NATIVE PLANT SOCIETY OF NORTHEASTERN OHIO

Founding Chapter Of

THE OHIO NATIVE PLANT SOCIETY

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On the Fringe

THE JOURNAL OF THE OHIO NATIVE PLANT SOCIETY

Volume 8 **July/August** *1990* **No. 4**

1991 ANNUAL OHIO NATIVE PLANT SOCIETY WEEKEND

Mark your calendars now for the **1991 Annual Weekend** which will be held **May 10, 11, 12, 1991** in Ashtabula County. The weekend will feature field trips to various locations to see the boreal plants left here by the glacier. This is the only county in Ohio to hold many of these species of plants. We have obtained first class accommodations at the Highlands Camp and will have provision for tent and trailer camping as well as motels for those who wish it. Some of the plants you may expect to see are: Painted Trillium, Dalibarda repens, Hobblebush, Clintonia borealis, Trollius laxus, Goldthread, Netted Chain Fern, Early Coralroot, and Rose-Shell Azelia.

More information will be coming in the future issues of the **Journal**, but the important thing is to reserve those dates now so you don't miss out on all the fun, fellowship and plant discoveries.

At the Annual Meeting in Oxford in May long-time Ohio Native Plant Society President Ann Malmquist resigned. Elected to succeed her was Dr. Victor Soukup of the University of Cincinnati. Widely known to many Ohioans, Vic has been a member of the Cincinnati Wild Flower Preservation Society (our Cincinnati Chapter) for many years and has served repeatedly as its president. Vic is known internationally for his work with trilliums and each summer does advanced research on orchid chromosomes. The Ohio Native Plant Society is fortunate to have a man of Dr. Soukup's stature to lead it in the coming years. In addition, Tom Sampliner of Cleveland was elected Vice-President and Ellen Fox of Dayton was elected Secretary. Malmquist will continue to be Executive Secretary of the Society and correspondence, both written and phone, call still be directed to the address on the masthead of the **Journal.**

CALENDAR OF VARIOUS CHAPTER ACTIVITIES:

Please call chapters if you wish to join them in an activity - phone numbers are listed after the calendar.

SNP = State Nature Preserve / **DNAP** = Division of Natural Areas and Preserves / **LBC** = Little Beaver Creek / **WC** = Wilderness Center

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July 7 (Saturday) **10 a.m. - Conkles Hollow SNP.** A nature preserve offers many interesting discoveries for "treasure" hunters with curiosity.

July 7 (Saturday) **9 a.m. - Cleveland Chapter.** Lost Lake Field Trip. This remote lake is part of the Cuyahoga River drainage. Getting to Lost Lake is tough — brambles, poison ivy, and swamps aplenty. Nice lilies and other botanical surprises are promised. Meet at the east side of Burton Square (E. Park Ave.) north of Rt. 87 in Burton in Geauga County.

July 7 (Saturday) **Cincinnati Chapter.** Field trip to Kilbuck Marsh Wildlife Area in Wayne County. High through the wet marsh to see the unusual plants of the area. Call for more details.

July 14 (Saturday) **6 p.m. - Clifton Gorge SNP.** Twilight ramble through the uplands of the preserve.

July 14 (Saturday) **10 a.m. - Dayton Chapter.** Field trip to Cowan Lake State Park. Call for more details.

July 14 (Saturday) **10 a.m. - Irwin Prairie SNP.** Explore the wet prairie for mid-summer flowers.

July 14 (Saturday) **9 a.m. - Prairie Road Fen SNP.** This wetland preserve is open only during special events. This walk will introduce you to things like bug-eating plants and quaking ground, plus lots of rare plants.

July 15 (Sunday) **5 p.m. - Mansfield Chapter.** Plant hike on the proposed bike trail. Call for more detials.

July 21 (Saturday) **10 a.m. - Adams Lake Prairie/Chaparral Prairie SNP.** See rattlesnake master, blazing stars, prairie dock, false aloe, whorled rosin-weed in bloom.

July 21 (Saturday) **10 a.m. - Conkles Hollow SNP.** Hike the quiet Gorge Trail which winds through patches of summer wildflowers and clusters of graceful ferns.

July 24 (Tuesday) - **5 p.m.** - Field trip to collect specimens for herbarium at Youngstown State University. Call for more details.

July 28 (Saturday) **10 a.m. - Cleveland Chapter.** Holden Arboretum. Brian Parsons will lead a walking tour of the plant conservation collection that contains state and federal listed endangered plants. Royal Catchfly (**Silene regia**) should be in bloom. Meet at the Corning Building.

July 28 (Saturday) **Wilderness Center Chapter - All day.** Trip to Erie Sand Barrens, Erie County for unusual plants of the area. Call for more details.

July 29 (Sunday) **3 p.m. - Bigelow and Smith Cemetary SNP.** See these prairie relics of the Darby Plains in full bloom.

August 4 (Saturday) **9 a.m. - Rockbridge SNP.** Summer wildflowers abound along the trails of this geologically significant preserve.

August 4 (Saturday) **2 p.m. - Clifton Gorge SNP.** Participate in a checkup of the Little Miami River, a state scenic river and meet some wet critters not often seen.

August 4 & 5 (Saturday & Sunday) **Cincinnati Chapter - Weekend trip** to Indiana Dunes National lakeshore. Woodland and open beach trails along Lake Michigan and a visit to Pinhook Bog, plus Hoosier Prairie. Call for more details.

August 11 (Saturday) **Natural Areas and Preserves Oak Openings** trip. Call DNAP for more details.

August 11 (Saturday) **10 a.m. - Bigelow and Smith Cemetary SNP.** Flowers and Grasses of August.

August 11 (Saturday) **10 a.m. - Conkles Hollow SNP.** Learn some of the historical lore of the areas as well as exploring the majestic geological features.

August 14 (Tuesday) **8 p.m. - Beaver Creek SNP.** Sugaring for moths.

August 17-18-19 (Friday, Saturday, Sunday) **Mansfield Chapter.** Field trip to the Oak Openings. Call for more details.

August 18 (Saturday) **9 a.m.** - Meet at Court House in Lisbon. Butterfly Weed census in Columbiana County (Asclepius tuberosus).

August 18 (Saturday) **10 a.m. - Dayton Chapter.** Field trip to the prairies of the Darby Plains. Call for more details.

