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MISSOURIENSIS

Missouriensis is the official publication of the Missouri Native Plant Society. Founded in 1979 as a non-profit corporation, the Society is devoted to the conservation and study of the plants growing wild in Missouri, to the education of the public about the significance of the native flora and its habitat, and to the publication of related information.

Missouriensis is published quarterly by the Society. Manuscripts and illustrations are welcome, but cannot be returned unless accompanied by a stamped, self-addressed envelope. Contributions should be submitted in duplicate to Erna R. Eisendrath, Box 1137, Washington University, St. Louis, MO 63130.

Rules for submission of manuscripts are as follows: Typed on 8½ x 11-inch paper with one-inch margins; titles centered on page. Paragraphs should be typed single-space in block style, with double-spacing between paragraphs. Manuscripts should be signed and the author's address given briefly at the top of the article immediately beneath the title. Text of the article should follow two spaces below. We request that manuscripts be limited to three pages. Drawings and/or maps should be submitted in black or india ink. Bibliographies and/or references should be limited to a necessary minimum using abbreviations. Send change of address information to: Richard Daley, Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166.

MINUTES OF THE LAST MEETING

March 6, 1982, Cape Girardeau Missouri

Thirty assembled members and officers met at the University Center at 8:00 A.M. to indulge in a delicious breakfast, compliments of S.M.S.U., prior to the business of the Board Meeting. Board members present were: Melvin Conrad, Erna Eisendrath, Karen Haller, John Karel, Robert Mohlenbrock, Paul Nelson, Otto Ohmart, Paul Redfearn, Ginny Wallace, Wallace Weber, and Jim Henry Wilson. Other society members present: Arthur Christ, Dorothy Cole, John Doggett, Rod Doolen, Jean Freiling, Al Haller, Paul Heye, Paul Kittle, Russell Kullberg, Ed Loewenstein, John Molyneau, Wanda Oskins, Jay Raveill, Susan Russell, Dot Seibert, Larry Slutch, Joanna Turner, Mervin Wallace, and Jeannie Webdell.

MINUTES. Minutes of the December Board Meeting were approved as published in Missouriensis.

TREASURER'S REPORT. In the absence of Rick Daley, Jim Henry Wilson reported a balance of $2,922.04 in the account.

MEMBERSHIP COMMITTEE REPORT. Jim Henry Wilson pointed with pride to a small, very portable, cardboard display board, one of three completed with the help of Donna Pasley and Jeannie Webdell. Included in a pocket on the board, are newly designed folders. "An Invitation to Join the Missouri Native Plant Society", is lettered on the front, along with our logo. An application for membership with pertinent information regarding cost, is found on the backside.* Suggestions were made to request telephone numbers on the application, thus having them available for the next printing of the membership list.

MISSOURIENSIS. 300 copies of Missouriensis, Winter 1981, were published for $200.05 by the Southwest Missouri State University Print Shop. At $.67 each, as opposed to $.83 each, this was quite a savings. Bulk mailing at $.08, as opposed to $.50 each, on the previous issue, saved us even more. Now, a possible reduction in size is in the planning stages. Wally Weber circulated mock-ups of a folder-type Missouriensis, printed on 8½ x 12 paper, folded and stapled in the fold. It was noted that "some folks may have to use their glasses now". Perhaps knowing that the printing costs could be cut in half by going to the reduced size may help.

OLD BUSINESS

Inventory Committee. It was once again suggested that a workshop regarding plant inventory be held during the June meeting.

Patches and Decals. Paul has found hats to be too expensive, but cloth patches and paper decals bearing our logo are reasonably priced. It was moved and approved that Paul have the authority within the $500 range, to go ahead on this project. Sales to members should reimburse the treasury.

NEW BUSINESS

Nominating Committee. President Paul Redfearn will appoint members to a Nominating Committee.

Rare and Endangered Plant Exchange. An informative letter arrived from Brooklyn College regarding participation in The Rare and Endangered Plant Exchange, an organization "initiated in 1981 as a response to the increasing threats to the survival of several thousand native American wild flowers. The Exchange relies on people who have volunteered to care for endangered plants in their homes and gardens and return seeds and cuttings after each growing season."

AFFILIATE CHAPTER. A request for approval as a Chapter of the Missouri Native Plant Society was submitted to the Board by the Southern Illinois Native Plant Society. With pleasure, the Board granted the request and welcomed the Chapter as our very first affiliate Chapter. Wanda Oskins, President, enlightened us regarding current plans, activities, and membership (12).

ANNUAL MEETING. Warrensburg. Central Missouri State University. Melvin Conrad and Dave Castener have been planning a June 4, 5, & 6 meeting with a tentative schedule of Board Meeting on Friday evening, general business meeting and program during Saturday morning, lunch in the cafeteria, followed by four workshops. Optional field trips on Sunday are being considered. Members are hereby notified through Missouriensis and will later receive bulk mailing from Paul Redfearn and Southwest Missouri State University. (See page)

OTHER. Introduction of Dot Siebert, State Roadside Chairman, Missouri Federation of Garden Clubs, by Ginny Wallace.

Suggestion by John Doggett that a slide exchange be held at the quarterly meetings. Bring your extra wildflower slides to swap for someone else's you may desire.

