1980

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University of Northern Iowa

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The Vascular Flora of Starr’s Cave State Preserve

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Starr’s Cave State Preserve is a 140 acre tract of wooded bottomlands and limestone bluffs along Flint Creek in Des Moines County, southeastern Iowa. The vascular flora of the preserve was inventoried in 1975-79. This flora consists of 339 species in 79 families. Several rare species of southern and Ozarkian distribution occur here, including four species whose status in Iowa is threatened: blue ash (Fraxinus quadrangulata), winged monkey-flower (Mimulus alatus), winter grape (Vitis cinerea), and pagoda mint (Blephila ciliata). Twelve plant communities are found within the preserve, including 5 forest communities, 3 disturbance communities, 2 limestone exposure communities, a prairie opening community, and a streambank community. A quantitative comparison with the floras of 3 physiographically similar preserves in northern Iowa showed a 30-44% similarity among these northern preserves, and a 35-37% similarity between each of these and Starr’s Cave.

INDEX DESCRIPTORS: Starr’s Cave State Preserve, Iowa flora, floristic comparison, forest communities, prairie opening community.

The limestone exposures along Flint Creek within Starr’s Cave State Preserve have long been recognized as stratigraphically significant by Iowa geologists (Keyes, 1895; Prior, 1977). The floristic aspects of the preserve are no less significant but much less studied. The purpose of this study was to provide recent comprehensive data on the vascular flora of Starr’s Cave Preserve, and to attempt to quantitatively compare this flora to those of three physiographically similar preserves in northern Iowa.

LOCATION

Starr’s Cave Preserve is a 140 acre tract of wooded bottomlands and limestone bluffs along Flint Creek in Des Moines County, southeastern Iowa. The preserve is located one-half mile north of the Burlington city limits along Irish Ridge Road (County X60) which forms its eastern boundary. The main body of the preserve lies in the NW¼ section 19 T-70N R-2W, while a smaller contiguous portion is in the NE¼ section 24 T-70N R-3W. The Mississippi River and the state of Illinois lie 3 miles due east, while the Des Moines River and the state of Missouri are approximately 40 miles south-southwest.

GEOLOGY

Flint Creek has carved the sedimentary bedrock at Starr’s Cave Preserve to a depth of over 100 feet, resulting in steep rocky slopes and vertical escarpments. Four major rock formations are exposed here (Campbell, 1966). At the base of the section is the English River siltstone of Devonian age. All over-topping strata are of Mississippian age. In ascending order they are: 1) the North Hill formation, consisting of the McRaney limestone, the Prospect Hill siltstone, and the type section of the Starr’s Cave oolite, 2) the Wassonville limestone, and 3) the Burlington formation, composed of the Dolbee Creek, Haight Creek, and Cedar Fork members. The highly resistant Burlington dolomitic limestone forms an overhanging ledge 44 feet thick which projects up to 12 feet beyond the vertical wall below (Campbell, 1966).

Starr’s Cave (from which the preserve takes its name) is the largest of three caves within the preserve. The mouth of the cave is situated in the vertical limestone wall on the north bank of Flint Creek, approximately 40 feet above the stream bed (figure 1). The cave trends northeasterly and has been explored for about 750 feet (Bounk, 1978).

Des Moines County was last glaciated by the Illinoian ice sheet (Campbell, 1966). The resulting glacial till has been only slightly modified by subsequent aeolian loess deposition. The loamy Clinton and Lindley soils which cover the uplands and slopes of the preserve are derived from this till and loess. The soils of the bottomlands are Landes fine sandy loam, derived from alluvium. Weathering of the exposed bedrock has contributed to the residual soils around the outcrops.

HISTORY OF THE AREA

Prior to white settlement eastern Iowa was the domain of the Sac and
Mesquakie (Fox) tribes. The bluffs bordering Flint Creek were a source of flint (chert) which these tribes used to fashion arrowheads, spearpoints, and other tools.

The stucco farmhouse on the south bank of Flint Creek was erected in 1860 by William H. Starr, whose name became associated with the nearby cave. A sawmill, dam, and icehouse (none of which remain) were also constructed (Settles, 1973). The large barn and silo are probably newer. The nearby ruins of a small crudely-constructed stone building are reputedly those of "... a trading post where the early pioneers traded for furs with the Indians." (Settles, 1973). This may be the American Fur Company post established along Flint Creek in 1808 by Colonel John W. Johnson (Antrobus, 1915).

The Starr’s Cave vicinity has principally been used for agriculture. Row crops were grown on the narrow bottomlands, and the wooded slopes and uplands have been pastured and timbered. An early county plat book (Northwest Publishing, 1897) indicates a zinc mine in the area, listing the synonyms in parentheses have been added to bring the species composition. A prairie community occupies small openings on the wooded ridges and bluffs. Disturbance communities occur where man's activities have modified or destroyed the native vegetation. These include second-growth woods, upland pastures, and disturbed bottomlands. Minor associations of species are distinguishable on the exposed and shaded limestone outcrops and on the wet sandy banks of Flint Creek.

### PLANT COMMUNITIES

Twelve plant communities occur at Starr’s Cave Preserve (Figure 2). Five forest communities may be distinguished, based on topographic position and species composition. A prairie community occupies small openings on the wooded ridges and bluffs. Disturbance communities occur where man’s activities have modified or destroyed the native vegetation. These include second-growth woods, upland pastures, and disturbed bottomlands. Minor associations of species are distinguishable on the exposed and shaded limestone outcrops and on the wet sandy banks of Flint Creek.

1. **ALLUVIAL WOODS.** The bottomlands of Flint Creek are forested with deciduous softwoods resistant to periodic flooding. Dominant members of this community include silver maple (Acer saccharinum), cottonwood (Populus deltoides), sycamore (Platanus occidentalis), river birch (Betula nigra), peach-leaf willow (Salix amygdaloides), and green ash (Fraxinus pennsylvanica). Increasing numbers of hardwoods occur on terraces less subject to inundation and at the base of slopes. These include black maple (Acer nigrum), butternut (Juglans cinerea), black walnut (Juglans nigra), and swamp white oak (Quercus bicolor). Dense thickets of shrubby willows (Salix spp.) stabilize the wet sandbars along the creek. Wild grapes (Vitis spp.), nettles (Laportea canadensis, Urtica dioica), scorng rush (Equisetum hyemale), and poison ivy (Toxicodendron radicans) characterize the herbaceous layer.

2. **WOODS ON EAST-, SOUTH-, AND WEST-FACING SLOPES.** A mixed hardwood forest covers these slopes. The dominant canopy trees are white oak (Quercus alba), red oak (Quercus borealis), bitternut hickory (Carya cordiformis), and mockernut hickory (Carya tomentosa). A well-developed understory of small trees is present, and includes hop-hornbeam (Ostrya virginiana), blue beech (Carpinus caroliniana), and pin cherry (Prunus pensylvanica).

### Table 1. "List of Plants noticed on bluffs northwest of Burlington, Starr’s Cave Hill, July 14, 1908. Mrs. C. C. Clark in party."