August 18 (Saturday) **WC** - Field trip to Morris Woods in Licking County. Call for more details.

August 18 (Saturday) **9:30 a.m. - Goll Woods SNP.** Learn about ferns, where they grow, and folklore about them.

August 25 (Saturday) **2 p.m. - Clifton Gorge SNP.** A hike to learn about folk-tales, plant uses and weather-lore.

August 25 (Saturday) **10 a.m. - Caesar Creek George SNP.** Field trip to explore early field succession and explore the sun-loving plants of open fields.

August 26 (Sunday) **2 p.m. - WC** - Explore the Wilderness Center Prairie.

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The leathery leaves of American beech, Fagus grandifolia, were gathered before frost and used for mattress stuffing by early settlers.

CHAPTER CONTACTS

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ALLELOPATHY STRIKES AGAIN

Past **Newsletters** have carried items about allelopathy, especially concerning the chemical effects of the black walnut (**Juglans nigra**) exudate, juglone.

Allelopathy is suppression of growth of some plants by compounds producted by other plants.

According to The University of Toronto, the reason sugar maples sprout freely in woods and often in some flower or shrub beds, but seldom in fields, is allelopathy.

Grasses and other field plants such as goldenrod and asters, they say, exude water-soluble materials that interfere with germination and growth of sugar maple seeds.

Reprinted from The **Dawes Arboretum Newsletter,** January, 1990 issue.

SQUAWROOT: IT TOILS NOT. by George F. Buddell II and John W. Thieret

Squawroot (**Conopholis americana**) is a flowering plant that lives in a non-traditional way, in a non-traditional place. It spends its life as a parasite on an oak root, taking all its food and drink from the tree but not appreciably harming it. To the oak, squawroot is but a minor annoyance.

The story of this eastern North American member of the broomrape family begins traditionally enough: with seeds. These, though reaching only 1/16 inch in length, are large compared to the "dustlike" seeds of most other species of the family. Squawroot produces only (!) 400 to 600 seeds per capsule (we counted), while some other family members, in contrast, produce up to 70,000 (someone else counted).

When the seeds ripen, the capsules split to release them, but how the seeds are dispersed-whether by wind, rain, animals, or some other means—is quite unknown. There is another mystery: how do they get underground (which is a must) to where a root of an oak may be found? They will not even germinate—nor is there any reason to—unless they are almost or actually touching an oak root. They, like the seeds of other species of the family, germinate apparently in response to some chemical that diffuses from a young host root into the surrounding soil. The presence of this "germination stimulant" is a signal to a seed that a host is close by.

After germination, the developing seed grows toward the oak root and penetrates it. Such action initiates, on the root, the beginnings of a "gall," a swelling that increases in size yearly and ultimately strangles any part of the root extending beyond it. Ranging from 1/2 inch to as much as 10 inches in diameter, galls are irregular in shape and are covered with dark brown, rough bark. Some, especially the larger ones, may protrude from the ground, but usually it is only the flower stalks, which are produced after the fourth or fifth year, that reveal the presence of the parasite. (Fig. 1)

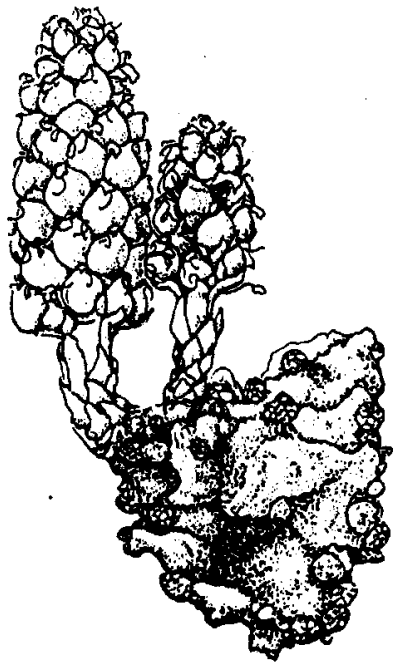


Figure 1. Conopholis americana.

A mature squawroot plant consists of one or more flower stalks, one or more buds from which additional stalks eventually develop, and a gall. The flower stalks are annual, living for only one season. Generally they persist over winter, brown and dead, being found next spring among the new ones.

Along the southern edge of its range-Florida, Georgia, and Alabama, squawroot opens its cream-colored flowers as early as February. Moving northward with the spring, flowering starts later and later; in the latitude of Nova Scotia and

Wisconsin—the northern edge of the range—the plant may bloom as late as July.

Flowering leads to yet another mystery in the life cycle: how are the flowers pollinated? In the more than 2 centuries that biologists have studied squawroot (we admit that they have not studied it much), only two visitors —both of them bumblebees—have been seen alighting on the flowers; whether the insects actually brought about pollination is anybody's guess. It has been suggested, too, that some self-pollination may occur. Though these items may be deemed interesting, they certainly are not enough to support any conclusions. If you know of the whereabouts of some squawroot plants and you have patience to sit and watch flowering specimens hour after hour, day after day, you may well be able to make significant observations on pollination of the plant. (Please let us hear about them).

Squawroot does not, of course, live forever. Plants estimated to be 12 years of age—determined by the number of annual rings in the parasitized roots—have been reported, but maximum life expectancy is conjectural. One factor affecting life span is that the oak does not placidly resign itself to supporting the parasite. In what seems an unfriendly gesture, the tree, over the years, sends tannins into the gall. These eventually clog the vascular pathways through which the parasite feeds, causing it to die.

In times past, the life of squawroot was shortened also by herbalists who, in field and forest, were seeking remedies for sundry diseases. Faith in the curative powers of squawroot led to its being prescribed—as the fresh, finely-ground plant—for gonorrhea, syphilis, dysentery, diarrhea, various cancers, and probably other ills as well. Medicinal uses of this wonder drug (?) from the forest had no basis in science; they are now as dead as those who advocated them.

Two of squawroot's other common names "clapwort" and "cancer-root" recall its heyday as a healing herb. We have, however, been unable to find a convincing explanation of why the plant is called "squawroot." One discreet author recorded it was used by some Amerindians for "females disorders," but he also said that squawroot parasitizes hemlocks, so we can't trust him.

