The Lady-Slipper

Kentucky Native Plant Society | DOUBLE ISSUE / Nos. 14:2–14:3 | Summer 1999

A Message from the President:

THE SUMMER SOLSTICE marks the "high point" of the sun in the sky. Certainly the Spring Wildflower weekend has been the traditional "high point" of the KNPS year. In spite of a chemical spill that caused many to believe the meeting was canceled and the Natural Bridge State Resort Park closed, the meeting was well attended. We heard excellent presentations by Julian Campbell and Carol Baskin on Friday and Saturday nights. As usual the trip leaders provided excellent guidance on the many walks. Our thanks again to Wilson Francis and all those who provided assistance in producing a wonderful weekend foray.

One of the highlights for me was to be able to announce the Ronald L. Jones Award of Merit. This award will be presented to those who have gone above and beyond to support and promote the goals of the KNPS. Ron Jones has provided excellent leadership and vision from the very inception of the Kentucky Native Plant Society. It is fitting that this award will carry his name. Two other pioneers and supporters of the KNPS were honored as the first recipients of the Award of Merit.

Clara Es-Stel Wieland received recognition primarily for her exemplary service over many years as our field trip coordinator, but also in recognition of many other unsung contributions. Her mantle has now passed to Michael Thompson who has already made significant contributions on your behalf.

Our second recipient is Charles Chandler who has worked tirelessly on many fronts since the beginning of the KNPS. Two very important contributions have come in the form of the design and production of our spectacular promotional brochure and the redesigned *Lady-Slipper.*

I am reminded of a comment by Malcome Browne, a Pulitzer Prize-winning foreign correspondent who has reported from nearly every crisis location for decades. He covered the Vietnam War for ten years and won the Pulitzer for his reports from Saigon in 1964. He said there were two kinds of observers in Vietnam; those who heard about the war from others and those with "muddy boots." Ron, Clara, and Charlie have done the "muddy boots" assignments for years and we are in their debt. They represent the kinds of volunteer leaders who have moved us to where we are today. Are there others of you out there that are willing to get into some "muddy boots"?

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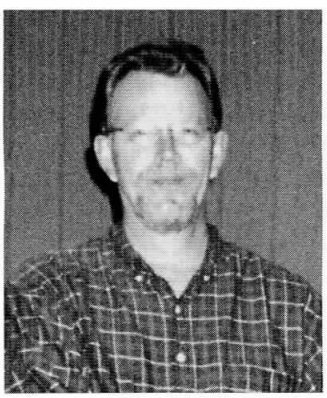
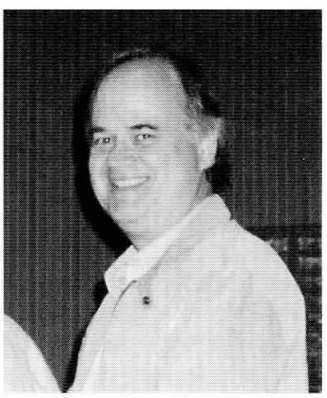
A note on the recipients of our various

(Continued on page 2)



Ron Jones

Clara Es-Stel Wieland



Charles Chandler

In this Issue—

Watch for the latest KNPS news and updates on the KNPS WEB SITE

http://sac.uky.edu/~mthom0/KNPS/knps.htm

This address is case-sensitive. Be sure to use Capitals or lower-case letters just as they appear above.

The Lady-Slipper

is published by the Kentucky Native Plant Society [IRC 501(c)(3)] in February, May, August, and November. Production deadlines are the 1st of the prior months. Submissions of letters and articles are welcomed.

Message from the President (Continued)

grants. The new $500 grant for students to take a summer field course in botany went to Rain Storm. One student research grant was awarded to Carey Fields. And finally, two demonstration garden grants were awarded; one to Bald Knob Elementary School in Franklin County and the other to Jamestown Elementary in Russell County. Congratulations to all!

I hope your summer has been productive and fun, and I will look for you at our upcoming Fall Get-Together on October 16. Details are on page 15.

—Dr Dave

Kentucky Native Plant Society — News & Notes

KNPS Display and Membership Information Gets Around

Back in April, the KNPS booth at the Lexington-University of Kentucky "Arbor Day at the Arboretum" event was manned by Charles Chandler. In June, Beth Galloway and Mary Carol Cooper got the display to Elizabethtown for a busy day at the Lincoln Trail Master Gardeners Plant Fair while Charles Chandler was doing the same up at the Sunnyside Master Gardener Herb and Garden Festival in New Albany, Indiana.

Later in June, Dave Eakin did the honors at the "Celebrate Kentucky Wildflowers" seminar at the Salato Wildlife Education Center in Frankfort, and he was there again for the Native Plant Sale in August.

Back in July, Angie Begosh set up the display for the Kentucky Beekeepers Association and who knows what other Extension Service-related events. Through it all, Byron Clark from Owensboro was distributing brochures at Pennyrile and Rough River State Parks. Someone else took brochures to Louisville.

Thanks, everybody. Please yell if we missed anyone.

Help Wanted!

Several KNPS officers will reach the end of their constitutionally mandated term limits in the Spring of 2000. There may also be positions opening on the society's Board of Directors.

If you'd like to be more involved in supporting the goals of the Kentucky Native Plant Society, please make your interest known to any of the current officers or directors as soon as possible.

No special experience is required—just your willingness to help directly with maintaining and continuing the work of the KNPS. Officers serve for a maximum of two two-year terms.

Elections and Board appointments will be the primary agenda for the KNPS spring meeting on May 6, 2000, at the Natural Bridge State Park Wildflower Weekend.

In the meantime, of course, assistance with any of the current KNPS committees or formation of other work or interest groups is always welcome.

If you can help, please contact anyone on the list at the left!

E-mail Anyone?

If you have an e-mail address, and would like to be notified of last-minute native plant rescues or other time-critical native plant-related activities, send your e-mail address to Michael Thompson at

KNPS_events@hotmail.com

Update—KNPS Support for Tennessee

Last January the KNPS board supported a distribution of $1,000 to the Tennessee Native Plant Society to assist with production of a Tennessee wildflower book. Unfortunately, publishing priorities and other difficulties have brought prospects for producing the book to a halt.

Our KNPS check has been returned pending resolution of the problems.

Update on *Wild Garden*'s Offer to KNPS Members

The KNPS has been informed by *Wild Garden* magazine that publication of the magazine is on hold in expectation of its sale to a new publisher. The former publishers are hopeful that publication will resume this fall and that reduced rate subscriptions will continue to be available to KNPS members. In the meantime, new subscriptions are not being accepted.

We'll keep you aware of the magazine's status here and on the KNPS web site as information becomes available.

A Long-Lost E-mail to the Editor... with a Recent Update

I JUST FELT LIKE YOU SHOULD KNOW how KNPS is impacting my teaching and my students this year. I joined the KNPS this past year after attending my second Spring Wildflower Weekend at Natural Bridge State Park. My family and I enjoyed it immensely. I teach sixth grade science at Jesse Stuart Middle School in Jefferson County.

For our Extended School Services (ESS) program this fall, I dreamed up a class and called it "Project Wild." I have been trained in Project Wild, Aquatic Wild, and Project Learning Tree. I also have participated in the National Science Teachers Association and University of Louisville Centers in Excellence, Research, Teaching and Learning (CERTL) program the past two years. Using those experiences along with my love of plants and Kentucky wildflowers, I began this class.

Transportation is provided for all students who stay late for ESS. One of our activities for the program was to hike over the vast school grounds surveying the plants which had already established themselves. We also were searching for a starting place to develop a wildlife habitat beginning with native plants. The goal of developing a habitat is for students and teachers to have an outdoor area to use for study, relaxation, or whatever their need is. While we were searching, we discovered a wildflower I had not seen before. It is the great blue lobelia. It is beautiful! At first we thought we had found an isolated plant, but to our delight there were numerous plants in a small area. Just by chance this area had been spared by the mowers.

