A FLORISTIC STUDY OF APPLE RIVER CANYON STATE PARK IN THE WISCONSIN DRIFTLESS DIVISION

by

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I hereby recommend that the thesis prepared under my supervision by

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Entitled

A FLORISTIC STUDY OF APPLE RIVER CANYON STATE PARK

IN THE WISCONSIN DRIFTLESS DIVISION

be accepted in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE

Robert H. Mohlenbrock
In Charge of Thesis

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DEDICATION

To the following naturalists this paper is warmly dedicated:

Professor John W. Voigt, a friend and scholar, who shared his wisdom and love of the tall-grass prairie with this student for nearly a decade.

Professor Robert H. Mohlenbrock, a gentleman and noted authority on the Illinois flora, who encouraged this student to challenge the canyon vegetation.

Professor Donald Ugent, curator of the Southern Illinois University Herbarium, who as a teacher and professional botanist has been and will continue to be an inspiration.

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Much of this work stands upon the many notable finds of such previous collectors as A. Chase, N. C. Fassett, F. J. Hermann, R. A. Evers, E. W. Fell, G. N. Jones, H. E. Ahles, G. D. Fuller, T. G. Hartley, R. H. Mohlenbrock, G. S. Winterringer, V. O. Graham, D. K. Evans, A. C. Koeling, J. H. Peck, J. Hinkley, C. J. Sheviak and M. Bowles.

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This collector equally expresses his sincere appreciation to all the curators and assistant curators of the numerous herbaria that were visited during the course of the study. My appreciation is similarly extended to all the local landowners. Without the cooperation of these landowners, accessibility to the canyon basin would have been more hazardous, if not impossible.

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RECOMMENDATIONS

History shows that this small picturesque area was initially set aside as a state park, through the joint efforts of county residents and state conservation officials. This action was taken because of its rich natural state. If the vegetation of Apple River Canyon State Park and the remaining canyon primeval are to be protected from the changing socioeconomic and political pressures that once nearly destroyed its rich vegetational features, then all of the park should not be treated as a public recreational area, nor as a state forest. Its best vegetational features should be treated as a nature preserve to forever serve people with relaxation, wonderment, and an insight into the unspoiled operations of the natural environment.

This writer is presently unaware of any equal-sized area within the boundaries of our state that houses the number of federal- and state-listed endangered or threatened plant species finding refuge in the canyon. The great loss and continued destruction by man of vegetal habitats elsewhere in Illinois has greatly increased the need for sanctity of this biological monument and only further emphasizes the rarity of such wisdom known and practiced by ever so few.

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INTRODUCTION

Northwest of the glaciated plains of central Illinois lies a deep, water-filled gorge carved by glacial stream erosion through Ordovician bedrock. Embraced by steep talus slopes and by laterally resistant dolomite formations, the sides of the canyon vary up to 200 feet. The cool, rapidly flowing interior canyon stream is commonly shaded by a mixed mesophytic canopy. Remnant native populations of white pine (*Pinus strobus* L.)[1] among temperate deciduous genera such as *Quercus*, *Acer* and *Tilia* mark the southwestern limits of their more northern distribution. These plants occur along the open bluff crests and steep talus slopes of this deeply dissected terrain. Sprawling entanglements of Canada Yew (*Taxus canadensis* Marsh.) mats the more northerly exposed slopes and protected, cool ravines, exemplifying the region's more boreal affinities with the Canadian flora.

Since the early botanical explorations by W. S. Moffatt and H. S. Pepoon, the Apple River Canyon State Park area of northwestern Illinois has been widely recognized for its diverse habitats, rich flora and most interesting plant assemblages. Subjected to erosional forces for millions of years, the state park and Apple River Canyon have

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1. Nomenclature used follows that of Mohlenbrock, 1975, and *The Illustrated Flora of Illinois*, 1967-1982, by the same author.

become a mosaic of loess-covered forested uplands, calcareous cedar glades, hill prairies, crags, pinnacles, dolomite cliffs, talus slopes, springy shaded ravines, marshy floodplains and stream margins. This diversity of habitats provides one of the most interesting floristic compositions of the Illinois flora.

Since the late 1800's this unique area has widely and repeatedly drawn professional botanists and amateurs alike, in search of distinctive floristic elements of the central and upper Midwest. Many plants found among the picturesque or rugged canyon habitats are rare or have a restricted distribution in the state. Included are Sullivanti renifolia Rosend., Circaea alpina L., Adoxa moschatellina L., Primula mistassinica Michx., Hackelia americana (Gray) Fern., Schizachne purpurpascens (Torr.) Swallen., and Solidago sciaphila Steele. Many of these are essentially limited in Illinois distribution to the Wisconsin Driftless Division of the northwest corner of the state. In many cases they are only presently extant or known to have existed in Illinois in the canyon area. Many collections by previous collectors or by this author that currently hold a state endangered or threatened status in Illinois include Carex communis Bailey, Laythrus ochroleucus Hook, Panax quinquefolius L., Equisetum scirpoides Michx., Oryzopsis thomasii Sarg., Mimulus glabratus HBK. var fremontii (Benth.) Grant., and Agropyron subsecundum (Link) Hitchc.

Perhaps of particular interest to the Driftless Area collector of adjacent Wisconsin and the Nebraskan drift region of northeastern Iowa and southeastern Minnesota are such finds as Carex diandra Schrank., Diarrhena americana Beauv., Cornus drummondii Meyer, Jeffersonia

diphylla (L.), Pers., Corallorhiza odontorhiza (Willd.) Nutt., Lysimachia quadriflora Sims., Lindera benzoin (L.) Blume, Poa trivialis L., Carex laevivaginata (Kukenth) Mack., Chaerophyllum procumbens (L.) Crantz., Napaea dioica L., Salix sericea Marsh., and Prananthes crepidinea Michx.

During the growing seasons of 1981, 1982 and intermittently in 1983 and subsequent winter months, literature, herbaria and extensive field work were conducted to develop an annotated catalogue of vascular plants that grow spontaneously within the boundaries of the study area, to recognize the important habitats and the plants associated with them, to enumerate the major plant community stands, and to investigate floristic relationships and the Pleistocene history of the area. During the course of this thirty-month study of the vascular flora, 628 taxa of 339 genera of 97 families were observed or collected. It is predicted the list will eventually exceed 700 or 750 with continued research.

LOCATION

The total research area is approximately 1,250 acres, of which 296.79 are owned by the Illinois Department of Conservation with the remaining acreage in private ownership. Presently the state-owned portion is separated into three parcels with a 147-acre state park existing in the northernmost sections. The latest land acquisitions within the canyon remain undeveloped with relative undisturbed habitats. Apple River Canyon State Park is located in most of E 1/2, SW 1/4, and S 1/2, SE 1/4 of Section 4 and W 1/2, NE 1/4, NW 1/4, of

Section 9 and E 1/2, NW 1/4, SE 1/4 of Section 8 and N 1/2, NW 1/4, and N 1/2, and N 1/2, NW 1/4, NE 1/4 of Section 17 of Rush Township in the northeastern corner of Jo Daviess County. The approximate coordinates are 90°03'30" west longitude and 42°22'30" north latitude. The study area is approximately twenty-five miles west of Freeport, Illinois, thirty-five miles east of Dubuque, Iowa, twenty-five miles north of Mt. Carroll, Illinois and four miles south of the Wisconsin-Illinois state line (Figure 1).

CLIMATE

According to Page (1949), variation is the principal climatic feature of northwest Illinois. Located at the crossroads of three major continental air masses, there is an annual temperature difference of more than 43.3 degrees C. from summer maximums to winter lows. Meteorologists characterize the northwest corner of the state as having a severe mid-continental type with very cold winters and moderately hot summers.

Although no satisfactorily long-range weather records are available from the immediate project area, Freeport and Mt. Carroll, Illinois, show about 33 inches of well-distributed precipitation per year. Over 50 percent of this falls during the growing season, which extends from May through September. Northwest Illinois generally receives the greatest amount of snowfall in the state. The annual average is slightly more than 35 inches, and a record high of more than 70 inches has been recorded at Mt. Carroll during the winter of 1925-26.

Freeport and Mt. Carroll reported an average January temperature of 6.5 degrees C., and an average July temperature of 21.5 degrees C.

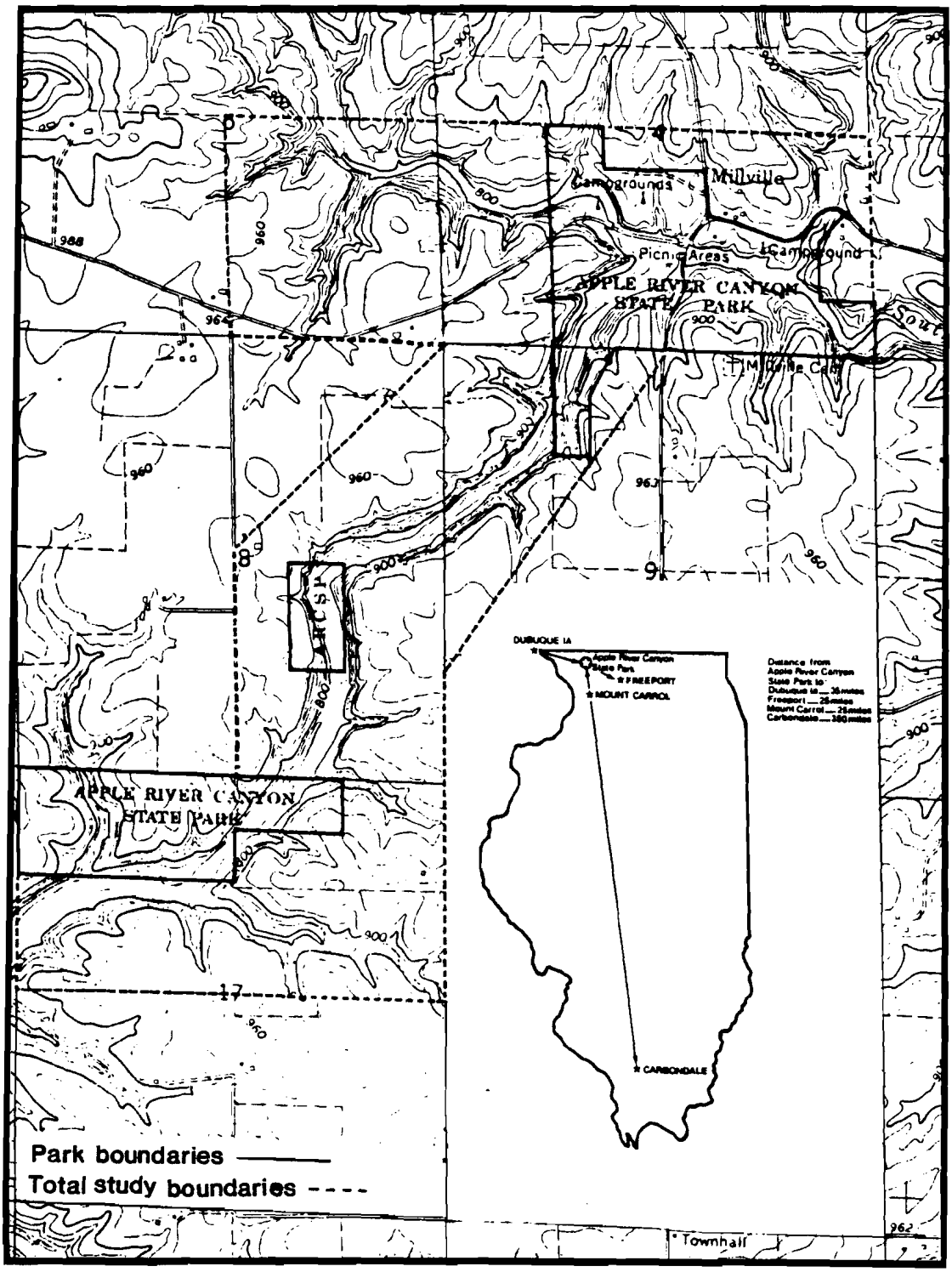

Figure 1. Location of the study area, the park boundary, and the total study area boundary.

An official Illinois low of -37.2 degrees C. was recorded at Mt. Carroll on January 22, 1930. The record high for Mt. Carroll of 42.2 degrees C. occurred July 2, 1936. Freeport and Mt. Carroll report approximately 152 frost-free days, with the average first killing frost occurring around October 6, and the average last killing frost on approximately May 7. Freeport reported the earliest killing frost in the state on August 30, while Mt. Carroll and Freeport share the Illinois record for the latest killing frost on June 8. Dubuque, Iowa, located approximately thirty-five miles due west along the Mississippi River, reports 182 frost-free days. Dubuque lies at a river level of 592 feet. This is 388 feet less than the highest land features of the immediate park area. The growing season on consecutive frost-free days, therefore, probably parallels that of Freeport and Mt. Carroll.

The physical features of the canyon undoubtedly impose a direct influence upon the diversity of plants and plant communities of the immediate area. Contrasting microclimates exist between the open, dry canyon bluff tops and the cool, late-spring frost-pocketed ravines. These conditions of the canyon provide for distinctive habitats supporting specialized plant assemblages in interesting juxtaposition.

GEOLOGY, PHYSIOGRAPHY, AND TOPOGRAPHY[2]

The Apple River Canyon area has had a long and interesting history of development. Located along the southeastern margin of the Driftless

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2. Papers by Trowbridge and Shaw (1916), Trowbridge (1921), Willman and Frye (1969), Frye, Glass et al. (1969), and Willman and Kolata (1978) have been especially helpful in the preparation of this section.

Area, the at least recent, nonglaciated region has some of the most rugged and scenic landscapes in Illinois. The study area lies on the southward projection of the Wisconsin Arch, a broad uplift centered in north-central Wisconsin. Bedrock consists of about 1900 feet of Paleozoic limestone, dolomite, sandstone and shale. For perhaps 225 million years, since the recession of the warm land-locked Silurian seas laid down these sedimentary formations, erosional forces have been cutting away great thicknesses of the paleozoic beds throughout the region. During the Pliocene Epoch, late Tertiary, about 2 to 7 million years ago, the region was reduced to a featureless erosional surface called the Dodgeville Peneplain. Although the Dodgeville Peneplain has largely been eroded away in the immediate project area, remnants can still be found throughout the county on flat-topped ridges and isolated knobs as Silurian representations of the highest land features in Illinois today.

After the Dodgeville Peneplain was formed, the region was again uplifted and another erosional surface called the Lancaster Peneplain was eroded on the bedrock strata, and apparently coincides with the top of the Galena Group and remnants of Maquoketa Shale in the canyon area.

The present topography of Apple River Canyon State Park is largely the result of this extensive erosional history and stream dissection of the Lancaster Peneplain during Pleistocene glaciations. Although glacial till analysis of the surrounding local Pleistocene events provide complex and everchanging views, continuous research by glacial geologists show evidence that an Illinoisan glacial front advanced westwardly blocking the pre-Illinoisan southeasterly flow of Apple

River. This blockage, aided by a resistant dolomite divide, eventually culminated in the formation of a glacial lake. With the continuous flow of water from the west branch of Apple River, from the north by Clear Creek, and the substantial addition of glacial meltwaters from the reversed southeast fork, the impounded water overflowed the drainage divide, releasing torrents of water and glacial debris through the narrow outlet. Continued erosion drained the lake and carved nearly a straight gorge through the Ordovician bedrock enroute southwest to the Mississippi River Valley.

The spectacular scenery of the area is the result of this briefly discussed evolutionary development and the present, destructive, erosional forces of the three headwater tributaries that have adopted the canyon drainage route by glacial diversion. This author was very much impressed to observe the volume of wind and water that fills the narrow canyon basin during summer flash floods, resulting in a tremendous flow of water that scours the stream and lower bank margins. This huge volume and velocity uprooted large trees and eroded banks, leaving behind a collection of scattered flood debris hanging aloft 30 feet or more on such flexible woody genera as Salix and Cornus.