If some day, while hiking through woods, you think you see **Conopholis americana**, and you are somewhere east of the Mississippi River, you probably do—nothing else looks like it. (It does not even, in our opinion, resemble a pine cone although the name "**Conopholis**," meaning "scaly cone," was bestowed upon it by a botanist who thought it did.) However, if you are in the mountains between Arizona-New Mexico-western Texas and Panama, and you think you see this species, you don't. Instead, you see its look-alike relative, **Conopholis alpina**, the western squawroot. And remember, when you are looking at a growing **Conopholis** plant anywhere, you must also be near an oak.

This article has been reprinted from the Kentucky Native Plant Society's **Newsletter**, Volume 5, Number 2, May, 1990 issue.

ONE MORE REASON FOR BAGWORM CONTROL by Michael Ecker

Stems of trees and shrubs can be girdled when something prevents growth expansion. Limbs or even whole plants can be killed by continued constriction. The damage is usually the result of twine, wire, plastic labels, twist-ties, dog chains, and other items on plant stems.

Another girdling culprit, not usually mentioned, is an insect known as bagworm (**Thriodopterix ephemeraeformis**).

The bagworm is a foliage-eating caterpillar (larva) commonly found on junipers, arborvita spruces, and nearly everything else. More than twenty genera of evergreen and deciduous ornamental plants in Ohio are vulnerable to bagworms.

While very young, the caterpillar spins a tough, silken pouch camouflaged with bits of leaves of the plant it is eating. The pouch protects the insect as it feeds and grows. The bag is enlarged as necessary during the feeding season, and then serves as a cocoon while the larva pupates into an adult, and provides a haven for overwintering eggs.

While encased, the bagworm attaches its pendent, conelike home to plant branches and stems. (Cocoons sometimes are found on stop signs, doorways, gutters, and other hardware.) Overwintering bagworm cocoons are attached to plants by bands of strong silk looped around twigs.

One method of control is to pick off the bags and destroy them. Sometimes an attempt to remove a bag causes it to slide down the stem, stripping bark and/or foliage, causing damage much like that from bagworm feeding.

Bagworms are not a serious threat as far as stem girdling is concerned. Branches and whole plants are more likely to be dead from bagworm feeding before girdling could ever take place.

But a girdled and dead two-year-old stem was observed on a juniper. So along with damage from the insect's feeding, potential stem girdling is just one more reason to remove them.

Another method of bagworm control is careful application of a legal insecticide while the bags are small (mid-June in central Ohio). Follow manufacturer's directions explicitly.

This article was reprinted from **The Dawes Arboretum Newsletter**, June, 1990 issue.

In reference to the following article.

The Native Plant Society of Northeast Ohio contributed to the planting of a **Franklinia** tree at the new native plant display garden at the Chagrin Falls Library. This article will tell you why it is such a desirable tree and was chosen as the centerpiece of the garden.

BENJAMIN FRANKLIN'S LOST TREE by Keith S. Thomson

Benjamin Franklin is most remembered for the extraordinary range of subjects—from statesmanship to the practical problems of navigation, from electricity to the design of efficient stoves and street lighting—to which he turned his imagination. He is also remembered, however, in the form of a remarkable flowering tree, **Franklinia alatamaha**, named in his honor by William Bartram, son of his old friend John Bartram. It is appropriate that **Franklinia** is not only one of the most beautiful of fall-flowering trees (for Franklin was a great lover of beauty) but something of a scientific puzzle, even in the year that marks the bicentennial of Franklin's death. The continuing inquiry into the botanical mysteries that surround "Franklin's lost tree" would no doubt have delighted America's premier inquirer and inventor.

The eighteenth century was the golden age of botanical exploration for plants of medicinal, agricultural, and (increasingly) horticultural value. To the great English and French patrons of botany, the eastern United States was an almost limitless treasure house, and the Philadelphian John Bartram (1699-1777), whom Linnaeus called "the greatest natural [i.e., self-taught] botanist of his time," was the leader in exploring this richness. Franklin, his friend for more than forty years, greatly encouraged him. Bartram became botanist to the new American Philosophical Society, which Franklin had founded. Franklin conducted some of his electrical experiments at the farm on the banks of the Schuylkill River in Philadelphia where Bartram established a garden in the mode of the great botanical gardens of Europe. Incidentially, when Franklin was in England he sent Bartram some stock of the rhubarb plant, which Bartram propagated at the garden and introduced to North America.

John Bartram's famous travels in search of new plants began in 1735. In 1738, he journeyed alone eleven hundred miles through Virginia and the Blue Ridge Mountains in five weeks, complaining that he was unable to find "one [friend] that will bear the fatigue to accompany me in my peregrinations" (1). By 1760, he had traveled as far as Lake Ontario, Pittsburgh, and Charleston, South Carolina, and was shipping more than 100 species to European buyers (2).

Through his patron Peter Collinson, a prominent Quaker merchant and botanist in London, Bartram built up a reputation that led to his appointment in 1765 as botanist to George III for the Floridas, newly ceded to England by Spain in exchange for Cuba. In this capacity, his last major expedition was an exploration of St. John's River and the surrounding country.

In 1755 Bartram solved the problem of a botanical companion by taking his son William (1739-1823) with him. Between them they discovered some 200 new American plants (3). William joined his father for the Florida trip, which they started by sailing to Charleston in July 1765, from there traveling

south on horseback through Georgia.

On October 1, 1765 they rode through some swampy land near "old Fort Barrington" on the Altamaha River in eastern Georgia (actually they got lost). "This days journey of twenty miles was all low, flat ground, the highest piney ground seldom above three or four foot perpendicular above the swamps. . .When we came to the river the soil was very sandy nearer the surface and the timber poor for about a mile from the low land, which is often overflowed with the river (to the great loss of the inhabitants). . . This day we found several very curious shrubs, one bearing good fruit" (4). One of these new shrubs was **Pinckneya bracteata**, or fever tree, the other the tree we now call **Franklinia.** Its "fruit" consisted of well-formed, hairy seeds, but apparently no flowers were seen.

Between 1773 and 1778, William Bartram, now an important botanist carrying on his father's tradition, made a series of journeys in Georgia and Florida for his London patron Dr. John Fothergill, retracing much of the path of the 1765 trip. On April 24 or 25, 1773, he revisited the Fort Barrington site, but curiously makes no mention in his journal of seeing **Franklinia** (5). In his **Travels**, written in 1791, however, he states: "I employed myself during the spring and fore part of summer in revisiting the several districts in Georgia and the east borders of Florida, where I had noted the most curious subjects; collecting them together, and shipping them off to England. In the course of these excursions and researches, I had the opportunity of observing the new flowering shrubs, resembling the Gordonia, in perfect bloom, as well as bearing ripe fruit" (6).

