

Iowa Native Plant Society

Newsletter

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Iowa Ecotype Project: from remnants to roadsides

by Greg Houseal

WHAT IS THE IOWA ECOTYPE PROJECT?

The Iowa Ecotype Project, funded by the Living Roadway Trust Fund, is a practical effort to develop a commercially available source of regionally adapted Iowa-origin seed of native tallgrass prairie species for erosion control, revegetation, and prairie reconstructions and restorations, primarily along roadsides. The project was initiated soon after the Integrated Roadside Vegetation Management (IRVM) program became established by an act of the Iowa legislature in 1988 to lower maintenance cost associated with roadside vegetation. The centerpiece of IRVM is the use of native species to stabilize soil, inhibit woody encroachment, and to reduce dependence on costly herbicides and mowing. At that time, most sources of seed of native species available in sufficient quantities were cultivars originating from outside of Iowa. If native species are considered to be well-adapted to Iowa's climate and soils, it seems only logical that Iowa-origin seed of native species would be best adapted. Concerns were also expressed by native plant enthusiasts that large scale plantings of non-Iowa seed might negatively affect remnant prairie communities through introduction of disease, pollution of local gene pools, or invasion by aggressive cultivars. The Iowa Ecotype Project was designed to provide a more ecologically sensitive and economically feasible alternative to the wide-spread planting of non-local seed and/or cultivated varieties of native species on Iowa's roadsides.

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The goals of the project are two-fold: 1) to increase the availability of Iowa-origin prairie seed for prairie reconstructions, and 2) to do so on a scale that will make Iowa seed competitively priced with more widely available cultivated varieties of native species. The former goal is rooted in ecology. Simply stated, Iowa-origin seed is best suited to be planted in Iowa for some of the reasons mentioned below. The second goal is economic in nature. There is an overwhelming need for native seed not only for state and county road projects, but also for the Conservation Reserve Program (CRP), Wetland Reserve Program (WRP), Wildlife Habitat Incentives Program (WHIP), etc. The high price of Iowa-origin seed means that many of those acres are being planted to seed originating from well beyond Iowa's borders, native or non-native. As Iowa-origin seed is becoming more available, costs are coming down, and more Iowa seed is being purchased and used in restorations. The flip side of the same economic coin is that native seed growers have little incentive to commercially produce local-source seed if the potential market for its end use (prairie reconstruction) is restricted to a small area around the point of origin of the seed, such as a single county.

WHAT IS AN ECOTYPE?

The flora of the tallgrass prairie is composed of several hundred different species, each with its own origin and history. These species differ in their tolerance of local environmental conditions of climate and soils, as well as frequency and intensity of disturbance, such as grazing, fire, and flooding - although all must tolerate macroclimatic factors such as day length (a function of latitude), seasonal patterns of temperature and precipitation. This has led to variation not only in the plant community from site to site (species composition), but also variation within the same species. When this variation within a species is determined to be genetically based and correlated with habitat, it has been

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Leaves from the President's Notebook...



It's that time of warming and showers, unfolding leaves, colorful flowers, and nesting. Spring started a bit early this year with a few skunk cabbage plants flowering at Hanging Bog on Saint Valentine's Day. The warming trend continued with marsh marigolds blooming at Cedar Hills Sand Prairie on April 17th. Wonder what the rest of the year will be like.

I visited Ryerson's Woods in Iowa City to look for spring flowers and enjoy a Sunday walk. There were toothwort, hepatica and bloodroot, and the reddish coiled fronds of maidenhair ferns were just emerging. But the flowers were not the only thing that I was looking at. Last summer's wind storm had snapped many trees in some areas, while others were permanently bent over. The falling trees had also bent over many younger trees and pinned their tops to the ground. It will be interesting to see how this woodland recovers from the loss of so many trees and how those not killed, but bent over survive and continue to grow.

The first society field-trip was to Palisades-Kepler State Park on May 1st. It was a beautiful day for a wild flower walk with our leader, Diana Horton. We saw prairie trilliums, squirrel-corn, morels, and a great blue heron rookery. Many rolls of film were exposed and field guides were used, and we reluctantly headed home, thinking about what we had just seen.

The program committee has organized field trips to several more interesting parks and preserves. We will have the opportunity to see cactus on quartzite outcrops, enjoy the scenic loess hills and walk on glacial terrain to visit a series of fens. So, have your field guides, binoculars and hiking boots ready.....

Ed Freese

Book Review: Steyermark's Flora of Missouri, Vol. 1

by George Yatskievych

reviewed by Diana Horton

Yatskievych, George. 1999. Steyermark's Flora of Missouri, Vol. 1 (revised edition). The Missouri Department of Conservation, Jefferson City, Missouri in cooperation with The Missouri Botanical Garden Press, St. Louis, Missouri. 991 pp. ISBN: 1-887247-19-X

The original Flora of Missouri by Julian Steyermark was published in 1963, in a single volume comprised of treatments of 2,438 species, 517 subspecies and varieties, and 297 forms. There are county dot maps and illustrations of most taxa, the illustrations including many reproductions as well as originals. In contrast to most floristic treatments, the foundation of Steyermark's Flora of Missouri was not descriptions of individual taxa; instead, he relied on detailed keys that were designed to facilitate identification and obviate the necessity for a description by incorporating characteristics of foliage, flowers and fruits, habit, habitat, geographic occurrence, and relative rarity. The fact that Steyermark's Flora went through seven printings, most recently in 1996, is testimony to the success of his innovative approach. In the hiatus between the sixth and seventh printings (1981 to 1996) when copies of Steyermark became very scarce, I counted myself lucky to have bought a copy shortly after I came to Iowa in 1983. As I recall, it was one of those 'bargain buys'; I must have paid \$20 or \$30.