Another activity which I have used with teachers and students was the T-shirt staining which my little boys learned and taught to me from this year's Spring Wildflower Weekend. The teachers involved in CERTL were really taken with this method of using plants. It was a sight to see thirty teachers, mostly middle school, hammering on T-shirts on top of the hill in the Jefferson County Memorial Forest. The CERTL Super Science Camp students used squares of material which I am sewing into a wall hanging for our CERTL lending lab at U of L. This past week my husband took his sixth grade students from Iroquois Middle School to Iroquois Park to stain squares of cloth with plant material they found in the park.

So, not only did I derive personal enjoyment from the Spring Wildflower Weekend, it helped me in my teaching. I often bring up stories about my experiences during the weekends and share my concern about the destruction of native plants with my students. It gives me a base from which to draw enthusiasm for nature and conservation which often suffers with busy lifestyles that leave little time for such thoughts.

Tom Barnes

Passion-flower vine (*Passiflora incarnata*)

I am really excited about having successfully started a small group of passion-flower vines with seed I retrieved from a plant along the fence at Manual High School. No one seems to know the plant exists or how important it is since this summer it was cut to the ground. The vines were on an eight-foot tall fence and extended for about fifty feet or more. They were simply gorgeous. I only wish I had known they had planned to cut them down so I could have at least let them know

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(Continued on page 4)

A Long-Lost E-MAIL TO THE EDITOR... (Continued)

what they were cutting down. I can only hope that the cutting of the vines have been good for them rather than killing them. Mary Carol Cooper told me they have had little success starting this vine at the Salato Center. I have some more seed and hope to start more plants next summer.

Tom Barnes

A Great Spangled Fritillary (*Speyeria cybele*) and Common Milkweed (*Asclepias syriaca*).

How to Study Plants, or Introduction to Botany / Alphonso Wood / 1879

I look forward to next spring and hope I will once again be able to enjoy the beauty of springtime at Natural Bridge. As mentioned in *The Lady-Slipper,* it has helped my family make plans for the weekend since we know it will be the first weekend in May and that it will be at the same location. Thanks for allowing me to share my story with you,

Brenda Sivado, October 18, 1998

HOW INTERESTING TO HEAR FROM YOU at this time. Tomorrow I am presenting a professional development in-service on environmental education at my school. The CERTL program is sponsored by the Jefferson Co. Public School System in conjunction with the U of L and the National Science Foundation. There are only about a dozen CERTL programs in the US. My husband and I have been fortunate to live in Louisville where one of the programs has been located. We have participated for the past three summers since the program began. My husband also teaches middle school science.

I would be delighted for my e-mail to be shared with others. The wall hanging I was working on last October was not completed due to my extraordinarily busy life. My husband has now completed his MEd. and our oldest son is driving, so I may now have a chance to complete the project. I am still searching for the correct mordant to use to preserve the color of the plant material on the cloth when used to make T-shirts. I have some ideas, but nothing solid yet. I will be doing the project with the teachers at my school in the workshop.

KNPS was the catalyst for getting me more involved in environmental education. While I am teaching reading this year, after having taught science for twelve years, I am not abandoning science. I see my new position as another avenue for spreading the word about environmental education and Kentucky native plants which have become dear to my heart. My growing knowledge inspired me to apply for an educator position at Blackacre, one of our State Nature Preserves here in Jefferson County. I didn't get the position, but I will continue trying for these types of positions.

I have been successful in starting the passion-flower vine in my backyard, as well as ironweed, and the common milkweed. I will have many passion fruits to share with plant loving friends this fall. The butterflies and insects that visit my garden are numerous. I saw a Great Spangled Fritillary for the first time this summer. Now the Monarchs have joined all the various Swallowtails to feed on the different plants. The Kentucky native woodland garden I started next to my house is thriving with new plants showing up that I know I didn't intentionally plant but am glad to see.

As you can see, I am enthusiastic and excited about our native plants. I am delighted when I can share my enthusiasm with others and hopefully infect them with a love for, and a desire to preserve, our native flora. The KNPS is a great support group and source of information for me. My only regret is that I didn't know about KNPS sooner.

Sharing the word,
Brenda Sivado, August 31, 1999

A Short Take on SHORT'S GOLDENROD . . . . . .

by James Beck

ANYONE OUT FOR AN AFTERNOON WALK or Sunday drive in Kentucky during late August through mid October just can't miss the bright yellows in every field and fencerow that belong to the Goldenrods (*Solidago* sp.). Mary Wharton considered 32 different species in the Commonwealth. Two of them, the White Haired Goldenrod and Short's Goldenrod, are endemic in Kentucky. They are known only from our state. The White Haired Goldenrod (*Solidago albopilosa*), discovered by E.L. Braun in the limestone clifflines of what is now Red River Gorge, is known from 90 populations and is listed as Federally Threatened by the US Fish and Wildlife Service. Short's Goldenrod, (*Solidago shortii*), listed as Federally Endangered in 1985, is both a beautiful plant, and one with a fascinating history.

This species was first collected by the eminent Dr. C.W. Short (then chair of the Medical Department at the University of Louisville) on Rock Island, which lies at the famous "Falls of the Ohio" between Louisville and Clarksville, Indiana. This is one of several islands and stony outcrops which were dry for part of the year and completely submerged for the remainder, representing the only serious navigational impediment on the Ohio River from Pittsburgh to New Orleans. Sent east for identification, the Goldenrod found at the Falls was subsequently described as a new species by Drs. John Torrey and Asa Gray, then hard at work on the landmark *Flora of North America*.

Civil engineering projects, culminating with the opening of a hydroelectric dam in 1930, have been historically blamed for the apparent disappearance and extinction of Short's Goldenrod by the 1870s. It wasn't until 1939 that the only other known population was discovered by Lucy Braun on rocky slopes and grazed pastures near Blue Licks Battlefield State Park at the convergence of Robertson, Nicholas, and Fleming Counties, Kentucky. Today 13 small subpopulations survive, all within the vicinity of Blue Licks.

The disappearance of this species at the Falls of the Ohio (which may have actually occurred some years before construction of the dam at Louisville) and its decline over the years at Blue Licks have always raised questions. Evidence exists that might support a connection between historic bison usage and *S. shortii*. Bison were possibly a seed dispersal mechanism, or perhaps Short's Goldenrod benefitted from the reduced plant competition that resulted from their trampling. The Falls of the Ohio

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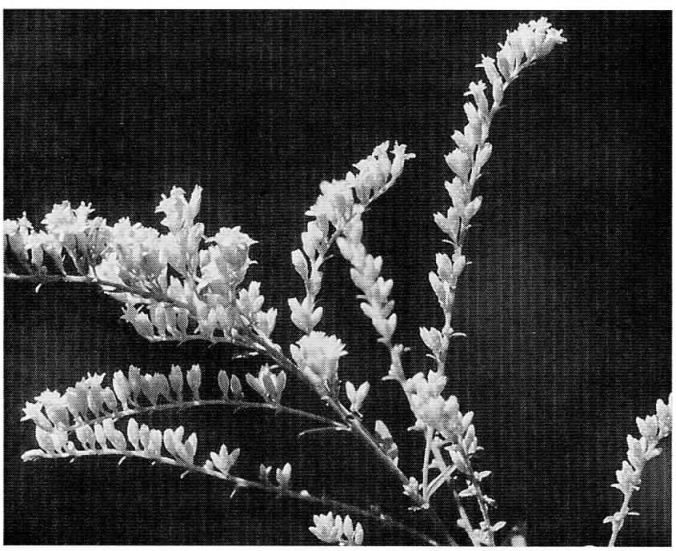


Tom Barnes

In Berkshire with the Wild Flowers / Elaine & Dora Read Goodale / 1879 / W. Hamilton Gibson, Illustrator

At right, one of the great "generic" Goldenrods most of us recognize as our state flower, and at left, Short's Goldenrod, the rarest of Kentucky's 32 different species.

A Short Take on SHORT'S GOLDENROD (Continued)

represents the most logical crossing point of the Ohio River on a trail which led the bison from the Midwest to the springs and salt licks of central Kentucky. Blue Licks itself is a famous lick, one which lies on a well documented horseshoe-shaped bison trace which began at what is now Covington and made a large circuit through the region, meeting the Ohio again at present day Maysville.