Because the new flowering shrub was similar to **Gordonia lasianthus,** a fall-flowering evergreen with the rather jolly name of loblolly bay, also recently discovered on the coastal plain of the southeastern United States, William Bartram called it **Gordonia pubescens.** But sometime before 1785 he was advised by Daniel Solander —a student of Linnaeus who worked both for Banks on the materials from the Cook voyage and for Fothergill—that it was not **Gordonia.** In a broadside catalogue of plants for sale in 1783 Bartram used the new name **Franklinia,** given in honor of his father's old friend (7). The Philadelphia nurseryman Humphrey Marshall in his **Arbustum Americanum** first formally published the new name, giving it as **Franklinia alatamaha** (8). Bartram used this name on a magnificent watercolor, now at the British Museum (Natural History), that he sent to Robert

Franklinia

Barclay in 1788, and this is the name today. (The spelling evidently represented a popular variant of Altamaha.) A catalogue published by Bartram in 1810 still advertised "Gordonia pubescens-Franklinia, with flowers of delightful fragrance .50 to 1.00," however, and as recently as 1977 some people were still sure that the tree was a **Gordonia** (9, 10).

Franklinia is a member of the tea family, Theaceae, which is divided into four subfamilies, of which the Camellioideae—the subfamily into which **Franklinia** falls—includes 12 living genera (11). Of these, six are restricted to Asia, although some, like **Camellia**, are widely cultivated in the Americas, **Gordonia** and **Stewartia (Stuartia)** are found in both east Asia and southeastern North America, **Laplacia** is found in the American tropics and east Asia, and **Franklinia** is (or was) found only on the southeastern coastal plain of the United States.

Franklinia alatamaha is a tree of no more than 25 feet or so in height, remarkable for producing an abundance of camellia-like flowers in the late summer and autumn. There are five snow-white petals, three inches across, with a central mass of pure gold stamens. The flowers have what Bartram called a "chinese orange" fragrance, which some people are unable to detect. After the tree flowers, and sometimes when the last flowers are still showing, the leaves turn a brilliant red, thus adding to its horticultural value. It grows well in Pennsylvania (William Bartram realized that it grew better there than in Georgia), north to Massachusetts, west to Ohio, and as far south as Georgia, but in the south it prefers higher elevations to the coastal plain where it was found. Although it has never done well in Britain, it is still offered for sale there; probably, like the dogwoods, it needs more summer heat.

It is not clear how many times **Franklinia** was seen and collected in Georgia after William Bartram's second trip. However, we do know that by 1787 the English nurserymen Grimwood, Hudson, and Barrit were asking Humphrey Marshall for "100 or more" **Franklinia** (12). Moses Marshall, who had orders for "as many as you can," collected at Fort Barrington in 1790 (13). In 1803 the Scot John Lyon, who was responsible for introducing "thirty one American plants into horticulture" visited the Fort Barrington site. Originally growing over two to three acres, the tree was reduced to six or eight individuals "in a bottom between two sand hills" (14).

Lyon was the last person to record **Franklinia** in the wild. The tree had never been found anywhere except at the site on the Altamaha River, and despite many expeditions from the 1870s on, it was never seen again, although many have searched (2, 15, 16). And so it became known as Franklin's lost tree.

Franklinia continued to be propagated at Bartram's garden, although Rafinesque gives the impression that there was only one tree there in 1832 (17). The story goes that in the 1880s the last remaining specimen in the

garden (now part of Philadelphia's extraordinary Fairmount Park) was almost dead. It was removed first to a neighbor and then to the Germantown nurseryman Thomas Meehan, who nurtured it and propagated it by layering. At that time "neither seeds nor cuttings could be made to grow" (2). In the early part of this century **Franklinia** was planted in many larger gardens of eastern America, all specimens probably being descended from the Bartram-Meehan specimen. A few magnificent old trees remain in Chestnut Hill, Philadelphia, but the total number of mature trees in cultivation may never have exceeded a hundred until the bicentennial celebration of 1976, which renewed interest in the tree.

Franklinia can now be propagated from seeds, by layering, or by softwood and hardwood cuttings (18). Only 10% of the seeds have viable ovules, and they are difficult to propagate (2, 19). One does not usually find seedlings growing around established trees. Possibly most seeds do not mature at all. The young plants are very finicky, but once established, the tree often thrives with little attention. The secret, apart from the right soil and drainage, may well be a mycorrhizal root association.

At the original Fort Barrington site, **Franklinia** was growing in a sandhill bog—a layer of fine sand over an impervious clay—about 20 feet above river level. The site provides a rather poorly drained soil where forest stands are thin and trees grow slowly (16). Water leaching from the sandhills "collects on the bottom, and seeps laterally . . . this is the sort of fresh-water site, resembling a spring, that travellers would use. It is a kind of upland garden spot for fresh vegetables that soldiers, or builders, would use" (19).

In contrast, horticultural experience shows that **Franklinia** needs a deep, moist, acid, organically rich soil in a well-drained site, with protection from wind. It should be fertilized sparingly, if at all. It seems to prefer a light shade and suffers if subjected to direct sunlight in daytime temperatures greater than 32°C for more than a week or so (19). It will not flower well without sun, however. It can resist winter cold, which in fact is necessary for seed germination.

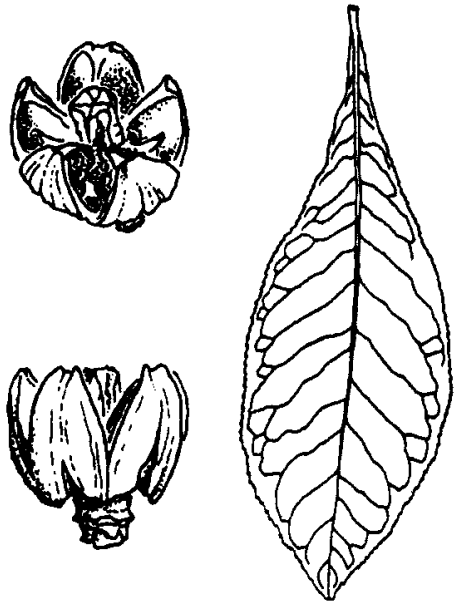
One of the mysteries about **Franklinia** centers on the fact that in his **Travels** William Bartram gives the impression that he saw the tree in bloom, and collected seeds, "in spring and the fore part of summer" of 1773, whereas **Franklinia** blooms in late July at the earliest in Georgia. However, throughout the **Travels** Bartram made many mistakes in dates (20). It is almost certain that he first saw **Franklinia** in flower when he revisited the site on his way home in late 1777.

