, 1734) was a combination of fancy and fact: "...the Wood of this tree is profitable against the French pox [syphilis], and an infusion in Vinegar helps Scabs and other cutaneous disorders." It should be noted that Europe at this time was desperate to discover a cure to syphilis, and that several New World plants, most notably the West Indian lignum vitae (*Guaiacum officinale*), were tried with a kind of uncritical enthusiasm. It's not clear that any of them were good at doing more than alleviating discomfort. Many were useless, and it is unclear that red-cedar really had much effect on those afflicted with the "pox." A decade later Peter Kalm, an important Swedish botanical explorer of the New World and disciple of Linnaeus, recorded red-cedar's similarity to savin and noted its efficacy as a medicinal. It was Linnaeus who named the species at this time (Vogel, 1970).

The active principles in the tree are found in an oil which is contained in the foliage, shoots, the "berries," and even the wood in lower concentrations. In practice, the oil is distilled from any of these plant parts. Leung and Foster (1996) describe the odor of cedarwood oil Virginia (as they call it) as "sweet pencil wood and balsamic odor." Mrs. Grieve (1931) called the oil cedrene camphor. More modern works call it cedar oil or juniper oil. She stated,

> To obtain Cedrene camphor, the oil must be cooled until coagulated and the crystalline portion separated by expression... The volatile oil has been used for abortion and has caused death, preceded by burning of the stomach, vomiting, convulsions, coma, and gastro-intestinal inflammation. It is used in perfumery, and is the principle constituent of extract of white rose.

Millspaugh (1892) recorded that a bushel of cedar chips would yield a half pint of oil. Much higher yields are obtained from the leaves or cones, but, then as now, cedar oil is an important byproduct of the waste from processing timber (see below). Although the oil is strongly aromatic, Millspaugh claimed that it is almost tasteless. He noted

that the leaves of our red-cedar yield significantly lower amounts of oil than European savin, noting the diaphoretic and emmenagogue properties of both species. For red-cedar he listed other uses:

> ...the oil is largely used as an application in arthritic and podagric affections [pertaining to feet], rheumatic, rheumatoidal, traumatic; and the excrescences (cedar apples), often found upon the branchlets, are quite extensively used in domestic practice, in dose of from ten to thirty grains every four hours, as an anthelmintic.

Cedar-apples are tumor-like swellings on the trunks of some cedar trees. Anthelmentic refers to the ability to expel parasitic worms from the body.

In her monumental work on plant resins, Langenheim (2003) classifies cedarwood oil (as she calls it) from *Juniperus* as an oleoresin, a terpene-rich plant exudate that is rather watery and has a higher component of volatile compounds compared to other resins. They are very common in most conifers. Modern analysis of cedar oil has found a large mixture of chemical metabolites. The principal ones are sesquiterpenes called cedrene, cedrol, and cedranol, as well as thujopsene and caryophyllene (Leung and Foster, 1996). Sesquiterpenes are relatively low weight terpenoid molecules, many of which are volatile and give off distinct, strong odors. The cedar oil smell is certainly a good example. (Other sesquiterpene scents include ginger and sagebrush.) Monoterpenes, lighter-weight and simpler molecules, are also present in the oil. The highest yielding North American junipers are *J. virginiana* and *J. ashei* of Texas. Junipers of the arid west are not as good a source of the active principles. Today,

> cedarwood oil is extracted in various ways, from home-built stills to more sophisticated laboratories. Distillation time, the size of the wood chips extracted, and temperature and pressure of steam can make large differences in cedarwood oil composition. Thus distilling practice as well as the species used determine the marketable product. (Langenheim, 2003)

The insecticidal properties of cedar oil are widely documented in both Native American (see below) and colonial use. The most obvious case of this is the use of cedar wood to make moth-repellent chests to protect woolens, still used today. Mrs. Grieve (1931) described these: "Boxes made of the wood are useful for the preservation of woolens and furs, it being an excellent insectifuge on account of the oil contained in it." Millspaugh (1892) too mentioned this use and added that "many people scatter the chips in their closets, trunks, etc." Other junipers, notably savin and the common juniper, had long been used in Europe for their insecticidal properties (Uphoff, 1968).