Short's Goldenrod is easily identified in the field. Totally smooth, leathery leaves and the length of its involucre (the circle of bracts or leaflet-like structures surrounding each flower) separate it out from most of the other local Goldenrod species. The Riverbank Goldenrod, (*Solidago rupestris*) is the most similar in form, although simple habitat differences (riverbanks versus dry, glady conditions) should end any confusion. Three other Goldenrods, *S. altissima, S. ulmifolia,* and *S. nemoralis,* grow with *S. shortii* at Blue Licks, but sufficient morphological differences exist between them and Short's, and anyone with a little patience and basic knowledge of terminology should have little trouble finding it.

***Solidago shortii* from Britton & Brown's *Illustrated Flora of the Northern United States, Canada and the British Possessions,* 1913.**

Short's Goldenrod is not included in Wharton and Barbour's Kentucky wildflower guide. The best key to it is the key to *Solidago* in Gleason and Cronquist's *Manual of the Vascular Plants of Northeastern United States and Adjacent Canada*.

The easiest viewing of this rare species occurs in the Kentucky State Nature Preserve Commission's Buffalo Trace Preserve, which is in the vicinity of Blue Licks Battlefield State Park. A truly unique and enjoyable day trip for any Kentuckian would be traveling from Lexington though Paris and on to the Park, all on US Highway 68. In just a few hours one could enjoy the majesty of the Bluegrass horse farms and the beauty of probably the rarest variety of our state flower. For more information on Short's Goldenrod or its conservation, feel free to call myself at (606) 622-4994, or Dr. Pat Calie at (606) 622-1505.

The Medicinal History

by Robert Paratley, Curator
University of Kentucky Herbarium

"Well, I could sit here and talk all day about black cohosh... It's at the top of the list... It's been a beneficial medicine forever."
—Appalachian herbalist Tommie Bass

BLACK COHOSH, *Cimicifuga racemosa*, is the most common and widespread of three Kentucky species of *Cimicifuga*, a genus of tall perennials (to 8 feet) in the Ranunculaceae family with large, twice or thrice-compound leaves and a tall dense spire of small white flowers. The showiness of the floral display is due almost entirely to the numerous white stamens in each flower, as the white sepals fall early and the flowers bear no petals. The two other species in the genus strongly resemble black cohosh and are separated from it by technical characters: the number and disposition of the pistils in the flower, and by the size and texture of the fruit, a several-seeded follicle (Gleason and Cronquist, 1991). In *Cimicifuga racemosa*, the leaves bear more numerous leaflets than its generic cousins, and the flowers bear but a single pistil. *Cimicifuga rubifolia*, Appalachian bugbane, is a rather infrequent inhabitant of higher elevation Appalachian woods to the east and south of Kentucky, with several disjunct sites in western Kentucky and southern Illinois. Also uncommon here is *Cimicifuga americana*, American or mountain bugbane, found in a number of locations in the eastern mountain counties of our state.

Two other common perennial herbs are also sometimes confused with black cohosh, and are sometimes mentioned in the herbalist's literature along with it. Sterile specimens of *Actaea pachypoda,* white baneberry (also Ranunculaceae), look uncannily similar to black cohosh, although baneberry is usually a much smaller plant. When fertile, it is easily distinguished from *Cimicifuga* by its more compact inflorescence, or, later, by its bright white berries with a characteristic black spot. It is not nearly so widely recognized as a useful plant, and less is known about its effects. Also sometimes associated with black cohosh is the similarly named blue cohosh, *Caulophyllum thalictroides* (Berberidaceae). The name cohosh is a Native American name referring to both *Cimicifuga* and *Caulophyllum* (Coffey, 1993), probably because both plants were often used for the same physiological actions by

# of Black Cohosh, *Cimicifuga racemosa*

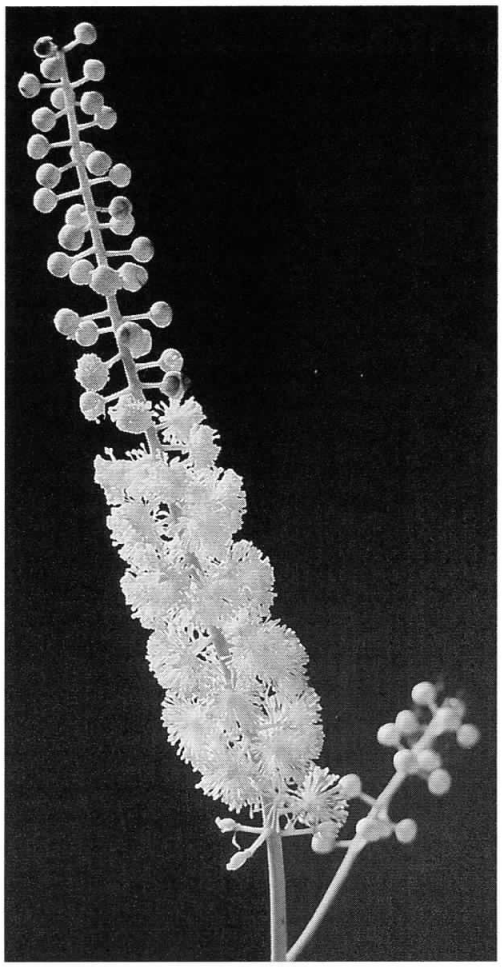
healers. Blue cohosh does not enjoy quite the widespread enthusiasm in traditional healing as black cohosh. With its brownish, six-parted flowers, blue-black exposed seeds, and blue-green, sparsely-toothed leaflets, *Caulophyllum* is easily differentiated from *Cimicifuga*.

Cimicifuga racemosa, black cohosh, ranges widely through deciduous woodlands from southern Canada south to Tennessee and South Carolina. In Kentucky it is common in the eastern counties and has a scattered distribution in the rest of the state, but is apparently absent from the Bluegrass and Coastal Plain. It prefers forest openings and woodland borders, as well as a rich soil.

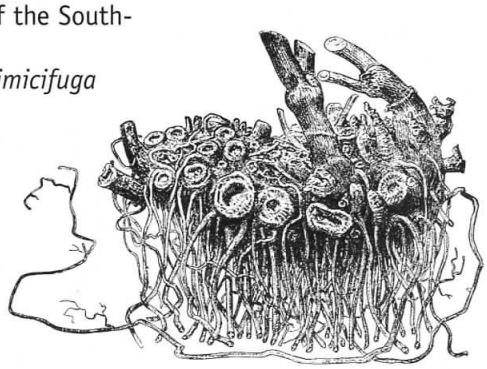
The Latin name *Cimicifuga* derives from *cimex*, a bug, and *fugo*, to repel (Combs, 1985). Another common name for the genus is bugbane, referring to the fact that the scent of the plant is said to repel insects. An old folk notion suggests that leaves laid above a room can drive bugs away (Duke, 1986). This is especially true of the east Asian species *Cimicifuga foetida* (fetid bugbane), today offered along with the native black cohosh in many garden catalogs. *Cimicifuga foetida*, like its American counterpart, has a long history of medicinal use in the Far East. The herbalist literature for North America focuses on *Cimicifuga racemosa*, which has a long history of use as a folk medicine by several Native American tribes and by Euro-American settlers of eastern United States. There is no mention of other species of *Cimicifuga*. Either other members of the genus were avoided or they are not differentiated from *C. racemosa*.

Black cohosh is a rhizomatous perennial, and it is the rhizome or "root" which has provided almost all of the medicinal applications for the plant. The active principles are derived either by boiling down (decoctions), in solution with alcohol (tinctures), or, more rarely, by liquid extracts. Records of use of the leaves are rare (see below).