<table>
<thead>
<tr>
<th>Plant Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helianthemum canadense</td>
</tr>
<tr>
<td>Lechea tenafolia</td>
</tr>
<tr>
<td>Hypericum prolificum</td>
</tr>
<tr>
<td>Hypericum cistifolium (H. sphaerocarpum)</td>
</tr>
<tr>
<td>Linum sulcatum</td>
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<tr>
<td>Ceanothus americanus</td>
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<tr>
<td>Rhus glabra</td>
</tr>
<tr>
<td>Polycarpon verticillatum</td>
</tr>
<tr>
<td>Baptisia leucantha</td>
</tr>
<tr>
<td>Amorpha canescens</td>
</tr>
<tr>
<td>Petalostemon violaceum (P. purpureum)</td>
</tr>
<tr>
<td>Astragalus canadensis</td>
</tr>
<tr>
<td>Desmodium paniculatum</td>
</tr>
<tr>
<td>Desmodium canadense</td>
</tr>
<tr>
<td>Desmodium acuminatum (D. glutinosum)</td>
</tr>
<tr>
<td>Lespedeza violacea</td>
</tr>
<tr>
<td>Lespedeza capitata</td>
</tr>
<tr>
<td>Phaseolus diversifolius (Strophostyles helvola)</td>
</tr>
<tr>
<td>Cassia chamaeicrista (C. fasciculata)</td>
</tr>
<tr>
<td>Psoraloe onobrychis</td>
</tr>
<tr>
<td>Physocarpus opulifolius</td>
</tr>
<tr>
<td>Rubus villosus (R. allegheniensis)</td>
</tr>
<tr>
<td>Geum album (G. canadense)</td>
</tr>
<tr>
<td>Potentilla arguta</td>
</tr>
<tr>
<td>Potentilla canadensis (P. simplex)</td>
</tr>
<tr>
<td>Pimpinella integerrima (Taenia integerrima)</td>
</tr>
<tr>
<td>Eryngium yuccifolium</td>
</tr>
<tr>
<td>Cornus sp.</td>
</tr>
<tr>
<td>Eupatorium altissimum</td>
</tr>
<tr>
<td>Liatris scariosa</td>
</tr>
<tr>
<td>Liatris cylindracea</td>
</tr>
<tr>
<td>Erigeron strigosus</td>
</tr>
<tr>
<td>Antennaria plantaginifolia</td>
</tr>
<tr>
<td>Silphium integrifolium</td>
</tr>
<tr>
<td>Parthenium integrifolium</td>
</tr>
<tr>
<td>Echinacea angustifolia (E. pallida)</td>
</tr>
<tr>
<td>Rudbeckia hirta</td>
</tr>
<tr>
<td>Helianthus occidentalis</td>
</tr>
<tr>
<td>Coreopsis palmata</td>
</tr>
<tr>
<td>Asclepias verticillata</td>
</tr>
<tr>
<td>Asclepias tuberosa</td>
</tr>
<tr>
<td>Penstemon pubescens (P. paillidus)</td>
</tr>
<tr>
<td>Veronica virginica (Veronicastrum virginicum)</td>
</tr>
<tr>
<td>Gerardia grandiflora</td>
</tr>
<tr>
<td>Ruelia ciliosa (R. humidis)</td>
</tr>
<tr>
<td>Teucrium canadense</td>
</tr>
<tr>
<td>Comandra umbellatum</td>
</tr>
<tr>
<td>Euphorbia corollata</td>
</tr>
<tr>
<td>Ostrya virginiana</td>
</tr>
<tr>
<td>Quercus alba</td>
</tr>
<tr>
<td>Allium canadense</td>
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</tbody>
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*http://scholarworks.uni.edu/pias/vols7/iss4/11*
5. DRY WOODED RIDGES AND BLUFFS. This community occupies the ridges and bluff crests above Flint Creek. The soil is thin and excessively drained clay or silt loam overlazing fractured limestone. Direct exposure to the hot afternoon sun and dry winds of summer produces a warm dry environment. The dominant trees are those which also dominate the upland woods; it is the sub-dominant species which distinguish this community. These characteristic species include the blue ash (Fraxinus quadrangulata), chestnut oak (Quercus prinoides var. acuminata), red cedar (Juniperus virginiana), nine-bark (Physocarpus opulifolius), black cherry (Prunus serotina), redbud (Cercis canadensis), and shadbush (Amelanchier arborea). The herbaceous layer includes siskleped (Arabis canadensis), yellow pimpernel (T. acutiloba), Indian tobacco (Lobelia inflata), four-leaf milkweed (Asclepias quadrifolia), woodland sunflower (Helianthus strumosus), hawkweed (Hieracium scabrum), cancer-root (Oreobanche uniflora), coral-root orchid (Corallorhiza odontorhiza), hirsute sedge (Carex hirsutella), and sessile-leaved tick-trefoil (Desmodium sessilifolium).  

6. PRAIRIE OPENINGS. Small openings dominated by prairie species occur at the most xeric sites on these wooded ridges. Dominants include big and little bluestems (Andropogon gerardi, A. scoparius), three-awn (Aristida oligantha), several low-growing species of panicgrass (Panicum spp.), and Mead’s sedge (Carex meadii). Characteristic herbs include butterfly milkweed (Asclepias tuberosa), purple prairie-clover (Petalostemum purpureum), leadplant (Amorpha canescens), milkvetch (Astragalus canadensis), purple cone-flower (Echinacea pallida), Indian plantain (Calacila atriplicifolia), puffcon (Lithospermum canadensis), bird’s-foot and arrowhead violets (Viola pedata, V. sagittata), yellow flax (Linum sulphureum), whorled milkwort (Polygala virgata), pinweed (Lechea tenuifolia), frostweed (Helianthemum bucknelli), violet wood-sorrel (Oxalis violacea), bastard roadflax (Comandra umbellata), New Jersey tea (Ceanothus americanus), false foxglove (Aureolaria grandiflora), pale beard-tongue (Penstemon pallidus), yellow star-grass (Hypoxis hirsuta), blue-eyed grass (Sisyrinchium campestre), tufted buttercup (Ranunculus fascicularis), and wild rose (Rosa carolina).  

The prairie community appears to have decreased in extent in historical times. All species listed by Clark (1908) from “Starr’s Cave Hill” (apparently the ridge above the cave) are characteristic of upland prairie or oak savannah (Table 1). Several species on this list have not been re-collected in this study. These species include two blazing-stars (Liatris cylindracea, L. scariosa), rattlesnake-master (Eryngium yuccifolium), French-grass (Poa ralea onobrychis), western sunflower (Helianthus occidentalis), wild quinine (Parthenium integrifolium), rabbit’s-foot bush-clover (Lespedeza capitata), tickseed (Coreopsis palmata), wild indigo (Baptisia leucantha), and tall cinquefoil (Potentilla arguta). These conspicuous species would not likely be overlooked. It seems more probable that they have been extirpated by an increase in forest cover on the ridge. This succession is due to the cessation of the prairie fires which formerly excluded most woody plants from the uplands. The situation here is identical to that described by Niemann and Landers (1974) at Woodman Hollow State Preserve in Webster County, Iowa.

7. SECOND-GROWTH WOODS. A wooded area of a disturbed nature occurs on the slopes and uplands just south and west of the farmhouse. The area has been timbered and pastured in the past. Settles (1973) indicated that a large vineyard once occupied this approximate area. The trees are young and of uniform size. Characteristic species include box elder (Acer negundo), black locust (Robinia pseudoacacia), red cedar (Juniperus virginiana), white mulberry (Morus alba), sedge oak (Quercus imbricaria), and choke cherry (Prunus virginiana). The copious shrub layer includes brambles (Rubus spp.), garden honeysuckles (Lonicera bella, L. morrowii), gooseberry (Ribes missouriense), greenbrier (Smilax hispida), prickly-ash (Xanthoxylum caroliniana), bladdernut (Staphylea trifolia), and wafer-ash (Ptelea trifoliata).

