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INTRODUCED NATIVE FLORA AT THE
SHAW ARBORETUM CONSTRUCTED
WETLAND

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Franklin County, Missouri, is among the fastest growing counties in the state and the nation. The rapid development has had a predictably negative impact on the native vegetation. The Missouri Botanical Garden’s 2400-acre Shaw Arboretum near Gray Summit is a notable exception to the county-wide trend in that there is an effort afoot to increase native plant and associated animal diversity on the site. The naturalist and horticultural staff of the Arboretum comb the surrounding countryside (usually less than 25 km from the Arboretum, 160 km maximum radius) for remnant populations of native plants, and staff and volunteers devote considerable time to harvesting their seeds (leaving some on site, of course). Collected seeds are divided into small quantities propagated for the Whitmire Wildflower Garden and larger quantities for ecological restoration in the Arboretum’s wetland, glade, prairie, savanna and woodland. The Whitmire Garden is now home to over 500 Missouri natives, including labelled sedges and grasses, arrayed in naturalistic plantings. The Arboretum’s premiere restoration project, the experimental prairie, has been so successful as to receive coverage in the form of several photographs in John Madsen and Frank Oberle’s recent book, *Tallgrass Prairie* (1993, Falcon Press, Helena, MT), the only planted prairie so honored.

The purpose of this article is to introduce readers to Shaw Arboretum’s latest habitat construction project, the wetland (Fig. 1). By making native plant enthusiasts aware of this constructed wetland early in its history, I hope to encourage them to observe and report the development of the wetland vegetation over time. The area consists of relatively flat land near the southern bank of Brush Creek, a small tributary of the Meramec River. The
Fig. 1. A portion of the wetland complex at the Shaw Arboretum.
area is underlain by a natural clay layer that was excavated to construct two berms, which trap surface runoff water totalling about 9.75 acres of water surface when full. The entire complex consists of the two adjacent ponds and about 8 acres of associated fields. Construction was supported by public and private funding.

Over half of the impounded water is shallow (60 cm or less), well-suited for emergent marsh plants. The fields are mostly wet-mesic (or potentially so), thus suited for development of sedge meadow and moist prairie vegetation. In the past, the whole area was cultivated, and drainage ditches remaining from that era still keep the fields drier than they will be when "fully restored". For several years before construction began in 1991, the fields where the wetland complex now lies were managed as fescue-orchard grass hay-fields, but a few low areas were wet enough in spring to support sedges and the breeding of amphibians in temporary pools.

A complete tabulation of plants that have been introduced to date in this wetland is given below, with nomenclature generally following Yatskievych and Turner's Catalogue of the Flora of Missouri (1990, Monogr. Syst. Bot. Missouri Bot. Gard. 37). Some species have been introduced from several sources and may arise from both purchased and locally collected accessions. Most species have been introduced as seed, and some have not yet been detected as growing plants. Many plant species occur spontaneously at the wetland, together with those listed below. Because this listing's purpose is ultimately to document the success of the introductions, the spontaneous flora is not listed.

Purchased material generally originated from non-local sources as potted or divided plant material. It was bought from Missouri Wildflowers Nursery (W) in Jefferson City, Missouri, or Kester Wildlife Gamefood Nursery (K) in Omro, Wisconsin. Some plants were collected under permit from Mingo National Wildlife Refuge (M) in southeastern Missouri by students of the Henry Shaw Academy of the Missouri Botanical Garden. Plants from these sources are a dominant feature of the submerged, floating, and emergent vegetation of the east pond, and comprise the first of the following lists. Seeds of most Carex species (in
a subsequent list) were purchased from Bluestem Prairie Nursery of Hillsboro, Illinois, and originated in Madison and Montgomery Counties in Illinois.

**Dominant plants of the east pond**
(introduced as cuttings or whole plants; these may also occur on seed lists, below; abbreviations as indicated above)

- Acorus americanus (K)
- Alisma triviale (K)
- Ceratophyllum demersum (K)
- Eleocharis acicularis (K)
- Elodea canadensis (K)
- Hibiscus lasiocarpus (M)
- Hydroclea uniflora (M)
- Iris fulva (W)
- Iris virginica var. shrevei (W)
- Juncus effusus (K)
- Ludwigia peploides (M)
- Nuphar lutea (K)
- Nymphaea odorata (three different clones from private ponds in northern Missouri)
- Pontederia cordata (K, M)
- Sagittaria latifolia (K, M)
- Scirpus acutus (K)
- Scirpus pungens (K)
- Scirpus validus (K)
- Sparganium eurycarpum (K, M)
- Taxodium distichum (M; also from MO state nursery)
- Vallisneria americana (K)

**Shoreline**
(introduced as seeds; primarily along high water mark of west pond; * indicates plants sown in shallow water, all other species sown in moist soil near water’s edge and areas inundated only after rain)

**Graminoids**

- Calamagrostis canadensis
- Carex annectens
- Carex bicknellii
- Carex buxbaumii
- Carex crinita
- Carex cristatella
- Carex crus-corvi
- Carex davisi
- Carex festucacea
- Carex frankii
- Carex granularis
- Carex hyalinolepis
- Carex lacustris*
- Carex lanuginosa
- Carex lupulina
- Carex lurida
- Carex molesta
- Carex praegracilis
- Carex projecta
- Carex shortiana
Shoreline Graminoids, Continued

Carex squarrosa  
Carex stricta*  
Carex suberecta  
Carex vulpinoidea  
Cinna arundinacea  
Elymus canadensis  
Glyceria striata  
Juncus biflorus  

Juncus brachycarpus  
Juncus nodatus*  
Leersia oryzoides*  
Panicum anceps  
Scirpus georgianus*  
Scirpus pungens  
Scirpus validus*  
Spartina pectinata  

Forbs

Alisma triviale*  
Amsonia illustris  
Bidens aristosa  
Bidens cernua  
Boltonia asteroides  
Chelone obliqua  
Eupatorium perforatum  
Helenium autumnale  
Hibiscus laevis  
Iris virginica  
Lobelia cardinalis  

Lobelia siphilitica  
Ludwigia alternifolia  
Lycopus americanus  
Penthorum sedoides  
Sagittaria calycina  
Sagittaria latifolia*  
Scirpus pungens  
Scirpus validus*  
Sium suave  
Sparganium eurycarpum*  
Verbena hastata  
Vernonia fasciculata  

Wet meadow to south of westernmost part of pond complex
(introduced as seeds; abundant Carex species and Scirpus georgianus already present; exotic fescue sprayed; area burned before sowing)

Graminoids

Carex annectens  
Carex frankii  

Carex lurida  
Carex shortiana  
Carex stricta
Forbs

*Agrimonia parviflora*
*Asclepias incarnata*
*Aster puniceus var. firmus*
*Chelone glabra*
*Desmanthus illinoensis*
*Eupatorium perfoliatum*
*Helenium autumnale*
*Iris virginica var. shrevei*
*Lobelia siphilitica*
*Lobelia cardinalis*
*Lysimachia quadriflora*
*Pedicularis lanceolata*
*Penstemon digitalis*
*Penthorum sedoides*
*Phlox maculata var. pyramidalis*
*Pycnanthemum virginianum*
*Rosa setigera*
*Rudbeckia fulgida*
*Solidago riddellii*

Berms
(introduced as seeds;
initially seeded with *Lolium perenne* for erosion control)

1. Top of berms, sunny sites
(* indicates plants sown on foot path)

Graminoids

*Andropogon elliottii*
*Bouteloua curtipendula*
*Bouteloua gracilis*
*Buchloe dactyloides*
*Carex frankii*
*Elymus canadensis*
*Eragrostis trichodes*
*Juncus tenuis*
*Muhlenbergia schreberi*
*Panicum anceps*
*Schizachyrium scoparium*
*Sorghastrum nutans*
*Sporobolus heterolepis*

Forbs

*Agalinis tenuifolia*
*Allium stellatum*
*Amorpha canescens*
*Asclepias verticillata*
*Aster novae-angliae*
*Aster oblongifolius*
*Baptisia alba*
*Baptisia australis*
*Castilleja coccinea*
*Chamaecrista fasciculata*
*Chrysopsis villosa*
*Coreopsis palmata*
*Coreopsis lanceolata*
*Dalea purpurea*
*Desmanthus illinoensis*
*Dodecatheon meadia*
*Echinacea simulata*
*Helianthus mollis*
*Heliopsis helianthoides*
*Hieracium gronovii*
Tops of Berms, Forbs, continued