Announcement by the Missouri Department of Conservation of a May 12, 13, & 14 search for the Cypripedium candidum. Contact Ginny if you are interested.

Updates by Paul Nelson and John Karel regarding the Endangered Species Act and Irish Wilderness, respectively.

ADJOURNMENT. Following adournment, Jim Henry Wilson projected a movie of natural areas, owned by the Department of Conservation, for our viewing pleasure. A short break, followed by an educational field trip through Big Oak Tree State Park, completed the planned activities. Wanda Oskins served ably as our well-informed guide. Ice on the boardwalk hindered her not one bit.

THANKS. To Otto Ohmart and Southeast Missouri State University for hosting this March meeting. We hope you have established a precedence in meals.

Respectfully submitted,

Karen S. Haller, Secretary

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*Editor's note: three of these display boards are available for the use of members at appropriate public gatherings. Two are presently in Jefferson City, whence they can be obtained from Jim Henry Wilson; the third is presently in St.Louis, under the guardianship of your Editor.

WHAT YOU MISSED

After the meeting most of the participants made a southward trek to Big Oak Tree Natural Area, a part of the 1,007-acre Big Oak Tree State Park located in southern Mississippi County. A cold, dismal day was brightened by Wanda Oskins, our enthusiastic and knowledgeable leader from the Botany Department, SIU Carbondale. The gloomy weather actually heightened the primeval atmosphere of the area with its huge virgin hardwoods, many bearing epiphytic ferns (Polypodium polypodioides) high in their branches, the large stands of giant cane (Arundinaria gigantea), which serve as breeding habitat for the rare Swainson's warbler, and the many bald cypresses (Taxodium distichum) with their gargoyle-like knees (called pneumataphores, as we learned from Wanda) protruding from the swamp. A boardwalk enabled us to walk into the swamp to examine the varied understory and to see some of the champion trees (eleven state and two national champion trees are located in Big Oak Tree).

We had the good fortune to meet Cletus Johnson, Superintendent of Big Oak Tree, who grew up near the entrance to the park. It was obvious that he and Wanda both do love a swamp, and all is not lost for those unable to make the trip, as Wanda's article posing the question "Who Loves a Swamp" in the Winter 1981 issue of Missouriensis gives an excellent report on the area.

COMING UP

The third Annual Meeting of the Missouri Native Plant Society will be held over the week-end of June 4-6, on the campus of Central Missouri Sate University. The business meeting will be held on Friday evening, June 4, leaving Saturday free for workshops and presentations , Sunday for possible field trips.

Of prime importance among projected workshops will be one concentrating upon the ways that members of the Society can participate in the all-important Botanical Inventory of the state's plants, a task not fully confronted since publication of Steyermark's Flora of Missouri, in 1963.

During the three years since founding of the Missouri Native Plant Society,many have labored over the task of deciding where to begin on this enormous task, how to go about accomplishing it,and, most important of all, who was going to do it! At last, we think we have answers to all three questions.

These answers can be found in two articles printed in Missouriensis, both emphasizing the important role that Society members can undertake in an effort of such magnitude. Dr.Steyermark's letter, with his suggestions for conducting a survey, appeared on pg.10 of Vol.III, no.2(Autumn, 1981). In the subsequent issue(Vol.III, no.3,pg.18,Winter, 1982) will be found a proposed "Procedure for Updating Records" by Ladd, Redfearn and Nelson.

With Steyermark's endorsement of the project of updating county records, and the blue-print of a plan, it is now time to construct the foundation, on the 114 county blocks, of the projected updating of Missouri's botanical inventory, and it is the members of MoNPS who must be depended upon to provide the labor!

Therefore, Wanda Oskins of Southern Illinois State University will conduct a Botanical Inventory Workshop, featuring a demonstration on how to construct a plant press, as well as instruction in the ethics of plant collecting, how one goes about same, and where one can and should collect, with in rmation about drying plants. Participants in this all-important Workshop will also be furnished with packets including the above sorts of information, and anyone anxious to take part in this exciting and valuable effort, but who is unable to attend the Workshop, may get hold of a packet from Paul Nelson at the Department of Natural Resources.

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Our State Botanist, Ginny (Klomps) Wallace has announced a foray into Northwest Missouri over the week-end of May 12-14, in quest of the Small White Lady-slipper (Cypripedium candidum) which has been found in Missouri, but not in recent years. This should be an exciting tour of exploration which members are invited to attend. More information can be obtained by calling the Missouri Department of Conservation in Jefferson City (314-751-4115).

MISSOURI GLADES: PART II

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The first part of this article (Missouriensis 3(3): 5-9) discussed a substrate based glade classification scheme and presented statewide distribution and density patterns for glades of each substrate type. In addition to a preponderance of rock at or near the land surface, the most visible aspect of glades is the vegetation. Glade vegetation differs markedly from other plant communities in the state, making glades easily distinguishable even at a distance.

Typically, glade vegetation can be generalized as predominantly herbaceous, although regularly interspersed with stunted, often gnarled, arborescent growth. Many herbaceous glade plants display conspicuous adaptations for life in harsh exposed seasonally xeric sites, including succulence, dense pubescence thickened leaf cuticles, reduced leaf area, and compact growth forms. Most are either deep rooted perennials or ephemeral annuals that complete their life cycles prior to the onset of the dry season. The glade classification scheme compiled by the Department of Natural Resources includes 415 taxa of vascular plants that regularly occur on undisturbed glades. Of these, 45 taxa are woody plants, and the rest are herbaceous. The most characteristic woody plant on most glades is Juniperus virginiana, which regularly occurs on all glade types except chert. Some glades, particularly extensive dolomite glades with a history of moderate disturbance, are dominated by a relatively dense cover of Juniperus.