The herbaceous layer of this community includes many spring-flowering ephemerals: Dutchman’s-breeches (Dicentra cucullaria), bloodroot (Sanguinaria canadensis), blue-bells (Mertensia virginica), Jack-in-the-pulpit (Arisaema triphyllum), toadshade (Aubrieta grandiflora), and whorled milkwort (Polygala virginiana). The herbaceous layer also includes many spring-flowering ephemerals: Dutchman’s-breeches (Dicentra cucullaria), bloodroot (Sanguinaria canadensis), blue-bells (Mertensia virginica), Jack-in-the-pulpit (Arisaema triphyllum), toadshade (Aubrieta grandiflora), and whorled milkwort (Polygala virginiana). The herbaceous layer also includes many spring-flowering ephemerals: Dutchman’s-breeches (Dicentra cucullaria), bloodroot (Sanguinaria canadensis), blue-bells (Mertensia virginica), Jack-in-the-pulpit (Arisaema triphyllum), toadshade (Aubrieta grandiflora), and whorled milkwort (Polygala virginiana).
americana), buckbrush (Symphoricarpos orbiculatus), multiform rose (Rosa multiflora), and dogwoods (Cornus spp.).

8. OLD PASTURES. Two large pastures occupy part of the uplands south of Flint Creek. Dominant grasses are blue-grass (Poa spp.) and brome (Bromus spp.), associated with timothy (Phleum pratense), orchard grass (Dactylis glomerata), red clover (Trifolium pratense), sweet-clover (Melilotus spp.), and Canada goldenrod (Solidago canadensis).

9. DISTURBED BOTTOMLANDS. The use of the floodplain of Flint Creek for agriculture has destroyed much of its native vegetation. Two fallow fields, cultivated through the early 1970's, lie along the creek near the farmhouse. The south field was planted in prairie grasses in 1979, while the north field remains a ruderal community. Common species here include pigweeds (Amaranthus spp.), goosefoot (Chenopodium album), ragweed (Ambrosia spp.), poison hemlock (Conium maculatum), wormwood (Artemisia annua), thistles (Cirsium spp.), wild carrot (Daucus carota), quack-grass (Agropyron repens), mustard (Barbara vulgaris), purslane (Portulaca oleracea), and nodding spurge (Euphorbia presilii).

There are blue-grass lawns around the parking lot, picnic area, and farmhouse. In neglected areas of these lawns grow dandelion (Taraxacum officinale), shepherd's purse (Capsella bursa-pastoris), purple dead-nettle (Lamium purpureum), ground ivy (Glechoma hederacea), and chickweeds (Cerastium vulgaratum, C. niusans, Stellaria media).

Thickets of small shrubs and tall coarse weeds border the forested bottoms, old fields, and trails. These thickets are composed of dogwood (Cornus spp.) brambles (Rubus spp.), smooth sumac (Rhus glabra), poison ivy (Toxicodendron radicans), burdock (Arctium minus), bergamot (Monarda fistulosa), wild lettuce (Lactuca floridana), giant hyssop (Agastache nepetoides), Jerusalem artichoke (Helianthus tuberosus), and brown-eyed Susans (Rudbeckia triloba).

10. DRY EXPOSED VERTICAL LIMESTONE. Crevices in the exposed vertical rock walls lining Flint Creek provide habitat for a few species adapted to such a harsh environment. Certainly the most distinctive member of this community is the cliff-brake (Pellaea glabella). Other members of this association include the spikenard (Aralia racemosa), columbine (Aquilegia canadensis), pellitory (Barbertaria pennsylvanica), and the rock-cresses (Arabis spp.).

11. MOIST SHADED VERTICAL LIMESTONE. This habitat is not frequent within the preserve. Only mosses, columbine, and bulblet fern (Cystopteris bulbifera) seem to utilize it.

12. WET OPEN MARGINS OF FLINT CREEK. A number of wetland species are found on the wet sandbars and banks of Flint Creek. This community includes the bulrush (Scirpus atrovirens), reed canary-grass (Phalaris arundinacea), sticktight (Bidens spp.), monkey-flower (Mimulus spp.), water pippernel (Lindernia dubia), duck stonecrop (Penthorum sedoides), bittercress (Cardamine pennsylvanica), speedwell ( Veronica peregrina), groundnut (Apios americana), and cockle-bur (Xanthium strumarium).

FLORISTIC COMPARISON

Comprehensive floristic surveys of three physiographically similar state preserves have been published in recent years: White Pine Hollow (Thorne, 1964), Brush Creek Canyon (Eilers, 1974), and Woodman Hollow (Niemand and Landers, 1974). These preserves are situated along small streams which have cut deep into sedimentary bedrock to produce a rugged, varied topography. Each harbors several forest communities as well as small bluffs-top prairie openings.

The geographic relationships of the four preserves presents opportunity for floristic comparison: White Pine Hollow (Dubuque County) and Brush Creek Canyon (Fayette County) are located in northeastern Iowa, Woodman Hollow (Webster County) is located in central Iowa, and Starr's Cave (Des Moines County) is located in southeastern Iowa.

A number of common forest and prairie species are found in all four preserves. A partial list of these would include white oak (Quercus alba), red oak (Quercus borealis), but oak (Quercus macrocarpa), shagbark hickory (Carya ovata), bitternut hickory (Carya cordiformis), black maple (Acer nigrum), butternut (Juglans cinerea), white ash (Fraxinus americana), green ash (Fraxinus pennsylvanica), hop-hornbeam (Ostrya virginiana), red cedar (Juniperus virginiana), maindenhair fern (Adiantum pedatum), lady fern (Athyrium angustum), Pennsylania sedge (Carex pensylvanica), bloodroot (Sanguinaria canadensis), Dutchman's-breeches (Dicentra cucullaria), bottle-brush grass (Hystrix patula), big bluestem (Andropogon gerardi), and leadplant (Amorpha canescens).

In contrast, each preserve possesses certain characteristic native species which distinguish it from the other preserves. The characteristic species of White Pine Hollow and Brush Creek Canyon are those whose presence in Iowa is restricted to the northeastern corner. The distributions of these species are centered in the coniferous forests of Canada and the Great Lakes region. A few are disjunct by several hundred miles. These species have been discussed at length by Thorne (1964), Hartley (1966), Eilers (1974), and Roosa and Eilers (1978).

The case at Starr's Cave is the opposite. The characteristic species here are those whose distributions in Iowa are restricted to the southeastern corner. Their floristic affinities lie with the Ozark Plateau, the southern Appalachians, or the Atlantic Coastal Plain.

Species which exhibit this pattern include the blue ash (Fraxinus quadrangulata), false hellebore (Veratrum woodii), sessile-leaved tick-trefoil (Desmodium sessilifolium), bush-clover (Lespedeza virginica), goat's-beard (Aruncus dioicus), climbing prairie rose (Rosa setigera), winter grape (Vitis cinerea), four-leaf milkweed (Asclepias quadrifolia), pagoda mint (Blephila ciliata), winged monkey-flower (Mimulus alatus), pale beard-tongue (Penstemon pallidus), Kentucky viburnum (Viburnum molette), black-jack oak (Quercus x bushii), woodland blue-eyed grass (Sisyrinchium angustifolium), hirsute sedge (Carex hirsutella), Short's sedge (Carex shortiana), purple-top (Tridens flavidus), and deer-tongue panic-grass (Panicum clandestinum).