A modern use of cedar oil is in microscope work as a clearing agent and immersion oil for fixing specimens for examination (Leung and Foster, 1996).

When European colonists came to North America, native peoples across the continent were making use of *Juniperus* species. Eastern red-cedar was used by native tribes across its wide range east of the Rockies. The most widely reported native use was as a fumigant: "The Dakotas, Omahas, Poncas and Pawnees burned twigs and inhaled the smoke for head colds, while both patient and fumigant were enclosed in a blanket... [they] also used them in their vapor baths." These tribes lived in the prairie states, in the western part of red-cedar's vast range. The Rappahannocks took an infusion of cedar "berries" and wild ginger for asthma. (Vogel, 1970). Several other tribes used the vapors for colds and coughs (Iroquois, several Plains tribes). Lewis and Lewis (2003) report a decoction of boiled cones and leaves used by Plains tribes for treating coughs.

Aside from respiratory problems, red-cedar was used for sore muscles and various bodily aches and pains. Vogel mentions the Natchez for shoulder, back and breast pain, the Creeks for muscle pain and hurt neck, the Alabama for rheumatic pain, and the Ojibwas for headache. (The last-mentioned lived in the Great Lakes area, the others in the Gulf Coast area.) Many tribes used the fruit as "water pills," taking advantage of the diuretic properties of the oil (Peirce, 1999). When cholera swept through the northern Plains area, the Dakotas employed cedar oil in an attempt to alleviate this serious affliction.

Many native tribes employed red-cedar as a topical for a variety of skin problems. Peirce (1999) reports that Native Americans chewed the cones to alleviate canker sores. Most sources also mention that the oil could be an irritant.

Another important use both in North America and in Europe (with savin) was as an abortifacient (Hocking, 1997). The concentrated oil is an irritant to the uterus, and was used in many locations as a way of terminating pregnancy. Most sources mention this use. Millspaugh (1892) is typical in his discussion of the toxicity of cedar oil, "Many other cases of poisoning by the oil taken in doses of from one drachm to an ounce, for the purpose of abortion or as an emmenagogue, show *Juniperus Virginiana* to cause severe venous congestion throughout the body."

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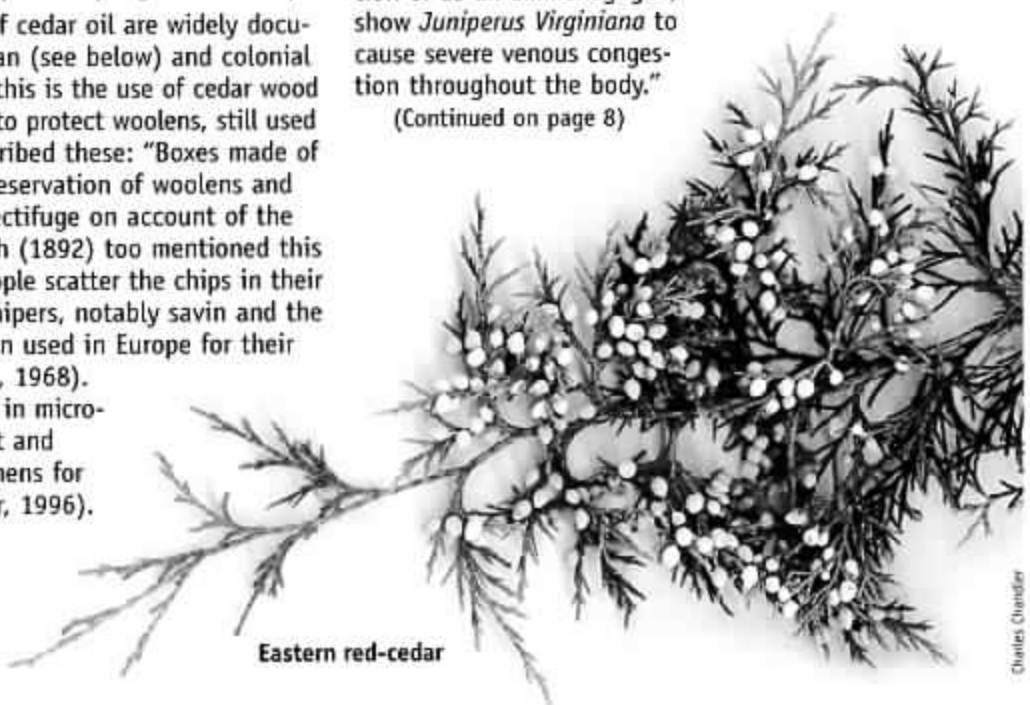


