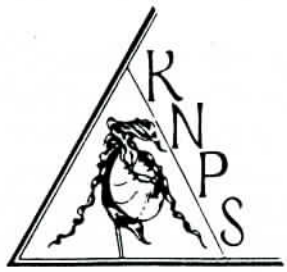
Kentucky
Native Plant
Society *NEWSLETTER*



Volume 8, Number 4 November, 1993

The Kentucky State Nature Preserves Commission

As members of the Kentucky Native Plant Society, each of you has an appreciation for our native flora and the natural communities in which they live. The Kentucky State Nature Preserves Commission, a state agency created in 1976, is charged with protecting Kentucky's natural heritage including its rare plants and animals and those natural communities which best exemplify presettlement conditions. This is no small task and the hardworking and dedicated staff have been constantly limited by budgetary constraints.

The following is provided for your information. The Kentucky State Nature Preserves Commission has geared up to request a significant increase in its operating budget, capital budget for land acquisition, preserve protection and management, and staff requirements.

To adequately protect and manage existing preserves as well as acquire new and important remnants of Kentucky's natural heritage, the Kentucky State Nature Preserves Commission desperately needs increased funding and support. Each of you are asked to immediately contact your local state legislator as well as the Governor's office and voice your support for the Kentucky State Nature Preserves Commission, its efforts, and its need for increased funding.

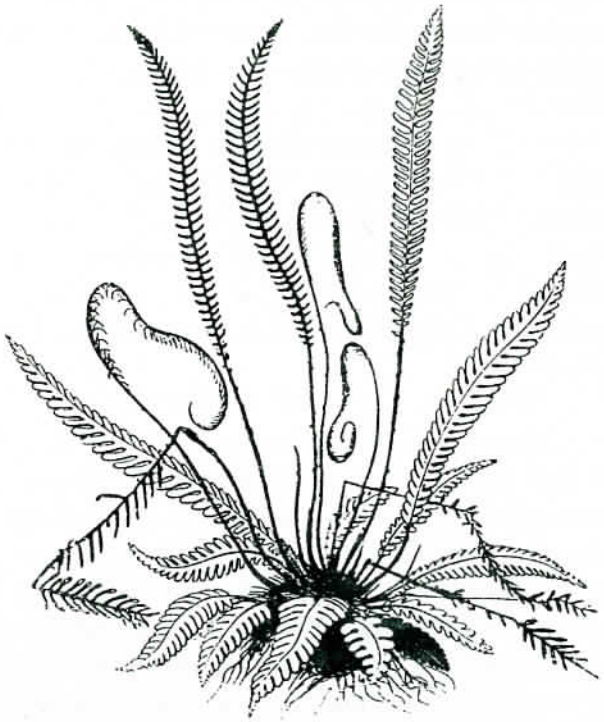
The goals of the Kentucky Native Plant Society have been and will continue to be enhanced by the efforts of the Nature Preserves Commission. Please support their efforts by contacting your elected state officials now.

Background Information

Budget Year: The budget year runs from July 1 to June 30. The year starting in 1993 is called fiscal year 1993-94, or just FY94. The budget request is for FY95 and FY96 (July 1994 to June 1996).

Sources of Money: KSNPC receives money from several sources. They are grouped in two different ways. The first system is: (a) general fund money appropriated by the General Assembly; (b) Restricted Agency Funds from all sources other than directly appropriated to us by the General Assembly or directly paid by the U.S. Government; (c) Federal Funds directly paid by the U.S. Government. The second system is by KSNPC accounts. The three categories are: (EA00) All funds exclusive of (EC00) and (ED00); EC00 are monies donated through the income tax refund checkoff program; ED00 are monies donated to KSNPC and deposited in the account created by our enabling legislation.

Budget Type: KSNPC seeks approval for two budgets. First is the Operating Budget that



pone and a beat-up copy of Gray's *Manual of Botany* in my knapsack, nearly all Kentucky ferns were considered to belong to one family -- the Fern Family, or Polypodiaceae. The few ferns relegated to other families were real oddballs, e.g., the adder's-tongue, filmy fern, and curly-grass fern.