Hypericum sphaerocarpum  
Lespedeza virginica  
Liatris aspera  
Liatris cylindracea  
Lobelia siphilitica  
Monarda fistulosaMonarda punctata  
Pedicularis canadensis  
Penstemon pallidus  
Physostegia virginiana  
Ratibida pinnata  
Rudbeckia hirta  
Rudbeckia missouriensis  
Rudbeckia triloba  
Sabatia angularis  
Salvia azurea  
Silene regia  
Silphium terebinthinaceum  
Silphium integrifolium  
Strophostyles helvula  
Tephrosia virginiana  
Veronicastrum virginicum

2. Spillways

Graminoids

Elymus canadensis  
Elymus virginicus  
    var. glabriusculus  
Juncus biflorus  
Panicum anceps  
Spartina pectinata

Forbs

Baptisia alba  
Bidens aristosa  
Boltonia asteroides  
Chelone obliqua  
Coreopsis tripteris  
Eupatorium perfoliatum  
Helianthus annuus  
Iris virginica  
    var. shrevei  
Lobelia cardinalis  
Lycopus americanus  
Penstemon digitalis  
Ratibida pinnata  
Silphium perfoliatum  
Sium suave  
Verbena hastata  
Verbesina alternifolia  
Vernonia fasciculata

3. Shady areas of west berm  
(* indicates creepers, sown to clamber over brush piles)
Graminoids

*Brachyelytrum erectum*  *Diarrhena americana*
*Bromus pubescens*  *Elymus virgineus*
*Chasmanthium latifolium*  *var. glabraflorus*

Forbs

*Agastache nepetoides*  *Dasistoma macrophylla*
*Allium cernuum*  *Dioscorea villosa* *
*Ampelopsis cordata*  *Echinacea purpurea* *
*Anemone virginiana*  *Eupatorium purpureum* *
*Blephilia ciliata*  *Helianthus hirsutus* *
*Campanula americana*  *Helianthus helianthoides* *
*Clematis crispa*  *Rudbeckia triloba* *
*Clematis virginiana*  *Verbena helianthoides* *
*Cynanchum laeve*  *Vitis riparia* *

Wet woodland
(introduced as seeds; swampy woods near raised boardwalk; * indicates transplants)

*Carex lupulina*  *Lobelia cardinalis*
*Cinna arundinacea*  *Quercus pagoda* (from Missouri state nursery)*
*Decodon verticillatus*  *Quercus phellos* (from Missouri state nursery)*
*Gentiana andrewsii*  *Saururus cernuus* *
*Glyceria striata*  *Verbena alternifolia*
*Iris fulva* *
*Liquidambar styraciflua* *

Prairie
(introduced as seeds; mesic to moist uplands adjacent to wetland trail; species sown according to moisture preferences)

Graminoids

*Andropogon gerardii*  *Calamagrostis canadensis*
*Bouteloua curtipendula*  *Carex complanata*
Prairie Graminoids, Continued

_Elymus canadensis_  
_Elymus virginicus_  
 _var. glabriflorus_  
_Juncus sp._  
_Koeleria pyramidata_  
_Panicum virgatum_  
_Schizachyrium scoparium_  
_Sorghastrum nutans_  
_Sporobolus heterolepis_  
_Sporobolus asper_  
_Sporobolus heterolepis_  
_Tridens strictus_  
_Tripsacum dactyloides_

Forbs

_Agalinis tenuifolia_  
_Amorpha canescens_  
_Asclepias incarnata_  
_Asclepias sullivantii_  
_Asclepias tuberosa_  
_Aster laevis_  
_Aster novae-angliae_  
_Aster praealtus_  
_Aster sericeus_  
_Baptisia alba_  
_Baptisia bracteata_  
_Boltonia asteroides_  
_Camassia scilloides_  
_Castilleja coccinea_  
_Chelone obliqua_  
_Coreopsis palmata_  
_Coreopsis tripteris_  
_Dalea candida_  
_Dalea purpurea_  
_Dodecatheon meadia_  
_Echinacea purpurea_  
_Echinacea simulata_  
_Erythronium mesochoreum_  
_Eupatorium coelestinum_  
_Gaura biennis_  
_Gentiana andrewsii_  
_Gentiana puberulenta_  
_Helenium autumnale_  
_Helianthus mollis_  
_Helianthus grosseserratus_  
_Heliopsis helianthoides_  
_Hypericum punctatum_  
_Lespedeza capitata_  
_Liatris aspera_  
_Liatris pycnostachya_  
_Liatris scariosa_  
_Monarda fistulosa_  
_Oenothera pilosella_  
_Parthenium integrifolium_  
_Penstemon digitalis_  
_Phlox glaberrima_  
_Phlox pilosa_  
_Pycnanthemum pilosum_  
_Ratibida pinnata_  
_Rudbeckia hirta_  
_Rudbeckia subtomentosa_  
_Sabatia angularis_  
_Salvia azurea_  
_Senna marilandica_  
_Silene regia_  
_Silphium integrifolium_  
_Silphium laciniatum_  
_Silphium perfoliatum_  
_Silphium terebinthinaceum_  
_Solidago rigida_  
_Solidago speciosa_  
_Tradesantia ohiensis_  
_Verbena hastata_  
_Verbesina alternifolia_  
_Verbesina helianthoides_  
_Veronicastrum virginicum_  
_Zizia aurea_
PLANTS OF
THE JAMERSON C. MCCORMACK
CONSERVATION AREA, HOLT COUNTY,
MISSOURI

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Formed over a ten thousand year period by wind deposits of fine sediment, the loess hills landform is disjunctively spread over Iowa, Nebraska, and Missouri along the Missouri River (Prior, 1976). The highly angular loess soil particles of pleistocene origin erode to produce unworkable exposed areas with high evaporation rates leading to low water penetration (Novacek, 1985). Ironically, these austere agricultural conditions have resulted in a fairly well preserved natural vegetation, although the overall acreage in Missouri is low. For these reasons, many native species of the hills have been saved from the effects of human activities (Farrar et al., 1985). In general, as with all prairie-like communities, plowing, over-grazing, and fire control appear to be the main causes of prairie destruction (Schroeder, 1982). At present, the greatest danger to natural vegetation of this landform appears to be fire prevention and consequent woody species invasions (Kucera and Koelling, 1964; Bragg and Hulbert, 1976). Comprehensive descriptions of the Loess Hills land form are available in Farrar et al. (1985), Heineman (1982), Mutel (1986), and Roosa et. al. (1986).

The Missouri loess hill prairies contain several state-listed species. The Jamerson C. McCormack Conservation Area, for example, is known to possess several species, such as, Astragalus lotiflorus, Castilleja sessiliflora, Dalea enneandra, and Lygodesmia juncea (Missouri Department of Conservation,
Fig. 1. Map of Jamerson C. McCormack Conservation Area. Missouri Department of Conservation property is in the striped portion, the remainder is property of The Nature Conservancy. The map is courtesy of the Missouri Department of Conservation.
Loess areas also are known for their specialized hill prairies, which occur mostly on the exposed tops and along the slopes throughout the loess hills. These prairies are often dominated by *Schizachyrium scoparium*, and *Bouteloua curtipendula* (Novacek, 1985). Other shortgrass components include *B. hirsuta*, and *B. gracilis*, whereas tallgrass components include *Andropogon gerardii* and *Sorghastrum nutans* (Novacek et al., 1985). According to Great Plains Flora Editorial Committee (1986) and Iffrig (1980), Atchison and Holt Counties provide Missouri with its only true mixed grass prairie.

Novacek et al. (1985) reported 703 species (358 genera in 97 families) in loess hills counties from South Dakota to Atchison and Holt Counties in Missouri. They reported 427 species in Holt County. Members of the Asteraceae, Poaceae, and the Fabaceae were most common.

**THE STUDY AREA**

The Jamerson C. McCormack Conservation Area (Fig. 1), Holt County, Missouri, is a 92 hectare (227 acres) site of loess hills in the northwestern corner of the state. Located within section 36 of T61N R39W and section 31 of T61N R38W, the area is jointly owned by the Missouri Department of Conservation (MDC) and The Nature Conservancy (TNC), and lies at the southern end of the loess hills landform (Novacek et al., 1985).

Holt County receives about 92 cm (36.8 in.) of rain annually. Wide fluctuations in climate are usual. Most of the rain falls during spring and summer, with maximums in May (13.3 cm) and September (14.0 cm). February, the driest month, has an average of only 2.9 cm. Mean daily temperatures are warmest in July (25.5°C), and the lowest temperatures occur in January, with a mean of -5°C (USDA Soil Conservation Service, 1982).

