

A VASCULAR AND NON-VASCULAR FLORA OF LITTLE RIVER
ON LOOKOUT MOUNTAIN IN NORTHEAST ALABAMA

by

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ABSTRACT

The documented vascular flora of Little River drainage in Alabama includes 773 taxa distributed among 331 genera, 110 families, and four divisions. Fourteen vascular species are considered "threatened" in Alabama while two species are federally listed and protected. County records include 133 that are reported first herein. Twenty-four species are new to Cherokee County, 17 are new to DeKalb County, and 92 are new to both counties. Fifty-four taxa are considered first reports for the Cumberland Plateau.

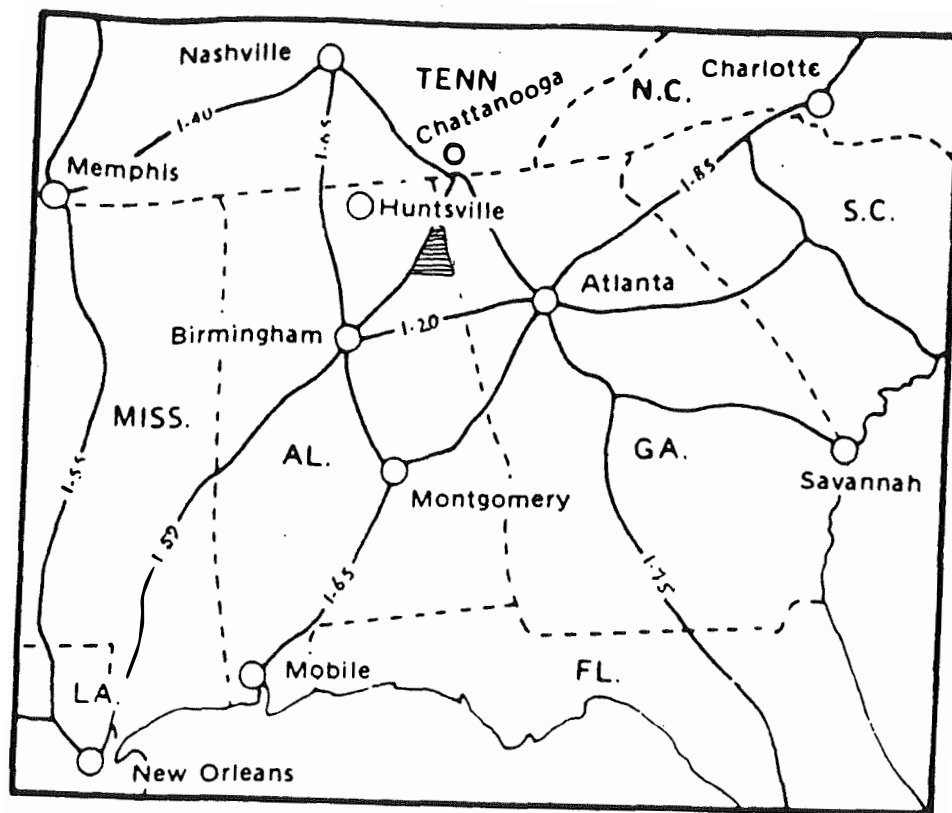
**A VASCULAR AND NON-VASCULAR FLORA OF LITTLE RIVER
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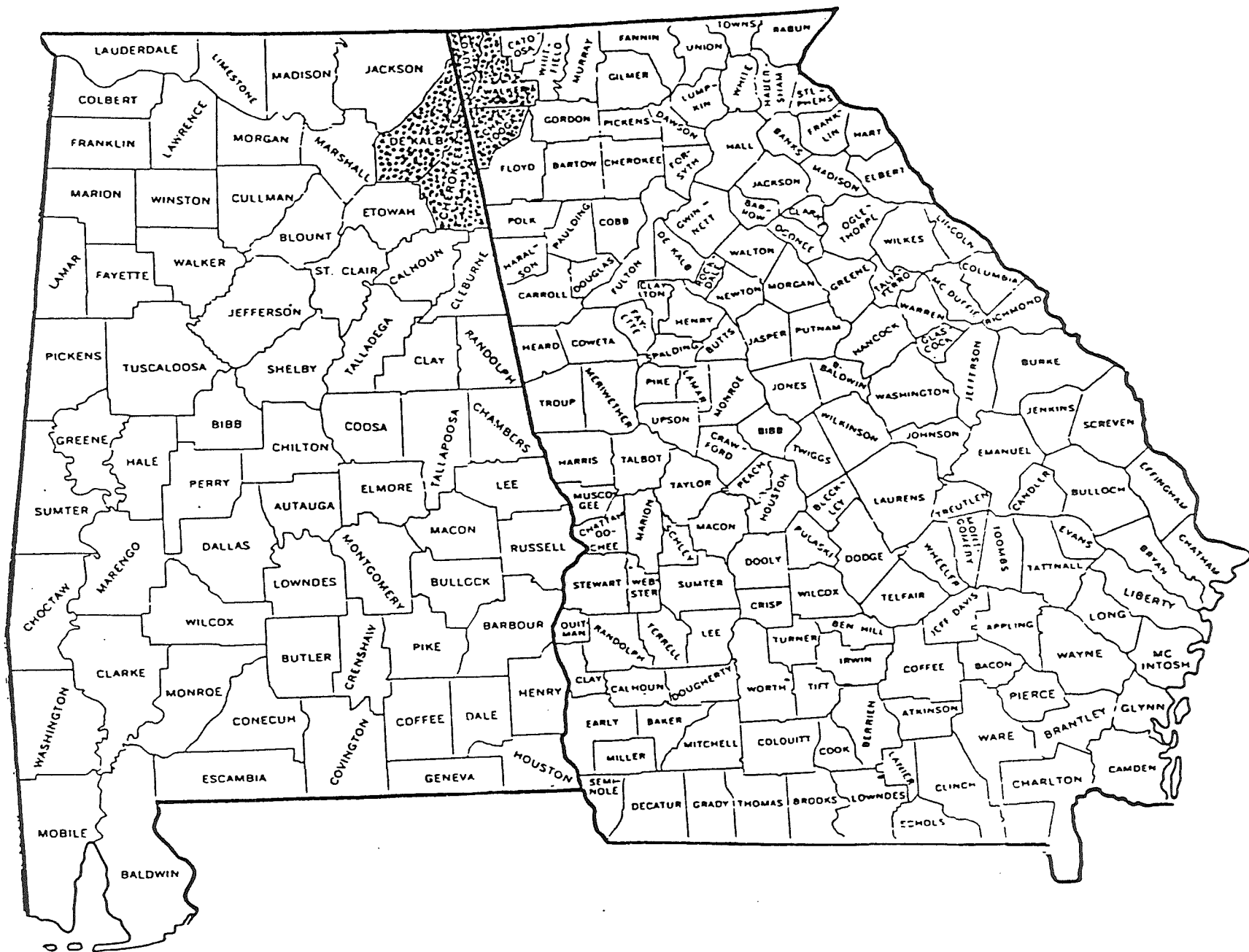
INTRODUCTION

Little River runs from northeast to southwest mostly atop Lookout Mountain. As it traverses Lookout Mountain, it forms picturesque vistas with numerous waterfalls interspersed with rapids, riffles, and quiet pools. It flows through northeast Alabama, forming most of the boundary between Cherokee and DeKalb counties (see fig. 1, fig. 2). A small but impressive canyon occurs along the upper river in DeSoto State Park. Below the junction of Alabama Highway 35, a breathtaking, continuous canyon meanders ca. 23 km (ca. 14 mi) long before it exits the plateau through a gulf called "Little River Canyon Mouth Park." The river continues about 3 km before flowing into Lake Weiss, a man-made impoundment. The original mouth of the river is drowned beneath the waters of the impoundment.