In contrast, nowadays most fern specialists splinter the Polypodiaceae into all kinds of little families, some of them seeming pretty silly to my conservative, traditionalist, curmudgeonly mind. Ray Cranfill, author of *Ferns and Fern Allies of Kentucky*, which is nothing short of wonderful, rends my old, almost-monolithic Polypodiaceae into wondrous-sounding fern families -- the Dennstaedtiaceae (the Hay-Scented Fern Family), the Blechnaceae (the Chain Fern Family), etc. I haven't paid attention to plant taxonomy for a quarter of a century so really I don't know whether the hay-scented ferns and the rest deserve their own families. If Ray thinks they might, then probably they do. I'm just bringing all this up so you'll know what's going on.

I'm writing about ferns now because at this time of year there are still some of them around. A few are evergreen; others require a really heavy frost before they completely die back.

Happily, two of Kentucky's most common ferns are fairly evergreen and both are easy to identify -- the Christmas fern and the ebony spleenwort -- and grow statewide in a wide variety of habitats. The ebony spleenwort is easy to recognize because its brittle stipe (stem) is dark purplish (not really ebony); some of them grow in the heavy shade beneath my mother's shrubs on the north side of her suburban house in McLean County. The Christmas fern, with pinnae (leaflets) shaped like Christmas stockings, looks a lot like the Boston ferns sold at K-Mart, but they're not closely related. If you can recognize just Christmas ferns and ebony spleenworts probably you'll know most of the ferns you meet on Kentucky walks.

In fact, during my early botanizing days I got frustrated seeing just these two species again and again. However, once I learned to seek out special ecological niches, I was rewarded by finding some real nice fern species. Some ferns, for instance, are found exclusively on limestone -- maybe the most common one is the purple cliff-brake. Others are just found in cracks of sandstone rocks, such as Bradley's spleenwort, or only in the dim, moist twilight beneath over-jutting ledges, as the filmy fern. Some ferns are restricted to just one of Kentucky's regions. In Eastern Kentucky the climbing fern, a vine, is fairly common but apparently it's nonexistent here in Western Kentucky; the aquatic mosquito fern is found along the Mississippi in far Western Kentucky, but not elsewhere in the state.

Sexually, ferns are kinky little things. The main novelty concerns something called a gametophyte. But let's backtrack a bit.

You know about chromosomes and chromosome number. People have 46 chromosomes, but the sperm and eggs we produce carry only half that number, 23;

biologists say that 46 is our diploid number and 23 is our haploid number; the cell nuclei in our skin are diploid but the nuclei in our sex cells are haploid.

Well, ferns aren't satisfied in having such a simple setup. Let's start with the spore. It's haploid -- it has only half of the fern's chromosome number, so it's somewhat analogous to human sperm and eggs. But then the spore germinates to form a gametophyte, which is a tiny, free-living entity looking like a lilliputian, green fingernail. Obviously, at this point things are getting weird and drawing analogies with us humans is pointless. Anyway, the gametophyte produces sex-cell-producing organs (male ones are called antheridia, female are called archegonia); male sex cells fertilize the females producing a zygote that is diploid, eventually developing into the fern.

Think about this! It's as if we humans could only engender dwarfish beings that go live by themselves, but they in their shady solitude beget human babies, which becomes us, and then the cycle starts all over again, with us begetting more shy midgets. Biologists call this "alternation of generations" and I think it's weird. Well, maybe being psyched-out by such cytological shenanigans is an acquired taste. By the way, finding those gametophytes is hard; I've seen only a handful in my whole life.

There's plenty of other fancy genetic dancing in ferns, too. There are lots of hybrids, mutants, and things like apogamy, heterospory, and allopolyploidy. For example, sometimes we find Christmas ferns in which the pinnae are deeply saw-toothed on the margin. All these goings-on are outlined in Ray Cranfill's book so if you're interested you can do no better than diving into that. Yes: When November is all brown and dead, and the stores' pre-pre-pre-Christmas hype is driving us nuts, nothing calms us down and adds a touch of natural grace to our lives more than going fern-looking. Take along Ray's book and become a fern expert, and be watching for those shy, lusty, leprechaunish gametophytes...