Eastern red-cedar

Charles Chandler

EASTERN RED-CEDAR (continued)

A few native tribes consumed the cones as a food item, or used them to flavor soups and stews. It was also important to some native tribes in their rituals and material culture. The Omaha used the scented wood smoke in their sun dance ceremony. Other tribes employed the wood for funerals or as a ritual incense (Kiowa, Lakota). The Seminoles of Florida used the smoke in two curious ways. Medicine men (or women) might "smoke the body for insanity" in troubled tribe members. Mothers used the smoke as a sedative or as a "baby's charm for fear from dreams about raccoons or opossums (Moerman, 1998)."

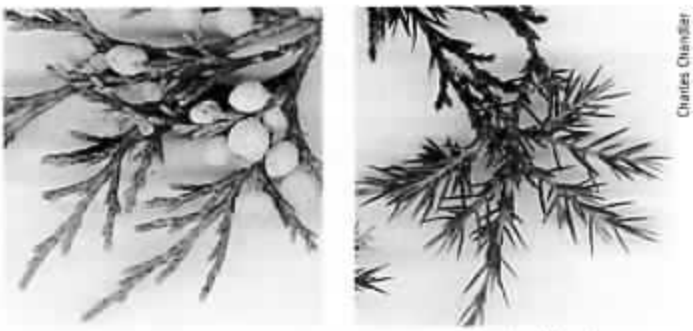
Red-cedar wood was far more important in native material culture. As in Europe, native peoples discovered the insect repellant properties of the wood and used boughs and chips, and even fashioned storage boxes of it to keep insects at bay. Long known to be decay-resistant, red-cedar wood was also used for fenceposts (Cherokee), teepee post stakes (Omaha), furniture and baby cradles (Ojibwa, Cherokee), musical instruments (Kiowa), and for mats and rugs (Chippewa). Red-cedar was also used for general carving by a number of tribes. Its resistance to decay made it suitable for marking graves. The Chippewa extracted a red-brown dye from the wood. Many tribes used the poles as lightning rods or to "ward off lightning" as recorded in Moerman (1998). Hard to say whether it was effective at this.

Euroamerican settlers made great use of red-cedar for its wood. Some early records mention it favorably, including the very early mention by the 17th Century Dutch (see quote beneath title). Peter Kalm in 1749 was rather laudatory in his praise of its versatility and physical characteristics:

> Of all the woods in this country this is without exception the most durable, and withstands weathering longer than any other... The best canoes, consisting of a single piece of wood, are made of red cedar: for they last far longer than any other and are very light. The heart of this cedar is of a fine red color, and whatever is made of it looks very fine, and has a very agreeable and wholesome smell. But the color fades by degrees, or the wood would be very suitable for cabinet work...the wood will keep its color if a thin varnish is put upon it while it is fresh. (Ericksen-Brown, 1979)

Already mentioned was the employment of cedar wood for its repellent characteristics, either as wood chips or moth-proof chests. Uphof (1968) summed up the properties of eastern red-cedar wood as close-grained, not strong, brittle, light, dull red in color, easily worked, fragrant, and decay resistant. Peattie (1964) commented on two of these characters to explain the popularity and usefulness of the wood, especially on the frontier in colonial times:

> So easy was it to split with the frow [a cleaving tool] and to smooth with the plane that it could be worked even by people as woefully ill-prepared for wilderness life as the theologian-tradesmen and overdressed gold hunters who first sought our shores... The fragrance of the wood and the showy contrast in color between the red heartwood and creamy sapwood compensated, to the tastes of those days, for the fragility of the material.



Charles Chandler

Eastern red-cedar's leaves are opposite and scale-like, but on young trees and at the tips of some branches on older trees, they are elongated and spiny. Its "berries" are actually cones.