Similarly, during the course of the field work, I was equally impressed by the steady mass-wasting of weathered rock material from the steep talus slopes and exposed bluff crests. This continuous gravity-compelled movement resulted in the accumulation of large piles of earth and giant dolomite boulders strewn along the canyon basin.

SOILS[3]

Soil scientists have mapped approximately 70 percent of the study area. Based on the complex interactions of climate, parent material, vegetation and time, the mass of detailed information available is organized in such a way as to be readily useful to farmers, engineers and other land-use planners, but it provides only limited applications to plant ecologists in correlating vegetational patterns of the area. Due to the general nature of the pedogenic processes involved, the dominant soil associations are briefly discussed by recognizing the present-day operative soil categories.

The majority of Jo Daviess soils are composed of silt-sized particles of aeolian sediments known as "loess." Loess covers most of the upland regions of the county, with its thickest deposits on the bluffs bordering the Mississippi River and gradually becoming thinner eastward toward the Apple River Canyon area. Most glacial geologists believe these alluvial deposits were wind-distributed over the Driftless Area during the Wisconsin Period of the Pleistocene Era and have since developed under prairie and forest vegetation into the briefly described soil associations found today on the research area.

The Fayette-Rozette association is composed of moderately well-drained to well-drained soils occupying the gentle to steep slopes in the project area. This association is comprised of deep, light-colored soils with moderately developed subsoil horizons that have formed in loess greater than five feet thick under forest vegetation. The Rozette soils generally lie on broader ridgetops than the well-drained

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3. This section was paraphrased from information received from the Jo Daviess County Soil Conservation Service.

Fayette soils. Both are geographically associated with the prairie-influenced Downs soils and the prairie-forest transitional Atterberry soils that occupy similar positions along the canyon uplands that are largely under extensive agricultural use.

The Palsgrove-Dubuque-Dunbarton-Sogn association comprises the dominant soil association of the steep, rugged terrain. The association is a variety of light-colored soils, having developed primarily in loess under forest vegetation with bedrock within its profile. The major soils of this association differ mainly in the thickness of their sola and depths to bedrock. Limestone occurs at 40- to 60-inch depths in Palsgrove soils, 20- to40-inch depths in Dubuque soils and less than 20-inch depths in Dunbarton soils. Sogn soils have a thin surface horizon resting directly on limestone and the surface color is usually darker than the other soils of this association. The Palsgrove-Dubuque-Dunbarton-Sogn association occupies the steep talus slopes, bluff crests and dolomite cliffs where organic accumulation is possible.

The soils of the stream margins, floodplains and lower picnic grounds are largely composed of the cobbly variant of the Dorchester silt loam. This dark-colored, well-drained bottomland variant is comprised of cobblestone and flagstone of chert and dolomite at depths of between two and four feet. The coarse-textured alluvium derived from the canyon upland outcroppings and talus slopes are generally filled with silty surface layers that have eroded into the canyon basin.

HABITATS AND ASSOCIATED PLANTS

The diversity of habitats of Apple River Canyon have long attracted professional interest and warrants a brief consideration of the principal plant community stands and characteristic vegetal components. Rattlesnake Ridge, Steamboat Rock, Robber's Den, Dead Horse Hole, Mammoth Rock, Miner's Gulley, Tower Rock and Clear Creek are a few of the figurative descriptions that allude to the diversity of natural features found throughout the study area. The major content of the descriptions are largely based on the field notes and observations made during the growing seasons of 1981 and 1982.

The rolling and flat-topped uplands are occupied by hardwood forest as described by Pepoon (1910, 1919) and adjacent southwest Wisconsin by Curtis (1959). This forest is dominated by Quercus, particularly Quercus alba and Quercus ellipsoidalis with an infrequent appearance of Quercus velutina. Frequent scattered associates include Quercus macrocarpa, Carya ovata, Carya cordiformis, Populus tremuloides, Populus grandidentata and Prunus serotina. The understory is a thicket of Corylus americana, Cornus racemosa, Zanthoxylum americanum, Prunus americana, Ribes missouriensis, Rubus occidentalis and Rubus allegheniensis. Quercus rubra, Tilia americana, Fraxinus americana, Acer saccharum, Ostrya virginiana, Carpinus caroliniana and Ulmus rubra are frequent invaders from the more protected talus slopes, adjacent ravines and lower undulating uplands. Pinus strobus, Juniperus virginiana and Quercus muhlenbergia are occasional intruders from the more xeric open bluff tops and ridge crests along the canyon rim. The open bluff tops and ridge crests provide an open habitat for Juniperus

virginiana, Quercus muhlenbergia, Quercus ellipsoidalis, Pinus strobus, Quercus rubra, Quercus macrocarpa, Populus tremuloides and Populus grandidentata. Especially abundant on the steep "hogback" ridge crests, the dominance of Juniperus virginiana on this loess over dolomite closely approaches the cedar glade community as described by Curtis (1959) of the prairie-forest province of southwestern Wisconsin. Occupying these rocky calcareous openings are numerous prairie grasses and forbs that include Ceanothus americanus, Amorpha canescens, Lobelia spicata, Solidago rigida, Petalostemum purpureum, Carex meadii, Carex eburnea, Sorghastrum nutans, Rudbeckia hirta, Monarda fistulosa, Panicum leibergii, Danthonia spicata, Aster azureus, Bouteloua curtipendula, Schizachyrium scoparium, Andropogon gerardii, Agropyron trachycaulum, Hypoxis hirsuta and Sisyrinchium campestre. Other interesting finds by this author or previous collectors include Agropyron subsecundum, Salix humilis, Bromus kalmii and Habinara viridis.

The vertical cliffs, pinnacles and ledges along the more southerly and southwesterly exposures provide a rather well-drained habitat for numerous calcicolus plants. Specially adapted to this wind-blown environment are Pinus strobus and Juniperus virginiana that cling to the highest vertical precipices along the three headwater tributaries and central canyon gorge. Growing out of the cracks and crevices of the steep canyon walls, they are often accompanied by such arborescent and shrubby species as Rhamnus lanceolata, Quercus muhlenbergia, Potentilla fruiticosa, Ribes cynosbati, Cornus rugosa, Rhus typhina, Viburnum rafinisquianum and Prunus virginiana. Herbaceous plants of this dry perpendicular habitat include Solidago bicolor, Galium

boreale, Pellaea glabella, Carex blanda, Carex eburnea, Aquilegia canadensis, Zigadenus glaucus, Campanula rotundifolia and the locally rare Cheilanthes feei. Abundant vines that stream down from the bluff crests or crawl up the dolomite formations are Menispermum canadense, Clematis virginiana, Toxicodendron radicans, Celastrus scandens, Vitis riparia, Lonicera prolifera and Parthenocissus quinquefolia.

Perhaps one of the most noteworthy habitats of the rugged canyon is the north-facing dolomite cliff that is supplied with a continuous flow of water from upland springs. Typically covered by a rich carpet of mosses and liverworts, this rich habitat supports such characteristic vascular plants as Cystopteris bulbifera, Cystopteris protrusa, Cryptogramma stelleri, Sullivantia renifolia, Mitella diphylla, Arabis hirsuta, Fragaria americana, Aralia racemosa, Saxifraga pennsylvanica, Solidago sciaphila, Rubus strigosus, Pilea pumila, Primula mistassinica, and Asplenium rhizophyllum. Equally found are such interesting marsh or aquatic plants as Glyceria striata, Cardamine pennsylvanica, Poa palustris, Senecio aureus, Caltha palustris, Lysimachia quadrifolia and such Driftless Area rarities as Carex diandra, Carex laevivaginata and Prenanthes crepidinea.

Of special interest are the lower north-facing, mossy, steep talus slopes and protected cool, loamy ravines. Constantly saturated with cold spring seepage, the damp, mossy ravine over-hangs are typically covered with a sprawling mat of Taxus canadensis. Occasionally Pinus strobus breaks the closed mesophytic canopy dominated by an Acer saccharum-Tilia americana forest. Other trees of this more "boreal" habitat appearing on the ravine bases and lower slopes include

Quercus rubra, Fraxinus americana, Juglans cinerea, Ostrya virginiana and Fraxinus nigra. The characteristic shrubby understory includes Hamamelis virginiana, Staphylea trifoliata, Cornus alternifolia, Dirca palustris, Carpinus caroliniana, and less frequently, Viburnum trilobum. The lower slopes and ravine bases are commonly studded with large dolomite boulders that have become dislodged from the uplands, forming a deep, loamy, rocky environment for ferns, sedges and spring wildflowers too numerous to list here. Apparently restricted to this mossy, damp habitat are Liparis loesilii, Panax quinquefolia, Carex careyana, Athyrium pycnocarpon, Matteuccia struthiopteris and Oryzopsis racemosa. Other notable finds previously recorded from this rare habitat include Carex communis, Equisetum scirpoides, Dryopteris goldiana and Gymnocarpon dryopteris.

Compared to the mature Acer saccharinum-Fraxinus pennsylvanica-Ulmus americana bottomland forest of the upper Mississippi River valley as described by Curtis (1959), a rather weakly developed southern hardwood forest type occurs on the interior alluvial floodplains of Apple River Canyon. Depending upon the degree of organic accumulation and local drainage patterns, the bottomland forest can vary from a typical wet Salix forest to an Acer saccharum-Tilia americana forest at the base of the steep slopes and bluffs. Salix interior, Salix nigra and Salix rigida are common thicket formers along the stream margins wth Acer negundo and the introduced Morus alba occasionally present. Less common are Populus deltoides, Acer saccharinum, Fraxinus pennsylvanica and Cornus stolonifera. On the more intermediate drainage sites large remnants of Ulmus americana lie

prostrate at the base of impressive healthy specimens of Celtis occidentalis with common occurrences of Morus rubra, Ulmus rubra, and less frequent, Ulmus thomasii and Juglans nigra. While the interior canyon floodplain valley is a spectacular, luxuriant growth of spring wildflowers, the summer growth of tangling vines and pure stands of Laportea canadensis makes travel extremely slow.

On the submature floodplain valley of Clear Creek the natural meandering of the stream has allowed for the formation of an open oxbow marsh community that is supplied by continuous seepage of cool spring water from the adjacent dolomite bedrock. Transitional in nature, the aquatic environment is presently an open, clear, shallow pond typically covered with a summer mat of Lemna minor and Spirodela polyrhiza and scattered populations of Glyceria canadensis, Alisma subcordatum, Sagittaria latifolia and Scirpus atrovirens. Salix sericea, Salix bebbiana, Cornus obliqua and Cornus alternifolia comprise the woody dominants along the littoral zone with large tussocks of Cyperaceae, particularly Carex vulpinoidea, Carex laevivaginata, Carex hystricina and Eleocharis erythropoda matting the wet shoreline beneath the open shrubby canopy. Other scattered shrubs and herbaceous plants of local importance include Sambucus canadensis, Ribes americanum, Zanthoxylum americanum, Glyceria striata, Poa palustris, Leersia oryzoides, Calamagrostis canadensis, Phalaris arundinacea, Asclepias incarnata, Eupatorium perfoliatum, Aster prenanthoides, Lycopus americanus, Epilobium adenocaulon, Rumex verticilatus, Cardamine bulbosa and Penthorum sedoides.

The stream margin community of Apple River Canyon and its three headwater tributaries are characterized by a large number of nonindi-

genous plants presumably washed into the canyon by heavy periodic floods from upland fields, roadsides, farmyards and other disturbed sites. The droughty, rocky habitat, composed largely of dolomite and chert cobbles filled with eroded silty surface layers, is subject to rapid change in the addition and deletion of species. The severe scouring action and frequent silt deposition restrict this floral assemblage to a similar composition typical of disturbed places throughout the study area. The list is very long, but a few common ruderals include Barbarea vulgaris, Daucus carota, Actium minus, Amaranthus retroflexus, Melilotus officinalis, Taraxacum officinale, Rumex acetosella, Chenopodium album, Mysoton aquaticum, Polygonum aviculare and Lychnis alba. Native plants of the shallow stream waters and margins include Zosterella dubia, Juncus tenuis, Scirpus acutus, Scirpus atrovirens, Bidens cernua, Scutellaria lateriflora, Polygonum hydropiperoides, Mimulus ringens, Nasturtium officinale, Scirpus validus and Phalarus arundinacea.

VEGETATION: HISTORY AND FLORISTICS

Vegetationally, the mature, dissected, erosional surface of northwest Illinois has been characterized by Braun (1950) and many others as a mosaic of unlike types and ages. This vegetation is represented by transitional and intergrading plant communities resulting from the meeting and interlocking of various floristic elements in climatic response to the catastrophic events of Pleistocene and post-Pleistocene history. Gleason (1923) recognized five floristic elements of the midwest flora and their respective centers of distribution and further speculated on their subsequent alternating routes

of migration as accorded by glacial climates versus modern climates. Pollen studies of the midwest by Voss (1933, 1934, 1937, 1939), Fuller (1935, 1939), Hansen (1937, 1939), Sears (1932, 1942), Griffen (1951) and many others have provided evidence of floristic displacements of tundra, coniferous forest, grasslands and deciduous elements in response to fluctuating climates. These interpretations suggested a dynamic shift of more boreal elements from the north in response to the advancing glaciers. Presumably these more northern forms were replaced by more southern elements, predominantly Quercus, by subsequent long, warm, dry interglacial or post-Pleistocene periods. Gleason (1923) was among the first investigators to suggest that grassland species migrated eastward from centers in the Great Plains in response to this warm, dry climate. He envisioned grassland vegetation between the northward migration of coniferous forests and the appearance of deciduous hardwood elements from the south. A pollen profile in Illinois by Griffin (1951) shows two long periods of low tree pollen frequency with a marked increase in grass pollen, indicating prairie invasion. Radio-carbon dates by Ruhe and others (1957) for a pollen profile in north-central Iowa dated the basal spruce zone at 11,725 ±200 years B.P. The transition from conifers to deciduous species occurred 8,140 ±200 years B.P. Jones and Beavers (1964) estimated a period of 5,133 years of widespread prairie throughout Illinois based on accumulative quantity of opal phytolith material present in the soils of central Illinois.

Perhaps one of the most enigmatic subjects concerning the diversity of floristic groups present today in the Driftless Area of the

upper midwest is how much of a refuge it provided the migrating biota during succeeding glacial incursions. The entire question of the periglacial climate is involved. Shimek (1948), Thorne (1964) and others believe that the severe climate during the several subsequent glacial stages must have caused a nearly complete migration or elimination of the interglacial biotas. Fernald (1925), Fassett (1931), Curtis (1959) and others suggest in view of the full range of floristic elements present today and the relative high degree of endemism, the most reasonable hypothesis to assume is that our major community dominants survived the glacial advances in or near the nonglaciated region and subsequently spread from that center to repopulate the surrounding glaciated areas. Undoubtedly, the land surface immediately adjacent to the ice front was influenced by temperatures of ice sheets, but considerable uncertainty exists as to the distance over which such an effect might persist. Schell (1961) and Bryson and Wendland (1966) indicated the great elevations and high albido produced an extreme drop over the ice sheet to a mean of about -60 degrees C. to -70 degrees C., which in turn caused an intensification of anticyclonic circulation over the ice. Manley (1955) reported a mean temperature decrease by as much as 18 degrees C. at the ice border. Periglacial phenomena at the ice border in northern Illinois by Sharp (1942) and permafrost features in southern and western Wisconsin by Black (1965) of the Wisconsin glacial stage indicate at least a 15 degree C. decrease to a mean annual temperature at least as low as -5 degrees C., which is the maximum temperature at which sporadic permafrost can form.

In view of the abnormal cold and aridity of the Quaternary and its climatic oscillations, this author is inclined to agree with the view that a nearly complete migration of the interglacial biota occurred with only the persistence of isolated relics of a once more-extended distribution. Furthermore, it is plausible to assume that the climatic shifts have not operated equally in all types of habitats and the persistence of isolated species on restricted habitats have since been proceeding toward extinction, holding their own or are spreading locally from the Driftless region as post-glacial migrants.