The first of two volumes of George Yatskievych's (pronounced yuts-kye/-vich, the middle syllable having a long e followed by a short e, as in Kiev) revision of

Steyermark's Flora of Missouri has just been published. The format of the new Steyermark is the same as the original, roughly 8" x 10" x 3". Similarly, between the covers, the general layout is pleasingly familiar for anyone who has grown accustomed to three county dot maps across the tops of pages with text and full pages of illustrations intercalated. But there the similarities end. The new Flora of Missouri is just that: an original work by Yatskievych. The most obvious differences in the text are the keys have been shortened to essential features and descriptions of each taxon have been incorporated. Steyermark's keys tended to be cumbersome because of the length and detail; Yatskievych's concise keys are really functional and efficient, and one can refer to the descriptions if further details are desired. The taxonomy and nomenclature have been completely reworked in accordance with modern concepts. All of the plates are new, and they are absolutely stunning in their accuracy, detail and aesthetic appeal. Other improvements include larger and bolder font, and similarly sharper dot maps, all of which have been updated from a computerized database. Volume 1 includes Pteridophytes (ferns and fern allies), Gymnosperms (conifers), and Monocots, a total of 898 taxa, among which are 87 species that are not in the original Steyermark. The introductory portions are greatly expanded to include an extensive (and fascinating!) History of Floristic Botany in Missouri; an overview of physical features (geography, climate, geology) and vegetation (natural regions and plant communities); and an Analysis of the Flora, with discussion of conservation status, origins and affinities.

Yatskievych dedicates his revision to the memory of Julian Steyermark, "in the hope that he would have approved of its contents". Looking at this wonderful treatment, it is hard to imagine that Steyermark would have been anything but deeply gratified; it is clear that Yatskievych is carrying on the tradition by producing another classic. - As soon as I saw the revision, I had one question: when will volume 2 be available?! Yatskievych estimates four to five years.

Given the shared occurrence of many taxa, the new Flora of Missouri will continue to be an essential reference for anyone working in Iowa. In addition, the records from northern counties of taxa not yet recorded from Iowa should serve as a stimulus for collectors. I would predict that anyone in the state of Iowa with the remotest interest in plants will regret it if they don't take advantage of the incredible opportunity of owning this outstanding flora before it goes out of print! The Missouri Department of Conservation and The Missouri Botanical Garden are to be congratulated for making Yatskievych's revision of Steyermark's Flora of Missouri available for the amazingly modest price of \$42 (incl. shipping and handling). It can be obtained from The Missouri Botanical Garden Press via the web <http://www.mobot.org/MOBOT/research/scipubs/order.html>; e-mail mbgpress@mobot.org; fax 314-577-9591; or phone 314-577-9534

Ed Freese - more than just our president

by Mary Brown

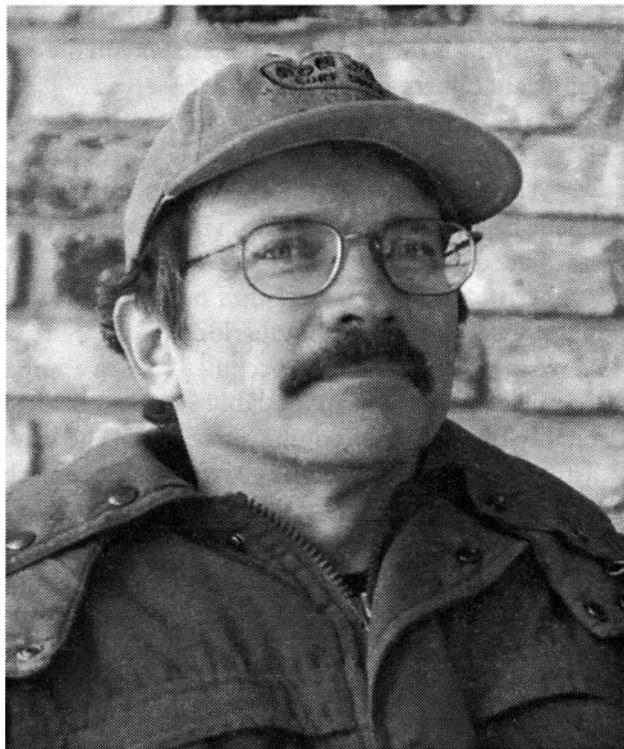
Ed Freese is beginning his second year as president of the Iowa Native Plant Society. He is a charter member of the society and has been a very active participant in the group's activities.

Whilst a boy growing up on a farm near Greene, Iowa, Ed's parents took him on walks through woodlands and other natural areas. These introductions to the outdoors sparked his interest in nature. He graduated from Iowa State University with a degree in Fisheries and Wildlife Biology.

In 1991, Ed published a flora of the Freda Haffner kettlehole in the journal of the Iowa Academy of Science. Currently, he is updating floras for Cedar Hills Sand Prairie and Clay Prairie. Ed's work at Cedar Hills earned him the Nature Conservancy's 1998 "Volunteer of the Year" award.

Ed always has his camera with him as he is an avid wildflower photographer. However, plants are not his only love. Birds, butterflies and beetles are also of great interest to him. He is doing a study of scarab beetles in Iowa!

Watch for "Leaves from the President's Notebook..." in your newsletters, and if you see Ed at an INPS event, give him a big "Thank-you" for serving as our president.