The physical and chemical differences between each of the six glade-forming substrate types in Missouri result in markedly different and distinctive floristic patterns on glades of each substrate type. Even though a given plant may occur on more than one glade type, it often has a completely different autecology on each substrate. Glades on similar substrates, though sometimes geographically remote, display a high degree of floristic resemblance.

Plate No. 1. Plants of dolomite and limestone glades: a. Oenothera missouriensis (Missouri evening primrose) b. Echinacea paradoxa (yellow coneflower) c. Leavenworthia uniflora d. Lithospermum incisum (yellow puccoon).

The following brief illustrated sequence highlights some representative plants from each glade type. Plants consistently occurring as major components of the vegetation of a particular glade type are classed as dominant. Dominant plants do not dominate every glade of a substrate type, nor are they necessarily restricted to glades. Plants listed as characteristic for a given glade type are those plants which regularly occur on glades of that substrate, and whose presence in combination with other characteristic species provides a reliable indicator of the glade type. Characteristic species are not necessarily or even usually confined to glade habitats, and this listing pertains only to their occurrance in glade situations. Certain floristic elements occur on a glade type only in a limited region, usually with a high degree of fidelity within that region. Some are totally endemic to a glade type in Missouri. These elements are classed as restricted. Nomenclature follows Steyermark's Flora of Missouri.

1. DOLOMITE GLADES: Dominant species: Andropogon scoparius (little bluestem, Bouteloua curtipendula (side-oats grama), Sorghastrum nutans (Indian grass), and Sporobolus heterolepis (prairie dropseed. Characteristic species: Arenaria patula (sandwort), Aster oblongifolius (oblong-leaf aster), Aster sericeus (silky aster), Buchnera americana (blue hearts), Carex meadii (Meade's sedge), Castilleja coccinea (Indian paintbrush), Comandra richardsiana (bastard toadflax), Echinacea pallida (purple coneflower), Echinacea paradoxa (yellow coneflower), Fimbristylis caroliniana (fimbristylis), Houstonia nigricans (bluets), Leavenworthia uniflora, Lithospermum incisum (yellow puccoon), Oenothera missouriensis (Missouri evening primrose), Petalostemum purpureum (purple prairie clover), Rudbeckia missouriensis (Missouri orange coneflower), Satureja arkansana (calamint), and Viola pedata (birdsfoot violet). Restricted species on glades in the Elk River section include Centaurea americana (American basket) and Valerianella ozarkana (Ozark corn salad). Crataegus danielsii (Daniels hawthorn) is restricted to glades in central Missouri, and Clematis fremontii var. riehlii (Fremont's leather flower) to glades in the Jefferson County area. A number of unusual species are restricted to glades in the White River area: Acacia angustissima (prairie acacia), Centaurium texense (centaury), Cotinus obovatus (smoke tree), Eriogonium longifolium (umbrella plant), Juniperus ashei (Ashe's juniper), Liatris mucronata (gay feather), Marshallia caespitosa var. signata (Barbara's buttons), Palafoxia callosa, Phyllanthus polygonoides, Andrachne phyllanthoides (buckbrush), Scutellaria bushii, Stenosiphon linifolius, Thelesperma trifidum, and Yucca glauca var. mollis (soapweed).

2. LIMESTONE GLADES: Dominant species: Andropogon scoparius (little bluestem), and Bouteloua curtipendula (side-oats grama). Characteristic species: Androsace occidentalis, Aristida dichotoma (triple-awn), Draba reptans (whitlow grass), Erysimum capitatum (western wall flower), Heliotropium tenellum (slender heliotrope), Mentzelia oligosperma (stick-leaf), Ophioglossum engelmanii (adder's tongue fern), Sedum pulchellum (widow's cross), and Verbena canadensis (rose vervain). Acacia angustissima (prairie acacia) is restricted to glades in the White River area, and Castilleja purpurea (painted cup) and Lesquerella filiformis are restricted to glades on the Springfield Plateau.

Plate No. 2. Plants of igneous glades: a. Hypericum gentianoides (orange grass) b. Diodia teres (buttonweed) c. Polygala senega (milkwort) d. Talinum calycinum (flower-of-the-hour) e. Crotonopsis elliptica (rushfoil).

3. SANDSTONE GLADES: Dominant species: Andropogon scoparius (little bluestem), Quercus stellata (post oak), and Vaccinium arboreum (farkleberry). Characteristic species: Diodia teres (buttonweed), Festuca octoflora, Hypericum gentianoides (orange grass), Isoetes melanopoda (quillwort), Lechea villosa (pinweed), Saxifraga texana (saxifrage), Selenia aurea, and, in glades in west-central Missouri, Chaetopappa asteroides, Corydalis crystallina (mealy corydalis), and Linaria canadensis (blue toadflax). Species restricted to Channel Sands glades include Geocarpon minimum, Portulaca mundula (purslane), Sedum nuttallianum, and Valerianella stenocarpa (corn salad).