ANNOTATED CATALOGUE OF VASCULAR PLANTS

The major content of this catalogue is derived from the author's collections, field notes and observations during the growing seasons of 1981 and 1982 with intermittent collecting during the summer of 1983. Collections from other botanists are cited for only those not collected by this author. Those cited from the various herbaria are indicated by the abbreviated symbols: F, IA, ILL, ILLS, ISM, SIU and WIS. All taxa were verified by the author with the exception of J. H. Peck's fern and fern allies collections which were largely accepted as verbatim from personal correspondence. The author's collections were placed in the herbarium at Southern Illinois University at Carbondale.

A brief description of habitat and an indication of frequency of occurrence is given for each taxon. In many cases these statements reflect only the author's growing field experience; the following scale was used:

Frequent . . . . . .20 or more observations

Occasional . . . . . .10-19 observations

Infrequent . . . . . 5-9 observations

Rare . . . . . 1-4 observations

Species not native to the area are indicated by an asterisk (*).

Lycopodiaceae (Club-moss Family)

Lycopodium digitatum A. Br. Trailing Ground Pine. Collected by J. H. Peck #78-1205; personal correspondence.

Lycopodium lucidulum Michx. Shining Club Moss. Collected by J. H. Peck #78-1204; personal correspondence.

Equisetaceae (Horsetail Family)

Equisetum arvense L. Common Horsetail. 530,856. Found in a variety of habitats, open upland woods, talus slopes, floodplains and stream margins; frequently observed.

Equisetum hyemale L. var. affine (Englm.) A. A. Eaton. Scour-Rush. 376. Rich upland, talus slopes, floodplains and stream margins; frequently observed.

Equisetum laevigatum A. Br. Smooth Scouring Rush. Collected by J. Hinkley s. n. (SIU), no habitat given.

Equisetum scirpoides Michx. Dwarf Scouring Rush. Collected by J. H. Peck #78-1208; personal correspondence.

Ophioglossaceae (Adder's-tongue Family)

Botrychium multifidum (Gmel.) Rupr. ssp. silaifolium (Presl) Clausen. Leathery Grape Fern. Collected by J. H. Peck #78-1209; personal correspondence.

Botrychium virginianum (L.) Sw. Rattlesnake Fern. 295, 576, 624. Rich wooded uplands, slopes and adjacent ravines; frequently observed.

Osmundaceae (Royal Fern Family)

Osmunda claytoniana L. Interrupted Fern. 127, 742. Rich upland woods, slopes and ravines; frequently observed.

Adiantaceae (Maidenhair Family)

Adiantum pedatum L. Maidenhair Fern. 196, 197. Rich upland woods, slopes and ravines; frequently observed.

Cheilanthes feei Moore. Slender Lip Fern. Collected by E. W. Fell #10491 (ISM), "vertical limestone cliffs, rare".

Cryptogramma stelleri (S. G. Gmel.) Prantl. Slender Rock Brake. 300. Mossy north-facing dolomite cliffs; occasionally observed.

Pellaea glabella Mett. ex Kuhn. Smooth Cliff Brake. 260, 261. Rich talus slopes and dolomite cliffs; frequently observed.

Polypodiaceae (Polypody Family)

Polypodium virginianum L. Common Polypody. 959, 960. Wooded talus slope; rarely observed.

Dennstaetiaceae (Hay-scented Fern Family)

Pteridium aquilinum (L.) Kuhn var. latiusculum (Desv.) Underw. Bracken Fern. 232. Open upland woods and adjacent fields; frequently observed.

Thelypteridaceae (Beech Fern Family)

Thelypteris palustris Schott. var. pubescens (Laws.) Fern. Marsh Fern. Collected by G. D. Fuller #9922 (ILL), "wet places, common".

Aspleniaceae (Spleenwort Family)

Athyrium angustum (Willd) Presl. Lady Fern. 335. Rich upland woods, slopes and adjacent ravines; frequently observed.

Athyrium pycnocarpon (Spring.) Tidestrom. Glade Fern. 984. Local on north-facing wooded slopes and ravines; rarely observed.

Athyrium thelypterioides (Michx.) Desv. Silvery Spleenwort. 1008. Rich upland woods, slopes and ravines; frequently observed.

Camptosorus rhizophyllus (L.) Link. Walking Fern. 183. Mossy dolomite ledges. rich wooded uplands and slopes; frequently observed.

Cystopteris bulifera (L.) Link. Bladder Fern. 198, 199, 200. Most abundant fern of the canyon; frequently observed on a variety of moist habitats, especially dolomite ledges and talus slopes.

Cystopteris protusa (Weatherby) Blasdell. Fragile Fern. 124, 188, 997. Rich upland woods, slopes, ravines and moist dolomite cliffs; frequently observed.

Cystopteris X tennesseensis Shaver. Tennessee Fragile Fern. 203. Occasionally observed with the two putative parents.

Dryopteris carthusiana (Villars) H. P. Fuchs. Spinulose Shield Fern. 393, 728, 729. Rich uplands, slopes and adjacent rich ravines; frequently observed.

Dryopteris goldiana (Hook.) Gray. Goldie's Fern. Collected by J. H. Peck #78-1210; personal correspondence.

Gymnocarpon dryopteris (L.) Newm. Oak Fern. Collected by J. H. Peck #78-1212 (SIU), "deep shaded ravine".

Matteuccia struthiopteris (L.) Todaro var. pennsylvanica (Willd.) Mart. Ostrich Fern. 385. North-facing lower talus slopes and rich ravines; infrequently observed.

Onoclea sensibilis L. Sensitive Fern. 452. Rich Upland woods and floodplains; infrequently observed.

Polystichium acrostichoides (Michx.) Schott. Christmas Fern. 990, 991. Rich wooded talus slope; rarely observed.

Woodsia obtusa (Spring.) Torr. Common Woodsia. 623. Scattered throughout; on talus slopes and dolomite ledges; occasionally observed.

Taxaceae (Yew Family)

Taxus canadensis Marsh. Canada Yew. 398, 531.532. Rich uplands; slopes and ravines; frequently observed with affinities for north exposures.

Pinaceae (Pine Family)

Pinus strobus L. White Pine. 588, 810. Scattered throughout on uplands; steep slopes and adjacent ravines; frequently observed. Planted populations equally present.

Cupressaceae (Cypress Family)

Juniperus virginiana L. Red Cedar. 327. Occurring virtually on all terrestrial habitats; uplands, slopes, cliffs and roadsides; frequently observed.

Alismaceae (Water-plantain Family)

Alisma subcordatum Raf. Small-flowered Plantain. 738. Stream margins and marshy borders; occasionally observed.

Sagittaria latifolia Willd. Common Arrowleaf. 679, 681. Stream margins and marshy borders; occasionally observed.

Poaceae (Grass Family)

*Agropyron repens (L.) Beauv. Witch Grass. 829. Weed of upland fields, cliffs and roadsides; frequently observed.

Agropyron subsecundum (Link) Hitchc. Bearded Wheat Grass. Collected by H. E. Ahles #4458 (ILL), "open bluff tops".

Agropyron trachycaulum (Link) Malte. Slender Wheat Grass. 830. Open uplands along the canyon rim; rarely observed.

Agrostis alba L. (incl. var. palustris (Huds.) Pers. 917.) Redtop. 378. Wide range of habitats; open uplands to

marshy borders; frequently observed.

Agrostis hyemalis (Walt.) BSP. Tickle Grass. 765. Scattered throughout on dry open habitats, especially cliffs and upland fields; frequently observed.

Agrostis scabra Willd. Tickle Grass 831. Open to rich rocky uplands and talus slopes; infrequently observed.

Andropogon gerardii Vitman. Big Bluestem. 404. Local along open uplands and adjacent fields; frequently observed.

Bouteloua curtipendula (Michx.) Torr. in Emory. Side-oats Grama. 826. Open uplands and more southerly exposed talus slopes; frequently observed.

Brachyeltrum erectum (Schreb.) Beauv. Long-awned Wood Grass. 692. Rich upland woods, slopes and ravines; frequently observed.

*Bromus commutatus Schrad. Hairy Chess. 297. Stream margins; infrequently observed.

*Bromus inermis Leyss. Hungarian Brome Grass. 244. Weed of old fields, roadsides and stream margins; frequently observed.

Bromus kalmii Gray. Prairie Brome Grass. Collected by H. E. Ahles #4457 (ILL), "open bluff tops".

Bromus pubescens Muhl. ex Willd. Canada Brome Grass. 262, 292. Rich wooded uplands, slopes and floodplains; frequently observed. Perplexingly intergrading to the following species?

Bromus purgans L. Brome Grass. 659. Found on similar habitats as Canada Brome; frequently observed.

Calamagrostis canadensis (Michx.) Beauv. Blue-joint Grass. 958.

Moist dolomite cliffs, alluvial woods and marshy borders; frequently observed.

Cinna arundinacea L. Stout Wood Reed. 412. Moist dolomite cliffs, talus slopes and floodplains; frequently observed.

*Dactylis glomerata L. Orchard Grass. 248. Weed of old fields, roadsides and stream margins; frequently observed.

Danthonia spicata (L.) Beauv. ex Roem & Schult. Open uplands along the canyon rim and dry roadsides; frequently observed.

Diarrhena americana Beauv. (incl. var. obovata Gleason. 942.) Beak Grass. 460, 469, 880. Rich rocky uplands and floodplain terraces; a very distinctive rare plant.

*Digitaria ischaemum (Schreb.) Schreb. ex Muhl. Smooth Crab Grass. 825. Weed of picnic grounds, fields and roadsides; frequently observed.

*Digitaria sanguinalis (L.) Scop. Crab Grass. 433. Weed of picnic grounds, roadsides and fields; frequently observed.

*Echinochloa pungens (Poir.) Rydb. Barnyard Grass. 420. Scattered throughout on moist roadside ditches, stream margins and dolomite cliffs; frequently observed.

Elymus hystrix L. Bottlebrush Grass. 313, 314, 701. Rich wooded uplands, talus slopes and ravines; frequently observed.

Elymus villosus Muhl. in Willd. Slender Wild Rye. 688, 789. Rich upland woods, talus slopes and ravines; frequently observed.

Elymus virginicus L. Virginia Wild Rye. 788, 827. Moist dolomite cliffs, alluvial woods and stream margins; frequently

observed.

*Eragrostis cilianensis (All.) Mosher. Stink Grass 787. Weed of roadsides, picnic grounds and stream margins; frequently observed.

Eragrostis frankii C. A. Meyer ex Steud. Sandbar Love Grass. Collected by V. O. Graham #9915 (ISM); "roadside, common".

Eragrostis hypnoides (Lam.) BSP. Creeping Love Grass. Collected by V. O. Graham #9910 (ISM); "roadside, common".

Eragrostis pectinacea (Michx.) Nees. Small Love Grass. 832, 833. Roadsides, picnic grounds and stream margins; frequently observed.

Festuca obtusa Biehler. Nodding Fescue. 304, 614, 646. Rich upland woods, talus slopes and moist dolomite cliffs; frequently observed.

*Festuca pratensis Huds. Meadow Fescue. 176, 245, 834. Upland fields and roadsides; frequently observed.

Glyceria grandis S. Wats. ex Gray. Reed Manna Grass. 628. Locally occurring in open marshy area adjacent to Clear Creek; occasionally observed.

Glyceria striata (Lam.) Hitchc. var. stricta (Scribn.) Fern. Fowl Manna Grass. 645. Wet dolomite cliffs, springy ravines and stream margins; frequently observed.

Hordeum jubatum L. Squirrel-tail Grass. 320. Dry roadsides and dry dolomite cliffs; frequently observed.

Leersia oryzoides (L.) Sw. Rice Cutgrass. 791. Marshy borders, stream margins and wet dolomite cliffs; frequently observed.

Leersia virginica Willd. White Grass. 790. Rich upland woods, slopes and floodplains; frequently observed.

*Lolium perenne L. English Rye Grass. 242. Moist upland campgrounds and roadsides; occasionally observed.

Muhlenbergia frondosa (Poir.) Fern. Common Satin Grass. 462, 919 920. Alluvial woods, moist dolomite cliffs and roadsides; frequently observed.

Muhlenbergia mexicana (L.) Trin. Leafy Satin Grass. 836, 921. Talus slopes, alluvial woods, marshy borders and moist dolomite cliffs; frequently observed.

Muhlenbergia schreberi Gmell. Nimblewill. 835. Roadsides, picnic grounds and roadsides; frequently observed.

Muhlenbergia sobolifera (Muhl.) Trin. Rock Satin Grass. 792 Rich talus slopes and ravines; occasionally observed.

Muhlenbergia sylvatica (Torr.) Torr. in Torr. & Gray. Woodland Stain Grass. Collected by R. A. Evers #34973 (ILLS), "riverbank".

Oryzopsis racemosa (J. E. Smith) Ricker in Hitchc. Blackseeded Rice Grass. 390, 837. Local on north-facing talus slopes and ravines; frequently observed.

Panicum capillare L. Witch Grass. 440, 463, 766. Dolomite cliffs, roadsides, fields and stream margins; frequently observed.

Panicum latifolium L. Broad-leaved Panic Grass. 793. Rich upland woods, slopes and ravines; frequently observed.

Panicum lanuginosum Ell. var. fasiculatum (Torr.) Fern. Panic Grass. 922. Open upland woods and sparsely wooded slopes; frequently observed.

Panicum liebergii (Vasey) Scribn. Prairie Panic Grass. 128, 612, 812. Open upland woods and more southerly exposed talus slopes; frequently observed.

Panicum praecocius Hitchc. & Chase. Panic Grass. 225, 275. 685. Open upland woods, sparsely wooded slopes and fields; frequently observed.

Phalaris arundinacea L. Reed Canary Grass. 647. Marshy borders, alluvial woods, lower bases of moist cliffs and stream margins; frequently observed.

*Phleum pratense L. Timothy. 247, 298. Weed of fields, roadsides and stream margins; frequently observed.

*Poa annua L. Annual Bluegrass. 878. Weed of picnic grounds, roadsides and stream margins; frequently observed.

*Poa compressa L. Canada Bluegrass. 879. Open upland woods, dolomite cliffs, roadsides and picnic grounds; frequently observed.

Poa palustris L. Fowl Bluegrass. 1003, 1004. Marshy borders, wet lower bases of dolomite cliffs and alluvial woods; frequently observed.

*Poa pratensis L. Kentucky Bluegrass. 88, 150. Virtually all terrestrial habitats; frequently occurring.

Poa sylvestris Gray. Woodland Bluegrass. Collected by G. D. Fuller #10495 (ISM); "shaded roadside".

Poa trivialis L. Rough-stalked Bluegrass. Collected by R. A. Evers #30066 (ILLS); "spring".

Schizachne purpurascens (Torr.) Swallen. False Melic Grass. Collected by F. J. Hermann #8896 (WIS); "rich elm woods, moist calcareous slope".

Schizachyrium scoparium (Michx.) Nash in Small. Little Bluestem. 828. Open uplands along the canyon rim and adjacent fields; frequently observed.

*Setaria faberii Herrm. Giant Foxtail. 421. Roadsides, fields and stream margins; frequently observed.

*Setaria lutescens (Wiegel) Hubb. Yellow Foxtail. 468. Weed of fields, picnic grounds and roadsides; frequently observed.

*Setaria viridis (L.) Beauv. Green Foxtail. 517. Weed of roadsides and stream margins; occasionally observed.

Sorghastrum nutans (L.) Nash in Small. Indian Grass. 402. Open uplands along the canyon rim and adjacent fields; frequently observed.

*Sorghum halepense (L.) Pers. Johnson Grass. 916. Roadside, probably never established; rarely observed.

Sphenopholis obtusata (Michx.) Scribn. var. major (Torr.) Erd. Slender Wedge Grass. 601. Wooded slopes, alluvial woods and moist dolomite cliffs; frequently observed.