Enthusiasm in the 19th Century and early 20th Century ran very high—"unquestionably one of the most valuable of our indigenous plants" stated the *Report on Indigenous Medical Botany and Materia Medica for 1850–51*, an important mid-19th Century compendium of plant pharmaceuticals (Clapp, 1852). Part of its popularity in the pharmacopeia of the last century was due to its popularity with Native American healers. "Our Indians set a high value on it" stated Barton in his *Materia Medica* of 1801 (Barton, 1801). Its availability as a commodity through Shaker communities in the middle years of the century also helped ensure its widespread use as a healing plant (Miller, 1976). At the height of its popularity in the 1870s and 1880s, black cohosh became an export commodity, sent to doctors in Great Britain (Crellin and Philpott, 1990). As late as 1912, a survey of physicians revealed black cohosh to be one of the most popularly prescribed drugs (Lloyd and Lloyd, 1921). As with all herbal medicines, use by the established medical profession waned through the 20th Century as laboratory-derived substitutes were introduced and popularized. But, as seen in Tommie Bass' opening endorsement, contemporary herbalists still have high regard for the plant (Crellin and Philpott, 1990).



Tom Barnes



Drugs and Medicines of North America / J.U. & C.G. Lloyd / 1884–87

Above, Black Cohosh's white inflorescence, and below, its rhizome, the source for most medicinal applications of the plant.

The well-documented medicinal use of black cohosh by several eastern Native American tribes ranges from the Micmac in Canada to the Cherokee in southern Appalachia. Others include the Penobscot (northern New England), Iroquois (New York State), and Delaware (mid-Atlantic coast) (Moerman, 1998). It is the Cherokee for which we have the most complete record, as the Cherokee relied heavily on black cohosh for a wide variety of medicinal uses, most of which were taken up by the Euro-American herbal practitioners of the Southern Appalachians.

An alternate folk name for *Cimicifuga* is squawroot, a reference to its use by Cherokee women for a variety of so-called women's ailments—general "women's problems," menstrual regulation, management of cramps, aid in

(Continued on page 8)

Black Cohosh *Cimicifuga racemosa* (Cont.)

childbirth and post-partum. Nursing mothers of the Iroquois took black cohosh to stimulate lactation, another association with the name squawroot. The potency of *Cimicifuga* makes it a rather dubious choice for such a use, and modern herbalists usually warn women not to use the herb during pregnancy or while nursing, although it is still recommended today for labor pains and post-partum (Bown, 1995). It is suggested too that prolonged use may irritate the uterus (Duke, 1986). In addition, Euro-American herbalists also have used "squawroot" for PMS, and regulation of hormonal imbalances with the onset of menopause. Indeed, recent German research has confirmed a chemical role for *Cimicifuga* in the hormonal regulation of estrogen production through its negative effect on progesterone production (Chevalier, 1996). Regulation of progesterone is believed to explain cohosh's efficacy in regulating difficult menstruation.

Racemes of Black Cohosh spire above the forest floor on stems 3–8 feet tall.

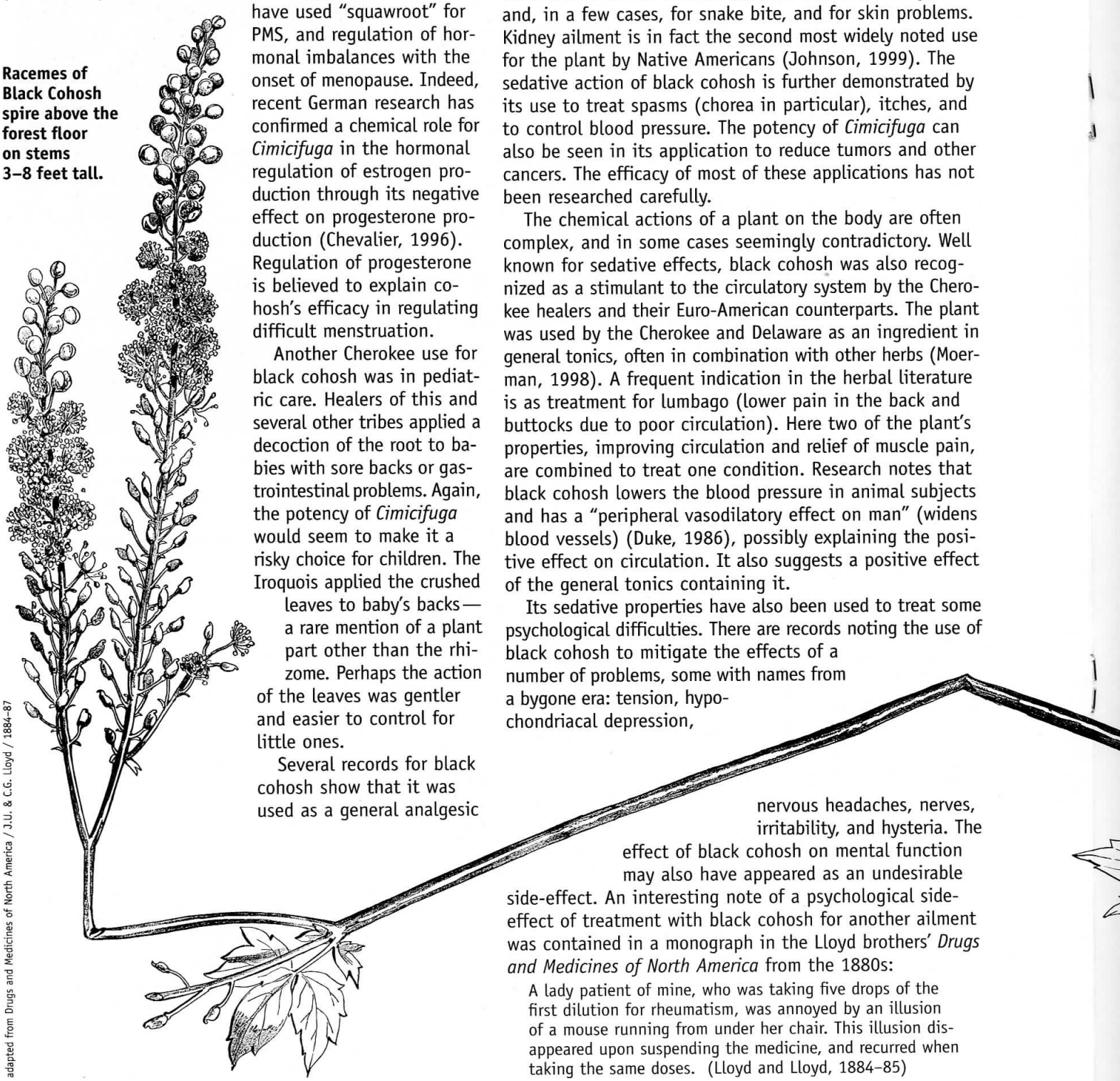
Another Cherokee use for black cohosh was in pediatric care. Healers of this and several other tribes applied a decoction of the root to babies with sore backs or gastrointestinal problems. Again, the potency of *Cimicifuga* would seem to make it a risky choice for children. The Iroquois applied the crushed leaves to baby's backs—a rare mention of a plant part other than the rhizome. Perhaps the action of the leaves was gentler and easier to control for little ones.

Several records for black cohosh show that it was used as a general analgesic (pain relief), and it is known to have sedative properties. This probably explains its favored status as an aid for the women's discomforts (cramps, labor pains) as listed above. Slowing the pulse, lowering blood pressure, easing pain, and allaying reflexive reactions like coughs and spasms were well understood effects of the herb. Coupled with its "cleansing properties," it was an herb of choice for Cherokee (and other tribes') healers to treat a range of respiratory ailments from sore throats, bronchitis, to whooping cough, as well as for the more serious tuberculosis. Other applications have been as a blood cleanser and as a kidney aid, and, in a few cases, for snake bite, and for skin problems. Kidney ailment is in fact the second most widely noted use for the plant by Native Americans (Johnson, 1999). The sedative action of black cohosh is further demonstrated by its use to treat spasms (chorea in particular), itches, and to control blood pressure. The potency of *Cimicifuga* can also be seen in its application to reduce tumors and other cancers. The efficacy of most of these applications has not been researched carefully.