According to records at the Holt County Abstract Office, the area was originally subdivided early in the 1850's. Many changes in ownership occurred until 1966, when Jamerson C. McCormack purchased much of the land (B. Richards, Holt County Abstracts Office, personal communication). He donated approximately two-thirds of the present area to the Nature Con-
servancy in 1968. The remainder was donated to the Missouri Department of Conservation by Jamerson and S. Carson McCormack in 1976.

The area possesses both prairie and forest communities. Nelson (1985) observed that S. scoparium and B. hirsuta were the prairie's dominant grasses, whereas Quercus alba, Q. rubra, Carya ovata, and Acer saccharinum were the dominant forest trees. Novacek et al. (1985) listed 32 tree species for the loess hills of Holt County. These occur principally on the somewhat cooler, moister north and east slopes. In the case of the McCormack area, the much disturbed forest occurs on lower sites, whereas a less disturbed upland forest occurs on the north slopes. These forest communities might possibly be classified as dry-mesic (Nelson, 1985). Management efforts undertaken by MDC have been carried out with emphasis on protecting sensitive prairie plants on the Missouri list (Missouri Department of Conservation, 1994). Limited vegetational studies within the area have been made, but a thorough species list of the vascular flora has not been compiled. The primary aims of the present study are to provide a species list for the area and to determine the relative dominances of species in the MDC and TNC prairies.

STUDY METHODS

To compile a baseline species list, plants were collected during two growing seasons, from May, 1986 to the end of October, 1987. Collections were made twice monthly by searching lowland woods, upland woods, prairie and ruderal areas. Within these habitats various unusual features, such as openings of wooded areas, were especially searched. Plants were identified by both authors and ultimately verified by the senior author. All specimens are deposited in the herbarium at Central Missouri State University (WARM) in Warrensburg, Missouri.

During September, 1987, transect lines were run through a representative upland forest in the area. A crown line-intercept technique was used to determine density and dominance of woody plants (Cox, 1980). All woody plants over 2.5 cm dbh were included in the survey. For future comparison, modified
importance values were determined for each species. The more disturbed lowland forest community was only searched visually, with important species recorded.

Prairie sites cover approximately 4.0 hectare and occur both in MDC and TNC parcels. In the summer of 1987, randomly dispersed 1 × 2 meter plots in the two prairie areas (ten plots on MDC land and five plots on TNC land) were selected. The Braun-Blanquet cover estimation method was used to estimate dominance by cover (Mueller-Dombois and Ellenberg, 1974).

THE FOREST COMMUNITY

The lowland forest occupies approximately 2.8 hectares. The primary canopy is dominated by Tilia americana, Populus deltoides, and Juglans nigra. The subcanopy layer consists largely of Asimina triloba and Cercis canadensis, with scattered Fraxinus americana and F. pennsylvanica. Liana formers are Parthenocissus quinquefolia and Vitis vulpina. The shrub layer is composed of Ribes missouriensis and Symphoricarpos orbiculatus. The ground layer contains Erythronium albidum, Dicentra cucullaria, Podophyllum peltatum, Bromus inermis, Tradescantia ohiensis, Commelina communis, Polygonatum virginianum, Urtica dioica, Ellisia nyctelea, Pilea pumila, Phlox paniculata, Eupatorium purpureum, E. rugosum, and Solidago altissima.

The upland forest forest occupies about 73 hectares and is relatively diverse. Twenty-two tree species were found and their importance values determined (Table 1). Importance value of a species is a relative indicator of its overall ecological position in a forest community [IV has an absolute community maximum of 300 and is calculated by adding the relative dominance, relative frequency, and relative density of the species]. No single tree species is clearly dominant. The three species with the highest importance values are Cornus drummondii (51), Ulmus rubra (35), and Fraxinus americana (31). Some major canopy species are Juglans nigra (11), Quercus macrocarpa (15), Celtis occidentalis (6), Ostrya virginiana (15) and Q. rubra (3.5). These data indicate a forest still in early successional development. Roosa et al. (1986) found dramatic increases in Cornus drummondii and Rhus glabra populations as woody species invaded loess
areas. The three dominant species, *Cornus drummondii*, *Ulmus rubra*, and *Fraxinus americana*, have been observed in Johnson county, Missouri, as aggressive invaders of abandoned fields and open woodlands. The presence of more climax associated trees, such as *Quercus macrocarpa*, *Q. rubra*, *Juglans nigra*, *Carya cordiformis*, and *C. ovata*, among the more weedy dominants in lower relative densities indicate these are survivors from an older succession. We should expect larger importance values for

Table 1. Importance values of an upland forest community at the Jamerson C. McCormack Conservation Area, Holt County, Missouri, Autumn 1986.

<table>
<thead>
<tr>
<th>Species</th>
<th>relative frequency</th>
<th>relative density</th>
<th>relative dominance</th>
<th>importance value</th>
</tr>
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<tbody>
<tr>
<td><em>Cornus drummondii</em></td>
<td>18.6</td>
<td>22.0</td>
<td>10.8</td>
<td>51.4</td>
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<td><em>Ulmus rubra</em></td>
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<td>11.2</td>
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<td><em>Fraxinus americana</em></td>
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<tr>
<td><em>Ulmus americana</em></td>
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<td>5.1</td>
<td>5.6</td>
<td>17.0</td>
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<td><em>Asimina triloba</em></td>
<td>3.1</td>
<td>8.3</td>
<td>5.1</td>
<td>16.5</td>
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<tr>
<td><em>Ulmus pumila</em></td>
<td>3.7</td>
<td>6.5</td>
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<td><em>Morus rubra</em></td>
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<tr>
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<td><em>Tilia americana</em></td>
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<td><em>Juniperus virginiana</em></td>
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these climax associated trees as the com-munity ages. Heineman (1982) suggested this may take as long as 80 years in the central Loess hills of Iowa.

Subcanopy species consist mainly of Cornus drummondii, Celtis canadensis, and Ulmus rubra. The shrub layer is composed of Symphoricarpos orbiculatus and Ribes missouriensis. Woody vines are Smilax hispida, Vitis riparia, V. vulpina, Parthenocissus quinquefolia, Celastrus scandens, and Sicyos angulatus. Two ferns, Botrychium virginianum and Adiantum pedatum, were also found.

THE PRAIRIE COMMUNITY

Few prairie plants flowered until well into spring. Early bloomers are Viola pratincola, Salix humilis, Castilleja sessiliflora, Astragalus crassicarpus, A. lotiflorus, Ceanothus herbaceus, and Sisyrinchium campestre. Later in spring, Comandra umbellata, Delphinium carolinianum, Anemone cylindrica, and Senecio plattensis flower. Summer flowering species include the warm season grasses, such as, Panicum capillare, Muhlenbergia cuspidata, and Bouteloua hirsuta, as well as late summer composites, such as Vernonia baldwinii, Kuhnia eupatorioides, Eupatorium rugosum, Liatris aspera, L. punctata, Aster oolentangiensis, A. sericeus, and several Solidago species. Although autumn flowering is limited almost exclusively to grasses and composites, other species, such as, Spiranthes cernua, Lespedeza capitata, and Hedyotis nigricans were observed. By November, all flowering had ceased.

A total of 38 species was found in the sample plots of the MDC prairie parcel. Sorghastrum nutans was the dominant species, occurring in 9 of 10 sample plots, with an average cover of 37.7 percent Next in occurrence and cover were Andropogon gerardii (6 plots, 9.5 percent), Amorpha canescens (6 plots, 7.7 percent), Schizachyrium scoparium (7 plots, 5.8 percent), and Bouteloua curtipendula (9 plots, 5.5 percent). Many woody species, such as Rhus glabra, Cornus drummondii, Quercus macrocarpa, and Ostrya virginiana, were found in the prairie area. No herbaceous weedy species, other than Erigeron
*annuus*, was found in the plots. Approximately 19 percent of the plots’ surfaces was open (exposed) (Table 2).

A total of 14 species was found in the sample plots on the TNC prairie parcel. *Melilotus* spp. (principally *M. officinale*) were dominant, with occurrences in 6 of 6 plots and with an average cover of 19 percent. Next were *Bouteloua curtipendula* (4 plots, 18.3 percent), *Andropogon gerardii* (4 plots, 16 percent), *Schizachyrium scoparium* (6 plots, 15.1 percent), and *Sorghastrum nutans* (5 plots, 13.4 percent). Two woody species, *Quercus rubra* and *Rhus glabra*, were found encroaching into the prairie. Again as in the MDC plots, no herbaceous, weedy species, other than *Melilotus* spp. was found in the plots. Approximately 9.6 percent of the sample plots’ surface was open (Table 3).