The seeds of **Franklinia** need to remain on the tree for a full growing season before they are ripe (19). The fact that the Bartrams saw seeds in October 1765 suggests that the seeds William Bartram sent to Fothergill, and those from which he grew the tree in Philadelphia, were collected in autumn 1777 rather than spring 1773. However, in 1774 a specimen of **Franklinia** was presented to Kew Gardens by a London nurseryman, William

Malcolm, and in the same year there was reported to be at least one specimen in the French royal gardens at Trianon (2, 21). It has always been supposed that the Kew specimen, at least, came from Bartram via Fothergill. If so, William Bartram must have managed to get viable seeds in April 1773, despite the fact that he did not mention **Franklinia** in his diary. On the other hand, Fothergill had another collector, a man named Williams, working out of Charleston in September 1773 (2). If Williams had seen John Bartram's journal of 1765, which had been sent to Collinson in London, perhaps he could have found the Georgia site. Or perhaps William Bartram gave him directions. Even more fancifully, perhaps there was another stand of **Franklinia**, and thus two have been lost.

There remain the further mysteries of where **Franklinia** came from and why it became extinct in the wild. John Lyon thought that "the seed has most probably been brought there orginally from a great distance by a Bird of Passage" (14). But if so, from where? More recently it has been suggested that because **Franklinia** is a member of the tea family, it might have been imported by early British or French settlers in Georgia along with camellias, mulberry, and cotton (19). But tea had not yet been successfully established in Europe at this date (22). Even if **Franklinia** were an import from someone's Asian travels, surely the plant must have been reasonably well known at its place of origin, and surely it would have been found elsewhere since then. But there has never been a trace of living **Franklinia** in the old world.

Nor is **Franklinia** the product of crossbreeding. Although recent genetic studies show that **Franklinia** will hybridize with the native **Gordonia lasianthus** as well as with the Asian **Camellia japonica** and **C. sasanqua**, it was not created by such crossings (23).



Franklinia alatamaha

If the tree is a native species, why are there no records from anywhere other than one spot in Georgia, especially since it grows so much better elsewhere? Whether **Franklinia** is a native or an import, we must conclude that it cannot disperse readily, perhaps because of special requirements for climate, seed germination, and root associations. The most likely explanation is that **Franklinia** and many other American species endemic to southeastern United States (including the related **Gordonia** and **Stewartia**) are relicts of stocks once widely distributed across Asia, North America, and Europe from the Cretaceous on (24). These stocks were made extinct everywhere

in North America except the southeastern coastal plain by Pleistocene glaciations and cold temperature climates. Of the four native tea species so limited, **Franklinia alatamaha** was the most severely affected. Supporting this idea is not only the present distribution of teas but the fossil evidence. **Gordonia** is known from the Eocene to Miocene in Europe and North Aermica, **Stewartia** is known from the Miocene and Pliocene in Europe and Japan, and **Franklinia** itself has been found in the Pliocene in both Europe and Asia (11).

Since the one place **Franklinia** does not grow well today is coastal Georgia, the extinction of this tree in the wild may be the least of its mysteries. It was probably on the verge of natural extinction in 1765, trapped in coastal swampland that was becoming an ever less suitable environment and unable to disperse to more favorable sites. In this sense, **Franklinia** is scientifically very interesting. There is also the nagging possibility that it was driven to extinction by the activities of early plant collectors. It is unlikely that collectors by themselves could have destroyed a large stand of mature trees over a fifty-year period simply by taking seeds and stem cuttings. But they might have pushed the tree's capacity for replacement below a viable threshold. It has also been suggested that **Franklinia** was killed off by a cotton root fungus, saltwater flooding, or the effects of rice farming (2, 19).

In any case, the Bartrams, by discovering **Franklinia**, and Franklin, by lending his famous name, may well have both accelerated the extinction of the plant and saved it, at the same time.

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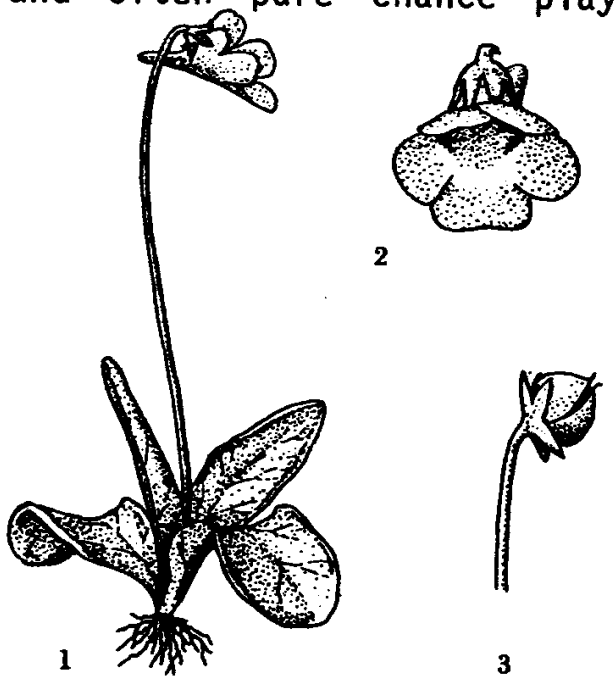
MICHIGAN'S MEAT-EATING PLANTS by David F. Wisse

As fodder for horror movies, comic books, and nightmares, man-eating plants have long held a certain fascination. However exaggerated, the notion of plants turning the predatory tables on animals is a fact of nature. Although not quite the stuff of science fiction, the true story of carnivorous plants is one of the marvels of biological adaptation, spell-binding in its own right.