Little River presents a unique opportunity for botanical research, for the following reasons:

- a. the Little River area shelters many different plant species, some of which are endemic to Little





River and others which are rare elsewhere but occur in abundance along the river;

b. man's activities are an immediate threat to the integrity of the unique assemblage of plants;

c. no effective protection for the flora currently exists; and

d. while some previous work has been done on the flora of Little River, a thorough and critical study of the flora has not been performed.

This study was undertaken to evaluate the flora occurring in the Little River drainage basin with the following primary objectives and methods. The foremost objective was to document the vascular flora occurring naturally in the basin. This was accomplished by field collections of fertile specimens during the extent of the growing season and examination of herbarium specimens primarily housed in the JSU herbarium (JSU), the Herbarium of the University of North Carolina (NCU), and the University of Georgia Herbarium (GA). A second objective was to document the flora of special habitats. This was accomplished by reviewing label data, particularly location, rock type, and habitat. A third objective was to identify flat rock outcrops, waterfalls, coves, ravines, and other topographic features that might support unique plant assemblages by surveying topographic and geologic maps, field exploration, and by conversations with local residents and officials. A

fourth objective was to analyze the flora for indigenous species, introduced species, disjuncts, relics, and range extensions. This was accomplished by examination of field collections and herbarium specimens, and a review of relevant literature. Analysis of the flora included determination of rare, threatened, and endangered species by reference to the most recent Alabama state list of rare plants, the Fish and Wildlife Service publication "Endangered and threatened wildlife and plants" (1991) and by personal observations. Flowering and fruiting phenologies were derived by field observations and examination of herbarium specimens. Life-forms were ascertained by examination of the literature and field and herbarium specimens when necessary. Distribution types were assigned by a review of pertinent literature. Specimens were identified by using standard floras, pertinent journal articles and monographs. These publications are cited in the FLORA with taxa where they were specifically used.

FIELD STUDIES

Field work commenced in August 1986 and continued year round until November 1989. During April, May, and early June one or more collecting trips were made per week. The large size of the study area and the rugged terrain necessitated many trips during the spring flowering season. In the fall,

several forays per month were undertaken to collect the fall flora. During winter, collections were made on an irregular schedule. Collections have been made sporadically since 1989 to augment the data.

Entry into the canyon without rappelling is possible in only a few places. Negotiating the canyon floor and river is treacherous due to the numerous boulders, swift, cold waters, and an extremely slippery substrate. Roads along the canyon shoulders and upper portions of the river are nearly impassible in wet-weather so an all-terrain vehicle is necessary. Primary entry along the upper river is at the two fords or by trekking cross-country. Along the canyon proper, access is usually through tributary canyons that mostly require some rock climbing.

Large plastic bags were used to hold plants while in the field. Specimens were wrapped in wet newspapers to prevent desiccation. During hot weather, the bags were placed on ice in coolers until the samples could be pressed and dried. Vouchers are deposited in the Jacksonville State University Herbarium.

HISTORY

Wilson (1977) and Strayhorn (1986) have described some

aspects of the history of Lookout Mountain in detail. The ensuing discussion is primarily derived from those two sources. A knowledge of the history of an area may yield clues in understanding historic and present vegetation.

Archaeological digs near Trenton, Georgia demonstrate that American Indians were living near Lookout Mountain nearly 2000 years ago with trade routes extending throughout North America. These digs yielded objects from the Gulf of Mexico, the Tennessee Copper Basin, Ohio, Minnesota, and the Yellowstone area. At various times, each of the three great Indian families, i.e., the Algonquins, the Iroquois, and the Muskogees, had tribes living in the vicinity of Lookout Mountain. From the Algonquins came the Shawnee tribe, whose territory included part of Georgia, all of middle Tennessee, Ohio, and Kentucky. The Creeks, a Muskogee tribe, later claimed all of present day Georgia and Alabama. By the mid-16th century, the Creeks had been ousted from Lookout Mountain by the Cherokees, an Iroquois tribe, who occupied the mountainous parts of northeast Alabama, northern Georgia, western portions of the Carolinas, and southwest Virginia.

In 1540, searching for gold, soldiers led by Hernando DeSoto reportedly passed nearby. Due to this report, his name appears throughout the area (e.g., DeSoto Falls, DeSoto

State Park, DeSoto Parkway). Settlement by persons of European extraction did not begin in earnest until the Indians were removed in 1835 and sent on the infamous "Trail of Tears". The town of Fort Payne was established as a staging area for this removal of Indians to the west.

During the American Civil War, Union troops crossed and recrossed Little River near Mentone. Two of the more famous battles of the war occurred at Chattanooga and Chickamauga at the northern terminus of Lookout Mountain.

Interestingly, the inhabitants of the Mentone area were split between loyalty to the Confederacy and neutrality.

In the 1890s, mining operations were financed up and down Lookout Mountain. Fort Payne was said to possess large amounts of iron and coal. From 1889 to 1892 it grew from a village of less than 500 people to an industrial center with thousands of inhabitants. But the mineral resource predictions had been overestimated, and by the end of 1892, people were moving from the area. It was not until the 1920's that another flurry of building and investment took place, and this was mostly confined to Chattanooga and nearby towns. Castle-like hotels were built on the bluffs overlooking the valley, and new roads were constructed onto the mountain.

BOTANICAL EXPLORATION

It is unclear when the first botanic investigation of Little River was undertaken, but by 1900, the flora of Lookout Mountain and Little River was known to botanists. Mohr (1901) reports "... there occurs a strong mingling of types that are at home in the Alleghenian area of the adjoining States and of North Carolina with plants of the lower ranges within the Carolinian area, giving rise to a varied flora, the like of which has not been observed in any other part of the mountain region of Alabama."