The chemical actions of a plant on the body are often complex, and in some cases seemingly contradictory. Well known for sedative effects, black cohosh was also recognized as a stimulant to the circulatory system by the Cherokee healers and their Euro-American counterparts. The plant was used by the Cherokee and Delaware as an ingredient in general tonics, often in combination with other herbs (Moerman, 1998). A frequent indication in the herbal literature is as treatment for lumbago (lower pain in the back and buttocks due to poor circulation). Here two of the plant's properties, improving circulation and relief of muscle pain, are combined to treat one condition. Research notes that black cohosh lowers the blood pressure in animal subjects and has a "peripheral vasodilatory effect on man" (widens blood vessels) (Duke, 1986), possibly explaining the positive effect on circulation. It also suggests a positive effect of the general tonics containing it.

Its sedative properties have also been used to treat some psychological difficulties. There are records noting the use of black cohosh to mitigate the effects of a number of problems, some with names from a bygone era: tension, hypochondriacal depression, nervous headaches, nerves, irritability, and hysteria. The effect of black cohosh on mental function may also have appeared as an undesirable side-effect. An interesting note of a psychological side-effect of treatment with black cohosh for another ailment was contained in a monograph in the Lloyd brothers' *Drugs and Medicines of North America* from the 1880s:

> A lady patient of mine, who was taking five drops of the first dilution for rheumatism, was annoyed by an illusion of a mouse running from under her chair. This illusion disappeared upon suspending the medicine, and recurred when taking the same doses. (Lloyd and Lloyd, 1884–85)



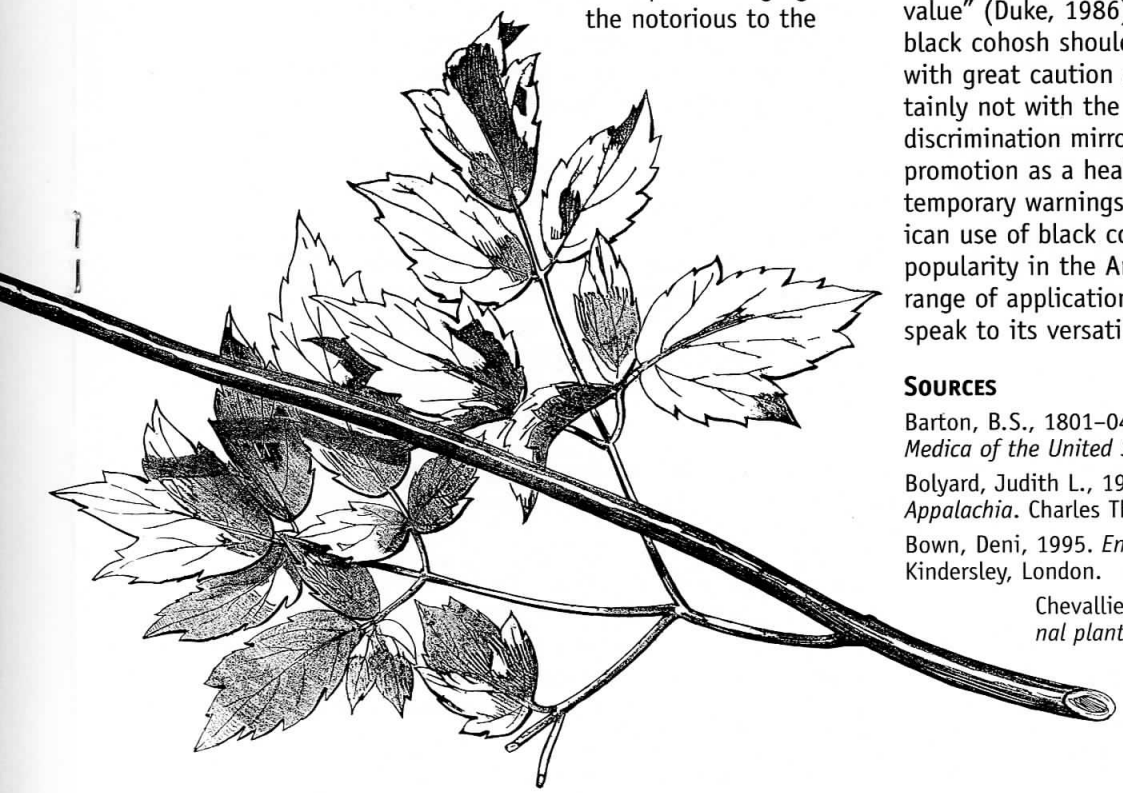
adapted from Drugs and Medicines of North America / J.U. & C.G. Lloyd / 1884–87

Treatment for rheumatism, by both colonial practitioners and tribal healers, seems to have been its most widespread and widely acknowledged use. Rheumatism is a constellation of diseases of the joints, tendons, muscles, or bones. Records of the efficacy of *Cimicifuga* as a mitigator of rheumatic symptoms, inflammation and joint pain, are widespread. It has been shown to reduce inflammation in laboratory rats (Bolyard, 1981), so it may be that its effectiveness in these cases may stem from both anti-inflammatory and analgesic action. Again from the Lloyd brothers:

> The aborigines of America already discovered the medicinal virtues in this plant: finding it, as they did, growing in various parts of the country, they soon learned to use and value it highly for a variety of complaints, chief among which were rheumatism... In rheumatism they depended much more on a decoction of the roots externally than internally. A hole was made in the ground, into which they put a kettle in such a manner as to receive the influence of the steam. (Lloyd and Lloyd, 1884–85)

Chemically potent plants usually have a dramatic effect on the gastrointestinal system, and are often used to purge the system. Although not as widely used as a purgative as many herbal medicines, black cohosh has in fact been employed by Native Americans for stomach ailments and as a laxative. Modern herbals warn that an unspecified overdose of cohosh produces nausea, vomiting, and dizziness (Tierra, 1980).

Numerous chemical constituents have been isolated in black cohosh, and many may figure in its diverse array of actions on our system. Of these substances, the saponins and resins potentially have the most troublesome effects. Most current sources are equivocal about the herb, acknowledging its potency and warning of its potential toxicity. Indeed, its family, the Ranunculaceae, contains numerous toxic plants ranging from the notorious to the poorly understood. Some have very serious reputations —*Delphinium* (larkspur) and *Aconitum* (monkshood) both contain alkaloids and are highly toxic, with a long history of livestock poisonings. Others possess glycosides like ranunculin, which, although harmless in glycosidal form, are easily broken down to release severely irritant oils which can distress the digestive system or cause serious illness.



Although these have not been isolated in *Cimicifuga*, it seems clear that adverse effects such as these and those documented for cohosh itself should discourage indiscriminate use. Some have gone on to write it off completely, asserting that the dangers far outweigh its equivocal and poorly documented (by hard research) positive effects. The FDA classes black cohosh as a plant of "undefined safety" and further states that there is "...no pharmacologic evidence of any therapeutic value" (Duke, 1986). Clearly, black cohosh should be used with great caution and "certainly not with the lack of discrimination mirrored in its promotion as a health food" (Tyler, 1981). Dismissive contemporary warnings aside, the long history of Native American use of black cohosh in the healing arts, its former popularity in the American pharmacopeia, and the wide range of applications for a number of health problems speak to its versatility and efficacy.

The Chemistry of *Cimicifuga racemosa*

Black cohosh is high in various resins including cimicifugin. Two triterpenoid glycosides (saponins), actein and cimigoside, have been isolated and been shown to lower blood pressure in some animal subjects (Crellin and Philpot, 1990). Both the resins and the glycosides contribute to the bitterness of the herb, and may also impart some of its purgative properties. Tannins, known for their astringency, are also present. These may be implicated in some of the plant's cleansing actions. A quinolizidine alkaloid, cytisine, has been detected, and may contribute to effects on the nervous system (Duke, 1986). Isoflavones (including formononetin) may be a factor in the effects of cohosh on women's hormones (Chevalier, 1996). Perhaps the most important constituent is salicylic acid (more commonly associated with the natural aspirin found in willows), a probable cause of the analgesic and anti-inflammatory properties of the herb. Aspirin is still widely prescribed for inflammations of joints and muscles.