Sporobulus asper (Michx.) Kunth. Drop-seed. 923. Open upland woods along the canyon rim and southerly exposed talus slopes; frequently observed.

Sporobulus vaginiflorus (Torr.) Wood. Poverty Grass. 838, 839. Weedy along dry roadsides adjacent to parking lots; frequently observed.

Cyperaceae (Sedge Family)

Carex albursina Sheldon. 573, 967. Rich wooded uplands, slopes and ravines; frequently observed.

Carex bebbii Olney. Collected by V. O. Graham #8856 (ISM); "moist woods, occasional".

Carex blanda Dew. 107, 195. Open to wooded uplands, talus slopes, dolomite cliffs and floodplains; frequently observed.

Carex brevior (Dew.) Mackenz. Collected by D. K. Evans s.n. (SIU); "creek".

Carex careyana Torr. 41. Rich wooded slopes and ravines; infrequently observed.

Carex cephalophora Muhl. 971. Open to wooded uplands and moist slopes; frequently observed.

Carex communis Bailey. Collected by T. G. Hartley #3320 (ILL); "steep wooded talus slope bordering Apple River".

Carex conoidea Schk. Collected by D. K. Evans s.n. (SIU); "creek".

Carex convoluta Mackenz. 741. Rich upland woods, slopes and ravines; frequently observed.

Carex diandra Schrank. 841. Moist dolomite cliff; rarely observed.

Carex eburnea Boott. 985. Open uplands along the canyon rim and dolomite cliffs; frequently observed.

Carex gracillima Schwein. 986. Rich talus slopes, floodplains and moist dolomite cliffs; frequently observed.

Carex granularis Muhl. 979. Wet dolomite cliffs; occasionally observed.

Carex gravida Bailey. 596. Moist depressions on upland fields; infrequently observed.

Carex grisea Wahlenb. 982, 983. Rich upland woods, talus slopes and wooded floodplains; frequently observed.

Carex haydenii Dew. 104. Lower rich talus slopes and wooded floodplains; infrequently observed.

Carex hirtifolia Mackenz. 840, 972. Rich upland woods, slopes and floodplains; frequently observed.

Carex hitchcockiana Dew. 973. Rich upland woods, slopes and floodplains; frequently observed.

Carex hystricina Muhl. 106. Lower wet dolomite cliffs and marshy borders; frequently observed.

Carex jamesii Schwein. 957, 1001. Rich upland woods, slopes and wooded floodplains; frequently observed.

Carex laevivaginata (Kukenth) Mackenz. 615, 976. Rarely observed on the bases of wet dolomite cliffs, but locally abundant along marshy borders; occasionally observed.

Carex lanuginosa Michx. Collected by V. O. Graham #8850 (ISM); "swamps, common".

Carex meadii Dew. 975. Open uplands along the canyon rim and more southerly exposed talus slopes; frequently observed.

Carex normalis Mackenz. 933. Scattered throughout on alluvial woods; occasionally observed.

Carex oligocarpa Schk. Collected by T. G. Hartley #4295 (ILL); "moist north-facing maple-basswood slope bordering Apple River".

Carex pedunculata Muhl. Collected by T. G. Hartley #9127 (ILL); "with Carex communis on a steep rather moist north-facing wooded slope bordering Apple River".

Carex pennsylvanica Lam. 40. Open to rich upland woods and moist wooded slopes; frequently observed.

Carex rosea Schk. Collected by D. K. Evans s.n. (SIU); "woods".

Carex sparganioides Muhl. 172, 574, 995. Rich upland woods, slopes and wooded floodplains; frequently observed.

Carex sprenglii Dew. 535. Rich upland woods, talus slopes and floodplains; frequently observed.

Carex stipata Muhl. 105. Moist dolomite cliffs and alluvial woods; infrequently observed.

Carex vulpinoidea Michx. 616 987, 988. Alluvial woods and marshy borders; frequently observed.

Cyperus esculentus L. 417. Stream margins and roadsides; infrequently observed.

Cyperus strigosus L. 848. Stream margins; infrequently observed.

Eleocharis erythropoda Steud. 155. Moist dolomite cliff bases, stream margins and marshy borders; frequently observed.

Scirpus acutus Muhl. 310, 311. Stream margins and marshy borders; occasionally observed.

Scirpus atrovirens Willd. 343. Stream margins and marshy borders; frequently observed.

Scirpus validus Vahl. 342. Stream margins; occasionally observed.

Araceae (Arum Family)

Arisaema dracontium (L.) Schott. Green Dragon. 70, 205.

Rich upland woods, slopes and floodplains; frequently observed.

Ariseama triphyllum (L.) Schott. Jack-in-the-Pulpit. 30, 31. Rich upland woods, slopes and floodplains; frequently observed.

Lemnaceae (Duckweed Family)

Lemna minor L. Duckweed. 516. Floating aquatic of marshy floodplain adjacent to Clear Creek and stream margins; frequently observed.

Spirodela polyrhiza (L.) Schleid. Water-flaxseed. 515. Frequently observed with Lemna minor.

Commelinaceae (Spiderwort Family)

*Commelina communis L. Dayflower. 437. Weed of roadsides, picnic grounds and stream margins; occasionally observed.

Tradescantia ohiensis Raf. Spiderwort. 587, 762. Open uplands along the canyon rim and more southerly exposed talus slopes; frequently observed.

Pontederiaceae (Pickerelweed Family)

Zosterella dubia (Jacq.) Small. Water Star Grass. 676, 912. Shallow flowing waters of Apple River; frequently observed.

Juncaceae (Rush Family)

Juncus dudleyi Weig. Rush. 145, 213, 613. Lower bases of moist dolomite cliffs, stream margins and marshy borders; frequently observed.

Juncus tenuis Willd. Path Rush. 270. Stream margins and compacted nature trails through rich woods, frequently observed.

Liliaceae (Lily Family)

Allium canadense L. Wild Garlic. 578. Open upland woods, talus slopes and floodplains; frequently observed.

Allium tricoccum Ait. Wild Leek. 691. Rich upland woods and slopes; occasionally observed.

*Asparagus officinalis L. Asparagus. 289. Scattered throughout on moist, open habitats; frequently observed.

Erythronium albidum Nutt. White Trout Lily. 22. Wooded talus slopes and floodplains; frequently observed.

*Hemerocallis fulva L. Orange Day Lily. 706. Persisting from cultivation on moist picnic grounds; rarely observed.

Hypoxis hirsuta (L.) Coville. Yellow Star Grass. 122, 167. Open uplands and more southerly exposed talus slopes; frequently observed.

*Muscari botryoides (L.) Mill. Grape Hyacinth. 29. Persisting from cultivation on grassy picnic grounds; rarely observed.

Polygonatum commutatum (Schutt.) A. Dietr. ex Otto & A. Dietr. Solomon's Seal. 599. Open to rich upland woods and talus slopes; frequently observed.

Smilacina racemosa (L.) Desf. False Solomon's Seal. 100, 62. Open to rich wooded uplands, slopes and moist roadsides; frequently observed.

Smilacina stellata (L.) Desf. Small False Solomon's Seal. 32, 33, 602. Open upland woods and dolomite cliffs; frequently observed.

Trillium recurvatum Beck. Red Trillium. 23, 24. Rich uplands, slopes and floodplains; frequently observed.

Trillium flexipes Raf. White Trillium. 61, 62, 554. Wooded talus slopes and floodplains; frequently observed.

Uvularia grandiflora Sm. Yellow Bellwort. 187, 528. Rich upland woods and talus slopes; frequently observed.

Zigadenus glaucus Nutt. White Camass. 211, 394. Moist to dry dolomite cliffs; frequently observed.

Smilacaceae (Cat-brier Family)

Smilax ecirrata (Engelm.) S. Walts. Carrion Flower. 101, 553, 872. Rich upland woods and talus slopes; frequently observed.

Smilax herbacea L. Carrion Flower. 871. Variety of habitats from open uplands to alluvial woods; occasionally observed.

Smilax hispida Muhl. Carrion Flower. 173, 182, 277. Rich upland woods, slopes, wooded floodplains and roadsides; frequently observed.

Dioscoreaceae (Wild Yam Family)

Dioscorea villosa L. Wild Yam. 854, 1000. Rich upland woods, talus slopes and wooded floodplains; frequently observed.

Iridaceae (Iris Family)

Sisyrinchum albidum Raf. Blue-eyed Grass. Collected by G. D. Fuller #8653 (ISM); no habitat given.

Sisyrinchum campestre Bickn. Blue-eyed Grass. 72, 87. Open upland woods; frequently observed.

Orchidaceae (Orchid Family)

Corallorhiza odontorhiza (Willd.) Nutt. Autumn Coral-root. 855. One colony located along a nature trail through a disturbed mesophytic woods; rarely observed.

Cypripedium calceolus L. var. pubescens (Willd.) Correll. Yellow Lady's Slipper. 548, 550. Rich upland woods and talus slopes; frequently observed.

Habenaria viridis (L.) R. Br. var. bracteata (Muhl.) Gray. Green Orchid. 965. Open uplands and more southerly exposed upper talus slopes; infrequently observed.

Liparis lilifolia (L.) Richard. Purple Twayblade. 201 724. An orchid of various habitats, open to rich wooded uplands and disturbed sites under planted coniferous canopies; frequently observed.

Liparis lieselii (L.) Richard. Green Twayblade. 994. One small colony located at the base of a rich, northerly exposed talus slope; rarely observed.

Salicaceae (Willow Family)

Populus deltoides Marsh. Cottonwood. 660. Alluvial woods; occasionally observed.

Populus grandidentata Michx. Large-toothed Aspen. 743. Open upland woods and roadsides; frequently observed.

Populus tremuloides Michx. Quaking Aspen. 593. Open upland woods and roadsides; frequently observed.

*Salix alba L. var. calva G. F. W. Mey. White Willow. 181. Stream margins; rarely observed.

Salix amygdaloides Anders. Peach-leaved Willow. 273. Stream margins; occasionally observed.

Salix bebbiana Sarg. Bebb Willow. 547, 926. Base of moist dolomite cliffs, stream margins and marshy borders; occasionally observed.

Salix discolor Muhl. Pussy Willow. Collected by G. N. Jones #16349 (ILL); no habitat given.

Salix glaucophylloides Fern. var. glaucophylla (Bebb) Scheid. Blue-leaf Willow. Collected by G. D. Fuller #8360 (ISM); "moist banks, occasional".

Salix humilis Marsh. Prairie Willow. Collected by H. E. Ahles #4469 (ILL); "open bluff top".

Salix interior Rowlee. Sandbar Willow. 842. Wet alluvial woods and stream margins; frequently observed.

Salix nigra Marsh. Black Willow. 451. Alluvial woods and stream margins; frequently observed.

Salix rigida Muhl. Heart-leaved Willow. 678, 845. Marshy flood - plains and stream margins; occasionally observed.

Salix sericea Marsh. Silky Willow. One large colony along marshy adjacent to Clear Creek; rarely observed.

Juglandaceae (Walnut Family)

Carya cordiformis (Wang.) K. Koch. Bitternut Hickory. 479, 488, 694. Variety of terrestrial habitats, expecially rich woods; frequently observed.

Carya ovata (Mill.) K. Koch. Shagbark Hickory. 666, 667. Open to rich upland woods, slopes and well-drained wooded flood-plains; frequently observed.

Juglans cinerea L. Butternut. 395. Open to rich upland woods, slopes and floodplains; frequently observed, but healthy trees are rare.

Juglans nigra L. Balck Walnut. 392. Rich uplands, moist wooded slopes and floodplains; occasionally observed.

Betulaceae (Birch Family)

*Alnus glutinosa (L.) Gaertn. European Alder. 436, 823. Presently escaping from mesic picnic grounds; occasionally observed.

Betula papyrifera Marsh. White Birch. 824. One tree located adjacent to abandoned dwelling; origin extremely questionable.

Carpinus caroliniana Walt. Blue-beech. 243. Rich upland woods, slopes and well-drained wooded floodplains; frequently observed.

Corylus americana Walt. American Hazel. 579, 603. Open to rich uplands and talus slopes; frequently observed.

Ostrya virginiana (Mill.) K. Koch. Ironwood. 312. Rich upland woods, talus slopes and wooded floodplains; frequently observed.

Fagaceae (Beech Family)

Quercus alba L. White Oak. 485. Open to wooded uplands and talus slopes; frequently observed.

Quercus bicolor Willd. Swamp White Oak. 484. Talus slopes and alluvial woods; occasionally observed.

Quercus ellipsoidalis E. J. Hill. Jack Oak. 480. Open uplands, dolomite cliffs and dry roadsides; frequently observed.

Quercus macrocarpa Michx. Bur Oak. 483. Open to rich upland woods, slopes and well-drained wooded floodplains.

Quercus muhlenbergii Engelm. Chestnut Oak. 454. Open to wooded uplands, dolomite cliffs and talus slopes; frequently observed.

Quercus rubra L. Red Oak. 464. Open to rich wooded uplands, adjacent ravines and slopes; frequently observed.

Quercus velutina Lam. Black Oak. 933. Open upland woods; infre-

quently observed.

Ulmaceae (Elm Family)

Celtis occidentalis L. Hackberry. 971. Rich wooded uplands, slopes and floodplains; frequently observed.

Ulmus americana L. American Elm. Collected by G. D. Fuller #8416 (ISM); "floodplain of river, common".

Ulmus rubra Muhl. Red Elm. 595. Common on a variety of terrestrial habitats; frequently observed.

Ulmus thomasii Sarg. Rock Elm. 415, 416, 431. Lower talus slopes and wooded floodplains; frequently observed.

Moraceae (Mulberry Family)

*Cannabis sativa L. Hemp. 584, 807. Stream margins; occasionally observed.

*Morus alba L. (incl. var. tatarica (L.) Loudon. 281, 282). White Mulberry. 1002. Disturbed moist habitats, especially stream margins and roadsides; frequently observed.

Morus rubra L. Red Mulberry. 489, 726. Talus slopes and floodplains; frequently observed.

Urticaceae (Nettle Family)

Laportea canadensis (L.) Wedd. Wood-nettle 364, 506. On a variety of moist habitats, expecially alluvial woods, stream margins and springy ravines; frequently observed.

Parietaria pennsylvanica Muhl. Pellitory. 696. Weedy affinities on a variety of open habitats, especially around park facilities and dolomite ledges; frequently observed.

Pilea pumila (L.) Gray. Clearweed. 430. Alluvial woods, ravine bases and other moist shaded habitats; frequently

observed.

Urtica dioica L. Stinging Nettle. 429, 748. Moist uplands, slopes, alluvial woods, stream margins and roadside ditches; frequently observed.

Santalaceae (Sandalwood Family)

Comandra richardsiana Fern. False Toadflax. Collected by G. N. Jones #15812 (ILL); no habitat given. A plant of dry uplands.

Aristolochiaceae (Birthwort Family)

Asarum canadense L. Wild Ginger. 7, 11, 42. Rich uplands, talus slopes and well-drained wooded floodplains; frequently observed.

Polgonaceae (Buckwheat Family)

*Polygonum aviculare L. Knotweed. 400, 862, 935. Roadsides and picnic grounds; frequently observed.

Polygonum hydropiper L. Smartweed. 493. Stream margins, marshy borders and wet roadside ditches; occasionally observed.

Polygonum lapathifolium L. Pale Smartweed. 476, 757. Stream margins, marshy borders and wet roadside ditches; frequently observed.

Polygonum pennsylvanicum L. var. laevigatum Fern. Common Smartweed. 863. On a variety of moist to dry disturbed habitats; frequently observed.

*Polygonum punctatum Ell. Water Smartweed. 477, 934. Stream margins and alluvial woods; frequently observed.

Polygonum scandens L. Climbing False Buckwheat. 449, 711. Rich upland woods, talus slopes, floodplains and stream margins; frequently observed.