Unless one is an insect, or of insect size, there is nothing to fear from any of the world's 400-plus species of carnivorous plants. North America is home to some 45 species, of which nearly 20 are native to the state of Michigan. While insects are the usual victims of most carnivorous plants, these plants are not strictly insectivorous. They also prey upon small animals, including microscopic organisms, spiders, and even in some cases small reptiles and amphibians.

No meat-eating plant actually pursues its prey, but remains firmly anchored to its substrate, capturing and devouring its substrate, capturing and devouring prey that ventures close enough to fall victim. The means of capture varies by species--some actively participate in the process while others take a more passive role. All carnivorous plant species have evolved one or more specialized structures or substances for capturing prey animals. Luring, deception and entrapment are commonly used, and often pure chance plays a part. These captive techniques are not infallible, and are often highly inefficient. Fortunately for the plants, none must rely entirely on a carnivorous diet. As green plants, they are able to produce food through photosynthesis, and absorb vital nutrients through their root systems.



BUTTERWORT (*Pinguicula vulgaris*).

1. Habit, x 1. 2. Face view of flower, x 2. 3. Capsule, x 2.

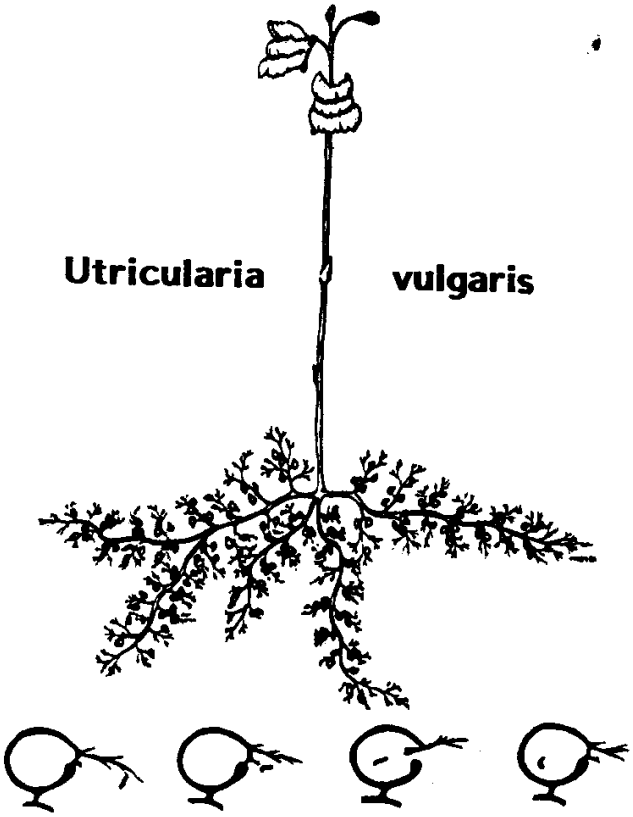
Flowers purple; stemless, all of the leaves from the crown; leaves yellowish-green. Growing in soil-filled crevices of wet rocks. North shore of Lake Superior in Lake and Cook counties.

Research has shown that carnivorous plants fed a steady supply of insects produce larger, more viable seed crops--a distinct evolutionary advantage. Not surprisingly, carnivorous plants are often found in nutrient-poor habitats, such as acid bogs. In such an environment, the plants' ability to subsist on

an insect diet allows them to survive where many other plants could not. The acidic soil of peat bogs, in particular, is deficient in nitrogen, an essential plant nutrient. Insects, however, are rich in nitrogen, thus providing the carnivorous plant with a handy substitute. Recent research has also shown insects to be an important source of other nutrients as well.

In Michigan, boggy environments are among the best places to find and observe carnivorous plants, and several species may be found within the same area. Unfortunately, some bogs--especially those in southern Lower Michigan--have been destroyed or are being increasingly threatened by development and other human activities. Bog terrain is fragile, supports carnivorous plants and other unique and rare species, and is well deserving of protection. Use of existing trails, or boardwalks when available, minimizes damage to the bog and its vegetation while allowing easy access for visitors.

Bogs, isolated from groundwater sources, often form in ponds or lakes where they are dependent on precipitation for many of their nutrients. This cool, waterlogged, acidic setting retards decomposition, resulting in an accumulation of organic material. Sphagnum moss, also known as peat moss, plays a particularly important role in bog development. The acidifying peat mosses begin to dominate the boggy environment, setting the stage for the species that follow. The spreading moss colonies also inhibit plant decay, resulting, over many years, in thick mats of spongy plant material that form the classic "quaking bog."



Growing amid the peat moss colonies and usually near the water's edge is found Michigan's largest and perhaps most striking carnivorous plant, the Northern pitcher-plant (**Sarracenia purpurea**). Its bright red or green "pitchers," about four to eight inches long at maturity, are arrayed in clumps that each spring produce unusual, long-stalked maroon flowers. Each pitcher is actually a highly modified leaf. Pointing skyward, the pitchers collect pools of rainwater, setting the trap for hapless, unsuspecting

visitors.

First, however, the potential prey is attracted to the pitcher's red lip, where bait glands exude an intoxicating nectar. As the stupefied prey ventures ever deeper into the pitcher, it encounters the pool of rainwater and may attempt to retreat. At that point it is generally too late, for the inside surfaces of the pitcher are covered with slippery, downward-pointing hairs. After much struggling, the victim falls to the water and drowns. Nutrients from the prey, broken down by digestive enzymes and possibly bacterial action, are then absorbed by the plant. This is an example of a passive capture system--no physical movement is required of the plant. The prey is deceived into entering the pitcher where gravity, rainwater and enzymes do the rest.

While effective, the pitcher-plant's predatory apparatus is not infallible. Large insects and spiders are sometimes able to escape the plant's clutches, and ants of all sizes seem to be particularly adept at escaping. There is even a species of mosquito that relies on the pitcher-plant to complete its life cycle. Adults of that species lay their eggs in the pitcher's rainwater pool. The resultant larvae, or wrigglers, live on bug remains in the pitcher pools, even over-wintering in a frozen state to emerge as adults in the spring.