Woodman Hollow is further removed from floristic centers in the east. The species which characterize it are rare or infrequent in central Iowa, but not infrequent in the northeastern corner of the state. These species have been discussed by Niemand and Landers (1974) and Peck (1976).

An attempt was made to quantitatively measure similarities among the reported floras of these preserves, using an empirical formula developed by zoologists to measure faunal resemblance (Simpson, 1960) which has previously been adapted to floristic studies (Eilers, 1971):

\[
FS% = \frac{C}{N_1 + N_2 - C} \times 100
\]

FS% = percent floristic similarity
C = number of taxa in common
N1 = number of taxa in first flora
N2 = number of taxa in second flora

The data used to calculate these similarity indices are tabulated on Table 2. From these data, the similarity values in Table 3 were calculated.

The exact significance of these indices is difficult to determine. The values seem rather low when compared to those reported by Eilers (1971). This is possibly due to the much larger areas involved in Eilers' (1971) comparison.
Based on phytogeographic factors, it was hypothesized that the reported floras of the three northern preserves (Brush Creek Canyon, White Pine Hollow, and Woodman Hollow) would resemble each other to a greater degree than any one would resemble the flora of Starr's Cave. The values on Table 3 would seem to substantiate this.

These preserves may also be compared by the number of taxa they harbor which are considered threatened or endangered in Iowa (Roosa and Ellers, 1978).

White Pine Hollow harbors twelve species considered endangered, nine considered threatened, and one of undetermined status. Brush Creek Canyon is refuge for two endangered and two threatened species. One endangered species, Dryopteris intermedia, was collected at Woodman Hollow in 1903 (Peck, 1976). It was not found by Niemann and Landers (1974).

No endangered species occur at Starr's Cave. Four species are threatened: blue ash (Fraxinus quadrangulata), winged monkey-flower (Mimulus alatus), winter grape (Vitis cinerea), and pagoda mint (Blephila ciliata). The status of sessile-leaved tick-trefoil (Desmodium sessilifolium) and flase pennyroyal (Isanthus brachiatius) is undetermined.

### ANNOTATED CATALOGUE

The catalogue of vascular plants which follows is based upon collections and observations made from 1975 to 1979. Intensive field study was conducted each week of the 1978 and 1979 growing seasons. Voucher specimens were collected for each species. Those collected during 1975 and 1976 are deposited in the Herbarium of Iowa State University; those from 1977-79 are deposited in the Herbarium of the University of Northern Iowa.

In the catalogue, plant families are arranged phylogenetically according to the system of Cronquist (1968). Species are arranged alphabetically within families. The nomenclature below class level follows Gleason and Cronquist (1963) except for the following taxa: Equisetophyta and Polypodiophyta (Peck, 1976), Poaceae (Pohl, 1966), and Carex (Gilly, 1946). In a few other instances, a binomial is employed which is considered more appropriate than that used by Gleason and Cronquist (1963). Their binomial is then given parenthetically. Vernacular names, in parentheses follow the scientific binomials.

Following each name is a subjective estimation of the local abundance of the species within the preserve, based upon five years of observation. Since these estimates are based upon field observations, valid estimates could not be made for a few species not easily recognized in the field. For these, the frequency estimate is omitted.

Four terms are used to describe abundance: common, frequent, infrequent, and rare. "Common" refers to a species which is dominant in a community or which occurs throughout a substantial portion of the preserve. "Frequent" indicates a species of repeated occurrence, but which is not dominant or widespread. "Infrequent" designates a species occasionally encountered, while "rare" is reserved for species of which only a small number of individuals could be located.

It should be emphasized that these designations apply only within the preserve and should not be confused with occurrence on a statewide or county-wide level.

The habitats in which a species has been observed are denoted by Arabic numerals corresponding to the section headings in the plant community descriptions.

Notes on the distribution within Iowa of rare species are appended as a brief paragraph. These notes are based upon specimens examined in the herbaria of Iowa State University, the University of Iowa, the University of Northern Iowa, Iowa Wesleyan College, and the former Parson's College. Species marked with an asterisk (*) are not considered indigenous to the preserve.

### EQUISETOPHYTA

#### EQUISETACEAE

*Equisetum arvense* L. (field horsetail) — infrequent; 12

*Equisetum hyemale* L. (scouring rush) — infrequent; 1, 12

### POLYPODIOPHYTA

#### OPHIOGLOSSACEAE

*Botrychium dissectum* Spreng. (grape fern) — rare; 2, 4. Both the *var. dissectum* and the *var. obliquum* (Muhl.) Clute occur here.

*Botrychium virginianum* L. (rattlesnake fern) — frequent; 2, 4, 7

### ADIANTACEAE

*Adiantum pedatum* L. (maidenhair fern) — frequent; 2, 3

*Pellaea glabella* Mett. (cliff-brake) — frequent; 10

### ASplenIACEAE

*Asplenium platyneuron* (L.) Oakes (ebony spleenwort) — infrequent; 2, 4

*Camptosorus rhizophyllus* (L.) Link (walking fern) — rare; 3

*Cystopteris bulbifera* (L.) Bernh. (bublet fern) — frequent; 3, 11

*Cystopteris prostrata* (Weatherby) Blasdell (creeping fragile fern) — common; 1, 2, 3, 4

*Dryopteris spinulosa* (O.F. Muell.) Watt. (spinulose wood fern) — rare; 2. The only known population in the county.

*Polystichum acrostichoides* (Michx.) Schott (Christmas fern) — infrequent; 2
PINOPHYTA

CUPRESSACEAE

Juniperus virginiana L. (red cedar) — common; 2, 4, 5, 6, 7, 8, 10

MAGNOLIOPHYTA: MAGNOLIOPSISDA

ARISTOLOCHIACEAE

Asarum canadense L. (wild ginger) — frequent; 2, 3

RANUNCULACEAE

Actaea alba (L.) Mill. (white baneberry) — frequent; 2, 4
Anemone virginiana L. (thimbleweed) — frequent; 4, 5, 6, 7
Anemonella thalictroides (L.) Spach (rue-anemone) — common; 2, 4, 5
Aquilegia canadensis L. (columbine) — common; 2, 3, 10, 11
Hepatica acutiloba DC (hepatica) — frequent; 2, 3
Isopyrum biternatum (Raf.) T. & G. (false rue-anemone) — infrequent; 1, 2, 3
Ranunculus abortivus L. (small-flowered crowfoot) — frequent; 1, 7, 9, 12
Ranunculus fascicularis Muhl. (tufted buttercup) — infrequent; 5, 6
Ranunculus septentrionalis Poir. (swamp buttercup) — frequent; 1, 7

BERBERIDACEAE

Podophyllum peltatum L. (may-apple) — common; 2, 4

MENISPERMACEAE

Menispermum canadense L. (moonseed vine) — common; 1

PAPAVERACEAE

Sanguinaria canadensis L. (bloodroot) — common; 1, 2, 3, 4

FUMARIACEAE

Dicentra cucullaria (L.) Bernh. (Dutchman’s-breeches) — common; 1, 2, 3, 4, 7

PLATANACEAE

Platanus occidentalis L. (sycamore) — common; 1

ULMACEAE

Celtis occidentalis L. (hackberry) — frequent; 1
Ulms rubra Muhl. (slippery elm) — common; 2, 4

MORACEAE

*Morus alba L. (white mulberry) — rare; 1
*Morus rubra L. (red mulberry) — infrequent; 1, 9