Polygonum virginianum L. Virginia Knotweed. 387, 441. Rich upland woods, talus slopes and alluvial woods; frequently observed.

*Rumex acetosella L. Sheep-sorrel. 265. Upland fields and stream margins; occasionally observed.

*Rumex crispus L. Curley Dock. 598, 168. Upland fields and stream margins; frequently observed.

*Rumex obtusifolius L. Bitter Dock. 625, 653, 665. Moist roadside ditches, alluvial woods and stream margins; frequently observed.

Rumex verticillatus L. Swamp Dock. 626, 627. Marshy borders and stream margins; frequently observed.

Chenopodiaceae (Goosefoot Family)

Atriplex patula L. Spear Scale. 883. Moist roadsides and picnic grounds adjacent stream; infrequently observed.

*Chenopodium albus L. Lamb's-quarters. 470, 782. Roadsides, fields, and stream margins; frequently observed.

Chenopodium gigantospermum Aellen. Maple-leaved Goosefoot. 760. Moist roadsides and stream margins; occasionally observed.

Chenopodium pallescens Standl. Narrow-leaved Goosefoot. 943. Stream margins, weedy; occasionally observed.

Amaranthaceae (Amaranth Family)

Amaranthus graecizans L. Prostate Pigweed. 414. Roadsides; occasionally observed.

*Amaranthus retroflexus L. Pigweed. 494, 504. Weed of roadsides, fields and stream margins; frequently observed.

Amaranthus tuberculatus (Moq.) Sauer. Water-hemp. 843, 844. Stream margins; occasionally observed.

Nyctaginaceae (Four-O'clock Family)

Mirabilis myctaginea (Michx.) MacM. Wild Four-o'clock. 585. Roadsides and stream margins; occasionally observed.

Portulaceae (Purslane Family)

Claytonia virginica L. Spring Beauty. 5. Rich upland woods, talus slopes and wooded floodplains; frequently observed.

*Portulaca oleracea L. Common Purslane. 1020. Weedy around park buildings and freshly disturbed sites; occasionally observed.

Caryophyllaceae (Pink Family)

*Arenaria serpyllifolia L. Thyme-leaved Sandwort. 93. Weed of mowed picnic grounds; frequently observed.

Cerastium nutans Raf. Nodding Chickweed. 362. Alluvial woods and stream margins; frequently observed.

*Cerastium vulgatum L. Common Mouse-ear Chickweed. 86, 90. Stream margins, alluvial woods and moist roadsides; frequently observed.

*Dianthus armeria L. Deptford Pink. 714. Moist upland woods bordering picnic grounds; infrequently observed.

*Gysophila paniculata L. Common Baby's Breath. 254. One large colony adjacent to parking lot; rarely observed.

*Lychnis alba Mill. Campion. 116. Fields, roadsides and stream margins; frequently observed.

*Myosoton aquacticum (L.) Moench. Water Chickweed. 237. On low moist habitats, especially abundant on stream margins and alluvial woods; frequently observed.

*Sapinaria officinalis L. Bouncing Bet. 368. Roadsides, stream margins and other disturbed sites; frequently observed.

Silene antirrhina L. Sleepy Catchfly. Collected by H. E. Ahles #4449 (ILL); "rock cliff tops, partial shade".

Silene nivea (Nutt.) Otto. Snowy Campion. Collected by G. S. Winterringer #7261 (ILL); "moist ravine".

*Stellaria graminea L. Common Stitchwort. 580. Mowed moist picnic grounds and stream margins; occasionally observed.

*Stellaria media (L.) Cyrillo. Common Chickweed. Collected by H. E. Ahles #8029 (ILL); "grassy river bottoms".

Ranunculaceae (Crowfoot Family)

Actaea pachypoda Ell. Doll's-eyes. 366. Rich upland woods and wooded slopes; frequently observed but far less abundant than the following Red Baneberry.

Actaea rubra (Ait.) Willd. Red Baneberry. 367. Rich upland woods and wooded slopes; frequently observed.

Anemone canadensis L. Canada Anemone. 114, 115. Found on a variety of habitats, open to rich upland woods, slopes and wooded floodplains; frequently observed.

Anemone cylindrica Gray. Thimbleweed. Collected by H. E. Ahles #4453 (ILL); "wooded slopes".

Anemone quinquefolia L. Wood Anemone. 12. Open to rich upland woods and slopes; frequently observed.

Anemone virginiana L. Tall Anemone. 219, 231, 759. Open to rich upland woods and slopes; frequently observed.

Aquilegia canadensis L. Wild Columbine. 15, 16. Open to rich upland woods, slopes and dolomite cliffs; frequently observed.

Caltha palustris L. Marsh Marigold. 58, 59. Springy ravines and lower wet bases of dolomite cliffs; occasionally observed.

Clematis virginiana L. Virgin's Bower. 374, 403, 481. On a variety of habitats; open to rich upland woods, slopes and dolomite cliffs; frequently observed.

Hepatica nobilis Schreb. var. acuta (Pursh) Steyerm. Sharp-lobed Hepatica. 3. Rich upland woods and talus slopes; frequently observed.

Ranunculus abortivus L. Kidney-leaf Buttercup. 14. On a variety of moist to dry habitats with weedy affinities; frequently observed.

Ranunculus fasicularis Muhl. Early Buttercup. 17, 19. Open upland woods and along compacted nature trails through mesic woods; occasionally observed.

Ranunculus recurvatus Poir. Hooked Buttercup. 564. Rich upland woods, slopes and floodplains; frequently observed.

Ranunculus scleratus L. Cursed Crowfoot. 160. Alluvial woods, Marshy borders and stream margins; occasionally observed.

Ranunculus septentrionalis Poir. Swamp Buttercup. 35, 36, 575. Rich upland woods, slopes alluvial woods and stream margins; frequently observed.

Thalictrum dasycarpus Fish. & Lall. Purple Meadow Rue. 303, 695, 846. On a variety of moist to dry habitats; open to rich upland woods, talus slopes, dolomite cliffs and alluvial woods, frequently observed.

Thalictrum dioicum L. Early Meadow Rue. 18, 20. Rich upland woods, talus slopes and moist dolomite cliffs; frequently

observed.

Berberidaceae (Barberry Family)

*Berberis thunbergii DC. Japanese Barberry. 549. Locally escaped from cultivation to upland woods and talus slopes; occasionally observed.

Caulophyllum thalictroides (L.) Michx. Blue Cohosh. 85, 89, 257. Rich upland woods and talus slopes; frequently observed.

Jeffersonia diphyllum (L.) Pers. Twinleaf. 21. Large colonies present on lower rich talus slopes and wooded floodplains; frequently observed.

Podophyllum peltatum L. Mayapple. 73, 171. Rich upland woods, wooded slopes and wooded floodplains; frequently observed.

Menispermaceae (Moonseed Family)

Menispermum canadense L. Moonseed. 274. Rich upland woods, talus slopes and alluvial woods; frequently observed.

Lauraceae (Laurel Family)

Lindera benzoin (L.) Blume. Spicebush. Collected by V. O. Graham #9920 (ISM); "moist woods, common".

Papaveraceae (Poppy Family)

Dicentra canadensis (Goldie) Walp. Squirrel-corn. Collected by T. G. Hartley #3331 (IA); "moist base of rocky wooded slope".

Dicentra cucullaria (L.) Bernh. Dutchman's Breeches. 8. Rich wooded uplands, talus slopes and moist dolomite cliffs; frequently observed.

Sanguinaria canadensis L. Bloodroot. 1. Rich upland woods, talus slopes and wooded floodplains; frequently observed.

Brassicaceae (Mustard Family)

Arabis canadensis L. Sicklepod. 605. Rich upland woods and talus slopes; frequently observed.

Arabis glabra (L.) Bernh. Tower Mustard. 258, 966. On a variety of moist to dry habitats, open uplands, dolomite cliffs and stream margins; occasionally observed.

Arabis hirsuta (L.) Scop. var. pycnocarpa (M. Hopkins) Rollins. Hairy Rock Cress. 194. Mossy moist dolomite cliffs and talus slopes; occasionally observed.

Arabis laevigata (Muhl.) Poir. Smooth Rock Cress. 55, 56. Open to rich rocky wooded uplands, talus slopes and dolomite cliffs; frequently observed.

Arabis shortii (Fern.) Gl. Rock Cress. 53. Lower talus slopes, alluvial woods and stream margins; occasionally observed.

*Armoracia lapathifolia Gilib. Horseradish. 737. Escaped or persisting from cultivation on mesic upland campgrounds; rarely observed.

*Barbarea vulgaris (L.) R. Br. var. acuata (Opiz) Fries. Yellow Rocket. 39. Moist fields, roadsides and stream margins; frequently observed.

*Brassica nigra (L.) Koch. Black Mustard. 622, 739. Moist roadsides and stream margins; frequently observed.

*Capsella bursa-pastoris (L.) Medic. Shepherd's-purse. 546, 713. Weed of roadsides, picnic grounds and stream margins; frequently observed.

Cardamine bulbosa (Schreb.) BSP. Spring Cress. 52, 551. Shaded spring ravines, moist dolomite cliffs, marshy borders and

alluvial woods; frequently observed.

Cardamine pennslyvanica Muhl. Bitter Cress. 566, 670. Lower bases of moist dolomite cliffs, marshy borders, alluvial woods, springy ravines and stream margins; frequently observed.

Dentaria laciniata Muhl. Toothwort. 529. Rich talus slopes and wooded floodplains; frequently observed.

*Erysimum cheiranthoides L. Wormseed Mustard. 332. Weed of moist roadsides, alluvial woods and stream margins; occasionally observed.

*Hersperis matronalis L. Dame's Rocket. 619. Low disturbed moist woods and roadsides; occasionally observed.

*Lepidium campestre (L.) R. Br. Cow Cress. 108. Moist upland fields, picnic grounds and stream margins; occasionally observed.

*Nasturtium officinale R. Br. Water Cress. 448, 630, 768. Springy ravines and streams; frequently observed.

*Sisymbrium officinale (L.) Scop. var. leiocarpon DC. Hedge Mustard. 610, 611, 652. Weed of moist picnic grounds, alluvial woods and stream margins; frequently observed.

Crassulaceae (Orpine Family)

*Sedum purpureum (L.) Link. Live-forever. 961. Escaped and persisting from cultivation along a moist roadside ditch; rarely observed.

Saxifragaceae (Saxifrage Family)

Heuchera richardsonii R. Br. var. grayana Rosend. Alumroot. 118, 268. Open to rich rocky upland woods, talus slopes and dolomite cliffs; frequently observed.

Mitella diphylla L. Bishop's-cap. 185, 186. Wooded talus slopes, mossy dolomite cliffs and rich wooded floodplains; frequently observed.

Penthorum sedoides L. Ditch Stonecrop. 780. Marshy borders, moist dolomite cliffs and stream margins; frequently observed.

Ribes americanum Mill. Wild Black Currant. 69, 71, 544. Rich upland ravines, talus slopes, alluvial woods and marshy borders; frequently observed.

Ribes cynosbati L. Prickly Gooseberry. 60. Rich upland woods, talus slopes and dolomite cliffs; frequently observed.

Ribes missouriense Nutt. Missouri Gooseberry. 46, 47. On a variety of moist to dry habitats; frequently observed.

Saxifraga forbesii Vasey. Swamp Saxifrage. 989. Mossy talus slopes and moist dolomite cliffs; frequently observed. Perplexingly intergrades with the following species?

Saxifraga pennsylvanica L. Swamp Saxifrage. 125, 126. Found on the same habitats as the above species, often in juxtaposition; frequently observed.

Sullivantia renifolia Rosend. Sullivantia. 256, 783, 784. Shaded moist dolomite cliffs; frequently observed.

Hamamelidaceae (Witch-hazel Family)

Hamamelis virginiana L. Witch-hazel. 190, 266, 938. Rich upland woods, adjacent ravines and slopes; frequently observed.

Plantanaceae (Plane Tree Family)

Platanus occidentalis L. Sycamore. 672. Large trees present on main picnic grounds and yard of resident park managers, origin highly questionable; only locations.

Rosaceae (Rose Family)

Agrimonia gryposepala Wallr. Tall Agrimony. 381, 773. Rich upland woods and talus slopes; frequently observed.

Agrimonia pubescens Wallr. Soft Agrimony. 874. 875. Open to rich upland woods and dryer slopes than the preceding; frequently observed.

Amelanchior arborea (Michx. f.) Fern. Juneberry. Collected by G. N. Jones #21958 (ILL), no habitat given. A tall shrub of dry rocky woods.

Crataegus calpodendron (Ehrh.) Medic. Sugar Hawthorn. 559. Open mesic upland fields bordering woods; occasionally observed.

Fragaria americana (Porter) Britt. Hillside Strawberry. 78, 876, 936. Open to rich upland woods, talus slopes and moist dolomite cliffs; frequently observed.

Fragaria virginiana Duchesne. Common Strawberry. 27, 63. Open upland woods, dolomite cliffs and roadsides; frequently observed.

Geum canadense Jacq. White Avens. 238, 621. Rich upland woods, slopes and alluvial woods; frequently observed.

*Malus pumila Mill. Common Apple. 50, 51. Scattered throughout on mesic open uplands; occasionally observed.

Physocarpus opulifolius (L.) Maxim. Minebark. 161, 180. On a variety of rocky habitats, open uplands, talus slopes, dolomite cliffs and stream margins; frequently observed.

Potentilla arguta Pursh. Tall Cinquefoil. 941. Open upland woods and adjacent fields; frequently observed.

Potentilla fruiticosa L. Shrubby Cinquefoil. 210. Moist and dry dolomite cliffs; frequently observed.

Potentilla norvegica L. Rough Cinquefoil. 309, 705. Stream margins and moist dolomite cliffs; frequently observed.

*Potentilla recta L. Sulfur Cinquefoil. 382. Old fields and dry roadsides; occasionally observed.

Prunus americana Marsh. Wild Plum. 537. Open upland woods and fields forming fencerow thickets; frequently observed.

Prunus nigra Ait. Canada Plum. 287, 288, 969. Open to wooded uplands, slopes and alluvial woods; frequently observed .

Prunus pennsylvanica L.f. Pin Cherry. 75, 348. Lower talus slopes, alluvial woods and moist picnic grounds borders; frequently observed.

Prunus serotina Ehrh. Wild Black Cherry. 134, 136, 137. Open to rich upland woods, talus slopes, fields and roadsides; frequently observed.

Prunus virginiana L. Choke Cherry. 139, 141, 657. On a variety of habitats, rich upland woods, slopes, cliffs and floodplains; frequently observed.

*Pyrus communis L. Pear. One small aapling bearing fruit adjacent to moist picnic grounds; rarely observed.

Rosa blanda Ait. Early Wild Rose. 175, 656. Open uplands, fields and roadsides; frequently observed.

Rosa carolina L. Pasture Rose. 635. Open upland woods, fields and roadsides; frequently observed.

*Rosa multiflora Thunb. Multiflora Rose. 234, 633. Scattered throughout as a recent adventive, especially moist open disturbed woods, occasionally observed.

Rubus allegheniensis Porter. Common Blackberry. 132, 586. On a variety of habitats, especially open mesic woodlands; frequently observed.

Rubus flagellaris Willd. Northern Dewberry. 177, 591, 977. Upland fields, roadsides and alluvial woods; frequently observed.

Rubus occidentalis L. Black Raspberry. 130, 563. Occurring on a wide range of terrestrial habitats; frequently observed.

Rubus strigosus Michx. Red Raspberry. 764, 767. Mossy north-exposed habitats, slopes, cliffs and adjacent ravines; occasionally observed.

*Sorbus aucuparia L. European Mountain Ash. 567, 568. One decaying plant persisting on a dolomite bluff crest; rarely observed.

Fabaceae (Pulse Family)

Amorpha canescens Pursh. Leadplant. 693. Open upland woods and more southerly exposed upper talus slopes; frequently observed.