Plant Life-Histories

by Doug Reynolds, EKU

An artist friend once told the well-known physicist, Richard Feynman, that he pitied scientists because they couldn't see the beauty of things like flowers. The friend said that scientists always ruined things by trying to take them apart and analyze them. Feynman's response has an important message for all of us. He told his friend that scientists can appreciate the beauty of a flower like anyone else but that the additional knowledge they get by studying the plant only enhances its beauty. To know why a flower is a beautiful red and how this attracts pollinators or how a plant "knows" to bloom in April rather than August only deepens our wonderment of that beautiful Trillium by the path.

Let's look beyond the surface beauty of plants into the their life-history characteristics. By life-history characteristics I mean the patterns of growth and reproduction by which a plant survives in its environment. In nature, resources are always limited and no plant can be all things. The ideal plant should grow to a large size in order to get the light, it should be able to grow well in all kinds of soil, and be able to survive dry and wet conditions, and cold and warm climates. Unfortunately, the traits that allow survival in some of the above conditions would hinder survival in others. Like the old proverb says, The jack of all trades is master of none. We find when we study a particular plant species that it is well-adapted to a specific set of conditions. Each plant species we see is a combination of trade-offs; but it is a selected package of trade-offs that suit the plant to a specific habitat.

One important part of a plant's adaptation is its growth form. A simple classification would be into the categories of herbaceous plant, shrub, or tree. Raunkiaer, a European botanist from early in this century, created a more detailed classification which groups plants according to where their buds

spend the winter or dry season. Trees have their buds up in the open, exposed to the elements, for example, while many herbaceous plants have their buds underground during the winter where they are protected from cold temperatures and drying winds. Each type of growth form has its advantages and disadvantages which must be compensated for by other aspects of the plant's biology, if the plant is to be successful. Plants that grow tall and build a large, permanent plant body (like a tree) can overtop competitors and have good access to sunlight but then their buds are exposed and must be able to tolerate drought, cold, and insect attack. A large plant also must be able to capture enough energy to maintain its body year round. A small herbaceous plant which dies back in the winter, on the other hand, has its buds protected under a covering of snow, leaves, or soil. Its small size means that its energy needs are low. But then it must deal with living in the shade of its larger neighbors in the summer. To do this, it must be able to photosynthesize at low light levels.

Another important aspect of a plant's life-history is its phenology. By this term we mean the timing of various stages in the plant's development throughout the year. Does it germinate in the spring or fall? Does it flower in the early spring, summer, or fall? Each pattern requires its own set of adaptations. Many of our favorite Kentucky wildflowers such as Trillium or Rue Anemone are what are known as spring ephemerals. This means that they are active in the spring, accomplishing their reproduction and most of their growth in March and April. This is a very successful pattern for small plants in a deciduous forest, because early spring is a time of warming temperatures, but most importantly, a time of high light levels before the trees leaf out. Blooming in the early spring can be risky though; there may be a shortage of pollinators because of cool temperatures and the early date. But many spring ephemerals are adapted to this; they can self-pollinate and produce seeds even if a pollinator does not happen by.

Other important features of a plant's life-history are its life-span and how often it reproduces. Many of our native plants are perennial, that is, they live for a number of years and reproduce many times. Other species are annual or biennial, growing for one or a few years and then putting everything they have into a "big bang" of reproduction followed by death. What are the advantages and disadvantages of these patterns? Perennial species do not have to establish from seed every year and build new root and shoot systems; they can keep up with or get ahead of their competitors. On the other hand, they must spend substantial energy building and maintaining their permanent plant body, energy which could have been used to reproduce. An annual plant, however, only needs a temporary plant body; it can often get by with a slender root system and small shoot system. All other energy can be put into reproduction. Of course, the trade-off is that a tiny annual is a poor competitor for light and thus we rarely find them in a forest. In open fields or in disturbed areas along a river or roadside, they are much more successful and common. Their rapid growth and reproduction allow them to take over a new site and capture the resources before their slower-growing perennial neighbors can get established.

This brings us to the question of seed size and number. Is it better to have all your eggs in one basket or not? That is, is it more advantageous to produce many small seeds or a few big ones? The ideal, of course, would be to produce lots of big seeds. In the real world, unfortunately, resources are always limited and the ideal is not possible. Nature will favor the plant whose particular combination of seed size and number give it the greatest success in a given habitat. In different environments, the successful combination will be different. Many annual plants from open, disturbed environments are successful by producing many small seeds which can be widely dispersed. While many of these may land in unsuitable sites, the loss of each is slight, and by producing many seeds, at least a few will

ultimately "find" a newly disturbed site where they can quickly colonize and be successful. Many of the plants that we call weeds have this kind of pattern. Effective, isn't it? In a closed, competitive environment such as a forest, on the other hand, producing a few large seeds may give greater success. A larger seed contains more food reserves than a small one, and this may allow the seedling a greater chance to survive the competition and shade on the forest floor.