When compared, the sample plots of the MDC and TNC prairies appear at first to be somewhat different. The MDC prairie had 38 species in the sample plots, whereas the TNC prairie had only 14 species. The MDC prairie was dominated by *Sorghastrum nutans* and *A. gerardii*, but the TNC prairie appeared dominated by an atypical dominant, *Melilotus officinale*. However, its high cover percentage comes from only two sample plots. Therefore, if *M. officinalis* were to be ignored, the TNC prairie then becomes much like the MDC prairie, being dominated by more typical species, *Bouteloua curtipendula, Andropogon gerardii*, and *Schizachyrium scoparium*.

**THE SPECIES LIST**

A total of 275 taxa representing 268 species in 73 genera was found in all communities of the conservation area (see Appendix). Species names are those of Yatskievych and Turner (1990).

The Asteraceae were most diverse, with 43 species, followed by the Poaceae (30 species), and the Fabaceae (20 species). These three families are also the most common families of the loess hills (Novacek et al., 1985).
Table 2. A list of species and their cover percentages obtained from ten randomly selected sample plots on Missouri Department of Conservation prairie parcels at the Jamerson C. McCormack Conservation Area, Holt County, Missouri, 1987.

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Number of species: 13 6 10 9 10 9 9 9 7 8 9

Covered ground: 75 75 80 85 89 74 79 79 80 85 - 80.1

Open ground: 25 25 20 15 11 26 21 21 20 15 - 19.9
Table 3. A list of species and their cover percentages from eight randomly selected survey plots on The Nature Conservancy prairie at the Jamerson C. McCormack Conservation Area, Holt County, Missouri, 1987. tr = less than 1 percent cover

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Table 4. New species to the Loess Hills landform (Novacek et al., 1985) from the Jamerson C. McCormack Conservation Area, Holt County, Missouri, 1987.

- Aster drumondii
- Aster praeealtus
- Bidens aristosa
- Buglossoides arvenses
- Carex albicans var. albicans
- Dalea candida
- Digitaria cognata
- Erigeron pulchellus
- Geranium carolinianum
- Hypericum punctatum
- Leonurus marriubiastrum
- Lobelia spicata var. leptostachya
- Lobelia spicata var. spicata
- Panicum lanuginosum
- Phlox paniculata
- Prunus hortulana
- Spiranthus cernua
- Torilis arvensis
- Tradescantia ohiensis
- Triodanis perfoliata
- Viola rafinesquii
- Viola triloba
- Woodsia obtusa
Five state-listed Missouri species were confirmed to still occur in the area. These were *Lygodesmia juncea*, *Dalea enneandra*, *Yucca glauca* var. *glauc*a, *Astragalus lotiflorus*, and *Castilleja sessiliflora*. *Yucca glauca* var. *glauc*a is reported for the first time from the area. *Anemone cylindrica*, a rare species, was also found. And finally, *Leonurus marrubiastrum*, a new addition to flora of Missouri was found growing at the edge of the lowland forest (Castaner and Priesendorf, 1988). Comparison with Steyermark’s (1963) distributional maps indicated 53 new county records were present. The study also added 32 additional species to the Loess Hills Landform flora list of Novacek et al. (1985) (Table 4).

ACKNOWLEDGMENTS

The authors would like to thank the Missouri Department of Conservation and The Nature Conservancy for their help in this project. Special thanks go to Mr. Doug Ladd of The Nature Conservancy for his advice and suggestions.

LITERATURE CITED


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APPENDIX

Vascular Flora of Jamerson C. McCormack Wildlife Area. Nomenclature follows that of Yatskievych and Turner (1990). The number of species found in a family is in brackets after the family name. An asterisk (*) indicates a county record. Two asterisks (**) indicate a state record. A dot (•) indicates a species not native to Missouri. Voucher specimens are listed last, and are housed at Central Missouri State University (WARM).

DIVISION PTERIDOPHYTA
ADIANTACEAE [1]

Adiantum pedatum L. var. pedatum, maidenhair fern, woodlands, common, Priesendorf 762

DRYOPTERIDACEAE [2]

Cystopteris protrusa (Weatherby) Blasdell, fragile fern, common, Priesendorf 636

*Woodsia obtusa (Spreng.) Torr., blunt-lobed woodbia, woodlands, common, Priesendorf 763, 765

EQUISETACEAE [2]

Equisetum arvense L., field horsetail, MDC prairie depression, uncommon, visual record only

*Equisetum laevigatum A. Br., smooth scouring rush, prairie, incidental, Priesendorf 804

OPHIOGLOSSACEAE [1]

Botrychium virginianum (L.) Sw. var. virginianum, rattlesnake fern, woodlands near open edge, common, Priesendorf 622, 699

DIVISION PINOPHYTA
CUPRESSACEAE [1]

Juniperus virginiana L. var. virginiana, red cedar, woodland edge and woodlands, common, Priesendorf 685, 878
DIVISION MAGNOLIOPHYTA
ACANTHACEAE [1]

_Ruellia humilis_ Nutt. var. _longiflora_ (A. Gray) Fern., wild petunia, open areas, common, _Priesendorf 358_

ACERACEAE [1]

_Acer negundo_ L. var. _negundo_, box elder, varied habitats from wooded slopes to open fields, common, _Priesendorf 789, 1012_

AGAVACEAE [1]

_Yucca glauca_ Nutt. var. _glaucan_, soapweed, prairie, uncommon, photo record only

ANACARDIACEAE [2]

_Rhus glabra_ L., smooth sumac, old fields and prairies, very common, _Priesendorf 286_
_Toxicodendron radicans_ (L.) O. Kuntze ssp. _pubens_ (Engelm.) Gillis, poison ivy, woodland edge and exposed areas, common, _Priesendorf 833_

ANNONACEAE [1]

_Asirina triloba_ (L.) Dunal, paw paw, lowland forest as subcanopy tree, common, _Priesendorf 1073_

APIACEAE [4]

_Cryptotaenia canadensis_ (L.) DC., honewort, woodlands, common, _Priesendorf 550_
_Osmorhiza longistyli_ (Torr.) DC., sweet Cicely, woodlands and disturbed open areas, common, _Priesendorf 700_
_Sanicula odorata_ (Raf.) Pryer & Phillippe, black snakeroot, woodlands, common, _Priesendorf 740, 702_
**_Torilis arvensis_** (Huds.) Link, hedge parsley, woods and disturbed open areas, common, _Priesendorf 445_

APOCYNACEAE [1]

_Apocynum cannabinum_ L. var. _cannabinum_, Indian hemp, woodland openings and disturbed areas, locally common, _Priesendorf 770_
*_Apocynum cannabinum_ L. var. _pubescens_ (Mitchell) A. DC., Indian hemp, woodland openings and disturbed areas, locally common, _Priesendorf 413_
ARACEAE [1]

*Arisaema triphyllum* (L.) Schott, Jack-in-the-pulpit, forest bottoms, occasional, *Priesendorf 709*

ASCLEPIADACEAE [3]

*Asclepias syriaca* L., common milkweed, open areas, common, *Priesendorf 1118*
*Asclepias verticillata* L., whorled milkweed, open areas, common, *Priesendorf 901, 982*
*Asclepias viridiflora* Raf., green milkweed, wooded areas, common, *Priesendorf 453*

ASTERACEAE [43]

*Ambrosia artemesiifolia* L. var. *elatior* (L.) Desc., common ragweed, old fields, common, *Priesendorf 1016*
*Ambrosia psilostachya* DC., western ragweed, disturbed open areas and prairie, common, *Priesendorf 994*
*Ambrosia trifida* L., horseweed, lowland woods, common, *Priesendorf 974*
*Aster drummondii* Lindl., Drummond aster, woods, fields, and prairie, common, *Priesendorf 602, 1043*
*Aster ericoides* L., wreath aster, prairie, common, *Priesendorf 592*
* Aster oolutangiensis* Ridd., azure aster, prairie, common, *Priesendorf 1061*
* Aster prealtus* Poir. var. *subasper* (Lindl.) Wieg., willow-leaved aster, prairie, common, *Priesendorf 535*
*Aster sericeus* Vent., silky aster, prairie, occasional - *Priesendorf 590, 591*
*Bidens aristosa* (Michx.) Britton, tickseed sunflower, low woods, common, *Priesendorf 586*
*Brickellia eupatorioidea* (L.) Shinn., false boneset, open disturbed areas and prairie, common, *Priesendorf 512, 1026*
*Cacalia atriplicifolia* L., pale indian plantain, open upland woods, common, *Priesendorf 906*
*Carduus nutans* L., musk thistle, disturbed open areas, common, *Priesendorf 818*
*Cirsium altissimum* (L.) Spreng., tall thistle, disturbed prairie, common, *Priesendorf 556, 557*
*Conyza canadensis* (L.) Cronq., horseweed, open fields, common, *Priesendorf 919*
*Erechtites hieracifolia* (L.) Raf. var. *hieracifolia*, fireweed, woods, common, *Priesendorf 1120*
*Erigeron annuus* (L.) Pers. var. *annuus* (L.) Pers., daisy fleabane, woods and old fields, common, *Priesendorf 647, 1057*
*Erigeron pulchellus* Michx. var. *pulchellus*, Robin's plantain, bottomland forest, occasional, *Priesendorf 712*
Erigeron strigosus Muhl. var. strigosus, daisy fleabane, woods and prairie, common, Priesendorf 678, 1050