Amphicarpa bracteata (L.) Fern. (incl. var. comosa (L.) Fern. 419). Hogpeanut. 821. Open to rich upland woods, talus slopes and alluvial woods; frequently observed.

Apios americana Medic. Groundnut. 999. Scattered throughout on open to wooded uplands, talus slopes and alluvial woods; occasionally observed.

Astragalus canadensis L. Milk-vetch. Collected by A. Chase #6786 (ILL); "steep canyon wall".

Baptisia leucantha T. & G. Prairie False Indigo. 286. Open

uplands and roadsides; infrequently observed.

Cercis canadensis L. Redbud. 633. Shrubby sprouts persisting on upland campgrounds, planted; infrequently observed.

*Coronilla varia L. Crown-vetch. 650, 651. Grassy moist roadsides; infrequently observed.

Desmodium dillenii Darl. Tick Trefoil. 859. Open to rich upland woods; infrequently observed.

Desmodium glutinosum (Muhl.) Wood. Pointed Tick Trefoil. 279. Rich upland woods and talus slopes; frequently observed.

Desmodium illinoense Gray. Illinois Tick Trefoil. 356, 750, 858. Open uplands, fields and roadsides; frequently observed.

Gleditsia tricanthos L. forma inermis (Pursh) Fassett. Honey Locust. 649, 799. One tree located on the base of talus slope adjacent to picnic grounds; rarely observed. Perhaps persisting from cultivation.

Lathyrus ochroleucus Hook. Pale Vetchling. 131. Open to sparsely wooded moist uplands and woody invaded fields; infrequently observed.

Lathyrus venosus Muhl. var. intonsus Butt. & St. John. 178, 594. Open to sparsely wooded uplands; occasionally observed.

Lespedeza capitata Michx. Bush-clover. 405, 406, 455. Open uplands and adjacent fields; frequently observed.

Lespedeza violacea (L.) Pers. Violet Bush-clover. Collected by A. Chase #6768 (ILL); "summit of wall".

*Medicago lupulina L. Black Medick. 170, 192. Weed of picnic grounds, roadsides and stream margins; frequently observed.

*Medicago sativa L. Alfalfa. 355, 689. Upland fields, roadsides and stream margins; occasionally observed.

*Melilotus alba Desr. White Melilot. 293. Weed of fields, roadsides and stream margins; occasionally observed.

*Melilotus officinalis (L.) Lam. Yellow Melilot. 220, 597. Found on similar habitats as the White Melilot; frequently observed.

Petalostemum purpureum (Vent.) Rydb. Purple Prairie Clover. 1009. Dry, open upland woods; frequently observed.

*Robinia pseudo-acacia L. Black Locust. 569. Locally established along steep, disturbed roadsides; occasionally observed.

*Trifolium campestre Schreb. Low Hop Clover. 292. Weed of picnic grounds, roadsides, fields and stream margins; frequently observed.

*Trifolium hybridum L. Alsike Clover. 212. Picnic grounds, roadsides, stream margins and fields; frequently observed.

*Trifolium pratense L. Red Clover. 169, 179. Picnic grounds, roadsides, fields and stream margins; frequently observed.

*Trifolium repens L. White Clover. 263. Similar frequency and disturbed habitats as the above introduced legumes.

*Vicia angustifolia Reichard. Common Vetch. 316, 690, 751. Weed of moist grassy roadsides; occasionally observed.

Oxalidaceae (Wood Sorrel Family)

Oxalis dillenii Jacq. Yellow Wood Sorrel. 895. In open woods, fields, roadsides and stream margins; frequently observed.

Oxalis stricta L. Yellow Wood Sorrel. 331, 896. Woods, fields, roadsides and stream margins; frequently observed.

Oxalis violaceae L. Purple Oxalis. 545. Scattered throughout on dry open upland woods and dolomite ledges on wooded slopes; frequently observed.

Geraniaceae (Geranium Family)

Geranium maculatum L. Wild Geranium. 43, 44, 45. Open to richly wooded uplands, slopes and wooded floodplains; frequently observed.

Rutaceae (Rue Family)

Zanthoxylum americanum Mill. Prickly-ash. 221, 540. Open to wooded uplands, slopes and alluvial woods; frequently observed.

Polygalaceae (Milkwort Family)

Polygala senega L. Seneca-snakeroot. 97, 631. Dry open uplands and more southerly exposed talus slopes; frequently observed.

Euphorbiaceae (Spurge Family)

Acalypha rhomboidea Raf. Three-seeded Mercury. 503. Fields, roadsides, picnic grounds and stream margins; frequently observed.

Chamaesyce glyptosperma (Engelm.) Small Spurge. 492. Roadsides; infrequently observed.

Chamaesyce maculata (L.) Small. Eyebane. 796. Fields, roadsides and stream margins; frequently observed.

Chamaeayce supina (Raf.) Moldenke. Milk Spurge. 661, 853. Roadsides, dolomite cliffs and stream margins; frequently observed.

Euphorbia corollata L. Flowering Spurge. 315, 702. Open wooded

uplands and upper south exposed talus slopes; frequently observed.

Anacardiaceae (Cashew Family)

Rhus copallina L. Dwarf Sumac. Collected by G. N. Jones #17305 (ILL); no habitat given.

Rhus glabra L. Smooth Sumac. 321. Open upland woods and adjacent fields; frequently observed.

Rhus typhina L. Staghorn Sumac. 280. Open to rich uplands, slopes, dolomite cliffs, alluvial woods and fields; frequently observed.

Toxidendron radicans (L.) Kuntze. Poison Ivy. 202, 669. On a wide range of terrestrial habitats; frequently observed.

Celastraceae (Staff Tree Family)

Celastrus scandens L. Bittersweet. 758, 884. Open uplands, slopes, dolomite cliffs and roadsides; frequently observed.

Euonymus atropurpureus Jacq. Wahoo. 208, 318, 629. Partially wooded to rich uplands, slopes and wooded floodplains; frequently observed.

Staphyleaceae (Bladdernut Family)

Staphylea trifolia L. Bladdernut. 91, 380, 556. Rich uplands, slopes, cliffs and wooded floodplains; frequently observed.

Aceraceae (Maple Family)

Acer negundo L. Boxelder. 151, 152. On a variety of disturbed moist habitats; frequently observed.

Acer saccharinum L. Silver Maple. 426. Lower bases of moist dolomite cliffs and alluvial woods; infrequently observed.

Acer saccharum Marsh. (incl. var. nigrum Michx. f. 654, 886.). Sugar Maple. 887. Rich uplands, slopes, moist cliffs, and wooded floodplains; frequently observed.

Acer rubrum L. Red Maple. 604. One tree located on mesic picnic grounds; undoubtedly planted.

Balsaminaceae (Touch-me-not Family)

Impatiens biflora Walt. Spotted Touch-me-not. 359, 369. On a variety of rich moist habitats, especially alluvial woods, springy ravines and marshy borders; frequently observed.

Impatiens pallida Nutt. Pali Touch-me-not. 322. On springy ravines, alluvial woods, moist clifs and marshy borders; occasionally observed.

Rhamnaceae (Buckthorn Family)

Ceanothus americanus L. New Jersey Tea. 749. Open to rich rocky uplands and talus slopes; frequently observed.

Rhamnus lanceloata Pursh. Lance-leaved Buckthorn. 77, 271, 970. Open upland woods, dolomite cliffs and roadsides; frequently observed.

Vitaceae (Grape Family)

Parthenocissus quiquefolia (L.) Planch. Virginia Creeper. 339. Open to rich uplands, slopes and dolomite cliffs; frequently observed.

Parthenocissus vitacea (Knerr) Hitchc. Virginia Creeper. 747. Open moist uplands and woodland borders; occasionally observed.

Vitis aestivalis Michx. var. argentifolia (Munson Fern. Silver-leaved Grape. 913. Open to rich uplands, fields and talus

slopes; frequently observed.

Vitis riparia Michx. Riverbank Grape. 214, 608, 697. On a variety of moist to dry habitats, especially moist dolomite cliffs adjacent flowing streams; frequently observed.

Tiliaceae (Linden Family)

Tilia americana L. Basswood. 609. Open to rich uplands, slopes, dolomite cliffs and wooded floodplains; frequently observed.

Malvaceae (Mallow Family)

*Abutilon theophrasti Medic. Buttonweed. 427. Upland fields, roadsides and stream margins; occasionally observed.

*Hibicus trionum L. Flower-of-an-hour. 475. Roadsides, picnic grounds, fields and stream margins; frequently observed.

*Malva neglecta Wallr. Cheeses. 435, 675. Roadsides, picnic grounds and stream margins; frequently observed.

Napaea dioica L. Glade Mallow. 377. Open wooded floodplains; infrequently observed.

Hypericaceae (St. John's-wort Family)

*Hypericum perforatum L. Common St. John's-wort. 325, 699. Open upland woods and adjacent fields; frequently observed.

Hypericum punctatum Lam. Spotted St. John's-wort. 708. Open upland woods, fields and roadsides; frequently observed.

Hypericum pyramidatum Ait. Giant St. John's-wort. 771. Rich lower talus slopes and alluvial woods; occasionally observed.

Cistaceae (Rockrose Family)

Lechia stricta Leggett. Pinweed. 413. Open upland woods, south exposed talus slopes and dolomite ledges; frequently observed.

Violaceae (Violet Family)

Viola pratincola Greene. Common Blue Violet. 48, 526, 541. On a wide range of moist habitats; frequently observed.

Viola pubescens Ait. var. eriocarpa (Schwein.) Russell. Smooth Yellow Violet. 9, 66. Rich wooded uplands, slopes and alluvial woods; frequently observed.

Viola sagittata Ait. Arrow-leaved Violet. 112. Open uplands and more southerly exposed talus slopes; occasionally observed.

Viola sororia Willd. Wooly Blue Violet. 84, 103, 133. Found on a wide range of terrestrial habitats; frequently observed. Seemingly intergrades with the equally common blue violet.

Thymelaeaceae (Mezereum Family)

Dirca palustris L. Leatherwood. 915. Rich canyon upland woods and talus slopes; occasionally observed.

Onagraceae (Eving Primrose Family)

Circaea alpina L. Small Enchanter's Nightshade. 1007. Mossy, north-exposed dolomite ravine ledge in climax woods; rarely observed.

Circaea quadrisulcata (Maxim.) Franch. & Sav. var. canadensis (L.) Hara. Enchanter's Nightshade. 204, 334, 734. Rich wooded uplands, slopes and wooded floodplains; frequently observed.

Epilobium coloratum Biehler. Cinnamon Willow Herb. Collected by R. A. Evers #34794 (ILLS); "along riverbank".

Epilobium adenocaulon Haussk. Northern Willow Herb. 904, 953. Moist dolomite cliffs, marshy borders and stream margins; frequently observed.

Gaura biennis L. Evening-primrose. 422, 905. Upland fields and roadsides; occasionally observed.

Oenothera biennis L. Evening-primrose. 372, 781. Upland fields, roadsides and eroded stream margins; frequently observed.

Araliaceae (Ginseng Family)

Aralia nudicaulis L. Wild Sarsaparilla. 109. Rich upland woods, slopes and shaded moist dolomite ledges; frequently observed.

Aralia racemosa L. American Spikenard. 370, 809. Rich rocky upland woods, talus slopes and shaded dolomite cliffs; frequently observed.

Panax quinquefolia L. Ginseng. 379. Rich north-facing talus slopes; rarely observed.

Apiaceae (Parsley Family)

Angelica atropurpurea L. Angelica. 164. Moist dolomite ledges, marshy borders and alluvial woods; frequently observed.

Chaerophyllum procumbens (L.) Crantz. Wild Chervil. 67, 81. Wooded floodplains and stream margins; occasionally observed.

Cicuta maculata L. Spotted Cowbane. 307, 686, 816. Moist dolomite cliffs, marshy borders and stream margins; frequently observed.

*Conium maculatum L. Poison Hemlock. 240, 341. Moist roadside ditches and stream margins; occasionally observed.

Cryptotaenia canadensis (L.) DC. Honewort. 236. Rich upland woods, slopes and wooded floodplains; frequently observed.

*Daucus carota L. Queen Anne's Lace. 301. Weed of fields,

roadsides and stream margins; frequently observed.

Heracleum maximum Bartr. Cow Parsnip. 163, 632. Moist dolomite ledges, alluvial woods and moist roadside ditches; frequently observed.

Osmorhiza claytonii (Michx.) C. B. Clarke. Sweet Cicely. 127, 253, 255. Rich upland woods, slopes and wooded floodplains; frequently observed.

Osmorhiza longistylis (Torr.) DC. Anise Root. 110, 113, 154. Rich upland woods, slopes and rich alluvial woods; frequently observed.

*Pastinica sativa L. Parsnip. 521. Weed of roadsides, fields and stream margins; frequently observed.

Sanicula canadensis L. Canadian Black Snakeroot. 308, 745. Open to rich upland woods, talus slopes and wooded floodplains; frequently observed.

Sanicula gregaria Bickn. Clustered Black Snakeroot. 68, 111, 162. Richly wooded areas, especially with disturbnce; frequently observed.

Sanicula marilandica L. Sanicle Snakeroot. 223, 636. Open to rich uplands and slopes; frequently observed.

Sanicula trifoliata Bickn. Large-fruited Black Snakeroot. 755. Rich upland woods and talus slopes; occasionally observed.

Taenidia integerrima (L.) Drude. Yellow Pimpernel. 222, 644. Open to richly wooded rocky uplands and talus slopes; frequently observed.

Thaspium barbinode (Michx.) Nutt. Meadow Parsnip. 570. Open to wooded uplands and slopes; frequently observed.

Zizia aurea (L.) W. D. J. Koch. Golden Alexander. 98, 99, 226. Open to rich uplands, slopes and wooded floodplains; frequently observed.

Cornaceae (Dogwood Family)

Cornus alternifolia L.. Pagoda Dogwood. 140, 153, 156. Rich uplandwoods, slopes and alluvial woods; frequently observed.

Cornus drummondii C. A. Meyer. Rough-leaved Dogwood. 892. Rich rocky uplands, talus slopes and wooded floodplains; occasionally observed.

Cornus obliqua Raf. Blue-fruited Dogwood. 1010. Marshy borders and stream margins; occasionally observed.

Cornus racemosa Lam. Gray Dogwood. 218, 330, 450. Open to wooded uplands, slopes and roadsides; frequently observed.

Cornus rugosa Lam. Round-leaved Dogwood. 65, 328, 589. Rich upland woods, talus slopes and adjacent ravines; frequently observed.

Cornus stolonifera Michx. Red Osier. 285. Moist dolomite cliffs adjacent streams, marshy borders and stream margins; occasionally observed.

Ericaceae (Heath Family)

Monotropa uniflora L. Indian-pipe. 811, 946. Rich upland woods and slopes; frequently observed.

Pyrola elliptica Nutt. Shinleaf. Collected by R. A. Evers #30069 (ILLS); "wooded bluffs".

Primulaceae (Primrose Family)

Dodecatheon meadia L. Shooting Star. 49, 552. Open wooded uplands; frequently observed.

Lysimachia ciliata L. Fringed Loosestrife. 722, 723. Mesic upland fields; infrequently observed.

*Lysimachia nummularia L. Moneywort. 812. Compacted nature trails in rich woods and stream margins; occasionally observed.

Lysimachia quadriflora Sims. Narrow-leaved Loosestrife. 347, 715. Moist dolomite cliffs adjacent to streams; occasionally observed.

Lysimachia quadrifolia L. Whorled Loosestrife. 264. Open upland and adjacent fields; infrequently observed.

Primula mistassinica Michx. Dwarf Canadian Primrose. 937. Local on moist dolomite cliffs; frequently observed. One of the earliest spring ephemerals of the canyon with continuous and remotant blooms until frost.

Oleaceae (Olive Family)

Fraxinus americana L. White Ash. 184, 583, 658. Open to rich uplands, slopes and wooded floodplains; frequently observed.