The last life-history characteristic I want to discuss for now is the type of reproduction a plant employs, whether sexual, asexual, or a combination of both. For it's not always either/or; a number of species reproduce in both ways and can even change the amount of energy they put into one kind or another depending upon conditions. Sexual reproduction by flowers to produce seeds has several advantages; it produces units which are usually easily dispersed or which can "disperse through time" by remaining dormant in the soil for years until good conditions occur (a heavy rain, more light as a result of a tree fall, etc.). Seeds produced sexually also may receive new combinations of genes which may produce a plant that is more successful than either parent. On the other hand, there can be disadvantages to sexual reproduction; many seeds end up in unsuitable sites or in a year of drought or cold temperatures few seeds may germinate or the seedlings may perish. In addition, the new gene combinations may produce plants that are not as fit as the parents. Asexual reproduction can avoid some of these problems. It often occurs through underground rhizomes or by aerial stolons as in a strawberry plant. Plants produced this way are genetically identical to their parent. At first these daughter plants are still connected to the parent and receive nourishment to help them get established. Seeds, of course, are left on their own and many die as a result. Asexual offspring produced in these ways remain near their parent. Presumably, since the parent did well enough in that site to reproduce, an exact genetic clone will as well. Some plants such as the strawberry hedge their bets; they produce genetically variable seeds which are easily dispersed to new areas at the same time as they produce identical clones which get established near the parent. Some plants, like the dandelion, whose success we all know, actually produce seeds asexually, that is, the small, easily dispersed seeds actually contain an embryo that is genetically identical to its parent. What is the logic in this pattern? Dandelions are small plants that do well in disturbed areas which are often scattered over the landscape. Producing many copies of themselves, in easily dispersed form, allows a single individual to take advantage of these scattered patches of resources. As the biologist, Dan Janzen, has written, a dandelion with all its scattered clones is just like the leaves of a large spreading oak tree - without the trunk and connecting branches. So what exactly is an individual dandelion? Is it the single plant whose yellow flower mars the beauty of our front lawns or the population of clones spread throughout your neighborhood? Some plants confound our concepts of individuality.

There is so much more to a plant than just its pretty flowers; it is a package of characteristics, the result of tens of thousands of years of natural selection, which have honed it to have the combination of traits that leads to success in its particular environment. The next time you're out botanizing, look beyond the beautiful surface of the plants and see if you can discover what characteristics have made them so successful that they come back, in spite of environmental hazards, to delight us year after year.

(Author's note: For a fascinating account of the life histories of plants from the temperate zone to the tropics, read Peter Bernhardt's *Wily Violets and Underground Orchids*, 1989, William Morrow and Co., Inc.)

News and Announcements

A Student's Perspective of KNPS Certification Program

by Charles Lapham

Have you ever found a new plant and spent hours looking through all your guidebooks without success? Did you ever feel a plant was probably a weed but might be rare and there must be a book somewhere that could provide the answer? Does it irritate you when guidebooks show a few asters or goldenrods and say there are a lot more but the differences are too technical for the guidebook? Do you have a bunch of guidebooks on the premise that you can find what you need if you have enough books? If you answered yes to any of the above questions, you are a prime candidate for the KNPS Certification Program.

There is indeed a better way. There are botanical books called keys that present a couple of dozen decisions for you to make based on the plant in question and then lead you to the only plant in the key that matches. Modern keys don't have pictures but are potentially much faster and more accurate than picture books. Dr. Jones has told us that when we become proficient we should be able to key through family to genus and species in a few minutes. The keys also include the rare plants, grasses, sedges, and **ALL** the goldenrods and asters.

There is a catch to using keys though. They look like books full of incomprehensible gibberish at first. Botany, like all sciences, has developed its own terminology and, in botany, the terminology is loaded with Latin plus some Greek as well. On the other hand, botany is one of the few sciences where it's still possible for an amateur with limited cash to make a useful contribution. This more than makes up for the Latin, in my opinion.