Iowa Ecotype Project contd. from page 1

termed ecotypic differentiation. Such variation between populations seems to be the rule rather than the exception.

The term 'ecotype' has led to confusion in the scientific literature, and some have proposed that the term be abandoned. It has been used to describe any variation observed within a species. For example, a climatic ecotype might be further divisible into two or more soil 'ecotypes'. The natural environment consists of such a varied array of conditions in different combinations that the only clear meaning of the term 'ecotype' is as a synonym for 'population' of the species. Regarding the Iowa Ecotype Project, the term 'ecotype' is used in the sense of 'local population' or 'subpopulation'.

In the ecotype plots on the UNI campus, accessions of plant species established from the original remnant seed sources exhibit some interesting differences. Southern Iowa accessions (Zone 3) of some species flower 10 days to 2 weeks later than Northern Iowa accessions (Zone 1), when grown at this latitude. One wonders if a late flowering species such as New England aster from Appanoose county in southern Iowa would have sufficient time to set viable seed if planted in Howard county. Southern Iowa rough blazing stars were still in full bloom on campus during an October snowstorm in 1997. Some accessions are dramatically short-statured compared to other accessions, suggestive of perhaps an adaptation to droughty or low nutrient sites. Recessive traits such as white flower variants of prairie blazing star, bergamot, great blue lobelia, and white and pink New England aster have also been observed in some accessions. Of course, variations in disease resistance, reproductive success, root carbohydrate storage necessary for regrowth in spring or after mowing, grazing or burning are potentially even more significant but are much less easily observed.

HOW THE PROJECT WORKS.

With only very limited definitive information about the genetic basis of ecotypic variation in native species, the state was divided into three regional zones, Northern, Central, and Southern Iowa. The assumption being that latitude, as it affects seasonality and photoperiod, is a strong regional selective pressure. Each zone occupies an area approximately 300 miles east-to-west and roughly 60 miles north-to-south; roughly three tiers of counties per zone. The ecologically distinct area of the Loess Hills in western Iowa has been excluded from the project for the time being. Stock seed is collected from native remnant prairies throughout the state. Over 1300 collections of 28 species have been made since 1990. At UNI, individual accessions of seed are greenhouse grown and established in mapped gardens at three sites on campus, one garden or zone-plot per zone. Seed from these plots is hand-collected as it ripens and pooled by region for the purpose of agricultural seed increase. This helps assure

roughly equal representation in quantity of seed from each accession. The seed is then further increased for each zone in production plots by our regional USDA-NRCS Plant Materials Center in Elsberry, MO. (The University of Northern Iowa received a Federal Highway grant last fall to build a native vegetation center on campus, and this facility will be the site of new seed-increase production plots beginning in the spring of 2000). No intentional selection of traits occurs. When sufficient stock seed is produced (usually 3-4 years after original collections), it is released to qualified native seed growers in Iowa. When possible, seed is released to a grower within the same zone as seed-origin for long-term production. Growers' production plots and seed cleaning facilities are certified by the Iowa Crop Improvement Association. The list of candidate species includes those with (historically) statewide distribution in Iowa and considered to be intermediate successional species suitable for roadside environments. Of the 28 species currently in the project, 18 have been increased and released for commercial production. The 1998 Iowa Seed Directory, published by the Iowa Crop Improvement Association lists 57 native species from 74 different Iowa sources currently in production as certified source-identified seed. Some of these sources are from the Northern, Central, and Southern Iowa zones of the Iowa Ecotype Project, but many species have been collected more locally, increased, and commercially marketed by private growers. Write to the Iowa Crop Improvement Association, 2023 Agronomy Hall, Ames, IA 50011-1010, or call 515-294-7828, for a free copy of the Iowa Seed Directory.

REGIONAL VARIETY IS THE SPICE OF LIFE

Although the size of a 'region' as a source of donor seed is open for debate on ecological grounds, from a pragmatic view these regional zones are also the potential market for the seed, as previously mentioned. For native regional ecotype seed to be priced competitively with the more tempting price of cultivars, it has to be produced in commercial quantities. Smaller sized regions most likely would not support a market large enough to provide commercial growers with economic incentives to produce the seed in quantity. Without this economically competitive alternate seed source, cultivars will continue to be used by default, in spite of their potential shortcomings.

Even so, the three regions or zones of the Iowa Ecotype Project may yet prove to be on firm ecological ground. At a recent conference on the genetics of landscape scale ecosystem restoration, Gustafson (1997) presented his analysis of populations of big bluestem, Indian grass, and purple prairie clover from several locations in Illinois. Based on an analysis of random amplified polymorphic DNA (RAPD) markers, genetically similar populations fell into one of three regional groups - a southern, a central, and a northern Illi-

nois group. While not a verification of the Iowa Ecotype Project zones, it indicates potentially important latitudinal variation in these species.

A regional approach strikes a balance between the widespread inter-state use of cultivars on the one hand, and the extremely localized on-site or near-site donor seed source on the other hand. A regional approach seems well justified in light of Knapp's (1996) discussion of seed zones, based on his study of genetic variation in blue wild rye (*Elymus glaucus*) in California as follows:

"Efforts to define seed zones emphasize genetic variation among populations resulting from past evolutionary processes and events. But the potential for populations to evolve in response to future environmental challenges depends on the existence of genetic variation at the within-population level as well. The presence of genetic variation is especially critical for germplasm used in restoration and revegetation, because this seed may be planted across an array of local habitats where selection may favor different combinations of genes. A population containing genetic variation will enhance the likelihood that some plants in the existing collection will possess the best combination of genes for that particular habitat. Given that a seed collection for a particular seed zone may represent a mixture that is only 'coarsely' adapted to regional climatic conditions, genetic variation within the mixture will allow for selective forces to fine-tune populations for adaptation to local conditions. The numerous allelic variants found within *E. glaucus* populations emphasize the importance of collecting seed from many plants in order to obtain a seed source containing as much genetic variation of the original populations as possible. Indications of considerable genetic structuring of allozyme variation within subpopulations of *E. glaucus* further demonstrate that seed collections should not be limited to small areas within a population. Collecting seed from different subpopulations within a region is advised in order to maximize the potential for evolutionary response and thus the sustainability of restored populations."