Settlers employed cedar wood in construction, especially fence posts, but also for small articles subject to repeated wetting like wooden utensils, pails, and tubs. Its pleasant scent and color allowed its use in furniture. Waste wood was often employed in the extraction of cedar oil, as discussed above, for medicinal use, soap-making and perfumery.

A most important use for the workable wood emerged in the 1800s. Eastern red-cedar became the most important source of wood for lead pencils. Peattie (1964) discussed the wastefulness of the process, as the industry could only use the clearest knot-free portion of the wood. He claimed that up to 70% of the cedar timber was thus wasted. To illustrate the frenzied cutting, he noted that by 1900 the state of Tennessee sent 3,000,000 feet down the Cumberland River in timber rafts.

> But only ten years later, cedar "cruisers" had searched out the last virgin stands, lumbermen were working over the stumps of their previous destruction, and buyers were snapping up log cabins, barn floors, and even rail fences that had stood exposed to the weather for fifty years.

Cedar pencils were exported all over the world. Like many other industries, wood pencil manufacturers have moved on. Today the West Coast incense-cedar *Calocedrus decurrens* is the most important pencil wood, but eastern red-cedar wood is still used in most of its historical uses, including interior finishes, sills, closet linings, and, of course, chests for preserving woolen articles against moths (Uphof, 1968). It is also used for cigar boxes (Hocking, 1997).

Eastern red-cedar is not important as a medicinal plant, as it once was, although some modern herbalists mention it in their discussions of other junipers (especially common juniper). Red-cedar use for healing is more common in rural areas like Appalachia. Crellin and Philpott in their monograph on Appalachian herbal practice (1990) claim that

> Juniper oil and fruits...are currently used by many people in the Appalachians and elsewhere, especially for kidney complaints, without knowledge of reports on the injurious effects on the kidney. This (especially long term usage), and employment for premenstrual tension, sometimes justified as a benefit of diuretic action, are hardly prudent in the light of the availability of less toxic products. The reputation for skin complaints has some association with skin irritation, while the reported abortifacient property is linked to irritation of the uterus.

There have been some positive clinical results as an anti-inflammatory and anti-microbial. Other studies have confirmed cedar oil to be an irritant of skin, kidney, uterus, and strongly suggest it not be placed topically on a wound or taken internally (Fetrow and Avila, 2001.) Lewis and Lewis (2003) report cases of the pollen being allergenic. Of interest is the presence in the oil of podophyllotoxin, a phenolic compound more commonly associated with the spring wildflower mayapple (obviously no close relative.) It has been investigated as a potential antitumor medicine and is a known toxin, both actions due to its interference with cell division. Red-cedar has also been reported toxic to livestock (Burrows and Tyrl, 2001).

The American Pharmaceutical Association (1999) states

> The wisest approach may be to stick to commercial formulations for use on the skin or for inhalation... Watch out for skin irritation... Never ingest the essential oil. To confuse matters, many herbalists fail to specify which cedar tree they are referring to when recommending the plant, making it hard to verify the accuracy of their claims.

As with many other formerly popular medicine plants, the potential toxicity and irritating potential of cedar oil precludes its widespread use today.

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Kentucky Plants with Unusual "Lifestyles" – Part III, Hydrophytes, Epiphytes, & Saprophytes

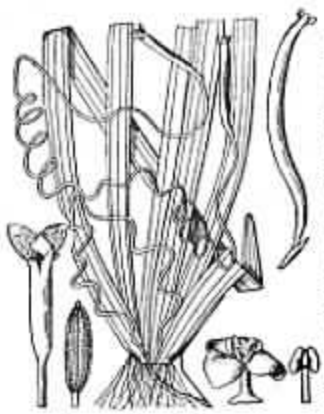
by Ron Jones

THE VAST MAJORITY of vascular plants in Kentucky exhibit a "typical" life history, that is, they are rooted in the soil, and have green above-ground parts that carry on photosynthesis. Thus, the typical plant is composed of roots, stems, and leaves, and obtains all the necessities of life from sunlight, air, water, and soil nutrients. A number of Kentucky plants, however, exhibit atypical forms or life histories. The first two parts of this series discussed parasites and carnivorous plants. This final section discusses hydrophytes, epiphytes, and saprophytes.