Eupatorium alissimum L., tall thoroughwort, disturbed open, common, Priesendorf 601

Eupatorium purpureum L., green-stemmed Joe-Pye weed, ow woods, common, Priesendorf 583

*Eupatorium rugosum Houtt. var. rugosum, white snakeroot, open areas, common, Priesendorf 609, 968

*Gnaphalium obtusifolium L. var. obtusifolium, sweet everlasting, old fields, common, Priesendorf 1009

Helianthus hirsutus Raf., woodland sunflower, disturbed open areas, common, Priesendorf 496

*Helianthus petiolaris Nutt., prairie sunflower, field and disturbed prairie, common, Priesendorf 564, 1013

Lactuca floridana (L.) Gaertn. var. floridana, wild lettuce, woodlands and edge of woods, common, Priesendorf 580

*Lactuca serriola, prickly lettuce, disturbed areas, common, Priesendorf 459

Liatris aspera Michx., blazing star, prairie, common, Priesendorf 528, 562

Liatris punctata Hook. var. nebraskana Gaiser, snakeroot, prairie, common, Priesendorf 536, 1030

Lygodesium juncea (Pursh) D. Don, skeleton weed, prairie, occasional, photo record only

Ratibida pinata (Vent.) Barnh., gray-headed coneflower, old fields, common, Priesendorf 808

Rudbeckia hirta L., black-eyed Susan, disturbed open areas, common, Priesendorf 752

*Senecio platensis Nutt., prairie ragwort, prairie, occasional, Priesendorf 674, 679

Silphium integrifolium Michx. var. integrifolium, rosin weed, lowland woods, prairie, and disturbed open areas, common, Priesendorf 588, 1036

Silphium integrifolium Michx. var. laeve Torr. & A. Gray, rosin weed, open areas, common, Priesendorf 905, 452

Solidago altissima L. var. altissima, tall goldenrod, low woods and old fields, common, Priesendorf 574

*Solidago altissima L. var. gilvocanescens Rydb., goldenrod, old fields, common, Priesendorf 599

Solidago missouriensis Nutt., goldenrod, prairie woodland edge, common, Priesendorf 950, 1033

Solidago nemoralis var. longipetiolata (Mackenzie & Bush) E.J. Palmer, old-field goldenrod, common, disturbed prairie, Priesendorf 563

Solidago rigida L. ssp. rigida, stiff goldenrod, prairie, common, Priesendorf 558, 945

Solidago ulmifolia Muhl. var. ulmifolia, elm-leaved goldenrod, prairie, common, Priesendorf 589
• *Taraxacum officinale* Weber, common dandelion, disturbed open areas, common, *Priesendorf* 332
• *Tragopogon dubius* Scop., goat’s beard, disturbed open areas, common, *Priesendorf* 334
*Verbesina alternifolia* (L.) Britt., yellow ironweed, low woods and disturbed open areas, common, *Priesendorf* 962
*Vernonia baldwinii* Torr. ssp. *interior* (Small) Faust, ironweed, disturbed open area, common, *Priesendorf* 821

**BALSAMINACEAE** [1]

*Impatiens capensis* Meerb., spotted-touch-me-not, low woodlands, occasional, *Priesendorf* 1046

**BERBERIDACEAE** [1]

*Podophyllum peltatum* L., May apple, lowland woods, common, *Priesendorf* 710

**BETULACEAE** [2]

*Corylus americana* Walt., hazelnut, woodlands, common, *Priesendorf* 760
*Ostrya virginiana* (Mill.) K. Koch var. *lasia* Fern., hop hornbeam, woodlands, common, *Castaner & Priesendorf* 9545

**BIGNONIACEAE** [1]

*Campsis radicans* (L.) Seem., trumpet creeper, woodland edge, common, *Priesendorf* 1054

**BORAGINACEAE** [4]

*Hackelia virginiana* (L.) I.M. Johnston, beggar’s lice, woodlands, common, *Priesendorf* 882
*Lithospermum canescens* (Michx.) Lehms., hoary puccoon, prairie openings, occasional, *Priesendorf* 1085
*Lithospermum caroliniense* (Walt.) MacMillan, plains puccoon, prairie openings, occasional, *Priesendorf* 326
*Lithospermum incisum* Lehms., yellow puccoon, prairie openings, occasional, *Priesendorf* 362, 1084
BRASSICACEAE [5]

Arabis canadensis L., sicklepod, woodlands, common, Priesendorf 667
Descurainia pinnata ssp. brachycarpa (Richards.) Detl., tansy mustard,
lowland woods and disturbed open areas, common, Priesendorf 645
*Draba reptans (Lam.) Fern., whitlow grass, disturbed open, common,
Castaner 9548
Lepidium virginicum L. var. virginicum, pepper grass, disturbed open areas,
common, Priesendorf 754
•Thlaspi arvense L., field pennycress, disturbed areas, common, Priesendorf
292

CAESALPINIACEAE [4]

Cercis canadensis L. var. canadensis, rRedbud, edge and woodlands,
common, Priesendorf 375
Chamaecrista fasciculata (Michx.) E. Greene, showy partridge pea, disturbed
open areas and woodland edge, common, Priesendorf 988
Gleditsia triacanthos L., honey locust, woodlands, common, Priesendorf 940,
1041
Gymnocladus dioica Lam., Kentucky coffee tree, disturbed woods, common,
Priesendorf 1039

CAMPANULACEAE [4]

Campanula americana L., tall bellflower, low woods, common, Priesendorf
837
Lobelia siphilitica L. var. siphilitica, blue Cardinal Flower, low forest,
common, Priesendorf 582
*Lobelia spicata Lam. var. leptostachys (A. DC.) Mackenzie & Bush, lobelia,
exposed areas, common, Priesendorf 720
Lobelia spicata Lam. var. spicata, spiked lobelia, exposed areas, common,
Priesendorf 416
*Triodanis perfoliata (L.) Nieuwl., Venus’ looking glass, open disturbed
areas, occasional, Priesendorf 650

CANNABACEAE [2]

•Cannabis sativa L., hemp, disturbed open area, occasional, Priesendorf 1006
Humulus lupulus L., hops, edge of wods, incidental, Priesendorf 920

CAPRIFOLIACEAE [3]

Sambucus canadensis L. var. canadensis, common elderberry, disturbed open
areas, occasional, Priesendorf 725
Symphoricarpos orbiculatus Møench, coral berry, edge of woods, occasional, Priesendorf 937
Triosteum perfoliatum L., common horse gentian, varied habitats from open areas to woods, common, Priesendorf 304

CARYOPHYLACEAE [4]

*Cerastium nutans* Raf., nodding chickweed, disturbed areas, occasional, Priesendorf 331
*Dianthus armeria* L., Deptford pink, exposed open areas, common, Priesendorf 311
*Saponaria officinalis* L., bouncing bet, open areas, occasional, Priesendorf 1063
*Silene antirrhina* L., sleepy catchfly, disturbed open areas, incidental, Priesendorf 323

CELASTRACEAE [1]

*Celastrus scandens* L., American bittersweet, edge of woods, common, Priesendorf 623

CHENOPODIACEAE [3]

*Chenopodium album* L. var. *lanceolatum* (Muhl. ex Willd.) Cosson & Germ., lamb’s quarters, disturbed open areas, common, Priesendorf 569
*Chenopodium simplex* (Torrey) Raf., maple-leaved goosefoot, disturbed open areas and edge of woods, occasional, Priesendorf 486
*Chenopodium standleyanum* Aellen, goosefoot, disturbed open area, occasional, Priesendorf 932

CLUSIACEAE [1]

*Hypericum punctatum* L., common St.-John’s wort, woodlands, common, Priesendorf 946

COMMELINACEAE [2]

*Commelina communis* L., dayflower, low moist woods, common, Priesendorf 479
*Tradescantia ohiensis* Raf., piderwort, Low woods, common, Priesendorf 1059

CORNACEAE [1]