URTICACEAE

Laportea canadensis (L.) Wedd. (wood-nettle) — common; 1
Parietaria pennsylvanica Muhl. (pellitory) — frequent; 4, 5, 9, 10
Pilea pumila (L.) Gray (clearweed) — infrequent; 1
Urtica dioica L. (stinging nettle) — common; 1

JUGLANDACEAE

Carya cordiformis (Wang.) Koch (bitternut hickory) — common; 2, 4, 5
Carya ovata (Mill.) K. Koch (shagbark hickory) — very common; 2, 4, 5
Carya tomentosa Nutt. (mockernut hickory) — frequent; 2, 4, 5
Juglans cinerea L. (butternut) — infrequent; 1, 2
Juglans nigra L. (black walnut) — frequent; 1, 2, 4

FAGACEAE

Quercus alba L. (white oak) — very common; 2, 4, 5
Quercus bicolor Willd. (swamp white oak) — infrequent; 1
Quercus borealis Michx. f. (red oak) — common; 2, 3, 4, 5
Quercus x bushii Sarg. (blackjack oak) — rare; 5
True blackjock oak of the southern United States (Q. marilandica Muenchh.) does not reach Iowa in a genetically pure condition. The blackjock oak found in southeastern Iowa is a hybrid population derived from Q. marilandica and Q. velutina. This hybrid is discussed at length by Cooperrider (1954).
Quercus imbricaria Michx. (shingle oak) — frequent; 1, 2, 3, 4, 5, 7
Quercus macrocarpa Michx. (bur oak) — common; 1, 2, 4, 5, 7
Quercus prinoides Willd. var acuminata (Michx.) Gl. (chestnut oak) — frequent; 2, 5
Quercus velutina Lam. (black oak) — common; 4, 5

BETULACEAE

Betula nigra L. (river birch) — frequent; 1, 7
Carpinus caroliniana Walt. (blue beech) — frequent; 2, 3
Osrya virginiana (Mill.) K. Koch (hop-hornbeam) — very common; 2, 3, 4, 5, 7

CHENOPODIACEAE

*Chenopodium album L. (goosefoot) — frequent; 9
Chenopodium standleyanum Aellen (goosefoot) — infrequent; 1, 2, 7

AMARANTHACEAE

*Amaranthus albus L. (redroot pigweed) — infrequent; 9
*Amaranthus graecizans L. (prostrate pigweed) — infrequent; 9

PORTULACAEAE

Claytonia virginica L. (spring-beauty) — common; 1, 2, 3, 4, 5, 7
*Portulaca oleracea L. (purslane) — infrequent; 9

CARYOPHYLLACEAE

Cerastium nutans Raf. (nodding chickweed) — infrequent; 9
*Cerastium vulgatum L. (mouse-ear chickweed) — infrequent; 8, 9
*Saponaria officinalis L. (bouncing-bet) — infrequent; 9, 12
Silene nivea (Nutt.) Ottl. (white campion) — rare; 12
The only known population in the county.
Silene stellata (L.) Ait. f. (starry campion) — infrequent; 2, 4, 7
*Stellaria media (L.) Cyr. (chickweed) — infrequent; 9

POLYGONACEAE

Polygonum scandens L. (false buckwheat) — infrequent; 1, 9
Rumex acetosella L. (sour dock) — infrequent; 8
Tovara virginiana (L.) Raf. (Polygonum virginianum L.) (jumpseed) — infrequent; 1
**HYPERICEAE (GUTTIFERAE)**

*Hypericum punctatum* Lam. (spotted St. John's-wort) — infrequent; 5, 6, 8

**TILIACEAE**

*Tilia americana* L. (basswood) — common; 2, 3, 4

**CISTACEAE**

*Helianthemum bicknellii* Fern. (frostone) — rare; 6

*Lechea tenuifolia* Michx. (pinweed) — frequent; 6

**VIOLACEAE**

*Viola eliocarpa* Schw. (yellow violet) — common; 1, 2, 4

*Viola pedata* L. (bird's-foot violet) — frequent; 6. Two distinct color forms occur at Starr's Cave. The first possesses corollas which are uniformly light lavender. This phase is restricted to the southeastern comer, where it is known from Appanoose, Henry, Jefferson, Muscatine, Van Buren, and Washington Counties. A few individuals were collected in the parking lot on dry sand. They most likely are recently introduced from outside the preserve. This species was first collected in Iowa in 1938, and is known from sandy prairies in Des Moines, Henry, Lee, Louisa, and Polk Counties.

*Viola sagittata* Ait. (arrowleaf violet) — very rare; 6

*Viola sororia* Wild. (woolly blue violet) — common; 1, 2, 4, 7

**SALICACEAE**

*Populus deltoides* Marsh. (cottonwood) — common; 1

*Salix amygdaloides* Anders. (peach-leaf willow) — frequent; 1

*Salix interior* Rowlee (sand-bar willow) — common; 1, 12

*Salix rigida* Muhl. (heart-leaf willow) — common; 1, 12

**BRASSICACEAE (CRUCIFERAE)**

*Arabis canadensis* L. (sicklepod) — infrequent; 5, 10

*Arabis hirsuta* (L.) Scop. (rock-cress) — infrequent; 5, 10

*Arabis laevigata* (Muhl.) Poir. (rock-cress) — rare; 3, 10

*Arabis shortii* (Fern.) Gl. (rock-cress) — infrequent; 1

*Barbara vulgaris* R. Br. (mustard) — infrequent; 9

*Capsella bursa-pastoris* (L.) Medic. (shepherd's-purse) — Cardamine pennsylvanica Muhl. (bittercress) — infrequent; 9, 12

*Dentaria laciniata* Muhl. (toothwort) — common; 2, 3, 4

*Descurainia pinnata* (Walt.) Britt. var. brachypoda (Rich.) Fern. (tansy-mustard) — rare; 9

*Thlaspi arvense* L. (penny-cress) — infrequent; 9

**CRASSULACEAE**

*Penthorum sedoides* L. (ditch stonecrop) — infrequent; 12

**SAXIFRAGACEAE**

*Mitella diphylla* L. (bishop's-cap) — rare; 3

*Ribes corymbati* L. (dogberry) — infrequent; 3, 10

*Ribes missourienne* Nutt. (gooseberry) — common; 1, 2, 4, 5, 7

**ROSAEAE**

*Agrimonia gryposepala* Wallr. (agrimony) — common; 2, 4, 7

*Agrimonia pubescens* Wallr. (agrimony) — common; 2, 4, 7

*Amelanchier arborea* Michx. f. (shadbush) — frequent; 2, 4, 5

*Aruncus dioicus* (Walt.) Fern. (goat's-beard) — infrequent; 2, 3, 10

*Geum canadense* Jacq. (white avens) — frequent; 2, 4, 7

*Geum laciniatum* Murr. (rough avens) — infrequent; 1, 12

*Phycocarpus opulifolius* (L.) Maxim. (nine-bark) — frequent; 5

*Potentilla simplex* Michx. (cinquefoil) — frequent; 5, 6

*Prunus serotina* L. (choke cherry) — common; 2, 4, 5, 10

*Rosa caroliana* L. (wild rose) — infrequent; 6

*Rosa multiflora* Thunb. (multiflora rose) — infrequent; 7, 8


*Rubus allegheniensis* Porter (blackberry) — common; 1, 7, 8, 9

*Rubus occidentalis* L. (black raspberry) — common; 1, 7, 8, 9

**CAESALPINIACEAE (LEGUMINOSAE)**

*Cassia fasciculata* Michx. (partridge pea) — infrequent; 6

*Cercis canadensis* L. (redbud) — common; 1, 2, 3, 4

**FABACEAE (LEGUMINOSAE)**

*Amorpha canescens* Pursh (leadplant) — frequent; 5, 6

*Apis americana* Medic. (groundnut) — rare; 12

*Astragalus canadensis* L. (milkvetch) — infrequent; 5, 6

*Desmodium cupiatum* (Muhl.) Loud. (tick-trefoil) — frequent; 2, 4, 5, 7

*Geum canadense* L. (coppertone) — the var. *cupiatum* and the var. *longifolium* (T. & G.) Schub. occur here.