Hydrophytes—

Hydrophytes are plants that have adapted to an exclusive or almost exclusive aquatic existence. They include many life forms, from rooted and emergent, to rooted and floating-leaved, to rooted and totally submersed, to free-floating. There is a full spectrum of aquatic and wetland habitats in Kentucky, from permanent bodies of water, to temporarily flooded, to wet soils with high water tables. There is also a full spectrum of plants adapted to these habitats.

In general, plants that typically live in permanent bodies of water exhibit the more extreme adaptations for aquatic existence. Such morphological adaptations include the following: the presence of gas-filled canals (lacunae) and special air-filled tissues (aerenchyma) for buoyancy, support, and transport; particular leaf shapes and textures (often round and tough in floating leaves and often very thin and linear or dissected in submersed leaves); leaf dimorphism (submersed leaves often more dissected), and cuticle/stomatal differences (floating leaves tend to have a heavy cuticle and stomates on the upper leaf surface only; submersed leaves often lack a cuticle and stomates). Reproductive adaptations include, for wind and insect pollinated flowers (anemophilous and entomophilous respectively), the development of vegetative mats or rafts to keep the flowers above the water; and, in the case of water-pollinated flowers (hydrophilous), special adaptations for surface pollination (as in American eelgrass, *Vallisneria americana*) or underwater pollination (as in *Ceratophyllum* and *Najas* spp.).

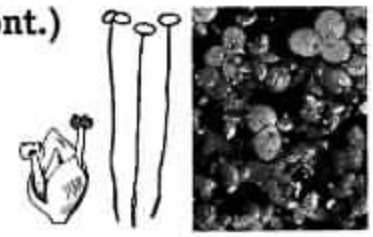


American Eelgrass

The most extreme morphological and reproductive adaptations for aquatic life are illustrated by the free-floating plants, and most of the Kentucky free-floaters are in the duckweed family (Lemnaceae). Other than the duckweeds, there are only two other species of free-floating plants in

(Continued on page 10)

Hydrophytes, Epiphytes & Saprophytes (cont.)



Common duckweed's thalli, shown about lifesize, float on the surface of ponds and lakes with their roots dangling below. At far left, an enlargement shows the flowers that emerge from a cavity on the thallus.

(Line art adapted from Britton & Brown, 1913; photo Robert H. Mohlenbrock @ USDA-NRCS PLANTS Database / USDA NRCS. 1995. *Northeast wetland flora*. Northeast National Technical Center, Chester, PA.)

Kentucky, and both are limited to far-western portions of the state—mosquito fern (*Azolla caroliniana*), and frog's bit (*Limnobium spongia*). Unlike duckweeds, these two species have all three major plant organs—stems, leaves, and roots. Duckweeds do not have distinct stems and leaves (roots are present in species of *Lemna* and *Spirodela*), and the plant body is referred to as a thallus.

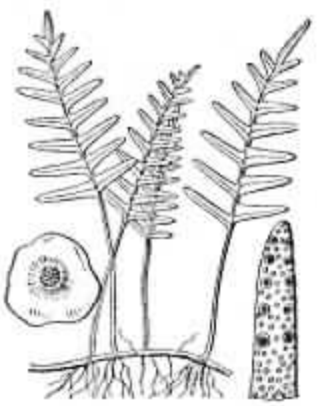
The Lemnaceae include the smallest flowering plants in the world, with the smallest (about 1–2 mm) in the genus *Wolffia*. Reproduction in the family is mostly vegetative by the production of buds; flowering and fruiting occurs only sporadically (flowers are highly reduced, consisting of only a single stamen or pistil in a cavity on the thallus). In Kentucky the family consists of duckweed (*Lemna*, 9 species), greater duckweed (*Spirodela*, 2 species), watermeal (*Wolffia*, 4 species), and greater wolffiella (*Wolffiella gladiata*). Since this family is so poorly collected in the state, other species are likely to be discovered with more intensive surveys. Because of the paucity of collections, the distributions of the currently known species are poorly documented.