4. IGNEOUS GLADES: Dominant species: Ambrosia bidentata (ragweed), Crotonopsis elliptica (rushfoil), Quercus stellata (post oak), Sorghastrum nutans (Indian grass), Ulmus alata (winged elm), and Vaccinium arboreum (farkleberry). Characteristic species: Agrostis elliotiana (bent grass), Bulbostylis capillaris (bulbostylis), Cheilanthes lanosa (hairy lip-fern), Diodia teres (buttonweed), Hypericum gentianoides (orange grass), Oenothera linifolia (sundrops), Polygala sanguinea (milkwort), and Talinum calycinum (flower-of-the-hour). There are no restricted species known from igneous glades in Missouri.

5. SHALE GLADES: Andropogon scoparius (little bluestem) is the only consistent dominant species, and Gillenia stipulata (Indian physic), and Astragalus distortus (bent milk vetch) are characteristic species. Although also occurring on limestone, Penstemon cobaea var. cobaea (purple beard-tongue) is essentially a restricted species.

6. CHERT GLADES: Dominant species: Andropogon scoparius (little bluestem), Selaginella rupestris (spikemoss), Sporobolus neglectus (poverty grass), Rhus copallina (dwarf sumac), and Quercus marilandica (blackjack oak). Characteristic species: Allium mutabile (wild onion), Arenaria patula (sandwort), Chaetopappa asteroides, Lotus purshianus (prairie trefoil), Scirpus kiololepis, Sedum nuttallianum, and Selenia aurea. Restricted species include Dracopsis amplexicaulis (coneflower), Lathyrus pusillus (wild pea), Marshallia caespitosa var. caespitosa (Barbara's button's), and Portulaca retusa (purslane).

NEW FORMAT

With our next issue Missouriensis will move out of its swaddling clothes and into more mature garb. This will involve a smaller format, with color-paper covers, which can be mailed without folding. Thanks to the capability of the printing services at Southwest Missouri State University, we will now also be able to print photographs, at a nominal charge of $6-8 per plate. As we reduce our size(despite maturing!) we ask that manuscripts still be typed out, single-spaced, on $8\frac{1}{2}$ x11" paper, as before, BUT with $1\frac{1}{4}$ " margins on all sides of a page. As before, we favor the block set-up....i.e., no indentations for paragraphs, BUT double spacing between paragraphs. Duplicates of manuscripts submitted are also greatly appreciated.

Plate No. 3. Plants of chert glades: a. Lathyrus pusillus b. Sedum nuttallianum (showing young and mature plants), sandstone glades: c. Plantago pusilla d. Geocarpon minimum e. Saxifraga texana (saxifrage).

CONTRIBUTIONS ON CARICES

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Separating Immature *Carex lurida* from *C. hystricina* and Some New County Records

Carex lurida Wahl. and *C. hystricina* Muhl. are common sedges of the southeastern and central Missouri Ozarks. They look alike and occur in similar habitats. When mature they can be easily identified by using any one of the regional *Carex* keys. These "key" characters are summarized for the two as following:

C. lurida: perigynial nerves (veins) 7-10; dorsal surface nerves (do not count the border nerves separating the ventral from the dorsal side) 2-3 (Figure 1a); achenes rhombic in outline (Figure 1b), distinctly papillate; perigynia somewhat inflated, 2.5-3 mm thick; body widest at the mid-point of the body or above.

C. hystricina: perigynial nerves 12-20; dorsal surface nerves 4-5 or more (Figure 2a); achenes obtrullate in outline (Figure 2b), relatively smooth; perigynia only slightly inflated, 1.5-2 mm thick; body widest at the midpoint or below.

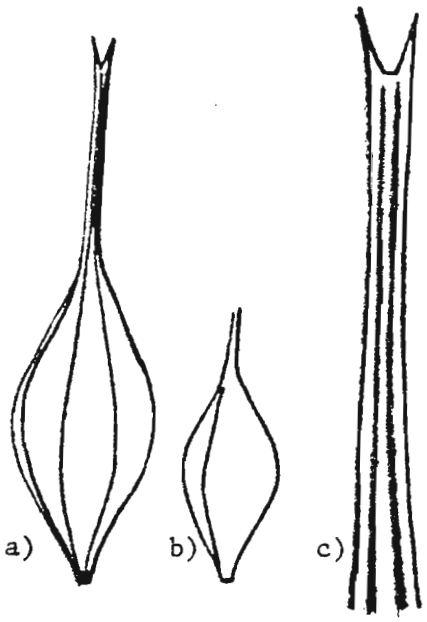

Figure 1. *Carex lurida*. a. perigynium; b. achene; c. beak (illustrations not to scale).

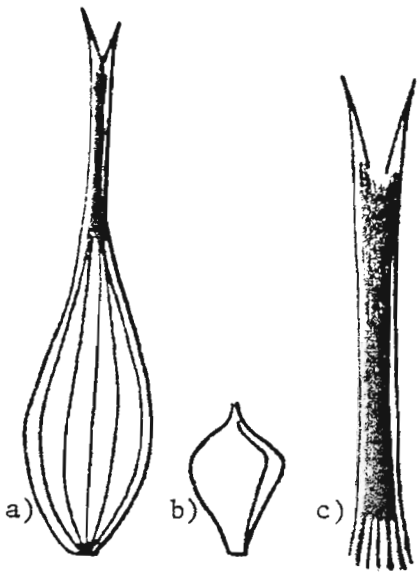

Figure 2. *Carex hystricina*. a. perigynium; b. achene; c. beak (illustrations not to scale).