*Desmodium glutinosum* (Muhl.) Wood (tick-trefoil) — common; 2, 4

*Desmodium paniculatum* (L.) DC (tick-trefoil) — frequent; 5, 6, 7, 8

*Desmodium sessilifolium* (Torr.) T. & G. (sessile-leaved tick-trefoil) — rare; 5, 6. This species has been collected previously in the state only in Lee County, in 1923 and 1953. Another station in Des Moines County was discovered in 1978. Its status in Iowa is considered undetermined but of concern (Roosa and Eilers 1978).

*Lespedeza virginica* L. Britt. (bush-clover) — rare; 6. Range in Iowa restricted to the southeastern corner.

*Medicago lupulina* L. (black medic) — infrequent; 8, 9

*Melilotus alba* L. (white sweet-clover) — frequent; 6, 7, 8, 9

*Melilotus officinalis* L. (Virginia creeper) — frequent; 6, 7, 8, 9

**EUPHORBIACEAE**

*Euphorbia corollata* L. (flowering spurge) — frequent; 5, 6, 8

*Euphorbia corollata* L. (flowering spurge) — frequent; 5, 6, 8

*Euphorbia preslii* Guss. (noding spurge) — infrequent; 9

**VITACEAE**

*Parthenocissus quinquefolia* (L.) Planch. (Virginia creeper) — common; 2, 4, 5, 7

*Portenocissus vitacea* (Kern) Hitchc. (woodbine) — rare; 5


*Vitis riparia* Michx. (riverbank grape) — frequent; 1, 12
LINACEAE
Linum sucatum Riddell (yellow flax) — infrequent; 6

POLYGALACEAE
Polygala verticillata L. (whorled milkwort) — rare; 6

STAPHYLEACEAE
Staphylea trifolia L. (bladdernut) — frequent, 2, 3, 4, 5

HIPPOCASTANACEAE
Aesculus glabra Willd. (buckeye) — frequent; 2, 3

ACERACEAE
Acer negundo L. (box elder) — frequent; 1, 7, 9
Acer nigrum Michx. f. (black maple) — infrequent; 1, 2
Acer saccharinum L. (silver maple) — common; 1
Acer saccharum Marsh. (sugar maple) — common; 2, 3

ANACARDIACEAE
Rhus glabra L. (smooth sumac) — common; 5, 6, 7, 8
Toxicodendron radicans (L.) Kuntze (Rhus radicans L.) (poison ivy) — common; 1, 7, 8, 9

RUTACEAE
Ptelea trifoliata L. (wafer-ash) — frequent; 2, 4, 5, 7
Zanthoxylum americanum Mill. (prickly-ash) — infrequent; 1, 2, 4, 5

OXALIDACEAE
Oxalis stricta L. (yellow wood-sorrel) — frequent; 7, 8, 9
Oxalis violacea L. (violet wood-sorrel) — rare; 5, 6

GERANIACEAE
Geranium maculatum L. (cranesbill) — frequent; 2, 3, 4

BALSAMINACEAE
Impatiens balsamina Walt. (orange jewelweed) — infrequent; 1, 12
Impatiens pallida Nutt. (yellow jewelweed) — infrequent; 1, 12

ARALIACEAE
Aralia racemosa L. (spikenard) — infrequent; 2, 10

APIACEAE (UMBELLIFERAE)
Chaerophyllum procumbens (L.) Crantz. (chervil) — infrequent; 1
*Conium maculatum L. (poison hemlock) — infrequent; 9
Cryptotaenia canadensis (L.) DC (honestwort) — infrequent; 1, 2, 4
*Daucus carota L. (wild carrot) — infrequent; 8, 9
Osmorhiza claytonii (Michx.) Clarke (sweet cicely) — common; 2, 3, 4, 7
Sonchus canadensis L. (black snakeroot) — common; 2, 4, 7
Sisicula gregaria Bickn. (black snakeroot) — common; 2, 4, 7
Taenidia integrirtima (L.) Drude (yellow pimpernel) — rare; 5
Thaspium barbinode (Michx.) Nutt. (meadowparsnip) — infrequent; 1, 2, 4

ASCLEPIADACEAE
Asclepias quadrifolia Jacq. (four-leaf milkweed) — rare; 5. Range in Iowa restricted to the southeastern corner.
Asclepias tuberosa L. (butterfly milkweed) — very rare; 6. The only known population in the county.
Asclepias verticillata L. (whorled milkweed) — infrequent; 6, 8

SOLANACEAE
Physalis heterophylla Nees (hairy ground-cherry) — infrequent; 6, 8
Physalis longifolia Nutt. var. subglabrata (Mack. & Bush) Cronq. (smooth ground-cherry) — rare; 8
Solanum nigrum L. (black nightshade) — infrequent; 8, 9

POLEMONIACEAE
Phlox divaricata L. (phlox) — common; 2, 4, 5
Polemonium reptans L. (Jacob’s-ladder) — frequent; 2, 4

HYDROPHYLLACEAE
Ellisia nyctalea L. (nyctalea) — infrequent; 1, 9, 12
Hydrophyllum appendiculatum Michx. (waterleaf) — infrequent; 1, 3
Hydrophyllum virginianum L. (waterleaf) — frequent; 1, 2, 4

BORAGINACEAE
Hackelia virginiana (L.) Johnston (beggar’s lice) — frequent; 2, 4
Lithospermum canescens (Michx.) Lehm. (puccoon) — rare; 6.
The only known population in the county.
Mertensia virginica (L.) Pers. (blue-bells) — frequent; 2

VERBENACEAE
Phyla lanceolata (Michx.) Greene (frogfruit) — infrequent; 12
Verbena stricta Vent. (wooly vervain) — frequent; 6, 8, 9
Verbena urticaefolia L. (white vervain) — frequent; 1, 7, 9

PHRYMACEAE
Phryma leptostachya L. (loosestrife) — common; 1, 2, 4

LAMIACEAE (LABIATAE)
Agastache nepetoides (L.) Ktze. (giant hyssop) — rare; 9
Blephila ciliata (L.) Benth. (pagoda mint) — infrequent; 1, 7.
*Glechoma hederacea L. (ground ivy) — infrequent; 1, 9
Hedeoma hispida (Michx.) Ktze. (hairy ground-cherry) — infrequent; 6, 8
Hedeoma pulegioides (L.) Pers. (western pennyroyal) — infrequent; 6
Hedeoma purpurea (Michx.) Pers. (eastern pennyroyal) — rare; 5
Isanthus brachiatius (L.) BSP (false pennyroyal) — rare; 10
*Lamium purpureum L. (purple dead-nettle) — infrequent; 9. This introduced Eurasian species has not been reported from Iowa. I have collected it at four other locales in Des Moines County. The only other Iowa collection that could be located is an undated collection from Johnson County in the Iowa State University herbarium.
*Leonurus cardiaca L. (motherwort) — infrequent; 7, 9
Monarda fistulosa L. (bergamot) — frequent; 1, 4, 7, 8, 9
Prunella vulgaris L. (selfheal) — frequent; 6, 7, 8, 9
Pycnanthemum pilosum Nutt. (woolly mountain-mint) — infrequent; 6