The terminology isn't as daunting as it seems initially, thanks to some dedicated botanists in our society. In the Fall of 1992, KNPS started to offer courses in botany to its members. My wife and I have taken five of them. Most of the original group of a little over a dozen students have taken most of what has been offered. The courses usually meet on four Saturday mornings or afternoons. There have been two courses offered each semester, one following after the other has been completed.

None of us had any appreciable background in botany and our knowledge of Latin and Greek was often worse than that. We have learned lots of neat things like some of the ecological relationships and how plant communities work; for instance, you can tell from the trees what sort of plants are likely to be under them. However, the main thrust has been systematics or the study of the terminology of the keys and this has required the bulk of the studying.

We are all keying now and we started only a little over a year ago. In fact, the last class was almost entirely keying. We are a long way from being experts, for keying takes a lot of practice. However, one needs some success to stay with the practice and we are now good enough to be past that problem.

If you make a mistake in the decisions in the key you end up with a description that doesn't match your plant. In this course we made good progress in recognizing this situation. We also learned how to prepare specimens to send to experts when all else fails. You can work the keys backwards if you have a positive identification and find where you made the mistake so the key will work correctly the next time.

This program was somewhat of an experiment; most native plant societies haven't attempted nearly this technical an approach. KNPS has proved that rank amateurs can learn how to start keying in about a year with this program.

If you're interested in the native plant study program, contact Dr. Ron Jones at EKU. He is the father of this program. He thinks

classes can be offered at WKU and NKU as well as EKU if there is interest. In fact, if there is interest, the courses might be offered almost anywhere. Considering the success we have had to date, there should be lots of interest. This is a very powerful program! It's now up to the members to show the interest needed to move forward. If the momentum can be maintained, our Kentucky program could be a model for other states. I know Tennessee has nothing like it. It's certainly been exciting for me! Let's make our experiment a grand success! The tough work of developing the program is almost done.

Landmark Project Produces First Two Volumes
First description of the plants of North America begins bearing fruit

ST. LOUIS, MO - September 1, 1993 - The first two volumes of the *Flora of North America*, the first-ever comprehensive description of the plants growing naturally north of Mexico, has been published by Oxford University Press on September 27, 1993. Volume 1 contains a series of introductory essays that provide a foundation for the Flora. The essays, written by nearly two dozen botanical authorities, discuss climate, geology, the history of vegetation and its current status, expeditions and research and discussions of overall classification and how to use the book. Volume 2 contains taxonomic treatments of ferns and gymnosperms.

The Flora of North America project is a collaborative, bi-national effort of 30 botanical institutions and hundreds of botanists to compile the first comprehensive description of all the plants growing spontaneously in the United States, Canada and Greenland. The Missouri Botanical Garden serves as the organizational center for the project.

In all, 14 volumes of the Flora will be published over a period of twelve years. The description of each species is written and reviewed by experts from the systematic botanical community worldwide, based on original observations of living and herbarium specimens supplemented by a critical review of the literature. Each volume will include identification keys, short descriptions, distributions, and other information of biological interest for a particular group of plants. Where necessary, each species entry corrects erroneous information, qualifies any variant names the editors believe misapplied and notes known hybridizations. The final volume will contain a comprehensive bibliography and index.

In addition to the published volumes, all the Flora's information will be stored in the Missouri Botanical Garden's computerized data base, TROPICOS, making it possible to provide floristic information in new ways. The database allows easy access, sorting, and comparison of a large amount of floristic information. Information will also be added to the data base after the published Flora has been completed and will be maintained by the Missouri Botanical Garden as a permanent resource for public access. A comprehensive bibliographic data base is being developed at the Hunt Institute for Botanical Documentation at Carnegie Mellon University in Pittsburgh, Pennsylvania.

"No continental flora has ever tried to do all of the things we're doing," said Dr. Nancy Morin, convening editor of the Flora of North America project and assistant director of the Missouri Botanical Garden. "There has never before been one place to obtain all of the information this project is providing."

North America's flora is remarkably rich and interesting, in part because of the continent's geological history, and in part because of its diverse topography and range of climates. Thirty-eight percent of the plant groups (genera) native to the area are found only in North America and an additional 18 percent of the native plant groups are found only in the Western Hemisphere.