This combination of characters make separation of these two species relatively easy when the plants are mature. However, immature specimens may cause the "key" characters to fail. In examining a number of specimens of these two species in Missouri, I have found the venation of the beak to be a reliable means of separating the two in either the immature or mature stages. In C. lurida, the veins entering the beak from the dorsal surface do not join but travel parallel to each other most of the length to the tip. In some specimens, the veins terminate somewhere in the beak, or they may anastomose just below the tip (Figure 1c). In C. hystricina, however, these veins anastomose at the base of the beak forming a wide-thickened vascular ridge (Figure 2c). I have examined specimens from various other states and Canada and have found these differences to be stable. Any reports confirming or denying the stability of these differences would be most welcome.

The following dichotomy is suggested for immature specimens:

A. The four or more veins of the perigynial dorsal surface (do not count the border veins separating the ventral from the dorsal surface) entering the base of the beak and anastomosing...C. hystricina

A. The 2-3 veins of the dorsal surface entering the beak and remaining distinct thru the length of the beak, only sometimes joining near the tip...C. lurida

The following are new county records:

Carex lurida
Monroe County; Castaner 2977, 7 June 1973; WARM.
Polk County; Redfearn et al 6043, 12 June 1960; SMS.
St. Clair County; Castaner 5258, 21 June 1978; WARM.
St. Francois County; Castaner 5106, 31 May 1978; WARM.

Carex hystricina
Bollinger County; Castaner 6555, 14 June 1981; WARM.
Dallas County; Castaner 5164, 1 June 1978; WARM.
Johnson County; Castaner 2355, 8 June 1972; WARM.
Madison County; Castaner 6552, 14 June 1981; WARM.
St. Francois County; Castaner 5107, 31 May 1978; WARM.

Voucher specimens, WARM, at Central Missouri State University; voucher specimen, SMS, at Southwest Missouri State University.

An Extant Colony of Carex sartwellii in Missouri and Some New Carex County Records

On June 1, and June 7, 1979, I had the pleasure of visiting a strip of land along highway 148 with members of the society. This prairie strip starts about ½ mile north of Pickering, Nodaway County, and runs between highway 148 and a north-south section of the Burlington-Northern Railroad for about three miles (hence my name for it: the 3-mile Prairie!). The prairie has a rich sedge flora.

The following species were collected during the two visits: C. annectans, C. bicknellii, C. blanda, C. buxbaumii, C. gravida, C. haydenii, C. laeviconica, C. lanuginosa, C. leavenworthii, C. meadii, C. molesta, C. vulpinoidea, and an unusual Carex.

The unusual sedge was subsequently identified as Carex sartwellii Dewey. In Flora of Missouri (4), it is reported only from Jackson county. I plan to visit the Jackson County site this coming spring, if I can locate it. Mackenzie (3) gives the location as "swampy ground near Lake City and Sibley" Hopefully, the colony will not have been "developed" out of existence! The two other closest sites are in the extreme southeast corner of Nebraska (Richardson County), and to the north near Council Bluffs in Iowa (Pottawattamie County). From these locations, the distribution radiates towards both the northeast and the northwest. Its range is given as: NY, Ontario, to BC., south to Ind., Mo. and Colo. (2).

The Nodaway county specimens have culms to 64 cm tall, leaves up to 3.5 mm wide; the inflorescence is 3-4.5 cm long with spikelets from 5-7.5 mm long; the perigynia average 2.6 x 1.3 mm (immature). These measurements fall well within the descriptive range of the species as given by Gleason (2). The almost black elongated rhizomes coupled with the gray-brown congested heads are distinctive.

This may be the only extant colony of C. sartwellii presently known in Missouri, making the 3-mile Prairie a valuable resource. In addition, the specimens of C. meadii and C. leaviconica are unique enough morphologically to be discussed in a later note. We hope this land can be protected.

As a consequence of the above trips, the following carices are reported as new County records:

Carex annectans Bickn.; Nodaway County; Castaner 5754, 7 June 1979, and Castaner 5758, 7 June 1979.

Carex gravida Bailey; Nodaway County; Castaner 5683, 1 June 1979.

Carex leavenworthii Dewey; Nodaway County; Castaner 5682, 1 June 1979.

Carex molesta Mack.; Nodaway County; Castaner 5751, 7 June 1979.

Carex sartwellii Dewey; Nodaway County; Castaner 5688, 1 June 1979 and Castaner 5747, 7 June 1979.

Recently, Christ (1) reported C. triangularis Böck. as new to Stoddard County. Previously, Flora of Missouri had only listed Dunklin and Wayne Counties. To these, we now add a fourth County, New Madrid, to the list. A specimen growing in a low moist area was found about 2 miles north of New Madrid along highway 61.

Carex triangularis Böck.; New Madrid County; Castaner 5630, 5 May 1979.

Voucher specimens for all are deposited in the herbarium of Central Missouri State University (WARM).