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Scutellaria ovata Hill (skullcap) — infrequent; 2, 4
*Verbascum thapsus* L. (germander) — frequent; 1, 5, 6, 8, 9, 12

**PLANTAGINACEAE**

*Plantago aristata* Michx. (bottle-brush plantain) — rare; 6
*Plantago virginica* L. (hoary plantain) — infrequent; 6, 8

**OLEACEAE**

*Fraxinus americana* L. (white ash) — frequent; 2, 4, 5
*Fraxinus pennsylvanica* Marsh. (green ash) — common; 1, 2, 4, 7
*Fraxinus quadrangulata* Michx. (blue ash) — infrequent; 2, 5.
10. This species of the Ozark Plateau is restricted in Iowa to Lee and Des Moines Counties in the extreme southeastern corner of the state. It is considered threatened by Roosa and Eilers (1978).

**OROBRANCHACEAE**

*Orobanche uniflora* L. (cancer-root) — very rare; 5. This species is a root parasite. Its host at Starr’s Cave is *Ostrya virginiana*. This species was observed only in 1976 and 1979, and may not produce aerial shoots each year.

**ACANTHACEAE**

*Ruellia humilis* Nutt. (wild petunia) — infrequent; 5, 6

**SCROPHULARIACEAE**

*Aureolaria grandiflora* (Benth.) Pennell var. *pulchra* Pennell (false foxglove) — frequent; 5, 6
*Gerardia tenaxifolia* Vahl. (slender gerardia) — infrequent; 5, 12
*Lindernia dubia* (L.) Pennell (water pimpernel) — rare; 12
*Mimulus rigens* L. (common monkey-flowers) — infrequent; 12
*Penstemon pallidus* Small (pale beard-tongue) — rare; 6. Range in Iowa restricted to the southeastern corner.
*Scrophularia marilandica* L. (figwort) — frequent; 1, 2, 4
*Verbascum thapsus* L. (mullein) — infrequent; 8, 9
*Veronica peregrina* L. (speedwell) — infrequent; 12
*Veronicastrum virginicum* (L.) Farw. (culver’s-root) — infrequent; 5, 6

**CAMPANULACEAE**

*Campanula americana* L. (bell-flower) — frequent; 1, 7, 9

**LOBELIACEAE**

*Lobelia inflata* L. (Indian tobacco) — frequent; 4, 5, 6, 12
*Lobelia spicata* Lam. (pale lobelia) — infrequent; 5, 6
*Lobelia syphilitica* L. (great blue lobelia) — infrequent; 12

**RUBIACEAE**

*Galium aparine* L. (cleavers) — common; 1, 4, 7, 9
*Galium circaeaeis* Michx. (wild licorice) — common; 2, 4, 5
*Galium concinnum* T. & G. (shining bedstraw) — common; 2, 4, 5
*Galium triflorum* Michx. (fragrant bedstraw) — common; 2, 4, 5

**CAPRIFOLIACEAE**

*Lonicera bella* Zabel (belle honeysuckle) — frequent; 7, 8
*Lonicera morrowi* Gray (Morrow’s honeysuckle) — frequent; 7, 8
*Lonicera pusiifera* (Kirchner) Rehder (grape honeysuckle) — frequent; 3, 5, 10
*Symphoricarpos orbiculatus* Moench (buckbrush) — common; 4, 5, 7, 8, 9
*Triosteum perfoliatum* L. var. *perfoliatum* (horse gentian) — infrequent; 4, 7
*Viburnum opulus* L. var. *opulus* (snowball bush) — infrequent; 7

**ASTERACEAE (COMPOSITAE)**

*Achillea millefolium* L. (yarrow) — infrequent; 6, 9
*Ambrosia artemisifolia* L. (little ragweed) — infrequent; 9
*Anaphalis trifida* L. (giant ragweed) — infrequent; 9
*Antennaria neglecta* Greene (pussy-toes) — infrequent; 5, 6
*Antennaria plantaginifolia* (L.) Hook. (pussy-toes) — frequent; 5, 6
*Arctium minus* (Hill.) Bernh. (burdock) — frequent; 7, 9
*Artemisia annua* L. (wormwood) — infrequent; 9. The only known population in the county.
*Aster laevis* L. (smooth aster) — frequent; 5, 6
*Aster novae-angliae* L. (New England aster) — rare; 6
*Aster pilosus* Willd. (pilo aster) — frequent; 5, 6
*Aster shortii* Lindl. (Short’s aster) — frequent; 2, 4, 5
*Bidens cernua* L. (stickgights) — infrequent; 12
*Bidens comosa* (Gray) Wieg. (B. *trirpartita* L., in part) (stickgights) — infrequent; 12
*Bidens frondosa* L. (stickgights) — frequent; 12
*Cacalia atriplicifolia* L. (Indian plantain) — infrequent; 5, 6
*Cirsium altissimum* (L.) Spreng. (tall thistle) — infrequent; 8, 9
*Cirsium discolor* (Muhl.) Spreng. (field thistle) — infrequent; 9
*Cirsium vulgare* (Savi) Tenore (bull thistle) — infrequent; 9
*Echinacea pallida* Nutt. (purple cone-flower) — infrequent; 6.

The only population in the county.
*Erigeron annuus* (L.) Pers. (daisy fleabane) — frequent; 6, 8, 9
*Erigeron philadelphicus* L. (Philadelphia fleabane) — infrequent; 5, 7, 8
*Eupatorium purpureum* L. (Joe-Pye weed) — infrequent; 1, 2, 12
*Eupatorium rugosum* Houtt. (white snakeroot) — common; 2, 4, 5
*Helianthus autumnale* L. (sneezeweed) — infrequent; 12
*Helianthus strumosus* L. (woodland sunflower) — common; 4, 5, 6, 7, 8
*Helianthus tuberosus* L. (Jerusalem artichoke) — infrequent; 1, 9
*Hieracium scabrum* Michx. (hawkweed) — rare; 5, 6
*Krigia biflora* (Walt.) Blake (false dandelion) — infrequent; 6
*Kuhnia eupatorioides* L. (false boneset) — rare; 6
*Lactuca floridana* (Gaertn.) Greene (pussy-toes) — infrequent; 5, 6
*Polymnia canadensis* L. (leaf-cup) — infrequent; 2, 3
*Prenanthes alba* L. (rattlesnake-root) — frequent; 2, 3, 4, 5
*Ratibida pinnata* (Vent.) Barnh. (yellow cone-flower) — rare; 6
*Rudbeckia hirta* L. (black-eyed Susan) — common; 6, 8
*Rudbeckia hirta* L. (brown-eyed Susan) — frequent; 9, 12
*Senecio pauperculus* Michx. (ragwort) — infrequent; 6, 8
*Silphium integrifolium* Michx. (rosinweed) — infrequent; 6
*Silphium perfoliatum* L. (cup plant) — infrequent; 9, 12
*Solidago canadensis* L. (Canada goldenrod) — frequent; 8
*Solidago flexicaulis* L. (zig-zag goldenrod) — frequent; 2, 3
*Solidago nemoralis* Ait. (gray goldenrod) — frequent; 5, 6

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*Taraxacum officinale* Weber (dandelion) — common; 7, 8, 9
*Xanthium strumarium* L. (cockle-bur) — infrequent; 9, 12

**MAGNOLIOPHYTA: LILIOPSIDA**

**ARACAEAE**

*Arisaema triphyllum* (L.) Schott (Jack-in-the-pulpit) — common; 1, 2, 3, 4

**COMBELLINACEAE**

*Commelina communis* L. (Asiatic day-flower) — rare; 9
*Tradescantia ohiensis* Raf. (spiderwort) — infrequent; 6, 8

**JUNCACEAE**

*Juncus tenuis* Wild. (path rush) — frequent; 8, 9

**CYPERACEAE**

*Carex blanda* Dewey (woodland sedge) — common; 1, 2, 4, 7
*Carex cephalophora* Muhl. (oval-headed sedge) — 4, 5
*Carex davisi* Schw. & Torr. (Davis’ sedge) — infrequent; 1, 9
*Carex granularis* Muhl. (meadow sedge) — 1, 2
*Carex hirsutella* Mackenzie (hirsute sedge) — infrequent; 5, 6.