Despite the ongoing study of North American plants, many species and many

geographical areas are still very poorly known. The project will stimulate initial research on these subjects as an integral part of preparing the Flora, and the printed Flora will identify species and areas in need of further study.

"As the authoritative botanical reference work for North America, the Flora will be used by many different people and agencies, in fields such as horticulture, conservation, agriculture, forestry and, of course, general biology, as well as in conducting environmental analyses and managing natural resources," said Morin. "There is no end to the ways it can be used.

The *Flora of North America* will provide essential data for identifying and protecting the 15 percent of the flora of the U.S. that is threatened with extinction. In order to identify a plant species as endangered, conservation groups like the Center for Plant Conservation, the Nature Conservancy and others, require reliable and thorough information about that species. The *Flora of North America* will provide a common point of reference for these groups.

The publication of the first two volumes of the *Flora of North America* represents the culmination of eleven years of work and a milestone in efforts that began more than 160 years ago, with botanists John Torrey and Asa Gray's attempt to produce a comprehensive flora of the continent. Another attempt was made in 1965 but was discontinued because of lack of funding. The total cost for the current Flora is approximately $1 million per year. The project has received major funding from the National Science Foundation, the Pew Charitable Trusts, the David and Lucille Packard Foundation, the Surdna Foundation, the Dula Foundation, the ARCO Foundation, the Chase Garvey Foundation, and the Hewlett and National Fish and Wildlife Foundations.

Interested individuals can order copies of the two volumes from Oxford University Press by calling 1-800-451-7556. The volumes are priced at $75 each.

KNPS To the Rescue

by Charles Chandler

Although it had all the makings of a mean trick, it turned out to be a treat when KNPS volunteers gathered at the University of Kentucky's Mathews Garden on Halloween afternoon to help move plants threatened by construction of a pipeline. Intermittent snow and sleet started the day before, but the temperature stayed just barely warm enough to keep it from sticking.

If you doubt that off-season plant identification and transplanting in the midst of whirling wet snow flurries can be an invigorating adventure, you need only seek the testimony of hale and hearty KNPS members Willem Meijer, Wayne Long, Clara Wieland, Charlie Chandler, Debbie Prewitt, John Maruskin, and Rita Wehner. "Armed and dangerous" (as Debbie proclaimed while hefting her iron digger and brandishing an assortment of shovels), the peacekeepers successfully completed their mission of getting the asters, goldenrods, phloxes, golden seal, celandine, wild ginger, wild yam, and other natives resettled out of harm's way and safely provisioned for the winter.

So far, the University remains intent on preserving as much of the garden as possible. Plans include storing topsoil from the pipeline path at an offsite location for restoration after the pipeline is laid, and professional arborists have been consulted about the best means of aiding root regeneration for larger trees whose roots are severed during construction.

Unfortunately, the need for such heroic efforts continues. President Landon McKinney noted at the fall meeting that the KNPS troops would again be mustered for operations in the Frankfort area next spring. Stay tuned for details...

KNPS Native Plant Seed Exchange

This year's Seed Exchange includes seeds from KNPS members Gail Smathers and Bill Carroll. Other members may request seeds of three species from the list below and three substitute species. If supplies hold out we'll try to send seeds of substitutes, too.