The first collections along Little River may have been A. Ruth's 1897 collections. Ruth collected *Cuscuta harperi* at DeSoto Falls on Little River, having collected the type specimen at Black Creek Falls on the southern terminus of Lookout Mountain (Yuncker 1927). The type specimen for *Sarracenia oreophila* was collected at DeSoto Falls (Mohr 1897).

In 1899, a C. D. Beadle of the Biltmore Herbarium is credited with discoveries of *Crataegus biltmoreana* C. D. Beadle, *C. austromontana* C. D. Beadle, and *C. sargentii* C. D. Beadle on "the declivities of the mountain" (Mohr 1901). T. G. Harbison made several trips to Little River in 1922

(Harbison field notebook, NCU herbarium).

Roland Harper visited Little River several times and has numerous publications which mention some aspect of the Little River or Lookout Mountain flora (Harper 1913, 1918, 1928, 1943, 1944).

In the 1940's C. Ritchie Bell of the University of North Carolina made extensive collections of *Sarracenia oreophila* from Little River (Bell 1949). In 1958, Harry Sherman completed a survey of the vegetation and floristics of five Cumberland Plateau gorges, including Little River Canyon.

During the 60's and 70's, Jacksonville State University, the University of Tennessee, Vanderbilt University, the University of Georgia, and the University of North Carolina brought students to Little River Canyon. It is a tribute to the distinctiveness of the area that so many botanists, schooled in the Southeast and now working throughout the United States and Canada, visited Little River as students.

Ross Clark (1971), then a student at the University of North Carolina, collected woody plants in Little River Canyon as part of his Ph.D. dissertation. David Whetstone, another University of North Carolina student, made extensive collections from Little River for his Ph.D. dissertation on

the flora and vegetation of the Cumberland Plateau in Alabama, completed in 1981. He subsequently has made additional collections (over 2000 collection numbers from the canyon alone) from the area in association with studies on rare and endangered flora and evaluation of the canyon as a national natural landmark (Whetstone 1987, 1987a, 1989). Bretta Perkins (1981), a student at the University of Tennessee conducted a vegetation study of the sandstone outcrops of the Cumberland Plateau including the rock outcrops along Little River.

CLIMATE

Climate records for Lookout Mountain alone have not and are not being kept. No records for Little River or the canyons were located during the course of this study. Careful climate records along the entire mountain, particularly the canyons, would be worthwhile and would yield information useful in understanding the distribution of the flora of Lookout Mountain.

The climate of Cherokee-DeKalb counties is described as continental, humid, mild, and temperate by the Soil Conservation Service (Soil Survey 1958, 1978).

Precipitation is well-distributed throughout the year with 12.7 cm (5 in) or more per month falling in December through

March. July receives 12.7 cm (5 in) tending to come in thundershowers rather than long soaking showers. October is the driest month with less than 6.35 cm (2.5 in) precipitation. Snow flurries occur several times each winter. Heavier accumulations are rare and remain only a few days (Soil Conservation Service 1978, 1958). The winter of 1988 brought a snowfall of about half a meter which remained for more than a week (personal observations).

Summers are long with moderately hot days. Temperatures 32.2 degrees Centigrade (90 degrees F) or higher are reached 64 days per year. Nights are fairly cool with lows averaging 19 degrees Centigrade (mid 60's F). Mid- to late-May brings the beginning of hot, humid days which last until mid-September. In most years, 35.5 degrees Centigrade (100 degrees F) is rarely recorded and even less frequently does this stretch over several days. Autumns are mild with the first cool weather arriving in late September with the first frost occurring around the last week of October. Winters are mild with extended periods of severe cold being rare. Daytime temperatures average ca. 11.1 degrees Centigrade (low 50's F). An average winter has temperatures of 0 degrees Centigrade (32 degrees F) or lower 70 times. Springs are stormy with the last frost arriving in mid-April. Prevailing winds are from the south and southwest but blow from the northwest and northeast nearly

as much, averaging a speed of about 1.3 km per hour (8 miles per hour). The highest year-round relative humidity occurs at daybreak and is 84%, the lowest at noon is 57%, with a significant rise beginning after 6 p.m.

Climate varies from one end of the mountain to the other as noted by Harper (1943). The northern part of the plateau surface has a frost-free period 1-2 weeks shorter than adjacent limestone valleys (Soil Conservation Service 1958, 1978). Cherokee County Soils Survey (Soil Conservation Service 1978) indicates that topography of Cherokee County is such that frost-pockets in low-lying spots can be 10--20 degrees F colder than areas only a short distance away.

SOILS

Information on soils of the study area was obtained from soil surveys of DeKalb (USDA 1958) and Cherokee counties (USDA 1978) and from Francis and Loftus (1977). As pointed out by Francis and Loftus (1977), little has been written specifically describing soils of the Cumberland Plateau. While terminology differs from one publication to another, all are in basic accord. Soils of the Plateau are primarily Utisols (i.e., extremely weathered soils with low retention of bases, *fide* Steila 1992). Soils on the plateau surface were formed *in situ* from weathered sandstone. Most true

soils represent siliceous, mesic families that are highly leached, low in organic matter and fertility, and are well- to excessively-drained. The Hartselle-Linker-Hector Association, covering most of the plateau surface comprises soils that are fine to coarse, sandy loams usually no deeper than 60--90 cm (23--35 in). Whetstone (1981) reports acidity in the 4.5--5.0 pH range from these soils. The USDA (1958) reports areas in which 50-75% of the original soil surface of DeKalb County has been eroded. The Cherokee County soil survey (USDA 1978) does not address the issue of extensive erosion of the original soil. Areas of bare, flat, rock outcrops with pockets and islands of thin "soil" are found along canyon shoulders and tributaries but are scattered as "ecological islands" across the mountain. These outcrops are classified as Rough, Stony Land since they do not possess a true soil. Shallow soils of the canyons and floodplains of Little River are assigned to the Hartselle-rock outcrop type. Soils within the canyon were formed by weathering of sandstone, as well as by fluvial depositions of minerals and organics and gravitational transport of talus from upper slopes and bluffs. Hence, soils comprise mixed organics, well-sorted sands and silts, as well as rocks and boulders of varying sizes.

Numerous investigators have recognized that soils can be a determining factor in the distribution of plants-individual

species as well as communities (Harper 1913; Braun 1950; Radford 1959; Furley 1974, 1976; Dearden 1979; Whetstone 1981). Soils are determined by the nature of the parent material, the climate, topography, and the associated vegetation (Braun 1950, Francis and Loftus 1979). All of these factors interrelate in a complex manner and the reader is referred to the above sources for detailed information.

GEOLOGY

Geologic history of the Cumberland Plateau, the physiographic region encompassing Lookout Mountain, has been interpreted by two major theories. The older theory involves three cycles of uplift with intervening peneplanation, explained in detail by Adams (1926), Fenneman (1938), and Braun (1950). The old school of thought holds that the contemporary landforms are the result of a complex process of uplifting, faulting and folding, and three cycles of erosion to low relief with peaks little raised about the plateau surface.