The round-leaved sundew (**Drosera rotundifolia**), is another common carnivorous denizen of Michigan bogs. Not as conspicuous as the pitcher-plant, the sundew is nonetheless a delicately beautiful plant--and just as deadly to some organisms. Aptly named, each small, round sundew leaf is yellowish, with rays of red tentacles (actually modified hairs) protruding in all directions. Each tentacle is tipped with a droplet of "dew," actually a sticky secretion that attracts, entangles and eventually digests tiny prey. Once stuck, the victim's struggling serves only to entangle it further. Unlike the pitcher-plant, the sundew takes an active role in capturing prey by gradually curling its tentacles and leaf around the victim. With dozens of rays grasping the prey, digestion by enzymes begins. Days later, all that remains of the captured prey is an empty exoskeleton.

Another carnivorous plant, the horned bladderwort (**Ultracularia cornuta**) grows in bogs and elsewhere, especially interdunal wetlands where it sometimes forms a carpet of yellow. Often, all that is visible of the horned bladderwort is its two-lipped yellow flower with characteristic spur. Bladderworts are perhaps the most active of Michigan's carnivorous plants, although their predation occurs on a very small scale and below

unfavorable habitats by capturing and consuming animals to supplement their diet. By turning the tables on the animal kingdom, these remarkable plants demonstrate that truth can indeed be stranger than fiction.

This article has been reprinted from the Michigan Natural Resources Magazine, November/December 1989 issue.

* * * * * * *

CREATING HEIRLOOM TREES

George and Martha Washington had no children, but at least one heir still resides at their Mount Vernon Estate, a tulip poplar, **Liriodendron tulipifera,** planted by Washington in 1775. As noted in "Sex and the Single Tree" (American Forests, October 1989), like the father of our country, the tree has famous roots but no known offspring. According to U.S. National Arboretum tree geneticist, Dr. Frank Santamour, a tree this old could not be expected to produce the number of healthy seed that a younger tree would. Also, since tulip trees require cross pollination by insects that must travel between two trees, it is not surprising that the tall and isolated tree has been unsuccessful in producing viable seed.

To assist the tree in this historic task, Dean Norton, Mount Vernon horticulturist, watched flower bud development on the historic tree, while Santamour worked out a method for gathering pollen from one of the most potent tulip poplars on the Arboretum grounds. Last spring, Santamour, using a large bucket truck to reach the branches, fertilized about 100 flowers and came back in the fall to clip off the seed. The seed pods then went to St. Louis, Missouri for germination and growing. About 1000 seedings have come to life, less than hoped for, but a lot more than George's tree had been able to do on its own.

This article has been reprinted from the Virginia Native Plant Society's **Newsletter,** Volume 9, Number 2, May, 1990 issue.

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SURPRISING FIND

Yale University researchers have unearthed the oldest known flower, a tiny fossilized plant estimated to be 120 million years old. Botanists were surprised by the plant's humble size and appearance; barely one inch tall with a drab green or beige flower, quite contrary to the traditional depiction of prehistoric plants with showy magnolia-like flowers and large leaves. The diminutive plant grew on the edge of a pond in the Koonwarra area of Australia. It probably was a perennial with an underground stem. With two leaves attached to its axis and one flower, the Koonwarra plant would have been a transition organism moving toward either the dicot or monocot branches of flowering plants.

This article has been reprinted from the Virginia Native Plant Society's **Newsletter,** Volume 9, Number 2, May, 1990 issue.

BLUE FALSE INDIGO (Baptisia Australis) by Jeff Lough

One of the plants discussed by Dr. Ralph E. Brooks at the recent KWS annual meeting (1989) was the prairie legume, **Baptisia australis.** Dr. Brooks indicated that Wild Blue Indigo was a species which exhibits significant antibacterial functioning. This perennial is found in the rocky and sandy prairies of the eastern two-thirds of Kansas (Bare, 1979) although plants have been sighted on the northern banks of the Arkansas River near Great Bend. It is native to virtually the entire eastern half of the United States, having been reported from Vermont to Georgia. Blooms appear earlier in the eastern United States, beginning in late April (Dirr, 1987) and continuing through June in Kansas. A single plant bears 5 to 75 flowers on each of one to several inflorescenses. Inflorescenses remain in bloom for one to two weeks while individual flowers persist for only a few days. They are borne in terminal stalks (racemes) that are 1 to 2 feet long. The flowers open progressively from the base to the apex of the inflorescence. Flowers are insect- (usually bumblebee)- pollinated. It is not known whether self-pollination occurs, but Haddock and Chaplin (1982) reported little capacity for self-pollination in two other species of **Baptisia.** After pollination, ovaries swell into large green inflated pods containing 30-50 seeds. Before hardening on the racemes they can be dried and used in flower arrangements.

The seeds should be at or near maturation about six weeks past flowering. The seeds turn varying shades of brown when mature. They should be harvested when the pods are black or show signs of splitting open.

The seeds should be combed from the pod, discarding the smaller shriveled ones. On the Kansas prairie it is not uncommon to find such predators as the moth **Grapholitha tristegana** (Olethreutidae) and the weevil **Tychius sordidus** (Curculionidae) among the earlier developing pods and such chewing insects as the blister bettle (**Epicauta fabricil,** Meloidae) later in the season (Evans, Smith, and Gendron, 1989). Dirr indicates that greenhouse-grown specimens attract mites.

Blue False Indigo

Phillips (1985) as well as our esteemed President (Snyder, 1989) indicate that soaking seeds in hot water encourages germination. Dirr found acid, mechanical scarification, cold water soaks, and cold stratification were also all effective and all resulted in a consistent 90% and higher level of germination. A warm soil temperature (70°F) hastens germination. The seeds may be productively sown in a prepared seedbed in April. One should

avoid overwatering. A weekly half-strength application of an all-purpose fertilizer enhances seedling development.

Baptisia australis thrives in open, dry, and sunny settings but tolerates light shade. Soil conditions are optimal when there is a pH of 7+.

One source has suggested that a person may plant a few spring bulbs around one specimen. They complete their cycle about the time **B. australis** is rising to the occasion.

The K-State group (Zajicek, Hetrick, and Albrecht, 1987) has illustrated the interesting relationship between the presence of certain fungi and the consequent flourishing of **Baptisia australis** during times of drought. It concluded that inoculation of seedling roots with certain fungi significantly increased their root colonization quantity and intensity. This would seem to be particularly the case when seedlings are transplanted into low-maintenance landscapes or to disturbed soils subject to water stress.

The production of the anti-bacterial agents in **B. Australis** appears to be localized in leaf chloroplasts and, consequently, may be somewhat difficult to produce artificially.