*Cornus drummondii* Meyer, rough-leaved dogwood, woodland edge and open areas, very common, Priesendorf 285
CUCURBITACEAE [1]

Sicyos angulatus L., bur cucumber, disturbed areas, common, Priesendorf 578

CYPERACEAE [6]

*Carex albicans* Willd. ex. Sprengel. var. albicans, sedge, woodland edge, common, Castaner & Priesendorf 9542 9544
*Carex amphibola* Steud., sedge, prairie, Priesendorf 803
*Carex blanda* Dewey, sedge, dry to moist woodlands and prairie, common, Priesendorf 634
*Carex brevior* (Dewey) Mackenzie, sedge, open areas, common, Priesendorf 662, 703
*Carex oligocarpa* Schkuhr., sedge, low woods, Priesendorf 694
*Carex radiata* (Wahlenberg) Small, sedge, low woods.- Priesendorf 690

EUPHORBIACEAE [7]

*Acalypha rhomboidea* Raf., three-seeded mercury, low woods, common, Priesendorf 478
*Chamaesyce glyptosperma* (Engelm.) Small, spurge, disturbed open areas, Priesendorf 911
*Chamaesyce nutans* (Lag.) Small, nodding spurge, disturbed open areas and edge of woods, common, Priesendorf 928
*Euphorbia corollata* L., flowering spurge, woodland trail, common, Priesendorf 863
*Euphorbia cyathophora* Murray, fire-on-the-mountain, disturbed prairie, common, Priesendorf 560, 925
*Euphorbia dentata* Michx., spurge, disturbed prairie and woodland edge, common, Priesendorf 561, 929
*Euphorbia marginata* Pursh., snow-on-the-mountain, prairie and disturbed prairie, common, Priesendorf 730

FABACEAE [20]

*Amorpha canescens* Pursh., lead plant, prairie, common, Priesendorf 352, 828
*Amphicarpa bracteata* (L.) Fern., hog peanut, woodland edge, common, Priesendorf 570
*Astragalus crassicarpus* Nutt., ground plum, prairie, occasional, Priesendorf 776
*Astragalus lotiflorus* Hook., low milk vetch, prairie, incidental, Priesendorf 1082
*Dalea candida* Michx. ex. Willd., white prairie clover, disturbed open areas, common, Priesendorf 446
Dalea enneandra Nutt., nine-anther prairie clover, prairie, occasional, Priesendorf 463
Dalea purpurea Vent. var. purpurea, purple prairie clover, prairie, common, Priesendorf 827, 889
Desmodium canadense (L.) DC., tick trefoil, disturbed open, common, Priesendorf 1017
Desmodium glutinosum (Muhl.) A.W. Wood, tick trefoil, disturbed open areas, common, Priesendorf 423
Desmodium paniculatum (L.) DC., tick trefoil, woodlands and open areas, common, Priesendorf 552
• Kumnerowia stipulacea (Maxim.) Makino, Korean lespedeza, disturbed open areas, common, Priesendorf 1004
Lespedeza capitata Michx., prairie bush clover, disturbed open areas and prairie, common, Priesendorf 518, 987
• *Lespedeza cuneata (Dumont.) G. Don, sericea lespedeza, disturbed open areas and woodland edge, common, Priesendorf 981
• Medicago lupulina L., black medic, disturbed open areas, common, Priesendorf 648
• Medicago sativa L. ssp. sativa, alfalfa, disturbed open areas, common, Priesendorf 772
• Melilotus albus Medikus, white sweet clover, disturbed open areas, common, Priesendorf 349, 724
• Melilotus officinale (L.) Pallas, yellow sweet clover, disturbed open areas, common, Priesendorf 767
Pediomelum argophyllum (Pursh.) J. Grimes, silvery psoralea, prairie, uncommon, Priesendorf 733
• Robinia pseudo-acacia L., black locust, prairie edge and low woods, common, Priesendorf 1029
• Trifolium pratense L. var. sativum Schreb., red clover, disturbed open areas, common, Priesendorf 502

FAGACEAE [4]

• Quercus macrocarpa Michx., bur oak, open areas, common, Priesendorf 306, 908
Quercus prinoides Willd., chestnut oak, prairie, common, Priesendorf 298, 705
Quercus rubra L. var. ambiguа (A. Gray) Fern., red oak, prairie edge and upland forest, common, Priesendorf 831, 960
• *Quercus velutina Lam., black oak, disturbed open areas, common, Priesendorf 955, 989

FUMARIACEAE [2]

Corydalis micrantha (Engelm.) A. Gray, small-flowered corydalis, disturbed open areas, common, Castaner & Priesendorf 9551, 9547
Dicentra cucullaria (L.) Bernh, Dutchman’s breeches, low woods, common, Priesendorf 1075

GERANIACEAE [1]

Geranium carolinianum L., cranesbill, disturbed open areas, common, Priesendorf 651

GROSSULARIACEAE [1]

Ribes missouriense Nutt. ex Torrey & A. Gray, Missouri gooseberry, woodlands, common, Priesendorf 1072

HYDROPHYLLACEAE [1]

Ellisia nyctelea L., aunt Lucy, low woods, common, Priesendorf 687

IRIDACEAE [1]

Sisyrinchium campestre Bickn., prairie blue-eyed grass, prairie, occasional, Priesendorf 673, 1087

JUGLANDACEAE [3]

Carya cordiformis (Wangenh.) K. Koch, bitternut hickory, prairie edge and forest, common, Priesendorf 961
Carya ovata (Mill.) K. Koch, shagbark hickory, prairie edge and woodland, common, Priesendorf 976
Juglans nigra L., black walnut, woodlands, common, Priesendorf 381

LAMIACEAE [7]

*Agastache scrophulariifolia (Willd.) Kuntze, purple-giant hyssop, disturbed open areas, common, Priesendorf 566
*Hedeoma hispidum Pursh., mock pennyroyal, disturbed open areas, common, Priesendorf 353, 751
**Leonurus cardiaca L., motherwort, woodland trail, common, Priesendorf 325, 778A
• Leonurus marrubiastrum L., biennial motherwort, woodland trail, occasional, Priesendorf 466, 847
Monarda fistulosa L. ssp. fistulosa, wild bergamot, disturbed open areas, common, Priesendorf 819
*Pycnanthemum tenuifolium Schrad., slender mountain mint, open, common, Priesendorf 1053
*Teucrium canadense* L., var. canadense, wood sage, disturbed areas, common, *Priesendorf* 534

**LILIACEAE [2]**

*Erythronium albidum* Nutt., white dog-tooth violet, low woods, common, *Priesendorf* 1078

*Polygonatum biflorum* (Walt.) Ell. var. biflorum, Solomon’s seal, low woodlands, common, *Priesendorf* 666

**LINACEAE [1]**

*Linum sulcatum* Riddell, flax, prairie, occasional, *Priesendorf* 365, 732

**MENISPERMACEAE [1]**

*Menispermum canadense* L., moonseed, woodlands, common, *Priesendorf* 741

**MIMOSACEAE [1]**

*Desmanthus illinoensis* (Michx.) MacMillan, prairie mimosa, open areas, common, *Priesendorf* 419, 532

**MORACEAE [3]**

*Maclura pomifera* (Raf.) Schneid., Osage orange, woods edge, occasional, *Priesendorf* 941

*Morus alba* L., white mulberry, woodlands and some disturbed open areas, common, *Priesendorf* 376, 851

*Morus rubra* L., red mulberry, woodlands and prairie edge, common, *Priesendorf* 369, 978

**OLEACEAE [2]**

*Fraxinus americana* L., white ash, woodland and edge of woods, common, *Priesendorf* 971

*Fraxinus pennsylvanica* Marsh., green ash, disturbed woodlands, common, *Priesendorf* 948

**ONAGRACEAE [5]**

*Calylophus serrulatus* (Nutt.) Raven, plains yellow primrose, prairie, common, *Priesendorf* 676

*Circaea lutetiana* L. ssp. canadensis (L.) Asch & Magnus, enchanter’s nightshade, woodlands; primarily low woodlands, common, *Priesendorf* 794
Gaura longiflora Spach, biennial gaura, disturbed open areas, common, 
Priesendorf 1020, 1044
Gaura parviflora Douglas, velvety gaura, disturbed open areas, common, 
Priesendorf 883
*Oenothera biennis L., common evening primrose, woodlands and open areas, 
common, Priesendorf 986, 1019

ORCHIDACEAE [1]

*Spiranthes cernua (L.) Richard var. cernua, common ladies’ tresses, prairie 
and fields, common, Priesendorf 593, 996

OXALIDACEAE [1]

Oxalis stricta L., yellow wood sorrel, low woodlands, common, Priesendorf 
481

PHYLLOCLADACEAE [1]