Dynamic equilibrium is the theory put forth by Hack (1960, 1966). Hack holds that peneplanation, erosion to a flat surface, is not needed to explain the current landscape. Current topography results from erosive forces down-cutting through the plateau surface. Subsequently, streams and

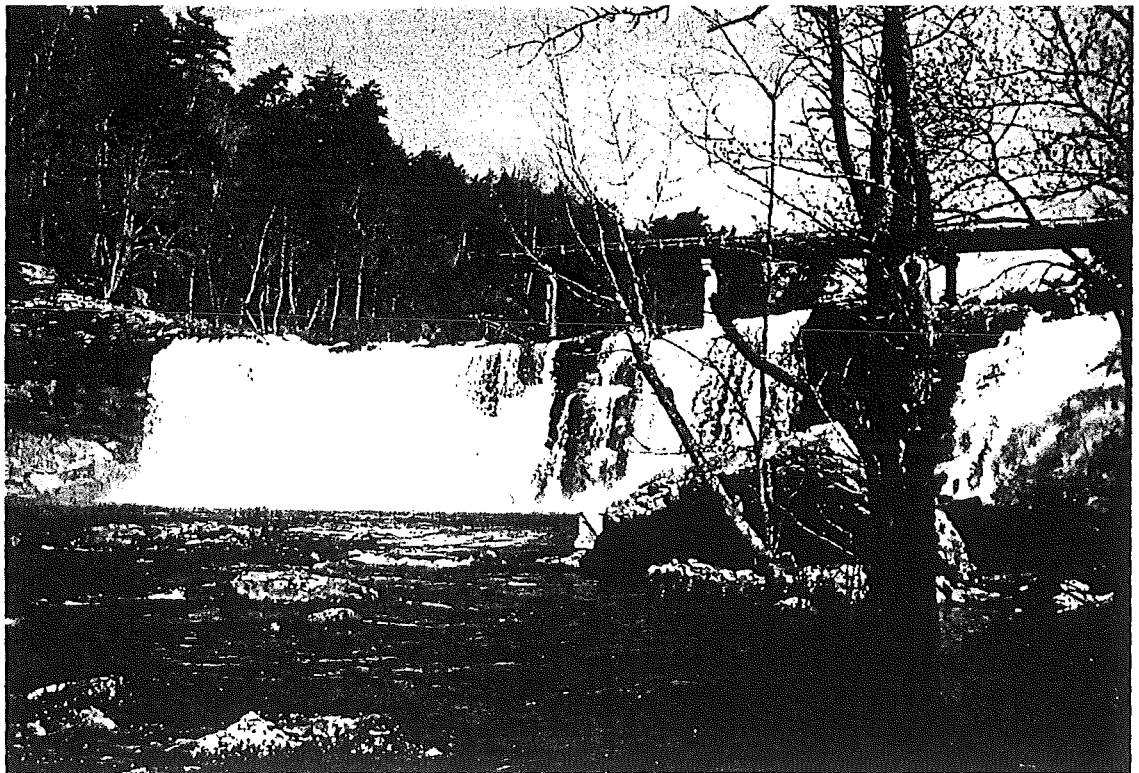
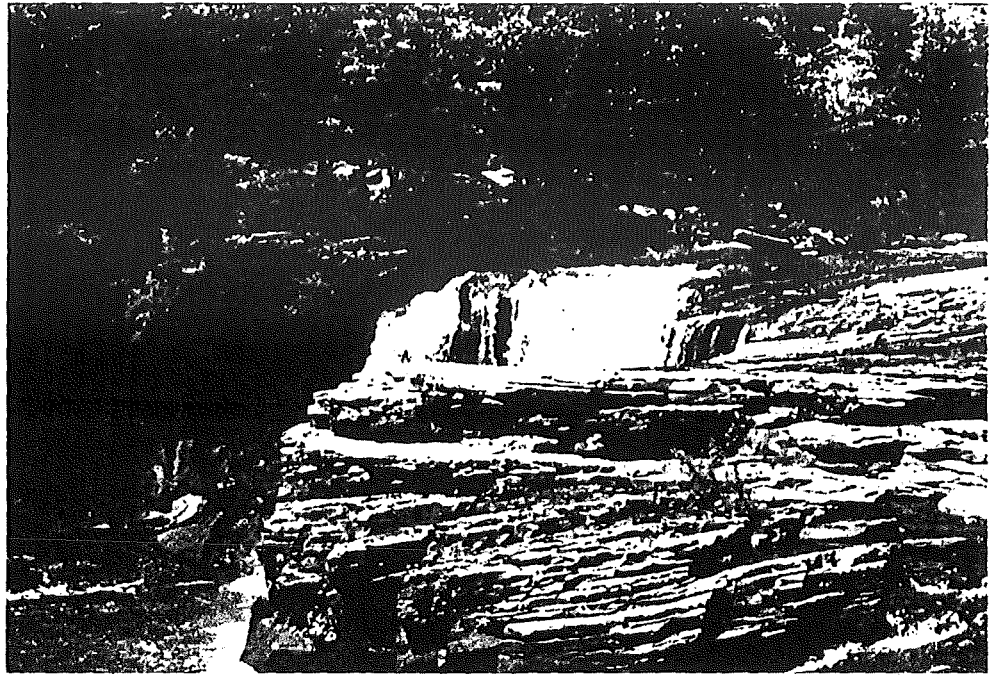
rivers continue the process by undercutting the edges of the plateau (sapping) to create deep valleys with steep slopes. This process is termed "slope retreat." Erosion has occurred at nearly the same rate on both highland and lowland areas but differences in relief, local rainfall, and the varying resistances of the rock type affect the rates of erosion (Hack 1966).

Both interpretations (Fenneman 1938; Hack 1960, 1966) of the geomorphic processes thought to be at work in the Cumberland Plateau are in general agreement on the following points. Lookout Mountain is formed of a thick (15--110 m; 50--350 ft), erosion-resistant cap of Pottsville Conglomerate sandstone of Pennsylvanian Age underlain by less resistant oolitic and cherty Bangor and Pennington limestones of Mississippian Age, Chattanooga shale of Devonian Age, and argillaceous Chickamauga and Red Mountain sandstones of Silurian Age. No limestone, chert, or argillaceous sandstones are reported to be exposed in the Little River area on Lookout Mountain. This includes canyons which are well over 120 m (400 ft) deep in some places. Broomtown Valley to the east and Wills Valley to the west are underlain by limestone. Lookout Mountain, a syncline formed of resistant sandstone, stands above valleys that were created by the breaching of anticlinal arches of exposed limestone.