Please use this form when submitting seeds:

COLLECTOR: _____		ADDRESS: _____				PH.: _____					
ZONE	COUNTY	SPECIES	CODE	TNSHIP	RNGE	EW	SECT#	QTR SECTION			
PROPERTY OWNER: _____					DATE: _____						
Site Notes: (e.g. slope, aspect, soil type, associated species, management, etc.)											
								<p>Mark location below:</p> <table border="1"> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table> <p>SECTION DIAGRAM</p>			

In theory, Iowa Ecotype Project seed should be quite genetically diverse and more broadly adapted to its region of origin. However, more local sources of seed may be desirable if they are nearer to and have similar conditions to the proposed planting site. Reconstructions and/or restorations near or adjacent to remnant prairies should utilize seed from on-site or from nearby similar sites as much as possible, as in the case of The Nature Conservancy's efforts at Freda Haffner/Kettlehole Preserve in Dickinson County.

The tallgrass prairie has been here for the last several thousand years, covering as much as 80% of Iowa. Now, small, scattered remnants of prairie are threatened with loss of both species and genetic diversity. By planting Iowa-origin seed and retaining as much genetic diversity as possible, we may enhance the long-term success of prairie roadside plantings and reconstructions in Iowa, as well as helping to assure the continued existence and vitality of remnant communities.

VOLUNTEER OPPORTUNITIES

You can contribute seed from remnant populations. Collect only a small portion of the seed from many individual plants within the population. Our target species for 1999 are mountain mint (*Pycnanthemum virginianum*), bluejoint grass (*Calamagrostis canadensis*) and prairie sage (*Artemisia ludoviciana*). Use the convenient seed label provided and include, briefly, as much of the information as possible. This information is required for source-identified seed certification. Thank you.

For more information contact: UNI Roadside Program, 113 CEEE, Cedar Falls, IA 50614-0293 Phone: 319-273-2813 Fax: 319-273-7140

Reference:

Gustafson, D. 1997. Learning from RAPD profiling of genetic diversity in big bluestem, purple prairie clover, and Indian grass. Presentation at the conference: From Bison to Buffalo grass: The genetics of landscape restoration. Oct. 31, 1997. Governor State University, Chicago, IL. Sponsored by Openlands Project and USFS Region 3.

Iowa's Very Own V. Iowa in synonymy

Thomas G. Lammers

In the last issue, we considered the case of *Cirsium iowense*, a name honoring Iowa that is now placed in synonymy. Sadly for the Hawkeye State, three similar names have shared its fate.

The Iowa Smartweed, *Persicaria iowensis* Rydb., was described by Per Axel Rydberg (1860-1931) of the New York Botanical Garden in the debut volume (1931) of the journal *Brittonia*. Most botanists have treated *Persicaria* as a section within a more broadly defined genus *Polygonum*. The combination needed to reflect this view, *Polygonum iowense*, was validated the following year by R. I. Cratty in the Proceedings of the Iowa Academy of Science.

The type specimen of *P. iowense* was collected on 29 July 1902 near Ames by Robert E. Buchanan, a professor at what is now Iowa State University. It is deposited in that institution's herbarium, with a duplicate at New York. More precise locality data is not recorded, though we may assume the plant was growing in a wet prairie or marsh habitat.

The road leading to the synonymy of *Polygonum iowense* was very similar to that of *Cirsium iowense*: something that seemed quite distinct at first seemed less so once more material had been studied. The type specimen of *P. iowense* clearly is just one point in the spectrum of variation seen in *P. amphibium* L., the Water Smartweed. This species is widely distributed in wetlands of the Northern Hemisphere and shows extreme variation in vegetative structures. Part of this variability is genetic and part is induced by simple changes in water level. In cases such as this, it simply is not possible to recognize narrowly defined species such as Rydberg's.

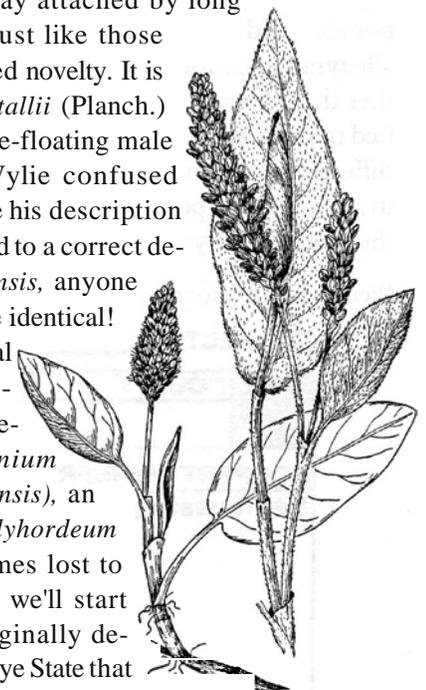
A century ago, numerous new species of Panic-grass (the genus *Panicum*) were described by William Willard Ashe (1872-1932), an employee of the North Carolina Geological Survey. Unfortunately, posterity has not been kind to Ashe, and many of his novelties are no longer recognized. One of these is the Iowa Panic-grass, *Panicum iowense* Ashe, described in 1900 in the North Carolina Agricultural Experiment Station Bulletin. Not only is this species no longer recognized, we are not even sure of the species under which to list the name as a synonym! First, the description apparently contains a typographical error, as it describes the plant as 1-2 cm tall, and no Midwestern panic-grass is that short! Second, Ashe did not cite any specimens which may be consulted, nor have any been found; instead, he merely stated that his new "species" grew on dry prairies from eastern Iowa to Kansas. Thus, we have no idea what he was looking at when he drew up the curt description. In light of such frankly shoddy workmanship, it is perhaps just as well that the name has disappeared from the literature.