All in all this deep-rooted attractive plant may someday prove to be a useful roadside wildflower as well as a potential commerical crop in the water-stressed area of west central Kansas.

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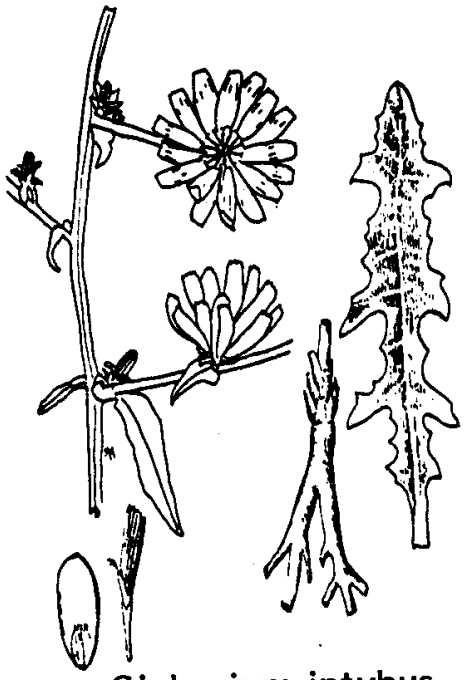
This article is a reprint from the Spring, 1990 issue of **Kansas Wildflower Society Newsletter.**

WILD CHICORY (Cichorium Intybus) by Sheldon H. Cohen

Some native species never spread beyond a restrictive tiny ecosystem, while others cover much of the earth's surface. The plant discussed in this article, **Cichorium intybus** or wild chicory, is of the latter type. A native of North Africa, parts of Europe and western Asia, it was used by the Romans as a salad plant. Chicory accompanied their legions on the conquest of Europe, and the species came to the New World with the first settlers. Once here, it escaped and spread widely, from Nova Scotia to Minnesota, south to Florida and Kansas, also to the Pacific Coast and locally elsewhere in the South and West. **Cichorium intybus** can be found growing in fields, meadows, pastures, roadsides, and vacant city lots. It isn't a problem in cultivated land since a few mowings during the year will eradicate it. Chicory needs full sun and good draingage. It can grow in many types of soil. Clay or acidic ground aren't barriers to its survival, and the weed has a good deal of drought tolerance.

Chicory is a perennial wildflower growing from a deep and succulent taproot. Its one-to-three-feet-high hollow stem, covered with minute stiff hairs, is much branched. The leaves at the base of the plant look somewhat like those of the dandelion. They are deeply toothed, tapered at the ends, and containing a single big vein on the underside of each plus many tiny veins branching from it. The upper leaves become progressively smaller and less deeply lobed. When any part of the plant is broken, cut or bruised it exudes a bitter white milky juice similarly to the behavior of its cousin, the common dandelion. The inch to inch-and-one-half flowers which usualy bloom from July through October are a beautiful blue color, but occasionally may be white or pinkish. They are in composite heads, composed wholly of ray flowers, and are arranged in one to three blooms at the nodes along the stem or sometimes terminally. They open in th early morning and generally close by noon on bright days, but in cloudy weather may remain open all day. The famous botanist Linnaeus invented a "floral clock" based on the time certain flowers opened and closed. Chicory was one of the plants he used. It was 5:00 a.m. if the flower was opening. Unfortunately, this was based on the conditions in Uppsala, Sweden, and even there, not too reliable. The short-lived blooms can be used as a cut flower if hardened overnight in warm water. Chicory is capable of self-fertilization, but it is more often cross-pollinated by honey, leafcutter and various species of mining bees. The little wedge-shaped seeds, which mature



Cichorium intybus

from late summer through fall, are packed in a circle in the center of the old flower head. They remain on the plant often through winter and into spring. The seeds are dispersed short distances when the wind shakes them off the stalk. Long distance dispersion is probably done by being carried in mud on vehicles or in agriculatural products. The seeds will usually germinate in the spring. If conditions are favorable this perennial will produce flowers the first year.

Chicory has an ancient history and its usefulness dates back at least to the Egyptians. Its genus name **Cichorium**, according to the Roman writer and naturalist Pliny (A.D. 23-79), was derived from the Egyptian name. The species name **intybus** also is obtained from an eastern name **Hendibel**, which was changed into the Latin equivalent **intibum**. The name for the annual or biennial cultivated form of Chicory, endive (**Cichorium endivia**), is based on the same eastern word. Such a widely distributed and showy wildflower is bound to have many common designations. Among these are chicory, succory, blue sailor, bunk, coffee weed, blue daisy, ragged sailor, blue dandelion, wild endive, witloof, Barbe de Capuchin, wild bachelor button, blue weed and chicory lettuce. The word chicory was the Arabian name applied to the plant. Succory comes from the Latin **succurrene** which means to run under and refers to the deep taproot. The names with blue in them, of course, are obvious, but the commonly used term sailor also is based on the color of the flowers and their similarity to the sailor's uniforms. Witloof or "white leaf" is from Europe and describes the appearance of the leaves which are blanched before eaten in salads. The name coffeeweed stems from the use of the ground up root as an adulterant of coffee.

Cichorium intybus has a long history as mentioned before of use for both food and medicine. In the spring the leaves can be collected and cooked like spinach or used raw in salads. Unless the leaves are picked when they first appear they are bitter and will require boiling and at least one change of water. Blanching the leaves will also remove the pungent flavor. In Europe the roots are grown in the dark causing them to produce abundant heads of crisp white leaves. These are used in expensive gourmet salads. Even though the greens are over ninety percent water they are rich in potassium, phosphorous, calcium and vitamin A. In addition they also furnish a source of iron, vitamin C, thiamine, riboflavin and niacin. The chicory root is frequently used as a coffee substitute. They are dug in autumn, winter or early spring and cleaned. Small cut pieces are roasted very slowly until dark brown throughout. This process change some of the polysaccharide inulin into fruit sugar and some of the original sugar becomes caramel. After being ground the root is brewed like coffee. The resulting beverage is stronger and more bitter than coffee, but is considered by many to be one of the better wild substitutes. Roasted chicory root is added to some commercial coffee blends, and imparts a very distinctive flavor which is known as 'French style' coffee.

This article is a reprint from the Winter, 1989 issue of **Kansas Wildflower Society Newsletter.**

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