Sediments comprising Pottsville sandstones of Lookout Mountain were deposited during the Paleozoic by seas which periodically invaded the area (Fenneman 1938, Milici 1968). The Lookout Mountain Pottsville formation is composed of a series of layered shales and sandstones containing some fossils and coal (see fig. 3). A piece of *Lepidodendron*, a Paleozoic tree, was discovered by the author in a deep ravine leading into Little River canyon. Chunks of coal in the upper river, washed down from strip mines above, contains numerous fossils. Along the wide, cobbly floodplain of the canyon, the author has also found crinoid and fern fossils in carboniferous shale. Seams of coal shale can be observed in deeper portions of the canyon.

TOPOGRAPHY

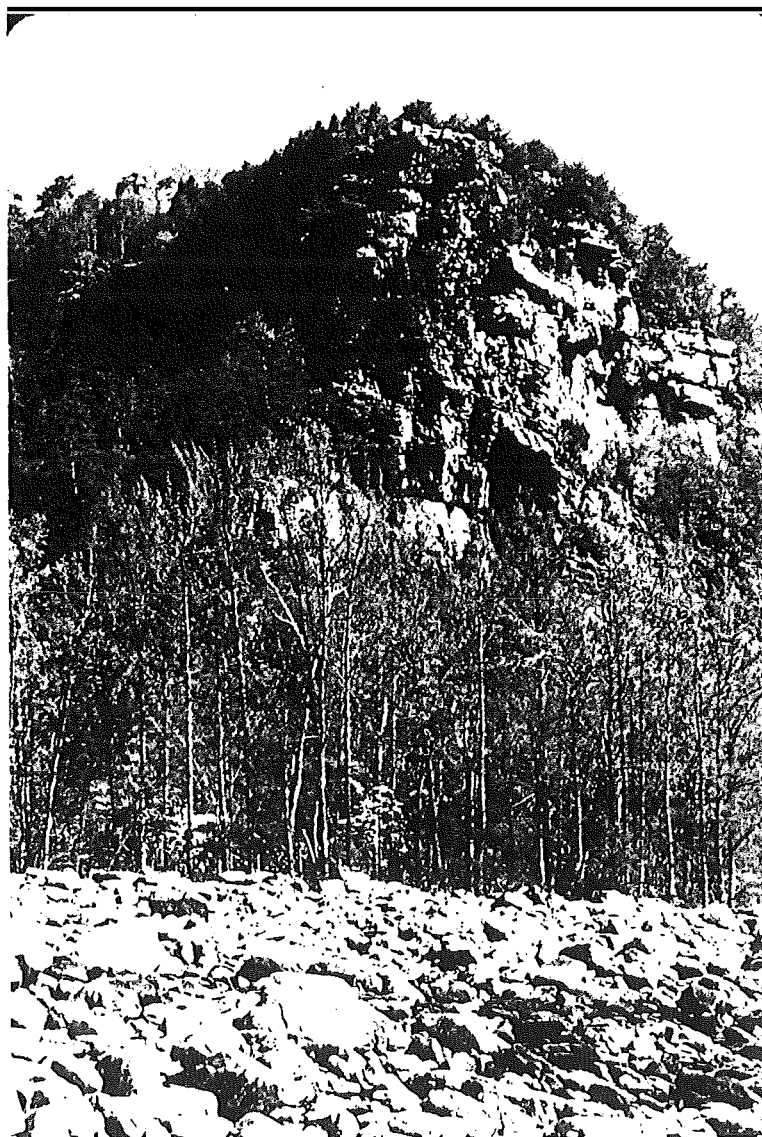
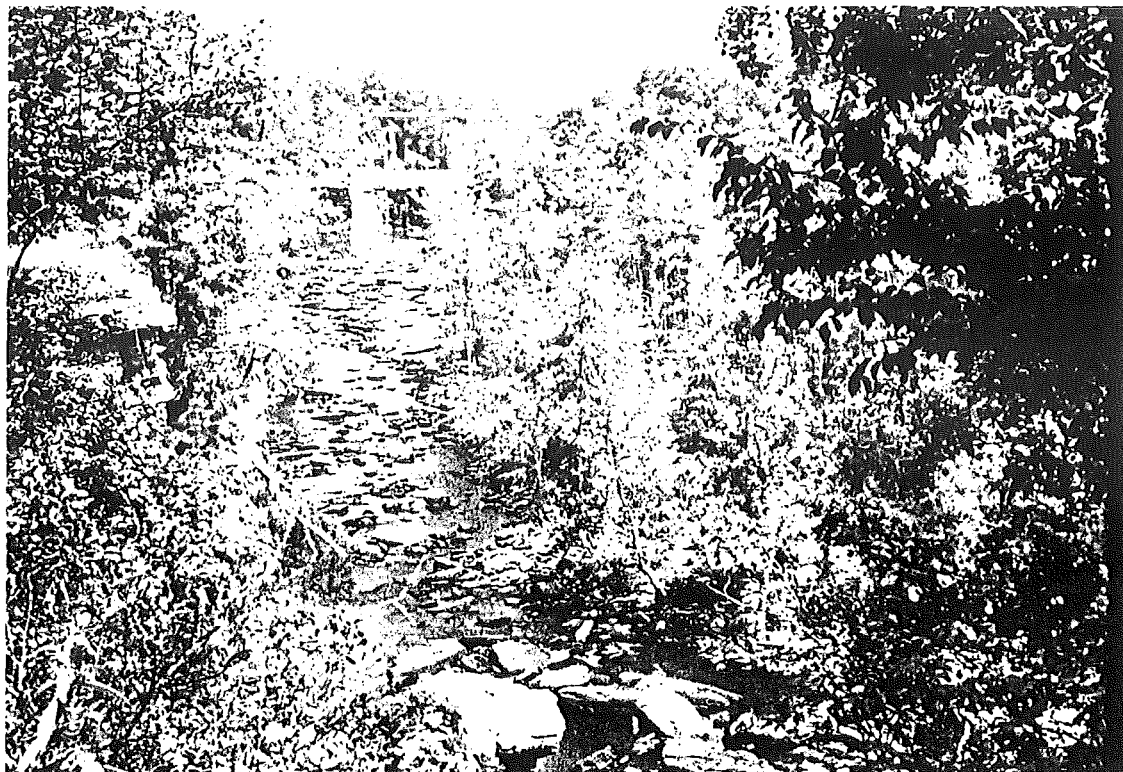
Along the upper reaches, terrain is usually gently rolling to hilly and drained by streams of intermittent and year-round flow. East and west Forks unite and gradually downcut to form waterfalls, rapids alternating with pool zones within a narrow gorge. Canyons occur, however, they are discontinuous and not as deep or as rugged as in the lower sections. Swift waters are interspersed with stretches of water gently flowing over flat bedrock and bouldery bottoms. Deep sands and boulder fields along the river give way upslope to deep, sandy, elevated floodplains