Sometimes, synonymy arises due to misunderstanding. Robert Bradford Wylie (1870-1959) was a professor of botany at the University of Iowa from 1906 until his death. He spent the summers of 1909-11 teaching at what is today the Iowa Lakeside Laboratory on Lake Okoboji. The lake, then as now, was quite rich in aquatic flora. In particular, the large colonies of Waterweed (the genus *Elodea*) caught Wylie's eye. Most species of *Elodea* produce male and female flowers on separate plants and such was indeed the case with the Okoboji plants. Overall, they looked just like Common Waterweed, *E. canadensis* Michx., but Wylie thought there was something odd about them ...

We're not sure just how Wylie went astray. Somehow, he got the idea that *E. canadensis* cuts its male flowers loose, allowing them to float free on the water's surface, while the female flowers remain attached to the plant via long floral stalks. When he saw that the Okoboji plants retained not only female flowers but also their male flowers on long stalks, he concluded that he was dealing with a new species. He described his findings in articles in the Proceedings of the Iowa Academy of Science and Science, and the population at Okoboji was finally christened *Elodea ioensis* Wylie in the University of Iowa's Bulletin of the Laboratories of Natural History for 1913. The type was a specimen that he collected in East Okoboji Lake in 1911 and sent to the Gray Herbarium of Harvard University.

The problem? *Elodea canadensis* does not cut its male flowers loose! They stay attached by long slender floral stalks, just like those seen in Wylie's supposed novelty. It is another species, *E. nuttallii* (Planch.) H. St. John, that has free-floating male flowers! Somehow, Wylie confused these two species. Once his description of *E. ioensis* is compared to a correct description of *E. canadensis*, anyone can see that the two are identical!

So what's the final score for Iowa's eponyms? Two "good" species (*Chrysosplenium iowense* and *Pyrus ioensis*), an intergeneric hybrid (*xElyhordeum iowense*), and four names lost to synonymy. Next issue, we'll start looking at species originally described from the Hawkeye State that were named something other than iowensis!



Polygonum amphibium
water smartweed

Update on the Threatened and Endangered Species Lists

by Deb Lewis

The first of several workshops planned for revising the Iowa Threatened and Endangered Species Lists was held in Ames on April 22. More than 70 folks interested in the listing process participated in the workshop. The compilation of the lists as legislated in the Iowa Code is the responsibility of the Iowa Department of Natural Resources. IDNR staff biologists Daryl Howell and John Pearson currently oversee the development of the lists. To open the workshop, John and Daryl provided some history of the Iowa T&E lists and an overview of what surrounding states are using as criteria for listing. They also expressed the desire for the state's biologists and others interested in T&E species to work with them to develop "science-based criteria" and draft lists for each of the groups of animals, plants and fungi.

In other brief reports at the workshop, Cathy Mabry described Deborah Rabinowitz's model for plant species rarity, Pauline Drobney outlined the Wilhelm Index as recently applied to the Iowa flora (a draft list will soon be available for additional input), and Jim Christiansen presented a proposal for legislative changes to the T&E list and its application. The meeting was then opened for general discussion and questions. The workshop culminated in the formation of committees - Vertebrate Animals, Invertebrate Animals, Plants, Fungi, and Legislative Issues - to work on various parts of the T&E list and criteria for generating the list. If you wish to be involved on one of these committees, or for more information, contact John Pearson, 515-281-3891.

Production of an Iowa Flora - Progress and Possibilities

by Deb Lewis

A group of botanists gathered at the close of the Iowa Academy of Science annual meeting on April 24th to discuss the production of an Iowa Flora. The general questions of "what has been accomplished?", "what do we want?", and "how do we get there?" resulted in a lively discussion of possible goals for a Flora and how those goals might be reached.

The history of working to produce a Flora was outlined, from Greene's 1907 list to Conard's keys of the middle of this century, to Thorne's and his students' work on Iowa floristics, to, most recently, the 1994 publication of Eilers and Roosa's *The Vascular Plants of Iowa*. The importance of workable keys and diagnostic illustrations was highlighted, along with the need for county-level distribution maps. Possible formats for making the Flora available was also discussed - as a printed document, CD-ROM, and/or Web-based publication were all mentioned.

A review of "who's doing what?" revealed a number of databasing, mapping and revisionary projects already initiated (and some completed) which could contribute to an Iowa Flora. As these projects progress, it may be possible to establish a time-line for producing a Flora. Intermediate goals might include 1) the production of an "Atlas of Iowa's Vascular Plants" which would provide distribution maps and update the 1994 "Checklist", and 2) searchable WWW databases that would make species or even specimen-level information readily available. Several participants agreed to form a "steering committee" to consider these and other possibilities. If you would like to be on the committee or for more information, contact Deb Lewis at 515-294-9499 or "dlew@iastate.edu".