Sources

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(Continued on page 10)

CARDINAL FLOWER / A Very *Lobelia*-r Question: *Float Like*

by Charles Chandler and Sarah Kennedy

WE BEGIN THIS E-MAIL CORRESPONDENCE at the Guest Book of Michael Thompson's "Wildflowers of Western Kentucky" web site, ***http://sac.uky.edu/~mthom0/flora.htm*** ·····➤

Native Flowers and Ferns of the United States / Thomas Meehan / 1880

Detail shows anthers united in a tube around the style. Note hairs (1) at the tip of the anther tube. The stigma (2) has emerged and is ready for pollination.

* *

GUEST BOOK Record 47 *
Name: Sarah Kennedy *
From: Lexington *
Time: 1998-10-16 *
* * * * * * * * * * * * * *

Comments: Love this site! I've been trying to get info on wildflowers around here, and there's not much within easy access. Pictures are great, too. I got on to this site because I'm looking for information about harvesting seeds on a cardinal flower, but I'll definitely bookmark this one! / Sarah

* *

Date: Sun, 22 Nov 1998 *
To: Sarah Kennedy *
From: Charles Chandler *
Subject: Guestbook comment *
* * * * * * * * * * * * * *

Sarah,

I saw your comment in Michael Thompson's Western Ky. Wildflowers guestbook and wondered what sort of info on wildflowers you're looking for. Are you looking for actual places to see flowers or just books or other resources. If you've not had any luck finding info about collecting cardinal flower seeds, I've done that before and could talk to you about it also. It's not hard, and it may not even be too late. / Charlie Chandler, Lexington

* *

Date: Mon, 25 Jan 1999 *
To: Charles Chandler *
From: Sarah Kennedy *
Re: Guestbook comment *
* * * * * * * * * * * * * *

Charlie—

Thanks for your response. I'm actually interested in getting my cardinal flower plants to pollinate because if hummingbirds are the only ones that do it, I'm in trouble. I've never seen hummingbirds around this area. I've read that cardinal flower plants don't last more than a few years, and I found no seeds on my plants this year (I bought them two years ago). Do you have any experience with hand pollination? / Sarah

* *

Date: Sat, 13 Feb 1999 *
To: Sarah Kennedy *
From: Charles Chandler *
Re: Re: Guestbook comment *
* * * * * * * * * * * * * *

Sarah,

Actually, I do have some experience with hand pollination that might be relevant for cardinal flower. Lobelia pollination in general is really interesting. For car-

BLACK COHOSH *Cimicifuga racemosa* (Cont.)

Committee on Indigenous Medical Botany and Materia Medica for 1850–51. Trans. Amer. Med. Assoc. 5: 689–906.

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a Hummingbird, Bumble Like a Bee?

dinal flower it's basically pretty red flowers, hummingbirds, *voila,* seeds. The details, however, are pretty curious. But first...

Are you certain your plants didn't set seed? They are really tiny. When you're trying to find them they're often mixed in with bits and pieces of the dried seed capsules. About the only thing that would lead you to recognize them as seeds (without a magnifying glass) is their uniform color (tan-ish?), size (a pin prick in a piece of paper), and their rounded football-like shape.

There *are* hummingbirds in the Lexington area from midsummer through early fall. We usually have scarlet runner beans and morning glories around our patio (about the extent of my garden lately) and although I didn't see too many hummingbirds last summer, there are always a few that show up. People who feed them with sugar water have lots. In fact, maybe they're so busy with the feeders, they don't make it around to the plants.

There are other pollinators, however, that I presume also pollinate cardinal flowers. I have more experience with great blue lobelia, cardinal flower's close relation, than I do with cardinal flower, but I'm pretty sure the same thing applies to both. I know for certain big bumble bees and some moths do a good job of pollinating the blue lobelia, and I've seen both visiting cardinal flower.

The actual mechanics of lobelia pollination are pretty neat. I've looked in several pollination books but never found an accurate account of how it happens. Most books say the pollen is created inside the fused anthers (the grayish tip of the tall, curved tube that extends upward from the base of the flower above the spread petals), and that it adheres to the short bristly white hairs at the tippy tip of the fused anthers.

The books say that the birds' or bees' fuzzy parts brush against the pollen covered hairs at the tip of the anther tube, and pollen just gets brushed off onto the critter. That's not what happens at all.

First off, if you look at an individual lobelia blossom closely (even with a hand lens) there's no pollen to be seen anywhere. Yet if you watch a bumble bee come for a visit, although it may show up at a blossom with nothing on its back, it often leaves carrying a patch of bright yellow pollen. Look closely at the flower it visited again, and you still won't see any pollen!

I was trying to figure out how this happens once and thought I'd try to pry apart the tip of an anther tube to see if I could find the source of all this pollen. While trying to hold onto a blossom without crushing it, I accidentally brushed against the white hairs at the tip of the anther tube with my fingernail. It didn't seem like I had done anything, but suddenly, there was my fingernail—covered with a big dollop of powdery, bright yellow pollen.

It turns out the pollen is both made and stored inside the anther tube just as the books say. But the bristly hairs at its end are actually triggers that, when tripped, somehow allow the anther tube to actually dispense a neat little pile of pollen right where it's needed—onto the fuzzy back of a bumble bee or the downy head of a hummingbird. It's like a little spigot or the ketchup dispenser at Wendy's. It's really cool, and I assure you it's the only bit of botanical trivia that I ever personally seem to have discovered or ever personally needed to inflict on anyone. Aren't we lucky that you asked?

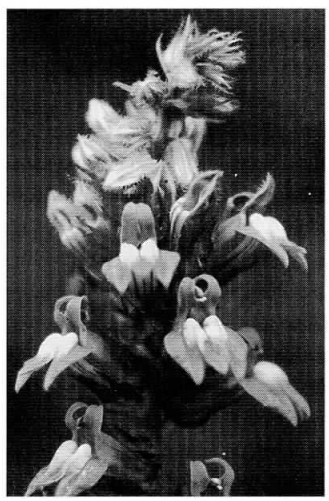
As I said, I found this out with *Lobelia siphilitica*, but I have tried it on cardinal flower and the same thing happens. Most of the flowers of the other native lobelias around here are too small to manipulate so easily, so I don't know if the same mechanism works throughout the entire *Lobelia* genus.

This pollen dispensing phenomenon doesn't happen every time with every individual blossom. I think it does (or can) happen at least once or maybe twice with each individual flower. I think it can only happen when the pollen is ready to be dispensed, and then once it's dispensed it doesn't happen again because the pollen, of course, is all gone. I think it's at that point that the female part of the flower, the stigma, can grow up and out through the now empty anther tube. After it emerges, it can open its two halves to be fertilized by a bird or bee that's coming from a flower that just dispensed its pollen onto the pollinator's back or head.

Each flower has both male and female stages, and it seems like it goes through its male stage first (dispensing pollen) before its female stage can make it ready to be pollinated. Most books seem to have this wrong, too. They tend to say the stigma grows up through, and perhaps is fertilized by, the pollen in the anther tube or on the

(Continued on page 10)

Tom Barnes



Tom Barnes

Cardinal Flower (*Lobelia cardinalis*) above, and Great Blue Lobelia (*Lobelia siphilitica*) below

Drugs and Medicines of North America / Lloyd & Lloyd / 1884-87

CARDINAL FLOWER / A Very *Lobelia*-r Question (Continued)

hairs at its tip. I think the pollen has to be gotten out of the way first by a visit from a pollinator. If the pollen isn't removed, I think it blocks the stigma from growing out and the flower just becomes deformed. Sometimes the stigma finds its way out through a weak spot or split in the anther tube's walls.