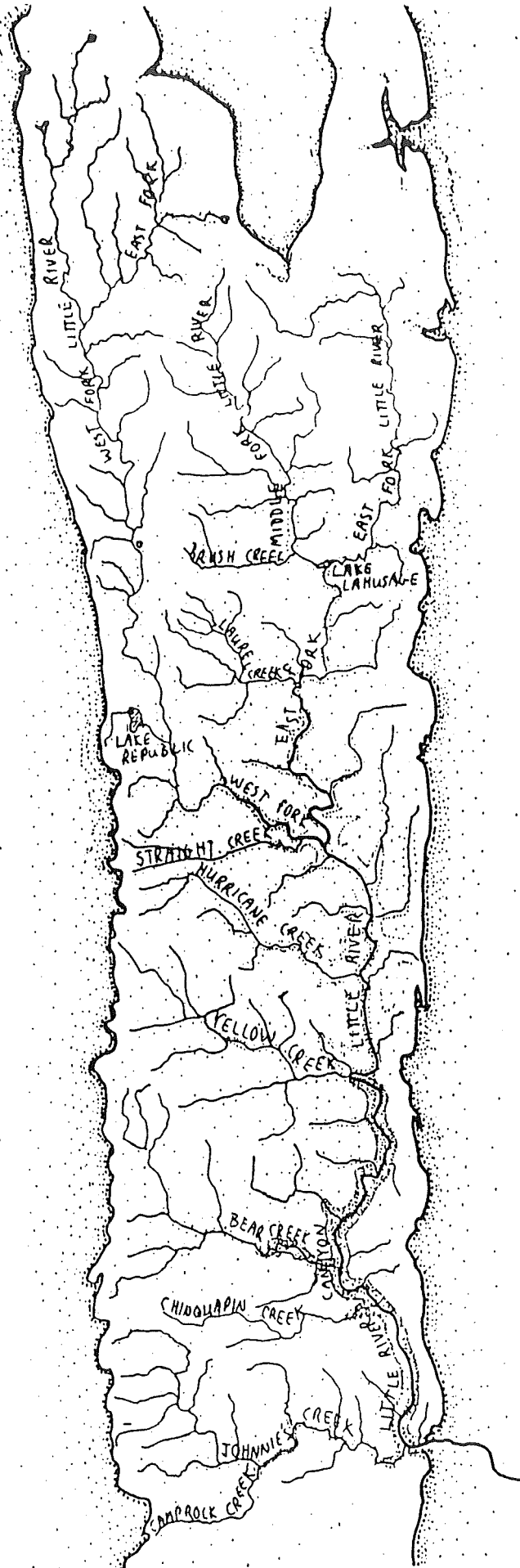


and ultimately to rolling hills. In the lower reaches, topography is more rugged. Below the Alabama Highway 35 bridge, Little River drops across Little River or Indian Falls (see fig. 4), and carves out a continuous canyon, 23 km (ca. 14 mi) long and 105 m (350 ft) deep, with a floodplain of variable width (see fig. 5). The river flows alternately over flat bedrock and then bouldery areas as it does in the upper reaches. Boulders of dissimilar sizes litter the slopes, floodplain, and river (see fig. 5, fig. 6). Occasionally fresh landslides can be seen following a period of rain. Tributaries (see fig. 7) on both sides of Little River Canyon have cut deep ravines, rock houses, and waterfalls. Bluffs 30+ m (100+ ft) high mark the canyon rim (see fig. 8). Flat rock outcrops extend away from the canyon rim as distinct shoulders that dip beneath successively deeper soils away from the canyon edge. Below the canyon rim, a steep talus slope (see fig. 9) gives way to a sometimes broad floodplain. Rugged terrain and high cliffs have made access to the canyon difficult.

PHYSIOGRAPHY

This discussion of physiography of Lookout Mountain is derived from Fenneman (1938) and Milici (1968). Lookout Mountain forms the eastern boundary, otherwise known as the Cumberland Front, of the Cumberland Plateau physiographic