Iowa's Herbaria: preserving the botanical harvest

by Deb Lewis

This article initiates an ongoing newsletter series about Iowa's herbaria and their value to the state and "botanical community". My plan is to offer an overview of herbaria, then invite the curators of each of Iowa's herbaria to write about the specifics of their herbarium's holdings, history, and activities. But let's begin with some general background information.

The practice of drying plant materials for preservation has been around for millennia - who knows where it started. Seeds and other plant materials from Egypt and elsewhere have maintained their characteristics for possibly 5000 years or more. In *Natural History* magazine (Sept. 1992, pp. 10-18), Harvard biologist Stephen Jay Gould writes about natural (although "atypical") preservation of leaves that are 20 million years old - not "fossilized" (mineralized), rather still "intact" with their original cells and "viable" DNA! So we see that plant materials are incredibly durable, and humans have taken advantage of that fact for a long time!

In the 1500's an Italian named Luco Ghini is attributed with being the first to dry whole plant samples and attach them to sheets of paper, creating what we now think of as a herbarium specimen. This process was successful, as specimens dating back to the 1500's can still be viewed and studied in European herbaria. These early specimens were bound together in "scrapbooks" called "exsiccatae". Linnaeus, a couple of centuries later, is said to have been one of the first to disassemble his exsiccatae so he could arrange the specimens in any way he chose.

Thus the herbarium is a collection of these dried, pressed specimens of plants or plant parts. With use of the correct techniques and products in preparation and with proper care, the herbarium specimens serve as permanent records of populations of plants that are or were living components of the environment. These specimens are usually remarkably little-changed by the drying/pressing process (other than being "flattened") and may typically serve as "accurate" representatives of the living plants.

Why do we go to all this trouble of building up and maintaining collections of plant specimens? The answers are numerous and variable, and, beyond botany, may lie in the realms of the other biological sciences, history, education, materials science and museum studies, art and aesthetics' and such philosophical ideas as preserving something of the past that otherwise would have been lost to the future. For these articles we'll focus mostly on the biological, and especially plant systematics uses of the collection.

Again, at its most basic, a herbarium specimen represents a sample from a past or current population of living plants. Each specimen has a label that provides the plant's name and origin, and records other information about the plant and its habitat. Information about the specimen can be retrieved, then, from either of its two parts - the information obtained from direct observation or use of the plant material itself, or the data from the specimen label. A question I am frequently asked is "Why do you have so many specimens of each species?" There are several reasons for this: one is that species vary morphologically depending on such things as age, the time of year, and where they were growing. One specimen alone cannot capture that variation. Another reason is that obviously one specimen doesn't tell us much about the geographic or ecological range of the species. Having only one specimen per species would certainly limit the herbarium's usefulness in plotting species distributions! And, lastly, most of the herbarium's holdings weren't collected just because someone enjoyed pressing plants - most of these are voucher specimens, documenting some aspect of research, whether it be an animal ecologist's study of what a deer is browsing, a floristic inventory of one of our state parks, material for monographic studies of taxonomic relationships, or collections made of plants to be ground up for DNA extraction and sequencing, or for many other reasons.

Iowa's larger herbaria are part of a global network of herbaria. We loan our specimens to specialists at other institutions to support research around the world, and incoming loans allow our researchers access to specimens from other herbaria in this global network. Beyond loans, specimens are also shipped for other reasons: unmounted specimens are sent from the collecting sites back to the collector's home institution; specimens are exchanged with other herbaria; and specimens are sent as gifts for determination, in which the receiving researcher gets to keep the specimen in return for providing the identification or verification.

I have partly misled you so far in describing the herbarium as simply a plant collection. If you visit a herbarium you will see that the facility encompasses more than this. The herbarium usually has a good set of taxonomic and nomenclatural references in book, card and microfiche formats. There are maps, journals and reprints of scientific articles, and illustrations. There is a helpful staff associated with the herbarium - at least we like to think we're helpful!

Now that we've gotten a generalized look at herbaria, let's next look at their role in today's botany and biology departments. The herbarium remains the heart of classical taxonomic studies, including both those that are floristic (species' occurrence and distribution) and monographic (species' relationships to each other) in nature. As mentioned above, the herbarium is a resource for acquiring needed specimens for these kinds of studies. If the desired plant groups or specific specimens are not at hand, they can be borrowed from other herbaria. The herbarium has dissecting and compound microscopes and dissecting tools, computers, references and maps as well as storage cabinets that all facilitate study of the specimens.

The herbarium is the university's or institution's best resource for identifying unknown plant specimens. These may be plants that a researcher has turned up in floristic studies, those that an animal ecologist isn't familiar with in those deer-browsing surveys, or a weed that a farmer doesn't recognize in his soybean field. The references maintained in the herbarium, the identified specimens to compare with and confirm the identity, and a knowledgeable staff facilitate making the identification.

Uses of the herbarium have evolved beyond the traditional taxonomy and plant identification roles. In teaching, specimens are used to supplement local or greenhouse grown living or "fresh" materials. The herbarium can introduce students to the wide array of the world's plants, providing a perspective that the student can't get from the local flora alone. When specific examples are needed, the herbarium specimens can fill in for locally or seasonally unavailable material.

But first and foremost the herbarium is a research facility. Some studies require "destructive sampling" in which fragments or parts of specimens are used as a primary source of material. Anatomical, ultrastructural, and biochemical uses involve such "destructive sampling". Careful consideration of alternatives, judicious removal to minimize damage to the specimen, and adherence to sampling policies all play a part in these uses. Yet herbarium specimens have routinely supplied materials for use in these analyses.