Phytolacca americana L., pokeweed, disturbed open areas and edge of woods, 
occasional, Priesendorf 917

PLANTAGINACEAE [3]

*Plantago aristata Michx., bracted plaintain, disturbed open, common, 
Priesendorf 1060
Plantago rugelii Decne., Rugel plaintain, disturbed open areas and low woods, 
common, Priesendorf 434
Plantago virginica L., hoary plaintain, disturbed open areas, common, 
Priesendorf 746

POACEAE [30]

Andropogon gerardii Vitman, big bluestem, prairie and disturbed open areas, 
common, Priesendorf 524, 993
Bouteloua curtipendula (Michx.) Torr., sideoats grama, prairie ridges at the 
crest, common, Priesendorf 391, 414
Bouteloua hirsuta Lag., hairy grama, prairie, occasional, Priesendorf 519, 899
*Bromus inermis Leyss, smooth brome, disturbed open areas, common, 
Priesendorf 775
*Bromus japonicus Thunb., Japanese brome, old fields, common, Priesendorf 
755
*Bromus tectorum L. var. tectorum, downy brome, old fields, common, 
Priesendorf 656
• Dactylis glomerata L. var. glomerata, orchard grass, disturbed open areas, common, Priesendorf 319

* Dichanthelium acuminatum (Sw.) Gould & C.A. Clark var. acuminatum, panic grass, disturbed open areas, common, Priesendorf 743

* Dichanthelium oligosanthes (Schultes) Gould var. scriberianum (Nash), panic grass, disturbed open areas and woods, common, Priesendorf 354, 665

* Digitaria cognata (Schultes) Pilger, fall witchgrass, disturbed open areas, common, Priesendorf 472

• Digitaria sanguinalis (L.) Scop., crab grass, disturbed open areas, common, Priesendorf 467

Elymus canadensis L. var. canadensis, wild rye, disturbed open areas and prairie, common, Priesendorf 453, 780

Eragrostis pectinacea (Michx.) Nees, Carolina love grass, disturbed woods, common, Priesendorf 433.

Eragrostis spectabilis (Pursh.) Steud. purple love grass, disturbed open areas, common, Priesendorf 896,

• * Festuca pratensis Huds., meadow fescue, disturbed open areas, common, Priesendorf 644

Festuca subvericillata (Pers.) E. Aleks., nodding fescue, disturbed open areas, common, Priesendorf 646, 768

• Hordeum pusillum Nutt., little barley, disturbed open areas and prairie edge, occasional, Priesendorf 360

Leersia virginica Willd., white grass, low woods, common, Priesendorf 470

Muhlenbergia cuspidata (Torr.) Muhl., plains muhly, prairie, common, Priesendorf 523

Muhlenbergia racemosa (Michx.) Britton, Sterns, & Poggenb., muhly, disturbed open areas and prairie, common, Priesendorf 916

Muhlenbergia schreberi Gmel., nimblewill, woodlands, occasional, Priesendorf 1115

Panicum capillare L. var. capillare, witch grass, prairie, common, Priesendorf 526

• Phleum pratense L., Timothy, disturbed open areas, common, Priesendorf 756

• Poa pratensis L., Kentucky bluegrass, disturbed open areas, common, Priesendorf 663

Poa sylvestris A. Gray, sylvan bluegrass, disturbed woods, common, Priesendorf 618

Schizachyrium scoparium (Michx.) Nash, little bluestem, prairie ridges along crests, common, Priesendorf 499

• Setaria pumila (Poiret) Roemer & Schultes, yellow foxtail, disturbed open areas, common, Priesendorf 438, 992

Sorghastrum nutans (L.) Nash, Indian grass, prairie and disturbed open areas, common, Priesendorf 990

Sphenopholis obtusata (Michx.) Scribn. var. obtusata, wedge grass, upland woods, common, Priesendorf 318, 691
Tridens flavus (L.) Hitch., purpletop, disturbed open areas, common, Priesendorf 577, 914

POLEMONIACEAE [2]

Phlox divaricata L. ssp. laphamii A.W. Wood, blue phlox, low moist woods, common, Priesendorf 614, 1071
Phlox paniculata L., perennial phlox, low moist woods, occasional, Priesendorf 576

POLYGONACEAE [4]

*Polygonum punctatum Ell. var. punctatum, water smart weed, prairie edge, common, Priesendorf 585, 964
Polygonum scandens L., false buckwheat, low moist woods, common, Priesendorf 584
Polygonum virginianum L. var. virginianum, Virginia knotweed, woodlands, common, Priesendorf 581, 549
*Rumex crispus L., sour dock, disturbed open areas, common, Priesendorf 388, 389

RANUNCULACEAE [6]

Actaea pachypoda Ell., white baneberry, woodlands, occasional, Priesendorf 1047
Anemone cylindrica A. Gray, thimbleweed, prairie edges, common, photo record only
Anemone virginiana L., thimbleweed, disturbed open and woodlands, common, Priesendorf 565, 814
Aquilegia canadensis L., columbine, woodlands, common, Priesendorf 665, 789
Delphinium carolinianum Walter ssp. penardii (Huth) M. Warnock, prairie larkspur, prairie, common, Priesendorf 363, 727
Ranunculus abortivus L., small-flowered crowfoot, low woods, common, Priesendorf 1067

RHAMNACEAE [1]

Ceanothus herbaceus Raf. var. pubescens (Torr. & A. Gray) Shinn., redroot, prairie, common, Priesendorf 301

ROSACEAE [8]

Amelanchier arborea (Michx. f.) Fern., service berry, woodlands, occasional, Castaner 9546
Geum canadense Jacq., white avens, woodlands, common, Priesendorf 541, 796
*Potentilla recta L., rough-fruitied cinquefoil, disturbed open areas, common
Priesendorf 1058
*Prunus hortulana L.H. Bailey, wild goose plum, woodland edge, occasional,
Priesendorf 980
Prunus serotina Ehrh., black cherry, woodlands, common, Priesendorf 1038
Prunus virginiana L. var. virginiana, choke cherry, dry woods, common,
Priesendorf 877, 1083
*Rosa setigera Michx. var. setigera, prairie rose, disturbed open areas,
common, Priesendorf 785
Rubus occidentalis L., black raspberry, disturbed areas, common, Priesendorf
340, 719

RUBIACEAE [4]

Galium aparine L., cleavers, disturbed open areas, common, Priesendorf 652
Galium circaeazz Michx. var. hypomalicum Fern., wild licorice, woodlands,
disturbed open areas and prairie, common, Priesendorf 664
Galium triflorum Michx., sweet-scented bedstraw, disturbed open areas and
woodlands, common, Priesendorf 493
Hedyotis nigricans (Lam.) Fosb., narrowleaved bluets, prairie, common,
Priesendorf 857

RUTACEAE [1]

Zanthoxylum americanum Mill., prickly ash, woodlands, occasional, Priesen-
dorf 1045

SALICACEAE [3]

**Populus alba L., silver poplar, low woods, incidental, Priesendorf 289
Populus deltoides Marsh., cottonwood, disturbed open areas and woods,
common, Priesendorf 835
Salix humilis Marsh. var. humilis, prairie willow, prairie, common, Priesen-
dorf 953, 1081

SANTALACEAE [1]

Comandra umbellata (L.) Nutt. ssp. umbellata, bastard toadflax, disturbed
open areas and prairie, common, Priesendorf 737

SCROPHULARIACEAE [6]

Agalinis aspera (Douglt. ex. Benth.) Britton, rough gerardia, prairie, common,
Priesendorf 559, 1032
Castilleja sessiliflora Pursh., downy painted cup, prairie, uncommon, photo record only

Scrophularia marilandica, figwort, woodlands, common, Priesendorf 880
• Veronica arvensis L., corn speedwell, woodlands, uncommon, Priesendorf 627

Veronica peregrina L. var. peregrina, neckweed, low woods, common, Priesendorf 330
• Verbascum thapsus L., mullein, disturbed open areas common, Priesendorf 797

SMILACACEAE [1]

Smilax hispida Muhl., bristly greenbrier, woodland edge, common, Priesendorf 845, 706

SOLANACEAE [3]

Physalis heterophylla Nees. var. heterophylla, ground cherry, disturbed open areas, common, Priesendorf 840
• Physalis virginiana Mill., ground cherry, disturbed open areas, common, Priesendorf 659

Solanum carolinense L. var. carolinense, horsenettle, disturbed open areas, common, Priesendorf 1051

TILIACEAE [1]

Tilia americana L., basswood, lowland forest, common, Priesendorf 1116

ULMACEAE [3]