Duckweeds have a very high growth rate and can proliferate rapidly, especially in small bodies of water. They are an important source of food for wildlife, and, because of their rapid growth and high protein content, are being investigated as a possible food crop for livestock and humans.

Epiphytes—

Epiphytes are plants that grow on other plants without harming their host. They are photosynthetic, and have a typical form with roots, stems, and leaves. They differ in obtaining their water and nutrients, not from soil, but from organic material that collects in the crooks and crevices of tree branches and trunks. This is a common life form in tropical regions, especially among bromeliads and orchids. The epiphytic habit is much less common in temperate regions, and there is only a single plant species in Kentucky that regularly displays an epiphytic habit—the resurrection fern (*Pleopeltis polypodioides*). It often occurs on trees with deeply furrowed bark; once established it can spread along the branches and trunks by creeping rhizomes.

A few other ferns, such as the walking fern (*Asplenium rhizophyllum*), may occasionally be found growing epiphytically on trees. Spanish moss (*Tillandsia usneoides*), is a common epiphyte of the southern United States, and is not currently a member of the Kentucky flora, although it may, in the near-future, join our flora as the result of global warming.



Resurrection Fern

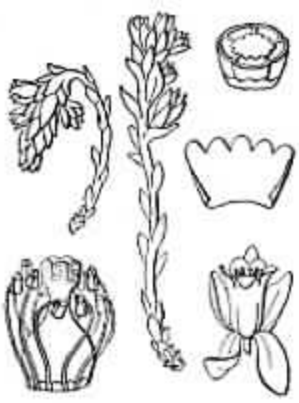
Saprophytic Plants—

Saprophytes have traditionally been considered those non-green plants that obtain their nutrients from decaying organic matter. Recent studies indicate that these plants actually obtain their food, water, and minerals from mycorrhizal fungi that are attached to the roots of other plants. This relationship has been described as myco-parasitic, epiparasitic, or myco-heterotrophic. The latter term will be used in this discussion.

Mycorrhizal relationships, widespread among angiosperms, are generally considered to be mutually beneficial—the fungus gets sugars and other organic nutrients from the plant, and the plant obtains water and minerals from the fungus. In the myco-heterotrophic relationship, however, there is a third party, the "saprophyte," which has evolved an obligate relationship with the "fungus-plant" association. These non-green plants now depend totally on the fungus and its associated plant for water, minerals, and food. There are two groups of myco-heterotrophic plants in Kentucky—the species of Monotropaceae, and the non-green species of Orchidaceae.

The Monotropaceae, sometimes placed in the Ericaceae, includes three species in Kentucky—Indian-pipe (*Monotropa uniflora*); pinesap (*M. hypopithys*), and sweet pinesap (*Monotropsis odorata*). The first two species are relatively common, but the latter is Threatened in the state.

Four non-green species in the Orchidaceae exhibit the myco-heterotrophic life history, including all three species in the genus *Corallorhiza* (also spelled *Corallorrhiza*)—autumn coralroot (*C. odontorhiza*), spotted coralroot (*C. maculata*), and spring coralroot (*C. wisteriana*), as well as the crested coral-root (*Hexalectris spicata*). One of these, the spotted coralroot, is Endangered in Kentucky. Two other orchids, puttyroot (*Aplectrum hyemale*) and crane-fly orchid (*Tipularia discolor*) also produce non-green shoots, but possess green basal leaves earlier in the season, and thus do not belong in this myco-heterotrophic category.



Sweet Pinesap

Spotted Coralroot

Illus. *Flora of the Northern U.S.* / Britton & Brown / 1913

Flora of North America: A Look at the Latest Published Volumes — by David Taylor

Flora of North America. Flora of North America Editorial Committee. Oxford University Press. New York, NY.

Vol. 22. Magnoliophyta: Alismatidae, Arecidae, Commelinidae (in part), and Zingiberidae. **2000. 352 p. cloth, $90.00** — This is the 4th volume published in the monumental *Flora of North America* (FNA) series and its treatment of the families it covers is comprehensive. For example, a typical eastern flora includes 4–10 species of *Tradescantia* (excepting Florida) which often are difficult to separate. This volume includes 40–50 species plus a few additional subspecies and varieties. An eastern flora's treatment of *Juncus* might include about 30 species; here there are 95. Their taxonomic treatment appears close to that of the PLANTS database (*http://plants.usda.gov/*). [KNPS is a partner with this database through *Index Kentuckiensis*, the herbarium database developed by Charlie Lapham, Ron Jones, and others]. The volume also provides numerous line drawings which, although small, are detailed and especially helpful for *Juncus*.