Much of systematics now depends on molecular studies. Is there a place for the herbarium in this modern world of high-tech systematics? I'll just make two quick points to convince you that the answer is YES! One role the herbarium serves is as the repository for voucher specimens. These vouchers permanently document the identity of the plant material being studied that may otherwise, upon completion of the study, be known only by its gene sequences or electrophoretic gel banding pattern.

Yet beyond this, the herbarium can directly serve as the SOURCE of materials to use in molecular studies. Viable DNA has been extracted from specimens more than 100 years old. With improvements in molecular techniques, ever better results are obtained from ever smaller amounts of material and from ever older specimens. New methods of drying and preparing specimens are also maximizing the viability of the DNA.

So what does the future hold for herbaria? Will the herbarium eventually be relegated to "dusty old museum" status, or even wind up in the dumpster, replaced instead by scanned-in pixels and data captured on the World Wide Web? No, there will always be a place for the herbarium. Yet in many cases we must do a better job of promoting the herbarium's role in today's high-tech scientific community.

I believe that there can be increased use of the herbarium in the biodiversity issues we face. The collections support basic research on biodiversity by systematists and ecologists, and are also critical to biodiversity management and conservation efforts. The pooling of data among herbaria with increased collaboration with government and private organizations, and making this data electronically accessible will help the biodiversity effort, as will completing such baseline studies as the *Flora of Iowa* and the *Flora of North America*. However, the herbarium is not being as fully utilized in biodiversity research and policy as it could be. The data is already there, on the specimens in the herbarium, and it should be telling us what we've had, what we've got, and what we're losing!

Today the herbarium is being used in ways that could never have been imagined 500 or 100 or even 25 years ago. Yet for a variety of reasons, the traditional, field-oriented, herbarium-supporting systematists are disappearing. In their absence, we must continue to think positively and creatively to promote the role of herbaria and other natural history collections in today's research. While we're not generally thought of as public museums in the sense of exhibits and such, we should open our doors to school groups and others who might actually find the herbarium an interesting and fun place to visit - such visibility may "pay off" in public support. Those of us at universities should encourage our colleagues and students collecting specimens or using the herbarium to include at least a small request in their grant budgets for herbarium support whenever possible. We should be willing to write annual reports that illustrate the herbarium's activities to our administrators. And finally, we must be alert to the changing directions in research utilizing specimens - who knows what currently unimaginable uses the herbarium will provide in the future?

Field-trip Venues for July to September

by Mark Leoschke, Tom Rosburg & Mary Brown

July 17th - Gitchie Manitou

The field trip to Gitchie Manitou will take you to the extreme northwestern corner of the state and introduce a landscape unlike most of Iowa. The gently rolling landscape along the Big Sioux River is pierced by exposed Precambrian Sioux Quartzite approximately 1.6 billion years old. The pinkish outcrops of quartzite were formed from compressed sands and have been polished by exposure to wind-blown sand. The soils on the preserve are sand and silt loams formed from alluvium. Prairie vegetation grades from a tallgrass midgrass community on the deeper soils to a xerophytic community on the quartzite outcrops.

Expect to see uncommon species like *Opuntia fragilis* (brittle cactus), *Heterotheca villosa* (golden aster), *Talinum parviflorum* (fameflower), *Prunus pumila* (sand cherry), *Selaginella rupestris* (spikemoss), *Schedonnardus paniculatus* (tumble grass) and *Woodsia oregana* (Oregon woodsia).

We will meet in the parking lot for the preserve at 10:00 AM. Follow Highway 9 northwest out of Larchwood to County Highway A10. Turn west on A10 and follow 4 miles to the preserve entrance which is located where A10 turns northward.

Remember to bring a lunch and drinking water.

August 14th - Cedar Bluffs Natural Area (Mahaska County)

Cedar Bluffs is an upland forest with sandstone bluffs and a wide diversity of plants. Some of the plants are unusual for this part of the state, including a large population of Goldie's wood fern (*Dryopteris goldiana*). There is a lot going on in this 225 acre natural area including a savanna restoration and an archeological survey. Our group may be able to add to the compilation of a species list for the area. Our field trip leader will be Perry Thostenson, the Mahaska County Conservation Officer.

We will meet at 10:00 a.m. at Eveland Access which is southwest of Oskaloosa where T39 crosses the Des Moines River (T39 is now named Galeston Road). Eveland Access is on the south side of the river. From there we will caravan to Cedar Bluffs Natural Area. For those interested, Eveland Access is a great place to camp. If the water level is appropriate, there is good canoeing on the Des Moines River.

September 12th (Sunday) - Fen Valley Wildlife Management Area

The Native Plant Society will co-sponsor a field trip (with The Nature Conservancy and the Iowa Prairie Network, part of all three organizations' joint annual meeting- the TNC will send out a newsletter on this to all INPS members) to the Fen Valley Wildlife Management Area in southeastern Clay County (northwest Iowa, southeast of Spencer). This site was purchased by TNC and the DNR. A complex of 7.5 calcareous fens occurs along the valley walls of Elk Creek within the WMA. This site is part of the second largest fen complex in Iowa. The botanical beauties that should be in bloom on this date include small fringed gentian (*Gentianopsis procera*), Kalms lobelia (*Lobelia kalmii*) and Grass of Parnassus (*Parnassia glauca*).