Literature Cited

1. Christ, Art. 1981. New county records of southeastern Missouri species. Missouriensis 3:17.

2. Gleason, H. A. 1952. The New Britton and Brown Illustrated Flora. New York Bot. Gard., New York. 3 Vol.

3. Mackenzie, K. K. 1902. Manual of the Flora of Jackson County Missouri. New Era Printing Co., Lancaster, PA 242 pp.

4. Steyermark, J. A. 1963. Flora of Missouri. Iowa State Univ. Press, Ames, Iowa. 1728 pp.

NEW EVIDENCE OF MASTODONS

Father James M Sullivan
3500 St. Luke Lane
St. Louis County, Missouri 63074

I was watching a mockingbird gulping fruits of a cultivated Euonymus outside my window today. I have yet to see the bird or other animal that could do the same with the softball-sized fruits of Maclura pomifera, the Osage Orange. Some biologists are presently discussing evidence that mastodons could have feasted voraciously on these and other such large fruits. They postulate a major interaction between mastodons as well as other giant herbivores of the past and certain present-day trees with extra large fruits or seeds.

Maclura pomifera is historically recorded as native to Arkansas, Oklahoma, and Texas. It survives where planted as far north as southern New England, New York, Ohio, Indiana, Illinois, and Iowa(4). Perhaps it had a wider native range in the past, with the mastodons dropping its seeds with ample fertilizer, sometimes at great distances from where the fruits were eaten. It now grows in Missouri with the help of people. Perhaps it once grew here with the help of mastodons.

From a natural selection viewpoint, for a tree to put so much energy into the production of so many large and heavy fruits, there must be a reason. But in American Wildlife and Plants (3) we read, "There is very little to qualify the Osage Orange as a wildlife food plant, though it does have usefulness for cover." Moreover as Steyermark reports, the fruits are repellent to insects and have been put to practical use for this purpose(4). With the onset of winter, we find them cluttering the ground under the trees largely undisturbed.* Perhaps the value of these large fruits would be easier to understand if the mastodons were still with us. Within the family Moraceae, mulberries are disseminated by birds, while possibly the Osage Oranges are supposed to be disseminated by mastodons.

It is noteworthy that Maclura pomifera is a bearer of spines. These may have been very important to a species that attracted giant herbivores. Because of the spines, mastodons could have harvested the fruits with a minimum of damage to the plant that bore them. We can envision a mastodon "nosing in" on a Maclura thicket, using its long trunk to pick the fallen fruits from the ground. Historically, Maclura pomifera has been widely planted as a living fence, the spines of which kept grazing animals from penetrating it.

Another tree suspected of providing mast for the mastodons is Gleditsia triacanthos, the Honey Locust(2). This species bears extremely long pods which contain very hard beans. We note here, too, the presence of enormous spines on the trunk and on other parts of the plant. Perhaps the forma inermis, the Thornless Honey Locust, has appeared in the few thousand years since the disappearance of the potentially destructive herbivores.**

Of course there is no direct evidence that mastodons assisted significantly in the dispersal of Maclura pomifera or Gleditsia triacanthos. But throughout the Americas, scientists have listed many trees whose fruits and/or seeds appear to be too large to be useful in species dispersal, given the present-day fauna(2). One of these is the lowly avocado. George Burns in the movie Oh God! is quoted as saying, "It's not that I haven't made any mistakes. Take the avocado. The pit's too big."(1).

Mastodons and other giant herbivores have disappeared only recently in the scale of the history of life on earth. It would not be surprising if many of the plant species present in the world today would indeed be signs of their former presence.

Editor's notes:

* Others report that squirrels attack the fruits of Maclura pomifera so soon after they fall that it's difficult to collect them as insect repellents and/or for their delicate fragrance.

** One is tempted to believe that the "unarmed" Gleditsia could have been selected for by man, especially as Hui-Lon Li reports, in The Origin and Cultivation of Shade and Ornamental Trees, Philadelphia, 1963, that "In natural populations (of Gleditsia triacanthos) or in clutivation, there appear occasional individuals which are unarmed or nearly unarmed".

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NEW SELAGINELLA SPECIES

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Until recently, all Selaginella in the S. apoda complex were assigned to one species, S. apoda (L.) Fernald (Steyermark 1963). Buck (1977) has segregated a new species from S. apoda complex named S. eclipes Buck. Like S. apoda, S. eclipes grows on moist shaded rocks, often at the bases of bluffs. In Missouri this new species is found in the southern half of the state in the Ozark and Ozark Border Natural Divisions (Thom & Wilson 1980). It is likely that plants previously

assigned to S. apoda are S. eclipes except in the central and eastern part of the Ozarks where good S. apoda is recognized. In the herbarium of Southwest Missouri State University collections of S. eclipes are known from the following counties: Camden, Crawford, Douglas, Howell, Jefferson, Ozark, Shannon, and Texas. Selaginella eclipes may be distinguished from S. apoda by both the shape and structure of the dorsal (lower) leaves and the reticulation and appearance of megaspores. In S. eclipes the dorsal (lower) leaves are long attenuate with veined apices that are usually hyaline (Fig. 1); megaspores are shiny and laxly reticulate (Fig. 2). In contrast, the dorsal leaves of S. apoda have acute apices (if attenuate, then distinctly keeled near apex) and the veins do not extend into the apices which usually are not hyaline (Fig. 3); megaspores are dull and closely reticulate (Fig. 4).