Range in Iowa restricted to the southeastern corner: Davis, Decatur, Henry, Lee, Van Buren, and Wapello Counties.
*Carex hirtifolia* Mackenzie — 4
*C. meadii* Dewey (Mead’s sedge) — frequent; 6
*C. normalis* Mackenzie (larger straw sedge) — 4, 5
*C. pensylvanica* Lam. (Pennsylvania sedge) — common; 2, 4, 5
*C. rosea* Schkuhr (stellate sedge) — common; 2, 3, 4
*C. shortiana* Dewey (Short’s sedge) — infrequent; 1, 9
*C. typhina* Michx. (cattail sedge) — rare; 1
*Cyperus filiculmis* Vahl. (slender cyperus) — rare; 6
*Scirpus atrovirens* Willd. (dark-green bulrush) — frequent; 12
*Scirpus lineatus* Willd. (S. lineatus Michx.) (reddish bulrush) — rare; 6. A small clump of plants occurs on moist sandy clay soil in one of the prairie openings, an unusual habitat for a bulrush. Ordinarily, this species inhabits "... swamps or boggy prairie areas, or along ponds and streams." (Gilly 1946). However, Steyermark (1963) includes "... wet limestone glades and ledges." among the habitats in which it occurs in Missouri.

**POACEAE (GRAMINEAE)**

*Agropyron repens* (L.) Beauv. (quack-grass) — infrequent; 8, 9
*Agrostis alba* L. (redtop) — infrequent; 8, 9, 12
*Agrostis perennans* (Walt.) Tuck. (upland bentgrass) — rare; 5
*Andropogon gerardi* Vitman (big bluestem) — frequent; 6
*Andropogon scoparius* Michx. (little bluestem) — frequent; 6
*Arisiada olingantha* Michx. (three-awn) — frequent; 6
*Bromus inermis* Leyss. (smooth brome) — frequent; 8, 9
*Bromus japonicus* Thunb. (Japanese brome) — infrequent; 8
*Bromus pubescens* Muhl. (woodland brome) — common; 2, 4
*Bromus tectorum* L. (downy brome) — frequent; 8, 9
*Dactylis glomerata* L. (orchard grass) — frequent; 8
*Echinocloa crus-galli* (L.) Beauv. (barnyard grass) — frequent; 1, 8, 9, 12
*Elymus canadensis* L. (Canada wild-rye) — infrequent; 6
*Elymus villosus* Muhl. (hairy wild-rye) — infrequent; 1
*Elymus virginicus* L. (Virginia wild-rye) — frequent; 1
*Festuca elatior* Biebler (woodland fescue) — common; 2, 4
*Hystrix patula* (L.) Moench. (bottle-brush grass) — frequent; 2, 4, 5

*Leersia virginica* Wild. (whitegrass) — infrequent; 2
*Muhlenbergia frondosa* (Poir.) Fern. (muhly) — infrequent; 1
*Muhlenbergia sobolifera* (Muh.) Trin. (muhly) — infrequent; 2
*Panicum depauperatum* Muhl. (depauperate panic-grass) — rare; 6. Known in Iowa only from a few widely scattered locations: Clayton, Black Hawk, Dickinson, Emmet, Muscatine, Story, Webster, and Winneshiek Counties.
*Panicum implicatum* Scribn. (prairie panic-grass) — frequent; 5, 6, 8
*Panicum praecox* Hitchcock & Chase (early panic-grass) — infrequent; 6
*Panicum scribnerianum* Nash (Scribner’s panic-grass) — frequent; 5, 6
*Phalaris arundinacea* L. (reed canary-grass) — infrequent; 12
*Phleum pratense* L. (timothy) — infrequent; 8
*Poa annua* L. (annual blue-grass) — infrequent; 1, 9
*Poa compressa* L. (Canada blue-grass) — frequent; 5, 6, 7, 8, 9
*Poa pratensis* L. (Kentucky blue-grass) — common; 5, 6, 7, 8, 9
*Sphenopholis obtusata* (Michx.) Scribn. var. major (Torr.) Erdman (weeds-grass) — infrequent; 2
*Tridens flavus* L. (Hitchcock (purpletop) — infrequent; 6. Range in Iowa largely confined to the southeastern quarter.

**LILIACEAE**

*Allium canadense* L. (wild onion) — infrequent; 5, 6
*Asparagus officinalis* L. (asparagus) — infrequent; 8, 9
*Smilacina racemosa* (L.) Desf. (false Solomon’s-seal) — common; 2, 3, 4
*Smilas hispida* Muhl. (greenbrier) — infrequent; 1, 2, 7
*Trillium nivale* Riddell (snow trillium) — infrequent; 3
*Trillium recurvatum* Beck. (toadshade) — frequent; 1, 2, 4
*Uvularia grandiflora* Sm. (bellwort) — common; 2, 3
*Veratrums woodii* Robbins (false heliobore) — rare; 3. Range in Iowa restricted to the extreme southern counties: Appanoose, Davis, Decatur, Henry, Jefferson, Lee, Monroe, Van Buren, and Wayne Counties. This species apparently does not flower each year. I have observed eight populations in four counties over three growing seasons and never observed flowering or fruiting plants.

**AMARYLLIDACEAE**

*Hypoxis hirsuta* (L.) Cov. (yellow star-grass) — rare; 6

**IRIDACEAE**

*Sisyrinchium campestre* Bickn. (prairie blue-eyed grass) — infrequent; 6

**ORCHIDACEAE**

*Corallorhiza odontorhiza* (Willd.) Nutt. (coral-root orchid) — very rare; 5. The only known population in the county.
*Niemann’s (1975) discussion of this saprophyte’s ecology correlates well with my observations at Starr’s Cave.

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ACKNOWLEDGMENTS

Appreciation is expressed to the Iowa State Preserves Advisory Board for financial support of this study, and to Dr. Lawrence J. Eilers, Dr. James H. Peck, and Dean M. Roosa for assistance and encouragement in the preparation of this manuscript. The assistance of Jean C. Prior, Dr. William Furnish, Michael Bounk, and Brian Witzke, of the Iowa Geological Survey, in the interpretation of the geology of the preserve is gratefully acknowledged. Andrew Hollander made available the photograph in Figure 1, and Barbara Dumkrieger prepared the map in Figure 2. The support and encouragement of my wife Diane, who also typed the manuscript, is especially acknowledged.

REFERENCES