The field trip will begin at 10:30 a.m. from the WMA parking lot. The closest town is Gillett Grove (very small) which is west of the WMA and on Iowa highway maps. To get there from the north take County Road M54 south from U.S. Highway 18 (between Spencer and Dickens) to Gillett Grove. Continue to follow the county road south and east out of town. About a mile east of town is a sharp right turn. Go straight on the gravel road east (do not turn south) a few blocks to the Fen Valley WMA parking area (there is a DNR sign here) or park along the gravel road. If you are coming from the south, take County road M54 north from state highway 10 (between Sioux Rapids and Marathon in Buena Vista County) to the little town of Webb. Four miles north of the intersection of M54 and County Road B63 (north edge of Webb) you will come to a sharp right turn. Go north on the gravel road (do not turn west) a few blocks to the WMA parking area or park along the gravel road. Questions as to directions, etc. can be directed to Mark J. Leoschke (field trip leader) by phone (515-244-5908) or e-mail (markjl@dmreg.infi.net).

Eddyville Dunes and Wetlands Update

by Glenda Buenger

The Environmental Impact Statement (EIS) has been completed for the Eddyville Bypass project. The approved route (still called the Near East Alternative) shifts the south end of the bypass slightly west to spare the large population of Tubercled or Pale-green orchids (state-endangered).

A 200-acre borrow area will be needed to supply 5.2 million cubic yards of fill for the Near East Alternative. The fill will add an estimated \$14 million to the cost. 5.2 million cubic yards of fill is 170,000 of those big dumptrucks. All of them will be using 182nd St. (through the orchid swale) or G77 past the high-school as haul roads. These costs and impacts were not included in the EIS documentation. An EIS is intended to provide an objective comparison of alternatives. The Far East Alternative, by contrast, would impact

fewer residences, fewer wetlands, cost less, avoid damaging and fragmenting the Dunes, and take no more farmland than the Near East Alternative.



Tubercled Orchid - an Eddyville native

Another mOT Public Hearing is scheduled May 27th to take public comment on the "west shift" of the Near East Alternative. Letters will be included in the hearing transcript if received by June 7th. Letters are needed. The most recent "Dunes News" provides help with letter-writing. If you are not on the mailing list and would like to be, please contact Glenda Buenger, 2282 Teller Ave., Rose Hill, Iowa, 52586; (515) 632-8308; rockman49@hotmail.com

Thank you for your help and support! We remain optimistic that we can do better by the Dunes than the Near East Alternative as currently approved.

Copies of the EIS and the Record of Decision (the ROD is only 15 pages and contains the most up-to-date mitigation proposal) are available from the mOT's Office of Project Planning, (515) 239-1391.

Picture Credits

page 2 - photo of Ed Freese by Mary Brown.
pages 6 & 11 from Gleason, H.A. 1952. The new Britton & Brown illustrated flora of the northeastern United States and adjacent Canada. New York: NYBG.

Membership/Change of Address Form and Survey:

Your input and support of the Iowa Native Plant Society are important:

Please complete and send with your 1999 dues of \$10 to Mary Brown, 330 Windsor Dr., Iowa City, IA 52245.

Name. _____

Address: _____

Phone # (____) _____

email address/web site: _____

Additional information or special interests for member directory entry: _____

O Mark this box if you DO NOT wish this information published in the INPS member directory. The INPS mail list is never distributed to other organizations or companies. Dues are payable on a calendar year basis, from January 1st to December 31st. Use this form for change of address. INPS form: Nov. 1997

In a Nutshell...

Related events of interest to INPS members

TNC:The Nature Conservancy, CIPN:Central Iowa Prairie Network, IPN:Iowa Prairie Network, INHA:Iowa Natural History Association, PSMC:Prairie States Mushroom Club

June 26(1 PM): Williams Prairie, Johnson County; TNC (515) 244-5044

June 28 (7:00 PM): Grant Ridge Prairie, Story County, CIPN (515) 232-3807

July 10 (1 PM): Broken Kettle Grasslands, Plymouth County; TNC (515) 244-5044

July 10-11: Lacey-Keosauqua State Park (Saturday) & Shimek Forest (Sunday); PSMC (515) 446-7358

July 13(6:30 PM): Pohl Memorial Preserve at Ames High School Prairie, Ames, Story County, TNC (515) 244-5044

July 15(7:00 PM): Doolittle Prairie, Story County; CIPN (515) 432-5026

July 16-19 2000: Seventeenth North American Prairie Conference, Mason City, IA. (More details will be included in future newsletters as they become available).

August 10(8:00 PM): Pohl Memorial Preserve at Ames High School Prairie, Ames, Story County, TNC (515) 244-5044

August 14(1 PM): Broken Kettle Grasslands, Plymouth County; TNC (515) 244-5044

August 14(10 AM): Cedar Hills Sand Prairie, Black Hawk County; TNC (515) 244-5044

August 19(7:00 PM): Doolittle Prairie, Story County; CIPN (515) 432-5026

August 23(7:00 PM): Stargrass Private Prairie Reconstruction, Story County; CIPN (515) 232-3807

September 4(1 PM): Cedar Hills Sand Prairie, Black Hawk County; TNC (515) 244-5044

September 14(6:30 PM): Pohl Memorial Preserve at Ames High School Prairie, Ames, Story County, TNC (515) 244-5044

September 18 (1 PM): Broken Kettle Grasslands, Plymouth County; TNC (515) 244-5044

September 19: Palisades Kepler State Park; PSMC (515) 446-7358

October 9 (1 PM): Medora Prairie, Warren County; TNC (515)244-5044

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