SO, IF YOU WANT TO HAND POLLINATE, it's both simple and complicated. First you have to look like a hummingbird or a bee. I've tried to do this by using a short piece of a soft, fuzzy pipe cleaner—just a couple inches or so. Basically, this just serves as a cylindrical brush that hopefully mimics the fuzzy back of a bee or a hummingbird head. And then, since some blossoms on a flower stalk are ready to dispense pollen, and some are ready to be pollinated, and some are ready to do neither, you have to act like a bee. You go visiting blossoms, brushing against those bristly hairs until you trigger a deposit of pollen on the pipe cleaner that you can then brush against the exposed stigmas of other blossoms that may be ready to be fertilized.

This actually seems to work, but at least for this human, being a bird or bee gets old pretty quick. Maybe if I got an occasional sip of nectar to keep me going....

There could be other factors in play to explain why your plants aren't setting seed, too. How did you come by them? Some pretty strange cardinal flowers are showing up in the nursery trade these days. There are getting to be more and more cultivars—selected strains or even hybrids—that might actually be sterile or otherwise incapable of setting seed. The Kroger over here in Gardenside had some last summer that had stalks about 1-1/2" thick and flowers 2-1/2" tall. They were mighty impressive, but I don't know how far back in their genealogy you'd have to go to find kin who were hearty enough to live in a ditch beside a road.

I'm ready to quit now. Hope I haven't worn out my welcome too badly. I don't know anything else, so I promise it won't happen again. / Charlie Chandler

* *

Date: Thu, 11 Mar 1999 *
To: Charles Chandler *
From: Sarah Kennedy *
Subject: Flower seeds *
* * * * * * * * * * * * * *

Charlie,

No wonder I couldn't find any seeds! For some reason which totally eludes me now, I thought the seeds were large-ish (1.5–2 mm) and black. This fall I'll know exactly what to look for. Your story about pollination was really fascinating and I'm going to try it. That whole process doesn't seem very efficient, which may be why the flowers are so intensely red—to attract more pollinators.

I had read somewhere that the cardinal flower poops out after a few years, and that's why I wanted the seed. I obtained the plants from a nursery which claims it propagates from native plants, and it didn't come with a cultivar name (like *L. cardinalis* 'Lipstick' or anything like that) and it weathered the dry summer pretty well, and the dogs and being transplanted from another yard—seems very hardy, if that's any indication.

I got interested in Kentucky wildflowers when we lived in a house that had a yard made up of pure clay. The builder must have scraped all the topsoil off because the first year we lived there, everything I planted was stunted, despite soil amending. I figured that native plants would survive better than anything else, and they did, but they didn't grow much. We moved last spring and I brought all my plants with me and they all just took off because this time we had topsoil.

So that's the reason I was on the Wildflowers of Western Kentucky website—to find out just what was native. It's interesting to read about what different people think "native flora" means; some think it means indigenous, others mean what was here before the Europeans came over—not always the same.

Again, thanks for taking the time to explain all that—I printed it out and put your letter in my garden notebook for future reference. / Sarah

* *

Date: Mon, 30 Aug 1999 *
To: Sarah Kennedy *
From: Charles Chandler *
Subject: Re: Flower seeds *
* * * * * * * * * * * * * *

Sarah,

Surprise. Most of a growing season and hopefully most of this drought has passed since we talked last, but here I am again. What I'm here for is I'm thinking about stringing together our long ago correspondence about cardinal flower for a Kentucky Native Plant Society newsletter article. We're a bit short on articles and it occurred to me that in addition to my observations about lobelia pollination, between the two of us, we touched on other issues that are relevant not only to cardinal flower, but to native plants and wildflowers in general. Either I'm really stretching it, or it wasn't bad for a couple of amateurs. (You are an amateur, too, aren't you?)

Any objections? Or concerns? Or conditions? I already gathered up all the relevant bits and pieces and consolidated them in a single text file. If you'd like to have your memory refreshed and get a better idea of what I'm talking about, I'd be glad to copy it into another e-mail for you to review. I don't want to make you read it all again if you don't need to. Let me know what you think. I'm on deadline though this time. / Thanks, Charlie Chandler

* *

Date: Tue, 31 Aug 1999 *
To: Charles Chandler *
From: Sarah Kennedy *
Re: Re: Flower seeds *
* * * * * * * * * * * * * *

Charles—

Sounds great! I still have your letter to which I am referring in detail because my cardinal flowers are in bloom, so you don't need to refresh my memory at all! I also want to let you know that I have hummingbirds in my garden—for the first time! I bought a very small feeder to put in back near the cardinal flowers, in case the hummingbirds needed encouragement. Good luck! And I'm looking forward to reading the next newsletter. / Sarah

Bernheim's Big Meadow to become BIG GRASSLAND

by Margaret Shea, Natural Areas Director
Bernheim Arboretum and Research Forest

BERNHEIM'S 500-ACRE ARBORETUM and 13,500-acre natural area have been managed completely separately in the past. Our goal is to begin integrating management of the two areas —using horticultural techniques in restoration of disturbed natural areas—and including use of native species and examples of natural community types within the arboretum. The Big Meadow, a 30 acre lawn within the arboretum, was chosen as an area to create an example of a native grassland.

The Big Meadow was designated as open space in the original Olmstead design for Bernheim. Olmstead often used open areas to contrast with plantings of trees in his landscape designs. The site of the Big Meadow was a corn field in the past, and was more recently planted in Bluegrass to create a lawn.

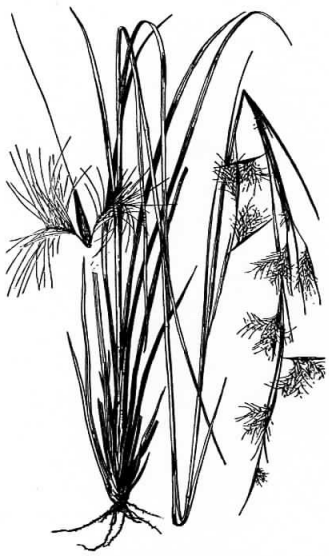
In 1997, the decision was made to stop mowing the Big Meadow to create a more natural meadow. The new look of the meadow received mixed reviews—rumors were flying that Bernheim no longer had the money to mow its lawn. Despite the criticism, the meadow was an excellent area to discuss succession with school groups. Considering the history of the meadow, a surprising number of native species appeared—even more native species appeared after a spring burn in 1998. While non-natives like Bluegrass, Fescue, and Johnson Grass dominated the meadow following the burn, many native species including Broomsedge, Yarrow, Pussytoes, Slender Mountain Mint, Milkweeds, and Goldenrods were present.

In 1999, we decided to attack the non-natives of the Big Meadow more aggressively and replace them with native grassland species. Since Bernheim is within the "Big Barrens" Region of Kentucky, where native grasslands were once abundant, the Big Meadow can provide an example of what this community may have looked like. By modeling the created grassland after native grasslands within Bernheim and nearby nature preserves, we can inform the public about this subtly beautiful and seriously threatened community type.

We began this years' efforts with a second spring burn, this time burning only half of the meadow in order to leave some habitat for insects, nesting birds and other wildlife. The afternoon of the burn was hot and dry and made me glad the meadow was surrounded by a big fire break—a closely mowed lawn. Burning in the center of the arboretum made me appreciate earlier burns in remote nature preserves where the audience was smaller! The burn went well and without a hitch, and the warm, wet spring resulted in a lush, green regrowth of Bluegrass and Fescue.

Our next step will be to spray 4 acres of the meadow with herbicide, and then use a seed drill to plant native grassland seeds. We are using a mix of 5 grasses and 25 forbs that are known to grow in nearby native grasslands; however, the source of the seeds is from southern Illinois. Only 4 acres of the Big Meadow will be planted this year, but eventually we plan to plant native grassland species in the entire 30 acres. Species that we hope to see in the meadow this summer include: Big Bluestem, Little Bluestem, Indian Grass, Coneflower, Blazing Star, Prairie Clover and Wild Quinine.

While there are many different techniques for establishing native grasslands, most people agree that it can take several years to see good results. It also takes a commitment to continued management of the site to control non-native species. I am hoping for the best and eager to see the results! Please feel welcome to visit the site and join me in watching the progress of this project.