Fraxinus nigra Marsh. Black Ash. 752. Ravines, lower talus slopes and alluvial woods; frequently observed.

Fraxinus pennsylvanica Marsh. var. subitegerrima (Vahl.) Fern. Green Ash. 954. Open woodland borders and alluvial woods; infrequently observed.

*Syringa vulgaris L. Common Lilac. 96. Persisting from early homestead cultivation adjacent to picnic grounds; infrequently observed.

Gentianaceae (Gentian Family)

Gentiana quinquefolia L. Stiff Gentian. 519, 891, 945. Open uplands and more southerly exposed talus slopes; frequently observed.

Apocynaceae (Dogbane Family)

Apocynum androsaemifolium L. Spreading Dogbane. 324, 351. Open upland woods and adjacent fields; frequently observed.

Apocynum sibiricum Jacq. Indian Help. 885. Grassy upland fields adjacent to roadsides; infrequently observed.

*Vinca minor L. Common Periwinkle. 538. Persisting from cultivation near abandoned dwelling; rarely observed.

Asclepiadaceae (Milkweed Family)

Asclepias exaltata L. Poke Milkweed. 278. Rich wooded uplands and slopes; frequently observed.

Asclepias incarnata L. Swamp Milkweed. 345, 708. Moist upland fields, stream margins and marshy borders; frequently observed.

Asclepias syriaca L. Common Milkweed. 668. Open upland woods, fields and roadsides; frequently observed.

Asclepias tuberosa L. var. interior (Woodson) Shinners. Butterfly Milkweed. 361. Open upland woods and grassy fields; infrequently observed.

Asclepias verticillata L. Horsetail Milkweed. 360, 770. Open upland woods and adjacent fields; frequently observed.

Convolvulus (convolvulus Family)

*Calystegia sepium (L.) R. Br. var. americana (Sims) Mohlenbr. Wild Morning Glory. 272, 671. Roadsides and upland fields; frequently observed.

Calystegia spithamaea (L.) Pursh. Low Bindweed. 166, 224. Open upland woods, southerly exposed slopes and adjacent fields; frequently observed.

*Convolvulus arvensis L. Field Bindweed. 354. Roadsides, upland fields and stream margins; frequently observed.

Cuscuta gronovii Willd. Dodder. 893. Alluvial woods on Laportea canadensis; occasionally observed.

Polemoniaceae (Polemonium Family)

Phlox divaricata L. ssp. laphamii (Wood) Wherry. Blue Phlox. 26, 37. Rich upland woods, slopes and wooded floodplains; frequently observed.

Phlox pilosa L. ssp. fulgida (Wheery) Wherry. Prairie Phlox. 120, 123, 592. Open uplands and more southerly exposed talus slopes; frequently observed.

Polemonium reptans L. Jacob's-ladder. 54. Rich upland woods, wooded slopes and grassy alluvial woods; frequently observed.

Hydrophyllaceae (Waterleaf Family)

Ellisa nytelea L. Aunt Lucy. 571. Stream margins, floodplains and moist roadside ditches; frequently observed.

Hydrophyllum appendiculatum Michx. Great Waterleaf. 117. Rich wooded slopes and floodplains; frequently observed.

Hydrophyllum virginianum L. Virginia Waterleaf. 94. Rich upland woods, talus slopes and alluvial woods; frequently observed.

Boraginaceae (Borage Family)

Hackelia americana (Gray) Fern. American Stickseed. Collected

by F. J. Hermann #8789 (F); "ledges of dolomite boulder, moist, wooded, calcareous slope".

Hackelia virginiana (L.) I. M. Johnston. Virginia Stickseed. 746. Disturbed moist uplands, slopes and roadsides, weedy; frequently observed.

Lithospermum canescens (Michx.) Lehm. Hoary Puccoon. 74. Open upland woods and more southerly exposed talus slopes; frequently observed.

Lithospermum incisum Lehm. Yellow Puccoon. 617. Open upland woods and more southerly exposed rocky slopes; occasionally observed.

Lithospermum latifolium Michx. American Gromwell. 193. Rich talus slopes; occasionally observed.

Verbenaceae (Vervain Family)

Verbena hastata L. Blue Vervain. 775, 815. Upland fields, roadsides and stream margins; frequently observed.

Verbena urticifolia L. White Vervain. 349, 736, 776. Moist dolomite cliffs, marshy borders, stream margins and moist roadside ditches; frequently observed.

Phrymaceae (Lopseed Family)

Phryma leptostachya L. Lopseed. 337, 338. Open to rich uplands and talus slopes; frequently observed.

Lamiaceae (Mint Family)

Agastache scrophulariaefolia (Willd.) Ktze. Purple Giant Hyssop. 998. Alluvial woods and stream margins; frequently observed.

Blephila hirsuta (Pursh) Benth. Wood Mint. 439. Moist wooded slopes and wooded floodplains; frequently observed.

*Glecoma hederacea L. (incl. var. micrantha Moricand. 4.) Ground Ivy. 30. Weed of moist picnic grounds, roadside ditches, floodplains and stream margins; frequently observed.

*Leonurus cardiaca L. Motherwort. 241, 930. Moist disturbed woods, roadsides and stream margins; frequently observed.

Lycopus americanus Muhl. Common Water-horehound. 411, 453, 911. Moist dolomite cliffs, marshy borders and alluvial woods; frequently observed.

Lycopus virginicus L. Water-horehound. 929. Moist dolomite cliffs, alluvial woods, marshy borders and stream margins; frequently observed.

Mentha arvensis L. var. villosa (Benth.) S. R. Stewart. Field Mint. 725. Moist dolomite cliffs, marshy borders, alluvial woods and stream margins; frequently observed.

*Mentha X gentilis L. Red Mint. 956. Grassy alluvial stream margins; rarely observed.

*Mentha X piperita L. Peppermint. Collected by R. A. Evers #8905 (ILLS); "streambed".

Monarda fistulosa L. Wild Bergamot. 814. Open upland woods, fields, and roadsides; frequently observed.

*Nepeta cataria L. Catnip. 358. Moist disturbed woods, roadsides and stream margins; frequently observed.

Prunella vulgaris L. var. lanceolata (Bart.) Fern. Self-heal. 704. Moist upland fields, picnic grounds and roadsides; frequently observed.

Pycnanthemum virgniianum (L.) Durand & Jackson. Mountain Mint. 908, 909, 955. Open upland woods and adjacent fields;

frequently observed.

Scutellaria lateriflora L. Mad-dog Skullcap. 712. Moist dolomite cliffs, marshy borders and stream margins; frequently observed.

Scutellaria ovata Hill. var. versicolor (Nutt.) Fern. Heart-leaved Skullcap. 306. Rich upland woods and talus slopes; frequently observed.

Scutellaria parvula Michx. (incl. var. leonardi Epling. 978.) Small Skullcap. 907. Open upland woods and rich talus slopes; frequently observed.

Stachys tenuifolia Willd. var. hispida (Pursh) Fern. Hairy Hedge Nettle. 373, 910. Alluvial woods, stream margins and moist roadside ditches; frequently observed.

Teucrium canadense L. var. virginicum (L.) Eat. Germander. 389, 716, 798. Moist upland fields, disturbed wooded slopes and floodplains; frequently observed.

Solanaceae (Nightshade Family)

Physalis heterophylla Nees. Ground Cherry. 709, 713. Upland fields and roadsides; frequently observed.

Physalis subglabrata Mack. & Bush. Smooth Ground Cherry. 357. Upland fields and roadsides; frequently observed.

Solanum americanum Mill. Black Nightshade. 438. Upland fields, roadsides and stream margins; frequently observed.

*Solanum carolinense L. Horse Nettle. 914. Stream margins and roadside ditches; occasionally observe.d.

*Solanum dulcamara L. Bittersweet Nightshade. 206, 388. Upland fields, roadsides and marshy borders; frequently observed.

Scrophulariaceae (Figwort Family)

Chelone glabra L. White Turtlehead. 902, 951. Moist shaded dolomite ledges and wooded floodplains; frequently observed.

Gerardia tenuifolia Wood. Pale False Foxglove. 473. Open upland woods; infrequently observed.

Gerardia grandiflora Benth. var. pulchra (Pennell) Fern. Yellow False Foxglove. 410, 774. Open upland woods; occasionally observed.

*Linaria vulgaris Hill. Butter-and-eggs. 903. Roadsides; occasionally observed.

Lindernia dubia (L.) Pennell. False Pimpernel. Collected by V. O. Graham #9911 (ISM); "wet soil along stream, common".

Mimulus glabratus HBK. var. fremontii (Benth.) Grant. Yellow Monkey Flower. Collected by T. G. Hartley #4273 (IA); "shady springy bank of Apple River".

Mimulus ringens L. Monkey Flower. 719. Moist dolomite cliffs, alluvial woods and marshy borders; frequently observed.

Pedicularis canadensis L. Common Lousewort. 83. Open upland woods; frequently observed.

Scrophylaria marilandica L. Late Figwort. 305, 756, 952. Open rich woods, stream margins and moist roadsides; frequently observed.

*Verbascum thapsus L. Common Mullein. 353. Weed of fields, roadsides and stream margins; frequently observed.

Veronica peregrina L. Purslane Speedwell. 582. Dolomite ledges, picnic grounds and stream margins; frequently observed.

Veronicastrum virginicum (L.) Farw. Culver's-root. 346, 777. Open upland woods, ravines and marshy borders; fre-

quently observed.

Orobanchaceae (Broom-rape Family)

Orobanche uniflora L. One-flowered Cancer-root. Collected by G. D. Fuller #10494 (ISM); "moist woods, rare".

Plantaginaceae (Plantain Family)

*Plantago laneolata L. Buckhorn Plantain. 284, 607. Upland fileds, roadsides and stream margins; frequently observed.

Plantago rugeli Dcne. Red-stalked Plantain. 733, 813. Rich north-exposed slopes, dolomite cliffs, fields, roadsides and stream margins; frequently observed.

Rubiaceae (Madder Family)

Galium aparine L. Spring Cleavers. 92. Moist dolomite ledges, wooded uplands, slopes and floodplains; frequently observed.

Galium asprellum Michx. Rough Bedstraw. 932. Rich wooded ravines, talus slopes and marshy borders; occasionally observed.

Galium boreale. L. Northern Bedstraw. 215. Dolomite cliffs and open upland southern exposures; frequently observed.

Galium circaezans Michx. var. hypomalacum Fern. Wild Licorice. 217, 664. Open to rich upland woods and talus slopes; frequently observed.

Galium concinnum T. & G. Shining Bedstraw. 216, 267, 700. Open to wooded uplands and talus slopes; frequently observed.

Galium triflorum Michx. Sweet-scented Bedstraw. 847. Rich talus slopes and wooded floodplains; frequently observed.

Caprifoliaceae (Honeysuckle Family)

Diervilla lonicera Mill. Bush Honeysuckle. 249, 269, 634. Open

to rich uplands, talus slopes and dolomite ledges; frequently observed.

Lonicera dioica L. Red Honeysuckle. 142, 143. Mossy north-exposed talus slopes and dolomite cliffs; occasionally observed.

*Lonicera maacki Maxim. Amur Honeysuckle. 513, 577. Planted on upland campgrounds; frequently escaping.

*Lonicera X muendeniensis Rehd. Bush Honeysuckle. 560. Planted on upland campgrounds; frequently escaping.

Lonicera prolifera (Kirchn.) Rend. Grape Honeysuckle. 207. Open to rich upland woods, talus slopes and dolomite ledges; frequently observed.

Sambucus canadensis L. Common Elderberry. 294, 614. On a vareity of moist habitats, open uplands to alluvial woods; frequently observed.

Triosteum perfoliatum L. Late Horse Gentian. 386. Rich upland woods, slopes and wooded floodplains; frequently observed.

Vibrunum lentago L. Nannyberry. 136, 561, 852. Found on a variety of moist to dry habitats, open uplands, wooded slopes, floodplains and fencerows; frequently observed.

*Viburnum opulus L. European Highbush Cranberry. 446, 947. Disturbed wooded uplands and slopes; occasionally observed.

Viburnum rafinesquinum Schult. Downy Arrow-wood. 129, 146, 147. Open to rich rocky uplands, talus slopes and dolomite ledges; frequently observed.

Viburnum trilobum Marsh. Highbush Cranberry. 159. North-facing talus slopes and ravines; infrequently observed.

Adoxaceae (Moschatel Family)

Adoxa moschatellina L. Moschatel. Collected by N. C. Fassett #18709 (WIS); no habitat given, and by F. J. Hermann #8896 (WIS); "rich elm woods, moist wooded calcareous slope".

Dipsaceae (Teasel Family)

*Dipsacus sylvestris Huds. Common Teasel. 490. Upland fields and stream margins; infrequently observed.

Cucurbitaceae (Gourd Family)

Echinocytis lobata (Michx.) T. & G. Wild Cucumber. 428, 495. Talus slopes, alluvial woods and stream margins; frequently observed.

Campanulaceae (Bluebell Family)

Campanula americana L. Tall Bellflower. 333. Moist woodland borders, moist roadsides and floodplains; frequently observed.

Campanula rotundifolia L. (incl. var. velutina A. DC. 209, 949). Harebell. 950. Open uplands, south-exposed talus slopes and dry dolomite cliffs; frequently observed.

Lobelia inflata L. Indian Tobacco. 434. Scattered throughout in moist woods, especially along compacted nature trails; frequently observed.

Lobelia siphilitica L. Great Blue Lobelia. 442, 491. Moist dolomite ledges, marshy borders and stream margins; frequently observed.

Lobelia spicata Lam. Pale Spiked Lobelia. 250. Open uplands, south-exposed talus slopes and dry dolomite ledges; frequently observed.

Asteraceae (Aster Family)

*Achillea millefolium L. Common Yarrow. 259, 239, 606. Weed of fields, roadsides, and similar disturbed open habitats; frequently observed.

Ambrosia artemisiifolia L. Common Ragweed. 424. Roadsides, fields and stream margins; frequently observed.

Ambrosia trifida L. Great Ragweed. 423. Moist wooded uplands, slopes and alluvial woods; frequently observed.

Antennaria neglecta Greene. 28. Open uplands, south-exposed talus slopes and adjacent fields; frequently observed.

Antennaria plantaginifolia (L.) Richards. Pussytoes. 34, 144. Open upland woods and adjacent fields; frequently observed.

*Anthemis arvensis L. Corn Chamomile. 684, 703, 740. Roadsides, fields and stream margins; frequently observed.

Artemisia serrata Nutt. Saw-toothed Sagebrush. 857. Stream margins; infrequently observed.

*Arctium minus (Hill.) Bernh. Common Burdock. 371, 384. Roadside ditches, stream margins and alluvial woods; frequently observed.

*Arctium tomentosum Mill. Cotton Burdock. 763. Moist roadside ditches and stream margins; occasionally observed.

Aster azureus Lindl. Sky-blue Aster. 518, 901, 948. Open upland woods and south-exposed talus slopes; frequently observed.

Aster cordifolius L. Blue Wood Aster. 497, 498. Open to rich upland woods and moist slopes; frequently observed.

Aster lateriflorus (L.) Britt. Side-flowering Aster. 509, 889, 900. Open to rich upland woods, slopes, floodplains and fields; frequently observed.

Aster novae-angliae L. New England Aster. 512, 944. Moist ditches and stream margins; infrequently observed.

Aster pilosus Willd. Hairy Aster. 496, 510, 511. Open upland woods, dolomite clifs, fields and stream margins; frequently observed.

Aster prenanthoides Mulh. Crooked Aster. 795, 849. Low moist slopes, moist dolomite cliffs, marshy borders and stream margins; frequently observed.

Aster puniceus L. Swamp Aster. 514. Disturbed rich woods, marshy borders and alluvial woods; occasionally observed.

Aster saggittifolius Wedem. ex Willd. Arrow-leaved Aster. 401, 500. Open to rich upland woods, slopes and wooded floodplains; frequently observed.