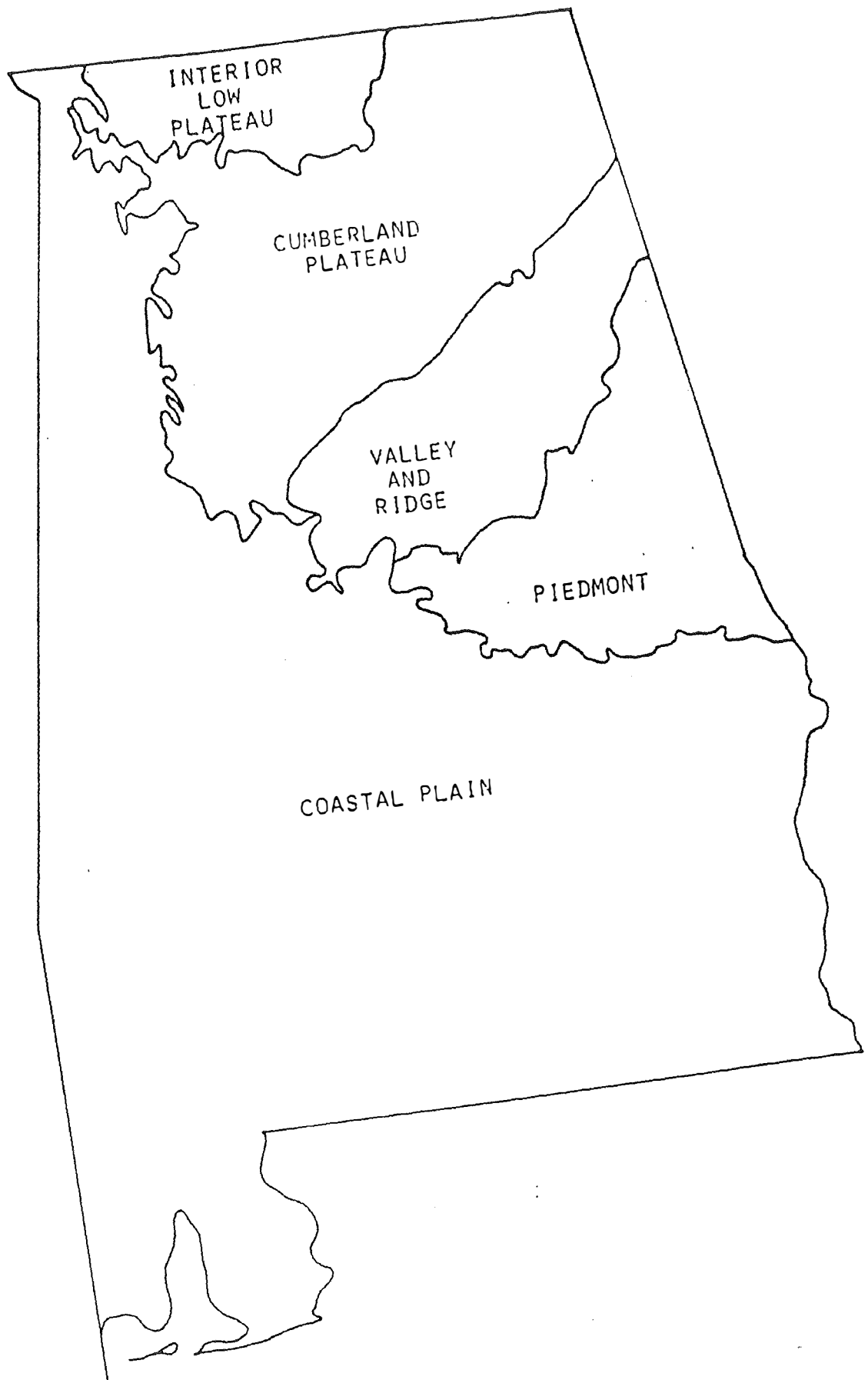


province. The Cumberland Plateau, extending from Alabama to Kentucky, is the southern portion of the Allegheny or Appalachian Highlands physiographic region. In Alabama, the plateau continues 219 km (135 mi) south of the Alabama - Tennessee state line. It is bounded on the north by the Interior Low Plateau Province and on the east and south by the Valley and Ridge Province (see fig. 10). The plateau is split by two valleys, Sequatchie and Big Wills, formed by the breaching of anticlinal arches. The present valley floors are thought to have been eroded from an elevation of 1033--1500 m (4,000 to 5,000 ft) above their current level. Erosion has left synclines standing above anticlines. Lookout Mountain is a syncline. The mountain extends from Chattanooga, Tennessee, in a northeast-southwest direction across the extreme northwest tip of Georgia to Gadsden, Alabama. Both the valleys and the mountains reflect the underlying geologic structure.

Sapping and frost action (modern and glacial) led to huge sandstone boulders falling away and creating a steep talus. Boulders of varied sizes have been deposited on the floodplain and alluvial fans.

LAND USE

Land ownership is a mixture of private, public, and



INTERIOR
LOW
PLATEAU

CUMBERLAND
PLATEAU

VALLEY
AND
RIDGE

PIEDMONT

COASTAL PLAIN

corporate holdings. The larger landholders include the State of Alabama and Alabama Power Company, Inc., a subsidiary of The Southern Company. The State of Alabama owns DeSoto State Park, an area encompassing about 1822 hectares. Alabama Power Company has vast holdings, mostly along the upper forks of the river. Much of their property is leased to the State of Alabama as the Little River Wildlife Management Area, a Pittman Robertson Project (personal communication, Alabama Power Company officers). Georgia-Kraft Company maintained large tracts for timber production; however, most of these areas were sold to private individuals recently (personal communication, Alabama Forestry Commission).

Private ownership varies in size from residential lots to vast camps and farms. A primary use of the Little River area is recreation, including camping, hiking, picnicking, canoeing/kayaking, fishing, rock climbing, rappelling, horseback riding, hunting, and riding all terrain vehicles.

Large tracts of timber are harvested annually on private and corporate lands. Corporate activities have included strip-mining for coal and rock quarrying along the East Fork and Little River but there are not any currently active (Strayhorn 1986, Alabama Development Office 1988, 1989).

Along tributaries, agricultural operations mostly include pasturage for cattle (beef and dairy), and hog and poultry (eggs, fryers, broilers) production (personal communication, DeKalb County Soil Conservation Office). Most other plots are for homes.

FLORISTICS

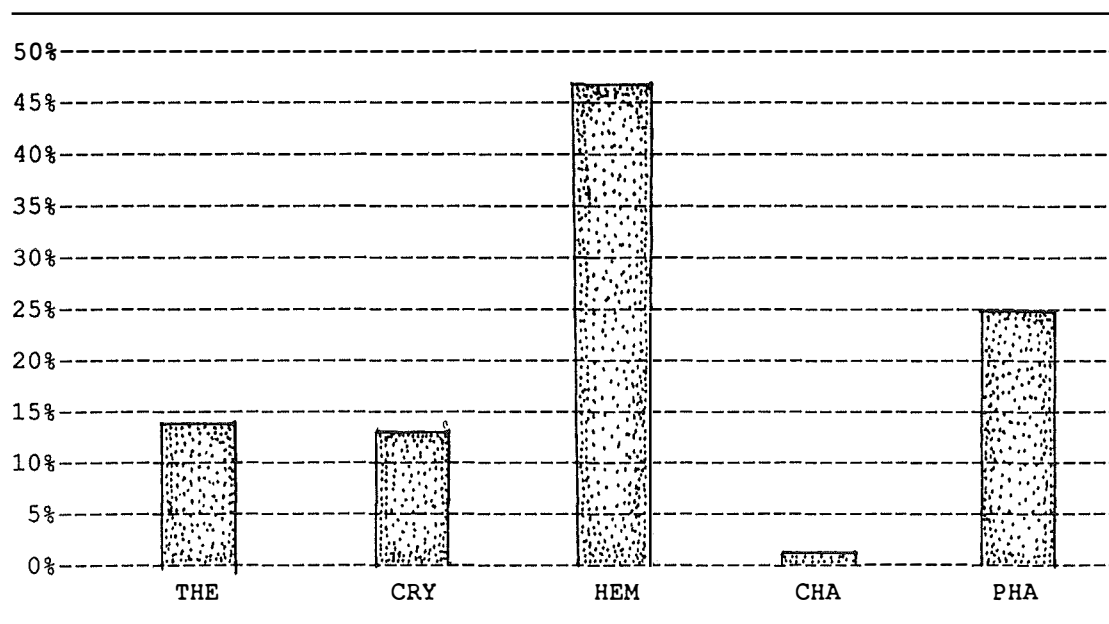
The life-form spectra of the flora of Little River were determined using Whetstone (1981) and Raunkiaer (1934). Native and non-native species are included in the analysis. Sometimes species are reported as having different life-forms, a problem noted by Gibson (1961). In such cases, the life-form evidenced by specimens from within the flora area was designated. When determination was difficult to discern, those taxa were excluded from the study. All determinations are noted within the entry for that taxon in the FLORA.

Table 1 indicates the number of species in each life-form category while Figure 11 graphically depicts relative frequency of each life-form in the flora. The largest group comprises hemicryptophytes with 282 species. Of these, 3 are succulents (not unexpected for a moist, temperate flora) and 15 are parasitic. Most parasites are also

Table 1. Absolute frequencies of life-forms in the Little River flora.