Broomsedge
(***Andropogon virginicus***)

Big Bluestem
(***Andropogon gerardi***)

Little Bluestem
(***Andropogon scoparius***)

Indian Grass
(***Sorghastrum nutans***)

Manual of the Grasses of the United States / A.S. Hitchcock / 1935

Field Trip Report—

Mantle Rock Nature Preserve

Livingston County

Text and photos
by Michael Thompson

On June 28, 1999, the Kentucky Native Plant Society conducted a joint field trip with The Nature Conservancy to the Mantle Rock Nature Preserve in northern Livingston County, Kentucky. The trip was led by Cindy Campbell of The Nature Conservancy. The Conservancy had previously performed a controlled burn on some of the front fields of the preserve in order to control invasive exotics and re-establish native grasses. The effects of this burn could already be seen; however, it will take a series of controlled burns over a number of years in order to control the non-natives and fully re-establish the native species. White sweet clover seems to be a particular problem species at the site.

Many of the early and mid-summer wildflowers were in bloom during our visit, such as purple-headed sneezeweed, passionflower, and St. John's wort. Other summer species that can be found in this area are St. Andrew's cross, orange grass, prickly pear, little bluestem, starry campion, common milkweed, orange milkweed, black-eyed susan, wild hydrangea and deptford pink.

Mantle Rock itself is a natural rock bridge, about 30 feet in height, located in the hill region of northern Livingston County near the Ohio River. The geology of this region is typically limestone with a thin sandstone cap.

Mantle Rock is also very rich in history, having housed several woodland culture villages at one time, and it was also a stop along the Cherokee Trail of Tears during the forced migration of the 1830s. The area is very rich in both plant life and wildlife.

At the top of Mantle Rock is a cedar glade, a hot, xeric (very dry) habitat dominated by species such as cedar, reindeer moss lichen, several species of mosses, prickly pear (Kentucky's only native cactus), and orange grass (an unusual member of the St. John's wort family), to name but a few. These species are in the process of very slowly building up the soil over the exposed rock. As succession continues, this area will probably evolve into a dry upland forest. The temperature during the summer in the glade can exceed 50 °C/120 °F.

Mantle Rock, a natural bridge (note the human at far left for scale), includes a cedar glade along its top where plants adapted to extremely dry, very thin soil reside. At left below, prickly pear cactus (*Opuntia humifusa*) shares its space with hairy-cap moss (*Polytrichum*), reindeer moss (*Cladonia*), which is actually a lichen, and the curly strands of poverty grass (*Danthonia spicata*). The less

KNPS Certification Program in Native Plant Studies at Bernheim Arboretum

These classes can be used as special topics for the KNPS Certificate in Native Plant Studies. Classes are taught at Bernheim Arboretum in Clermont, KY by Varley Wiedeman, Ph.D., Bernheim Science and Education Advisor:

Fall Leaf Identification – 3 Saturdays, Oct. 2, 9, 23, 1999

Spend three Saturday mornings hiking the trails and exploring the arboretum collections as you become familiar with the natural history of this region's woody species. This in-depth course includes lectures, hikes, instruction in key and field guide use, and informal discussions.

Time: 9:00 a.m.–1:00 p.m.

Place: Meet at Visitor Center Classroom

Fee: $45 members (KNPS or Bernheim), $60 non-members

Limit: 30 participants

Basic Botany – 4 Saturdays, November 6, 13, 20, 27, 1999

For the amateur naturalist with no background in botany or science. If you ever wondered why and how plants are so different from animals, you'll discover an exciting world of information from this study. You will use microscopes to examine details of plant bodies. You will learn how plants function in ecosystems as photosynthetic machines, and why none of us could exist without them.

Time: 9:00 a.m.–12:00 p.m.

Place: Meet at Visitor Center Classroom

Fee: $50 members (KNPS or Bernheim), $65 non-members

Limit: 30 participants

For more information or registration, please contact:

Claude Stephens
Bernheim Arboretum and Research Forest
502-955-8512
cstephens@bernheim.org

In early 2000, Dr. Wiedeman also plans to offer:

Plant Ecology in February

Plant Taxonomy in March

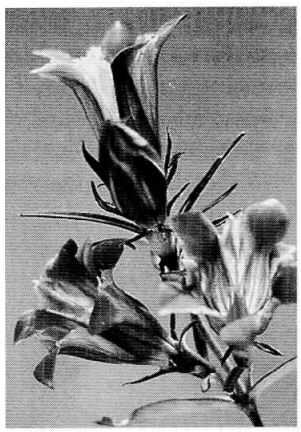
Exact descriptions have not yet been developed for these classes.

extreme habitats surrounding the natural bridge contain more familiar woodland and prairie species like the white, wild hydrangea (*Hydrangea arborescens*) and the bright yellow-bodied, but purple-headed sneezeweed (*Helenium nudiflorum*).

Field Trips!/Fall Get-Together!
OCTOBER 16! CALL NOW!

For the last two years the KNPS has tried to coordinate its Fall Get-Together with Colorfest at Bernheim Arboretum and Research Forest. In conjunction with this year's event, Deb White will lead a KNPS group on a **Saturday morning field trip, October 16, to Eastview Barrens** just southwest of Elizabethtown. This remnant of Kentucky prairie includes many unique species. We hope to see the rare prairie gentian (*Gentiana puberulenta*) in bloom. There is a cap of 25 people. ***If you are interested, please contact Deb directly at the KY State Nature Preserves Commission, 502/573-2886.***

Eastview Barrens Directions & Time: Traveling west from Elizabethtown on the Western KY Parkway exit at the Eastview exit. Go NW on Rt. 84 toward Eastview a short distance. At the junction of Rt. 84 and Rt. 62 you will see a blue convenient store. We will meet in its parking lot at **9:00 am ET/8:00 am CT.** *For the record, Eastview is just inside the Central Time Zone.*



Tom Barnes

Sky blue prairie gentian (*Gentiana puberulenta*)

In the afternoon, we have tentatively scheduled a **walk in Bernheim's Research Forest.** The cap is also 25. ***If you're interested, contact Dr Dave Eakin, 606/622-2258.***

If you can't join us, we hope you'll find time to support Bernheim's Colorfest, 9 am–5 pm., October 16–17.

Bernheim Arboretum Directions: From I-65, take the Bardstown-Clermont exit #112 (about 25 miles south of Louisville). Go east on KY 245 one mile.

KY Biodiversity Conference Oct. 14–15

The Center for Biodiversity Studies at Western KY Univ. hosts its 2nd annual KY Biodiversity Conference Oct. 14–15. Focal areas are: Incorporating biodiversity into the K-12 curriculum, Using molecular tools to evaluate biodiversity, and Sharing biodiversity-related data. The sessions will be chaired respectively by Joan Martin (Center for Math, Science, & Environmental Education), Dr. Irv Kornfield (Univ. of Maine), and Dr. Dave Vieglais (Univ. of Kansas). More info and registration is available at

http://biodiversity.bio.wku.edu

Questions? please email:

Michael.Stokes@wku.edu

Kentucky Native Plant Society
MEMBERSHIP FORM

Memberships are for the calendar year (Jan.–Dec.). Our dues are modest, please keep your membership current. *Membership expiration date is listed at the top of your mailing label.*

Name(s) _____

Address _____

City, State, Zip _____

KY County _____

Tel.: (Home) _____ (Work) _____

Membership Category (check appropriate boxes):

Annual — ☐ $7 - Individual ☐ $10 - Family

Lifetime — ☐ $100 - Individual ☐ $140 - Family

☐ *This is a renewal.* ☐ *This is a new membership.*

Membership $_____

Gift (optional) $_____ Gifts are tax deductible. [IRC 501(c)(3)]

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

Return form & dues to: KNPS Membership, c/o Dept. of Biological Sciences, Eastern Kentucky University, Richmond, KY 40475

Is Your KNPS Membership Current?

If the mailing label below lists an expiration date prior to December 1999, your membership is not current. Please complete the form at left and return it with your dues to continue your support of the Kentucky Native Plant Society and its goals.

Thank you!

Kentucky Native Plant Society
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Eastern Kentucky University
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