Aster shortii Lindl. Short's Aster. 499, 849, 850. Open uplands, talus slopes and dolomite ledges; frequently observed.

Aster simplex Eilld. Panicled Aster. 927. Marshy borders and stream margins; occasionally observed.

Bidens cernua L. Nodding Bur Marigold. 778, 899. Marshy borders, moist dolomite cliffs and stream margins; frequently observed.

Bidens connata Muhl. Purple-stemmed Tickseed. 761. Marshy borders, moist dolomite cliffs and stream margins; frequently observed.

Bidens frondosa L. Common Beggar's Tick. 507, 508, 898. Marshy borders, moist dolomite cliffs and stream margins; frequently observed.

Bidens vulgata Greene. Tall Beggar's Tick. 897. Marshy borders and stream margins; occasionally observed.

Brickellia eupatorioides (L.) Shinners. False Boneset. 851. Open upland woods and fields; occasionally observed.

Cacalia muhlenbergia (Sch.-Bip.) Fern. Great Indian-plaintain. 391 Rich upland woods and floodplains; rarely observed.

*Chrysanthemum leucanthemum L. Chrysanthemum. 251. Fields, roadsides and stream margins; frequently observed.

*Cichorium intybus L. Chicory. 290. Weed of roadsides, fields and stream margins; frequently observed.

Cirsium altissimum (L.) Spreng. Tall Thistle. 673. Fi lds and roadsides; occasionally observed.

*Cirsium arvense (L.) Scop. Canada Thistle. 673. Fields and roadsides; occasionally observed.

Cirsium discolor (Muhl.) Spreng. Field Thistle. 894. On various habitats, open uplands to stream margins; frequently observed.

*Cirsium vulgare (Savi.) Tenore. Bull Thistle. 383, 472. Weed of fields, roadsides and stream margins; frequently observed.

Coreopsis palmata Nutt. Prairie Coreopsis. 299. Open upland woods, southerly exposed talus slopes and fields; frequently observed.

Erigeron annuus (L.) Pers. Annual Fleabane. 227, 655, 683. Disturbed moist woods, fields, roadsides and stream margins;

frequently observed.

Erigeron canadensis L. Horseweed. 471, 818. Roadsides, fields and stream margins; frequently observed.

Erigeron philadelphicus L. Marsh Fleabane. 82, 174. On a wide range of habitats, open uplands, rich slopes, dolomite cliffs and alluvial woods; frequently observed.

Erigeron pulchellus Michx. Robin's Plantain. 157, 158. Open to wooded uplands, moist dolomite cliffs and talus slopes; frequently observed.

Erigeron strigosus Muhl. Daisy Fleabane. 620, 682. Open upland woods, sparsely wooded slopes, fields and roadsides; frequently observed.

Eupatorium altissimum L. Tall Boneset. 861. Open upland woods and adjacent fields; occasionally observed.

Eupatorium maculatum L. Joe-Pye-weed. 363. Marshy borders and moist dolomite cliffs; occasionally observed.

Eupatorium perfoliatum L. Common Boneset. 803, 820. Marshy borders and alluvial woods; frequently observed.

Eupatorium purpureum L. Purple Joe-Pye-weed. 459. Rich upland woods and talus slopes; frequently observed.

Eupatorium rugosum Houtt. White Snakeroot. 458, 465, 753. Rich upland woods, slopes, moist dolomite cliffs and roadsides; frequently observed.

*Galinsoga ciliata (Raf.) Blake. 457. Weed of picnic grounds adjacent to park buildings; frequently observed.

Helenium autumnale L. Sneezeweed. 478, 865. Moist dolomite cliffs, alluvial woods and stream margins; frequently observed.

Helianthus decapetalus L. Pale Sunflower. 717, 802. Open upland woods and sparsely wooded slopes; infrequently observed.

Helianthus occidentalis Riddell. Western Sunflower. 779. Open upland woods; occasionally observed.

Helianthus strumosus L. Pale-leaved Sunflower. 407, 752, 860. Open upland woods, fields and roadsides; frequently observed.

Helianthus tuberosus L. Jerusalem Artichoke. 456, 505. Alluvial woods; occasionally observed.

Heliopsis helianthoides (L.) Sweet. False Sunflower. 326, 804. Open to rich upland woods and talus slopes; occasionally observed.

Hieracium canadense Michx. Canada Hawkweed. 425, 866. Roadsides and upland fields; occasionally observed.

Krigia biflora (Walt.) Blake. False Dandelion. 246, 581. Open upland woods; frequently observed.

Lactuca biennis (Moench) Fern. Tall Blue Lettuce. 786. Moist roadsides, woodland borders and alluvial woods; frequently observed.

Lactuca canadensis L. Wild Lettuce. 819. Open upland woods, fields and roadsides; frequently observed.

Lactuca floridana (L.) Gaertn. Blue Lettuce. 408, 805. Rich uplands and talus slopes; occasionally observed.

*Lactuca serriola L. Prickly Lettuce. 744. Weed of roadsides and stream margins; frequently observed.

Liatris aspera Michx. Blazing Star. 822, 867. Open upland woods and south-exposed talus slopes; occasionally observed.

*Matricaria matricarioides (Less.) Porter. Pineapple Weed. 252, 600. Weed of roadsides, picnic grounds and stream margins; frequently observed.

Parthenium integrifolium L. Wild-quinine. 228, 409. Open upland woods and adjacent fields; frequently observed.

Polymnia canadensis L. Leafcup. Rich upland woods, slopes and moist dolomite ledges; frequently observed.

Prenanthes alba L. White Lettuce. 447. Open to rich upland woods, slopes and moist roadsides; frequently observed.

Prenanthes crepidinea Michx. Great White Lettuce. 808, 1005. North-facing dolomite cliffs; occasionally observed.

Ratibida pinnata (Vent.) Barnh. Yellow Coneflower. 350, 732. Open upland woods and adjacent fields; frequently observed.

Rudbeckia hirta L. Black-eyed Susan. 276, 687. Open upland woods and adjacent fields; frequently observed.

Rudbeckia laciniata L. Wild Golden Glow. 396, 769, 817. Marshy borders, moist dolomite cliffs and floodplains; frequently observed.

Rudbeckia triloba L. Brown-eyed Susan. 365. Rich moist woods, floodplains and stream margins; frequently observed.

Senecio aureus L. Golden Ragwort. 643. Moist dolomite cliffs and springy ravines; frequently observed.

Senecio pauperculus Michx. Balsam Ragwort. 102. Moist dolomite cliffs; occasionally observed.

Senecio plattensis Nutt. Prairie Ragwort. 148. Open upland woods and sparsely wooded slopes; frequently observed.

Silphium integrifolium Michx. Rosin Weed. 344. Open upland woods and adjacent fields; frequently observed.

Silphium perfoliatum L. Cup Plant. 317. Moist upland fields, talus slopes, floodplains and marshy borders; frequently observed.

Solidago bicolor L. var. concolor Torr. & Gray. Hispid Goldenrod. 340, 399, 698. Moist and dry dolomite cliffs; frequently observed.

Solidago canadensis L. Tall Goldenrod. 466, 873. Open upland woods, fields and roadsides; frequently observed.

Solidago flexicaulis L. Broad-leaved Goldentod. 869. Rich upland woods and talus slopes; frequently observed.

Solidago gigantea Ait. Late Goldenrod. 882. Moist dolomite cliffs, floodplains and stream margins; frequently observed.

Solidago graminifolia (L.) Salisb. Grass-leaved Goldenrod. Collected by G. D. Fuller #9484 (ISM); "upland prairie, occasional".

Solidago juncea Ait. Early Goldenrod. 444, 1006. Open upland woods and adjacent fields; frequently observed.

Solidago nemoralis Ait. Old-field Goldenrod. 445. Open upland woods and adjacent fields; frequently observed.

Solidago rigida L. Stiff Goldenrod. 443. Open upland woods and adjacent fields; frequently observed.

Solidago sciaphila Steele. Cliff Goldenrod. 461. Rich talus slopes and moist dolomite cliffs; frequently observed.

Solidago speciosa Nutt. Showy Goldenrod. 501. Open upland woods; infrequently observed.

Solidago ulmifolia Muhl. Elm-leaved Goldenrod. 432, 467, 939. Open to rich upland woods and talus slopes; frequently observed.

*Sonchus arvensis L. var. glabrescens Guenth., Gram. & Winn. Smooth Sow Thistle. 721. Weed of the upland fields and roadsides; occasionally observed.

*Sonchus oleraceus L. Common Sow Thistle. 881. Stream margins; occasionally observed.

*Taraxacum offininale Weber. Common Dandelion. 6. Weed of numerous terrestrial habitats; frequently observed.

*Tragopogon dubius Scop. Goat's-beard. 772. Weed of fields, roadsides and stream margins; frequently observed.

*Tragopogon pratensis L. Common Goat's-beard. 119. Weed of moist roadsides and stream margins; occasionally observed.

*Xanthium strumarium L. Common Cocklebur. 877. Moist roadside ditches and stream margins; frequently observed.

EXCLUDED SPECIES

It is most unfortunate that the earliest collections of the Apple River Canyon area by W. S. Moffatt and H. S. Pepoon were omitted from this work based solely on inadequate locale descriptions of many of their historical finds. Many of these turn-of-the-century collections were simply labeled "Warren bluffs" or "rocky banks of Apple River, Jo Daviess County, Illinois". This author was also forced to exclude numerous "fanciful" descriptions of the canyon flora that were given graciously by local citizens in various forms of old newspaper clippings, park brochures and tattered high school reports. As a result, the following list of species was largely obtained from scientific publications, herbarium investigations and unpublished field notes taken by T. G. Hartley and H. H. Iltis, based on their 1959 spring visit with a Plant Geography class from the University of Wisconsin, Madison, and on Hartley's 1958 collection.

It should be further emphasized that inclusion does not necessarily mean that a particular taxon does not exist but rather that this collector has not seen a voucher specimen, and an extensive search should be made to update our knowledge of its existence in the study area. The list follows the same sequence of families and species as the catalogue.

Adiantaceae (Maidenhair Fern Family)

Pellaea atropurpurea (L.) Link. Purple Cliff-brake Fern.

Although this species has been recorded from Jo Daviess County by Mohlenbrock and Ladd (1978) and the adjacent Driftless Area by Peck and Taylor (1980), Pepoon's reference

in 1909 was indicative of his early misidentification of Pellaea glabella Mett. ex Kuh.

Poaceae (Grass Family)

Poa alsodes Gray. Woodland Bluegrass. Collected by R. A. Evers from a spring habitat in Apple River Canyon. Subsequent study proved the collection was actually a misidentified Poa trivialis Gray.

Sporobulus cryptandrus (Torr.) Gray. Sand Dropseed. Unpublished field notes by Hartley and Iltis (1958-59), "prairies above cliffs and on top edge of high bluffs".

Cyperaceae (Sedge Family)

Carex plantaginea Lam. Unpublished field notes by Hartley and Iltis (1958-59); "base of slope adjacent floodplain". Noticeably, Hartley (1966) failed to mention this important find in his Driftless Area publication.

Carex virescens Muhl. I believe the specimen, collected by V. O. Graham and on deposit in the Illinois State Museum, is a misidentified Carex granularis Muhl.

Liliaceae (Lily Family)

Zigadenus elegans Pursh. White Camass. Reference to this western species by Pepoon in 1909 was in error for Zigadenus glaucus Nutt.

Orchidaceae (Orchid Family)

Cypripedium reginae Walt. Showy Lady's-slipper Orchid. See Pepoon (1909).

Papaveraceae (Poppy Family)

Corydalis sempervirens (L.) Pers. Pink Corydalis. Unpublished field notes by Hartley and Iltis (1958-59), "rather mesic limestone cliff in woods on steep slopes above Apple River Canyon in deep ravines adjoining valley".

Barssicaceae (Mustard Family)

Arabis missouriensis Greene. Missouri Rock Cress. Unpublished field notes by Hartley and Iltis (1958-59); "upland hardwoods" and the same habitat given for the Pink Corydalis. A questionable species not presently recognized in Illinois, and Hartley (1966) believes it is in need of study in the Driftless Area

Saxifragaceae (Saxifrage Family)

Parnassia glauca Raf. Grass of Parnassus. See Pepoon (1909, 1917 and 1919).

Sullivantia sulivantii (T. & G.) Britt. Camass. Reference to this binomial by Pepoon in 1909 was in error for Sullivantia renifolia Resend.

Rosaceae (Rose Family)

Amelanchior canadensis (L.) Medic. See Pepoon (1919). Probably based on a misidentified Amelanchior arborea (Michx. f.) Fern.

Crataegus coccinea L. Scarlet Hawthorn. Reported by Pepoon (1919), this binomial is a synonym for Cragaegus holmesiana Ashe.

Crataegus crus-galli L. Cockspur Hawthorn. See Pepoon (1919).

Crataegus macracantha Gray. Fleshy Hawthorn. This is the binomial used by Pepoon in 1909 for Crataegus succulenta Link.

Crataegus punctata Jacq. Dotted Hawthorn. See Pepoon (1919).

Pyrus ioensis (Wood) Bailey. Iowa Crab. See Pepoon (1919).

Equally known to many authors as Malus ioensis (Wood) Britt.

Fabaceae (Pulse Family)

Gymnocladus dioica (L.) K. Koch. Kentucky Coffee Tree. References of this species by Pepoon in 1910, 1916, and 1919 have been verified by this collector but the location is shortly south of study boundaires on Mckee's Bottoms.

Hypericaceae (St. John's-wort Family)

Hypericum canadense L. Canadian St. John's-wort. See Pepoon (1917).

Cistaceae (Rockrose Family)

Helianthemum sp. Rockrose. Unpublished field notes by Hartley and Iltis (1958-59); "prairies above cliffs and on top edge of high bluff".

Violaceae (Violet Family)

Viola missouriensis Greene. Missouri Violet. Unpublished field notes by Hartley and Iltis (1958-59); "weeds along paths, fields, etc."

Onagraceae (Evening Primrose Family)

Epilobium lineare (B. &B.) Rydb. Fen Willow Herb. Reported by Pepoon (1917), this binomial is a synonym for Epilobium leptophyllum Raf.

Gentianaceae (Gentian Family)

Gentiana crinata Froel. Fringed Gentian. See Pepoon (1909).

Gentiana flavida Gray. Yellowish Gentian. Reported by Pepoon (1909), this binoimal is a synonym for Gentiana alba Gray.

Lamiaceae (Mint Family)

Pycnanthemum flexosum (Walt.) B. S. P. Slender Mountain Mint. Unpublished field notes by Hartley and Iltis (1958-59); "prairies above cliffs and on top edge of high bluffs". Probably based on a misidentified Pycnanthemum virginianum (L.) Durand & Jackson since Hartley (1966) omitted this species from his Driftless Area publication.

Scrophulariaceae (Figwort Family)

Mimulus alatus Ait. Winged Monkey Flower. See Pepoon (1909).

Pedicularis lanceolata Michx. Swamp Betony. See Pepoon (1917).

Rubiaceae (Madder Family)

Galium tinctorium (Gray) B. & B. Wild Madder. Reported by Pepoon (1909), this binomial is a synonym for Galium obtusum Bigel.

Caprifoliaceae (Honeysuckle Family)

Viburnum prunifolium L. See Pepoon (1919).

Campanulaceae (bluebell Family)

Campanula uliginosa Rydb. Marsh Harebell. See Pepoon (1917).

Lobelia kalmii L. Bog Lobelia. See Pepoon (1917).

Asteraceae (Aster Family)

Aster macrophyllus L. Big-leaved Aster. Unpublished field notes by Hartley and Iltis (1958-59), no habitat given.

Senecio obovatus Muhl. Round-leaved Ragwort. See Pepoon (1917).

Solidago altissima L. Field Goldenrod. Although the taxonomy of this binomial is complex and highly controversial, the species was listed by Hartley and Iltis (1958-59) and therefore included here. No habitat given.

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