Vol. 26. Magnoliophyta: Liliidae: Liliales and Orchidales. **2002. 723 p. cloth, $120.00** — This 5th published FNA volume is the most comprehensive to date for these North American families. It includes recognized native taxa as well as truly naturalized, and many adventive, introduced species, so identifying some species can be cumbersome. Rather than the usual half dozen or so species of *Allium* found in eastern floras, there are now 96 with myriad varieties and subspecies to wade through, many separated only by the reticulate patterns on the underground bulb sheaths. The volume's nomenclature and taxonomy are largely the same as in PLANTS, but as an example of differing opinions, FNA treats *Olsynium* as a segregate genus of *Sisyrinchium* while PLANTS treats it as *Sisyrinchium*. In *Dioscorea*, *D. polystachys* is the accepted FNA name for the weedy introduced potato vine, but it is listed as *D. oppositifolia* in PLANTS. PLANTS also recognizes *D. quaternata*, while FNA reduces the name to synonomy under *D. villosa*. There are scattered minor omissions as well, such as no documentation of *Yucca flaccida* in Kentucky, where it frequently occurs and often spreads at old home sites. There are range maps for most species, but unfortunately, for many genera of naturalized species, even the listings of known state level distributions are not recorded. The few line drawings provided are small, but detailed.

Vol. 23. Magnoliophyta: Commelinidae (in part): Cyperaceae. **2002. 608 p. cloth, $120.00** — The 6th published FNA volume also is like the others in that its exhaustive coverage of native, naturalized, adventive, and introduced species makes identifying some species cumbersome, or in the case of *Carex*, even disheartening. While a typical eastern flora includes about 130 species of *Carex*, this volume has 480 plus numerous additional subspecies and varieties. In both cases about 60 sections are treated. In one or two of these, the first key dichotomy is geographic: east or west of the Rockies, which greatly reduces the number of species to consider. Although the taxonomic treatment is more up-to-date than at PLANTS, it is largely the same. For example, *Carex timida* and *C. cumberlandensis* are treated in FNA but have not been included in PLANTS. For most species, even introductions, a range map is given, and there are numerous small, detailed line drawings. Unfortunately, frequent reference to perigynial scales is made, and these are not always illustrated.

Vol. 25. Magnoliophyta: Commelinidae (in part): Poaceae, part 2. **2003. 783 p. cloth, $120.00** — The 7th published FNA volume joins all of its predecessors as an important, comprehensive reference for personal and agency libraries. Its treatment of this part of the grass family includes recognized native taxa, truly naturalized, and many adventive, introduced species. Additionally, there are a number of primarily forage or ornamental grasses and species currently not in the flora, but with recognized potential to become noxious weeds. Of course, this diversity complicates identification and it's especially so with *Muhlenbergia*, *Digitaria*, *Paspalum*, and *Setaria*. A typical eastern flora includes about 16 species of *Muhlenbergia*, 5 of *Digitaria*, 15 *Paspalum* and 6 *Setaria*. This volume includes 70, 31, 43, and 27 respectively, plus numerous additional subspecies and varieties in the latter three genera. It also treats the subfamilies Arundinoideae, Chloridoideae, Danthonioideae, Aristidoideae, Centothecoideae, and Panicoideae which include a total of 11 tribes. In both cases about 60 sections are treated. A general key is provided to subfamily and each subfamily provides a general key to tribe. The taxonomic treatment is more current but largely the same at the species level as the PLANTS database. Differences, however, do occur. The FNA treatment of *Dichanthelium*, for example, recognizes many more species and varieties than does PLANTS. *Dichanthelium ensifolium* with two subspecies is recognized in FNA, but it is treated as *D. dichotomum* var. *ensifolium* in PLANTS. For most species, even introductions, a range map is given, and in this volume the numerous line drawings are detailed, and often large—many images of spikelets are between 1 and 2 inches long. This volume surpasses the other published volumes in that every species includes a habitat illustration and most subtaxa are illustrated with spikelet and/or sheath details. Regrettably, a formatting error resulted in incorrect plates on three pages. A URL is provided on the front leaf to download the correct illustrations.