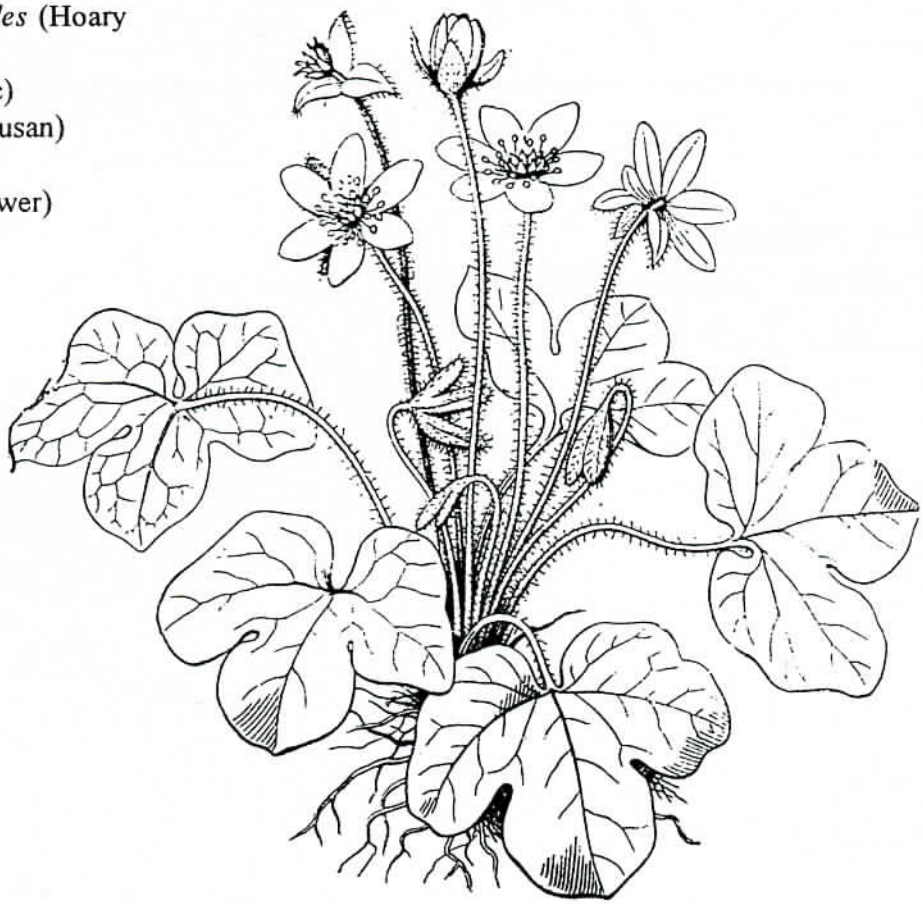
Asclepias incarnata (Swamp Milkweed)
Aster novae-angliae (New England Aster)
Campsis radicans (Trumpet Creeper)
Cassia marilandica (Wild Senna)
Celastrus scandens (Bittersweet)
Cercis canadensis (Redbud)
Diospyros virginiana (Persimmon)
Eupatorium coelestinum (Mistflower)
Hedeoma pulegioides (American Pennyroyal)
Lobelia cardinalis (Cardinal Flower)
Lobelia siphilitica (Great Blue Lobelia)
Opuntia humifusa (Prickly Pear)
Pycnanthemum pycnanthemoides (Hoary Mountain-Mint)
Rhus typhina (Staghorn Sumac)
Rudbeckia hirta (Black-eyed Susan)
Staphylea trifolia (Bladdernut)
Talinum teretifolium (Fameflower)

If you'd like to try some seeds, send your choices, a 29-cent stamp, and your address to:

KNPS Native Plant Seed Swap
c/o Charles Chandler
924 Maywick Drive
Lexington, KY 40504.

KNPS member Tom Lowery also has seeds of Blackberry Lily (*Belamcanda chinensis*) and Kentucky Coffee Tree (*Gymnocladus dioica*). If you'd like any of these seeds, send your request, address, and stamp directly to him:

Tom Lowery
7557 Grimes Mill Rd.
Lexington, KY 40515.



The Kentucky Native Plant Society

Department of Natural Science
Eastern Kentucky University
Richmond, KY 40475

NON-PROFIT ORG.
U.S.POSTAGE
PAID
RICHMOND, KY 40475
PERMIT NO. 116

Contents
(Volume 8, Number 4)

The Kentucky Native Plant Society, Inc. was founded in 1986 as a botanical organization for all persons interested in the native flora and vegetation of Kentucky. The goals of KNPS are to serve as a medium of information exchange, to promote native plant conservation, public education in botany, and botanical research in Kentucky. Annual dues of $5.00 (Family $7.00) may be sent to KNPS, c/o Tom Bloom, 900 Keenon Rd., Harrodsburg, KY 40330.

The KNPS NEWSLETTER is published quarterly (Feb., May, Aug., Nov.). Please notify us four weeks in advance of any changes of address. Back issues of the NEWSLETTER are available for $1.00 each. Send articles and correspondence to:
Editor, KNPS NEWSLETTER, Doug Reynolds, Department of Natural Science, Eastern Kentucky University, Richmond, KY 40475, (606) 622-1507.