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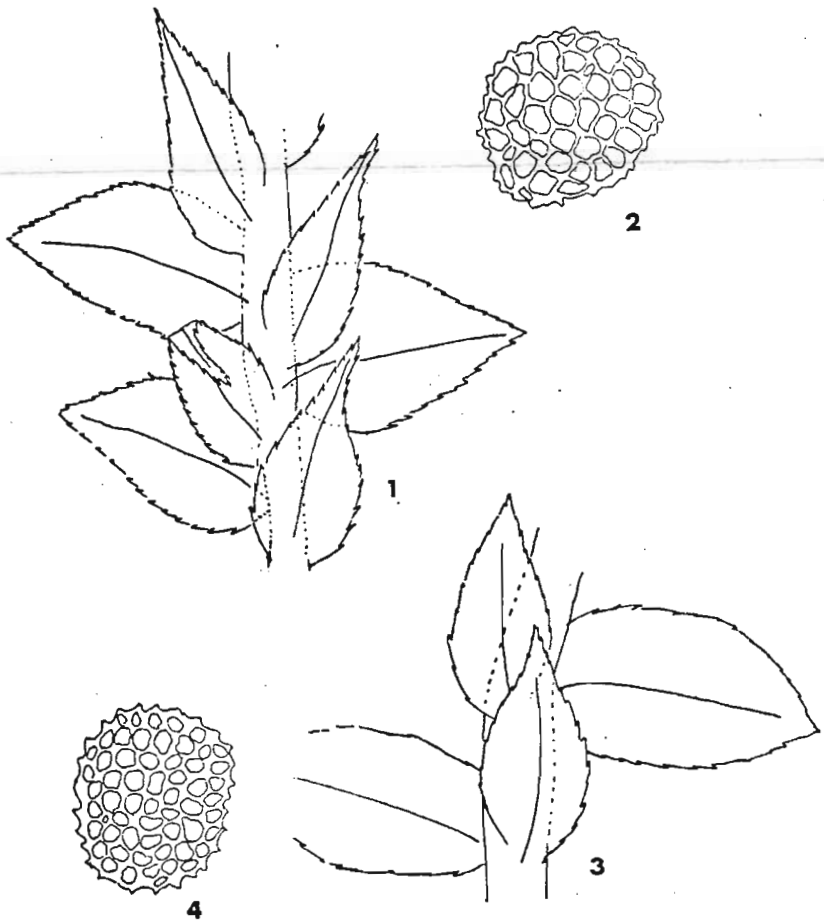

Figures 1-4. Selaginella eclipes: 1. View of dorsal leaves; 2. megaspore. Selaginella apoda; 3. View of dorsal leaves; 4. megaspore.

IRISH WILDERNESS UPDATE

On January 11, our President, Paul Redfearn expressed, in a letter to Leon Cambre, Forest Supervisor of Mark Twain National Forest, the position on the status of the Irish Wilderness adopted by the Society at the December 5th, 1981 meeting, held in St. Louis. Following are excerpts from the letter.

"The Irish Wilderness has a long tradition of botanical exploration and recognition of its significant flora. This botanical exploration goes back as far as 1936 when Dr. Julian A. Steyermark first discovered the sedge, Scirpus subterminalis, along White's Creek. Subsequent botanical surveys bear out that the Irish supports a great variety of plant species, plant communities, and several rare or unusual elements. In fact, the Irish Wilderness is one of the most significant botanical resources in Missouri. This significance is related to several factors.

"The variety of plants and plant communities in the Irish Wilderness are distinct from other areas of the state, including other wilderness areas which we have also studied. We refer to the Natural Communities Classification System used to classify natural area types for the Missouri Natural Areas System. At least fourteen distinct terrestrial and aquatic natural communities occur in the Irish Wilderness including:

1. Dry sand forest
2. Dry-mesic sand forest
3. Dry chert forest
4. Dry-mesic chert forest
5. Dry-mesic bottomland forest
6. Mesic bottomland forest
7. Dolomite talus
8. Dolomite cliff
9. Mesic limestone forest
10. Dolomite glade
11. Gravel wash
12. Sinkhole ponds
13. Spring branch
14. Caves

"In addition to the above natural communities, the occurrence of certain plant species makes the Irish Wilderness of special botanical value. Among these are Fly Poison (Amianthium muscaetoxicum) and Dwarf Iris (Iris cristata) which occur here in association with dry and dry-mesic chert forests dominated by a variety of oak and pine, including Southern Red Oak (Quercus falcata). Plants restricted to upland sinkhole ponds include Featherfoil (Hottonia inflata), St. John's-wort (Hypericum walteri), and Manna Grass (Glyceria acutiflora); and on one dolomite glade in the area, at or near their peripheral range, Soapweed (Yucca glauca var. mollis) and Skullcap (Scutellaria bushii), the latter an endemic on the state's rare and endangered species list.

"Finally, the large extent of the basic vegetative cover type, southern oak-pine forest, in an essentially recovered condition is a quality that may be unique in the nation.

"Preservation of the Irish Wilderness under conditions of natural succession will provide a resource of inestimable present and future scientific and aesthetic value. Official designation for the Irish Wilderness would also be an extremely significant contribution toward the maintenance of Missouri's native flora. In conclusion, the Missouri Native Plant Society has voted unanimously that such designation take place before any core drilling is considered."