Kentucky Native Plant Society
Membership Form

Memberships are for the calendar year (January-December).

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☐ Add me to the e-mail list for time-critical native plant news.

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Total $_____ (payable to *Kentucky Native Plant Society*)

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Calendar of Events . . . . . .

Red River Gorge Planning Workshops – *See page one for details.*

Sat., June 26 – Griffith Woods Workday, 9 am–5 pm, Harrison Co., KY. Morning, afternoon, or all day. From Lexington, go north on Russell Cave Rd. (KY 353) to US 62; turn right and enter first driveway on right. Permission required for visits at other times. Contact Julian Campbell, 859-271-4392 or *jcampbell@tnc.org* for agenda and suggestions about clothing, tools, etc.

Sat., July 3 – University of Louisville Butterfly Count, 10 am–3 pm, Horner Wildlife Sanctuary, Oldham Co., KY. Join lepidopterist Charles Covell in this annual update for the North American Butterfly Assoc. Fun for all and no experience required. For details and directions call Dr. Covell at 502-852-5942.

Sat., July 10 – Walnut Woods Restoration Workday, 9–11:30 am, Lexington, KY. Meet at UK/LFUCG Arboretum east entrance to Bluegrass Woods. Bring work gloves. Refreshments served. Details: Jim Lempke, 859-257-9339, *arboretum@lsv.uky.edu*

Sat., July 31 – Griffith Woods Workday. *See June 26 for details.*

Sat., Aug. 14 – Walnut Woods Workday. *See July 10 for details.*

Fri.–Sun., Aug. 20–22 – In Search of Wild Mushrooms, Pine Mtn. Settlement School, Harlan Co., KY. A workshop for beginning mushroomers led by noted Kentucky authorities. $135 fee covers lodging, meals, and activities. Details and registration at *www.pinemountainsettlementschool.com* or contact 606-558-3571, *pinemountain@earthlink.net*, or Pine Mountain Settlement School, 36 Hwy. 510, Pine Mountain, KY 40810.

Wed.–Sun., Aug. 25–29 – In the Footsteps of Lucy Braun, Pine Mtn. Settlement School, Harlan Co., KY. Four days of field trips, lectures, and slide presentations celebrating the legacy of Lucy Braun, the author of *The Deciduous Forests of Eastern North America* and one of the 20th century's foremost ecologists and botanists. Field trips include Bad Branch and Blanton Forest state nature preserves as well as Lilley Cornett Woods, Pine Mountin, and Black Mountain. $250 fee includes lodging, meals, and activities. Check *www.pinemountainsettlementschool.com* or contact 606-558-3571, *pinemountain@earthlink.net*, or Pine Mountain Settlement School, 36 Hwy. 510, Pine Mountain, KY 40810 for details and registration.

Sat., Aug. 28 – Griffith Woods Workday. *Details at June 26.*

Sat., Aug. 28 – Salato Center Fall Native Plant Sale, 9 am–4 pm., Ky. Dept. of Fish and Wildlife Resources Game Farm, 3 mi. west of Frankfort, KY, on U.S. 60. Sale of surplus plants to make room for future needs. Get advice on planting native species from greenhouse volunteers and Salato staff and tour the gardens to see mature native plants in their home soil.

Sun.–Wed., October 3–6 – Fourth Eastern Native Grass Symposium, 4 Points Sheraton, Lexington, KY. A symposium to share information, experiences, and research about recent native grass projects. Presentations and field trips will highlight diverse aspects of native grass uses, adaptations, and importance. More information at *http://forestry2.ca.uky.edu/grass_symposium* or contact Thomas Barnes, *tbarnes@uky.edu*

Sat., October 30 – KNPS Fall Get-Together, 10 am–?, Shakertown at Pleasant Hill, Mercer Co., KY. *See page one.*

See Page 2 for Contact Information.

(Return address below is for POST OFFICE USE ONLY.)

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