 Celtis occidentalis L., hackberry, woodlands, common, Priesendorf 871
 • Ulmus pumila L., Siberian elm, disturbed woods, common, Priesendorf 1042

Ulmus rubra Muhl., slippery elm, woodlands, common, Priesendorf 334, 939

URTICACEAE [4]

Laportea canadensis (L.) Gaud., wood nettle, Disturbed open areas, common, Priesendorf 489

Parietaria pensylvanica Muhl. ex Willd. var. pensylvanica, pellitory, low woods, common, Priesendorf 396

Pilea pumila (L.) A. Gray, clearweed, low woods, common, Priesendorf 966

Urtica dioica L. ssp. gracilis (Aiton) Selander, tall nettle, woodland trail, common, Priesendorf 482, 865
VERBENACEAE [3]

*Phryma leptostachya* L. var. *leptostachya*, lopseed, low woodlands, common, *Priesendorf 401*
*Verbena stricta* Vent., vervain, disturbed open areas, common, *Priesendorf 824*
*Verbena urticifolia* L. var. *urticifolia*, white vervain, woodlands, common, *Priesendorf 879*

VIOLACEAE [5]

*Viola pratincola* Greene, blue prairie violet, prairie, occasional, *Castaner & Priesendorf 9543*
*Viola pubescens* Aiton var. *eriocarpa* (Schwein.) N. Russell, smooth yellow violet, woodlands, occasional, *Priesendorf 698*
*Viola rafinesquii* Greene, field pansy, occasional, *Priesendorf 1117*
*Viola sororia* Willd., common blue violet, disturbed open areas, common, *Priesendorf 1070*
*Viola triloba* Schwein., three-lobed violet, woodland trail, common, *Priesendorf 784*

VITACEAE [3]

*Parthenocissus quinquefolia* (L.) Planch. var. *quinquefolia*, Virginia creeper, woodlands, common, *Priesendorf 886*
*Vitis riparia* Michx. var. *riparia*, riverbank grape, woodland edge, common, *Priesendorf 461*
*Vitis vulpina* L., winter grape, disturbed open areas and woods, common, *Priesendorf 710, 836*

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ANNOUNCEMENT

Copies of plant lists and other information relating to the flora are requested for inclusion in the Society’s flora file. Please send items to the archivist, Jim Bogler (see address on inside front cover).
UTRICULARIA SUBULATA IN MISSOURI

J. M. Sullivan
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It was Friday, the 19th of May, 1995, the last day of our five-day adventure, and the day to head for home. But, our Botany Group (of the Webster Groves Nature Study Society) made one more stop before proceeding north. We visited Shut-In Mountain Fens, a preserve of The Nature Conservancy in Shannon County, Missouri.

Shortly after entering the easternmost of three fens, Pat Harris called attention to a minute, yellow flower. From a stand-up position the find did not seem very impressive. The corolla was very tiny, appeared to have no definite shape, and seemed to be suspended about 2-5 cm off the ground, with no visible means of support.

A much closer examination revealed that the corolla did have a distinctive shape after all, one typical of the genus Utricularia L., the bladderworts. The supporting stem was little more than a wiry thread rising out of the wet sand.

Although not much to look at, the plant sparked a surge of excitement in our group. The only two Utricularia species known in Missouri were both submerged aquatics. This one was growing on a seepage slope, well anchored in coarse sand. There was no way it could float, even part-time. It seemed likely that we had something new!

We were delighted to find several more of the plants in that fen, and even more pleased when Pat discovered the first plant of the same kind in the preserve’s middle fen. We eventually found more of it in the middle and western fens than we had in the fen of the first discovery.

Karen Haller, Jack Harris, Nels Holmberg, and John Molyneaux did their best to photograph the miniscule subject in its lowly and wet situation. Nels stretched out prone on the watery ground to take his best shot. Meanwhile, Karen brought the third volume of Gleason’s New Britton and Brown Illustrated

After finding it in all three fens, we decided to take a single specimen for necessary documentation, both for The Nature Conservancy and for the Flora of Missouri Project. We cut out a small cylinder of the sandy marl with a pocket knife, hoping to preserve the subterranean parts, then washed most of the coarse-grained sand away in the clear-flowing sluiceways of the fen. A second, flowerless stem was discovered while cleaning the first one.

Back at the cars, we read from the introduction in Steyermark’s Flora of Missouri (1963, Iowa State University Press, Ames), where he suggested species that future botanists might find in Missouri because of their occurrence in nearby Arkansas. One of these was Utricularia subulata, a terrestrial species. According to Smith’s An Atlas and Annotated List of the Vascular Plants of Arkansas (1988, published by the author, Fayetteville), this species is most common in southeastern Arkansas, but it has also been collected in Benton County, the northwesternmost county, which is the wrong end of the state from our Missouri locality. Elsewhere, the species occurs along the Atlantic Coastal Plain of eastern North America and west to southern Texas.

Pat and Jack Harris and Betty Nellums hurried the specimen to George Yatskievych at the Missouri Botanical Garden that same day. George had been with the group earlier in the week, but returned to St. Louis late Wednesday, and thus missed the most exciting find of the trip. Using a microscope, various manuals, and other miniscule herbarium specimens, George determined conclusively that our discovery was Utricularia subulata L., the slender bladderwort. It is a new addition to the list of Missouri native plants.

In addition to its terrestrial growth form, U. subulata differs from the other two Missouri bladderwort species in several morphological features. Its vegetative stems are mostly
unbranched, with few, flattened, linear offshoots that resemble leaves, and the bladders are few and tiny. *Utricularia gibba* L. and *U. macrorhiza* LeConte both have highly branched stems with numerous, larger, and more conspicuous bladders. The few-flowered inflorescences of *U. subulata* also have a unique type of bract at the nodes. These are appressed, diamond-shaped, and peltate (attached in the middle of the lower surface). The small, yellow corollas are also unusual compared to the other Missouri species in their broad, noticeably 3-lobed lips.

As frequently happens with new discoveries, George also found that one of the Missouri specimens already in the MO herbarium was also *U. subulata*, although it had earlier been misdetermined as *U. gibba*, the humped bladderwort. This specimen had been collected by Bill Summers in 1985 in a fen on a slope of Thorny Mountain, also in Shannon County, about three airmiles from Shut-In Mountain Fens.

![Fig. 1. *Utricularia subulata* in its natural habitat.](image)

Photo by John Molyneaux.
BOOK REVIEW

George Yatskievych

The thoughtful, well-written text, together with the beautiful photography of Frank Oberle and others, makes this a must-buy for anyone with an interest in the wildflowers of the tallgrass prairie region. In some ways this book originated as an outgrowth of Oberle’s earlier book of photographs, the coffee table-sized Tallgrass Prairie, which contained text by the late John Madsen. The present book, also with wonderful visuals, is aimed primarily at allowing users to identify common wildflower species that are important in tallgrass prairie communities ranging from Oklahoma to Ohio, and northward into Canada. The coverage of plants in a particular habitat, as opposed to the more commonly seen approach in other field guides to plants in every habitat of a particular region, allows for relatively greater completeness in the Ladd and Oberle book than in most other guides.

The book contains information on 295 species arranged by flower color, complete with descriptions, photographs, and some line drawings. Also included is a section on selected grasses, sedges, and rushes. Not included are any of the introduced species, some of which are common in disturbed prairies. A lengthy introduction to different tallgrass prairie habitats sets the stage for discussions of habitat and range for the included plants. The species accounts also cover scientific and common names, seasons of bloom, and occasional discussions of related species. An introductory section on how to use the book also contains illustrations of plant structures, and there is an illustrated glossary toward the volume’s end. A map of tallgrass prairies and related vegetation helps to orient the user, and the book is rounded out with a section on prairie management, as well as lists of places to see prairies in various states and a bibliography of books for further reading.
The text shows the author's great experience with these plants and their ecology. The photographs pack a lot of information and complement the text very well. Knowing the prairie flora of Missouri, I was surprised at all of the species that inhabit prairies elsewhere, and the book fueled my excitement to visit them in other states. Many of the tidbits thrown into the comments section of each species treatment were amusing and educational. There is a lot more to be learned here than merely what the plants look like!

There are numerous reasons to buy this book, not the least of which is that a portion of the proceeds go to The Nature Conservancy. Many of these species are worthy of cultivation in gardens, and the book provides valuable habitat information. Others are in urgent need of conservation, and the book distinguishes these from more common look-alikes. Finally the book provides excellent insights into how these species fit together into a mosaic of different prairie and savanna communities. Ladd and Oberle are to be congratulated on completing an attractive, useful, and inspiring volume, well worth the price.