On February 26, the Missouri Wilderness Coalition sent out a press release reading,

"Representatives of the Missouri Wilderness Coalition learned today that an overwhelming majority of citizens commenting on a U.S. Forest Service proposal to

prospect and eventually mine in the Irish Wilderness in Oregon County were opposed unless the area is first protected as a federal wilderness. Almost 4000 Missourians responded to the Forest Service proposal to allow prospecting and over 96% favored preserving the Irish Wilderness for its primitive recreation and scientific resources."

On March 11, the news from the Coalition was even better:

"We are very pleased to report that citizen efforts have been successful in convincing Representatives Volkmer and Clay of the importance of preserving the Irish Wilderness. On Tuesday March 2, they introduced H.B. 5686 into the House of Representatives, a bill which if passed would designate the Irish as a federal wilderness. This is companion legislation to S. 1964 co-sponsored by Senators Eagleton and Danforth."

However, even such encouraging news should not prevent vigilant continuation of our support of the position outlined by Redfearn. This should be expressed in letters of appreciation to our Senators and Congressmen, along with the suggestion that the relevant bills should be scheduled for hearings as soon as possible.

NEW PRAIRIE PUBLICATIONS

The Presettlement Prairie of Missouri by Walter A. Schroeder was published by the Department of Conservation in December, 1981. It is the second in the Department's new Natural History Series. The 37 page bulletin is the result of Walter Schroeder's 12 year effort to analyze the original notes of the Government Land Office survey to determine what portion of Missouri was prairie at the time of the survey. The Missouri survey began in 1815 and ended in the 1850's.

The publication discusses the perceptions of prairie by early explorers, surveyors, and settlers, the land survey in Missouri, characteristics of the early prairie by regions of the state, settlement of the prairie, destruction of the prairie, prairie names, and preservation and restoration activities. The publication ends with ten pages of maps delineating presettlement prairie by region of the state at a scale of 1:1,000,000.

Single copies of Presettlement Prairie of Missouri are available free from the Department of Conservation, Natural History Section, P.O. Box 180, Jefferson City, Missouri 65102.

The Department has also published a three-color wall-sized map (1:500,000 scale) of the presettlement prairie, also authored by Walter Schroeder. The map is available for $5.00 postpaid ($5.21 for Missouri residents), or $4.00 if picked up at Department headquarters at Jefferson City. The map will be shipped rolled in a tube.

BOOK REVIEW

EARTH'S SONG - "What makes the crops rejoice, beneath what star to plow, of these I sing." by Leonard Hall, University of Missouri Press, Columbia & London, 1981. 274 pp.

This is a collection of Len Hall's charming little essays written for newspaper publication and not really crafted as a continuous book manuscript. His column "Possom Trot Farm" has been widely read for nearly four decades and, along with his lecturing and other writings, has done untold good for the conservation cause in Missouri and elsewhere.

To those of us who grew up in the country his clear, simple detailing of the common everyday activities on an Ozark farm provide deep nostalgia. For those who grew up in the city these writings give an intimate insight into the joys of rural living and some of its trials and tribulations. To the seasoned naturalist there will be little new, but pleasant memories and associations.

Throughout Hall's writings will be found a common thread, a plea for understanding the basics of ecology, the need to apply these principles in our daily lives and especially in our political activities and decision making. We can always count on his being "on the right side" even though he frequently takes to task conservation agencies such as the Soil Conservation Service and the Missouri Department of Conservation,when they seem to wander from their avowed purposes. It is indeed well to find a non-partisan voice speak out frankly against such modern horrors as off-road vehicles, fishing derbies, public shooting grounds and one-shot antelope killing contests.

In Chapter 9 - A Land Ethic - Hall reaches the heights both in ideas and in writing. This is a coherent statement of sound ecological thought, tracing its history briefly, concisely and mincing no words in such passages as, "Most economists are intellectual urbanites, knowing little of the land and seeing it merely as expendable income instead of an irreplaceable capital." Again he writes, "As the urban dweller searches for the easier life, the countryman asks for more fertilizer, more deadly pesticides, miracle crops that can bypass the true productivity of the land. Yet only in nature can we read and understand the laws that nature has written, laws that must be obeyed as the price of survival."

Since a review must be critical as well as complimentary, I will say that the frequent name dropping - so essential in the news column - is a bit boring in a book; that the constant repetition of scientific names seems a bit out of place in chapters of simple fare; and that the numerous word errors and confusion of terms such as variety, genus, and subspecies, may trouble some. The scientist will worry over Sericea lespedeza; Shooting Stars, instead of Blazing Stars in August; Asclepias tuberosa as the food of Monarch larvae; Purple Grackles in Missouri, and a photo of the Viceroy labelled Monarch.

But these are trivia in a book of wonderfully sound esthetics, crammed with delightful word pictures, nostalgia and a constant conservation crusade. This crusade is at least a generation old; some 35 years ago Len Hall made the original proposal for establishing the Irish Wilderness; the same dream and the same ethic pervade Earth's Song.

I know the countless fans of Len Hall's column and previous three books will welcome this newest volume enthusiastically and enjoy it as much as I have.

William H. Elder