Life-form	Number of species
Therophyte	86
Cryptophyte	78
Geophyte	75
Hydrophyte	3
Hemicryptophyte (sensu lato).....	282
Hemicryptophyte (sensu stricto)	264
Parasite	15
Succulent	3
Chamaephyte	14
Phanerophyte	156
Phanerophyte-tree	66
Phanerophyte-shrub	69
Phanerophyte-vine	21
Total	616

Figure 11. Graphic depiction of the life-form percentage of the Little River Flora. THE = therophytes, CRY = cryptophytes, HEM = hemicryptophytes, CHA = chamaephytes, PHA = Phanerophytes.



photosynthetic deriving only part of their sustenance from their hosts. Overall, hemicryptophytes (in the broad sense) make up ca. 46% of the flora. Phanerophytes account for 151 taxa comprising trees (65), shrubs (67), vines (19). Trees, shrubs, and lianas (woody vines) make up 26% of the flora although vegetationally they dominate the landscape in most areas of the canyon being prime components of the forested areas. Therophytes number 79, and cryptophytes 73, which were divided into two groups, i.e., geophytes (70), hydrophytes (3). These groups compose 14% and 13%, respectively, of the flora. Generally speaking, therophytes are more common in open areas while cryptophytic life-forms are primarily woodland taxa. The smallest group is chamaephytic with 14 species present in the flora which comprises ca. 2% of the total flora. Table 2 compares life-form spectra of Little River to the World Spectrum (Raunkiaer 1934), and to spectra of the Cumberland Plateau of Alabama (Whetstone 1981). As elucidated for the entire Cumberland Plateau by Whetstone (1981), this study determined that the Little River drainage basin has a hemicryptophytic climate. Differences in the individual life-form categories may be attributed to:

- a. the much larger flora area of the Whetstone study compared to the restricted nature of the Little River project; and

Table 2. Comparison of life-form spectra.

Flora Area		Life-forms					°N
Flora	The	Cry	Hem	Cha	Pha	Lat	
World Spectrum (Raunkiaer 1934)	13	6	26	9	46		
Little River	14	13	46	2	25	34	
Cumberland Plateau 19 (Whetstone 1981)		15	44	2	18	34	

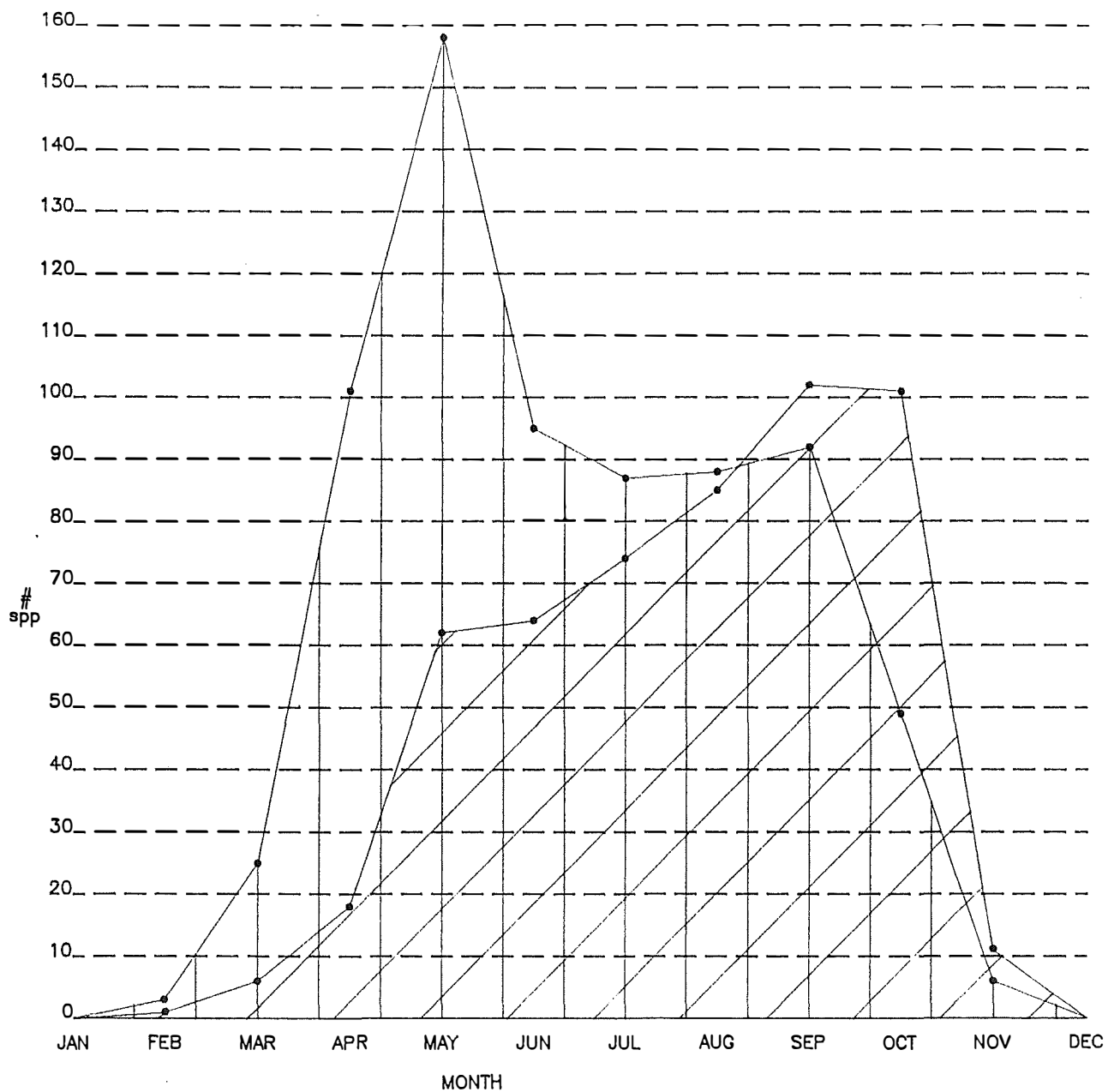
Key : The = Therophyte, Cry = Cryptophyte, Hem =
Hemicryptophyte, Pha = Phanerophyte, Lat = Latitude.

b. inclusion of urban areas in the Cumberland Plateau study which lead to an increase in the therophyte and cryptophyte categories in particular.

Little River spectra are similar to those found by Nixon (1989) in Randolph County within the Piedmont Plateau of Alabama. A notable difference exists in the therophyte category possibly due to the extensively disturbed character of Randolph County as opposed to Little River area. Compiled data for phenology of flowering and fruiting are presented in Table 3. April and May, respectively with 101 and 158 species, are peak flowering months for Little River. A second peak occurs in August and September with 88 and 92 species respectively. No species were collected or observed in flower during December and January. Peak fruiting season is September with 102 species. October is similar with 101 species bearing fruit. No species were collected in fruit during December or January although a number of taxa retain fruit of the previous season. These data are portrayed graphically in Figure 12. Analysis of distributional data shows that 73.8 percent of the flora are distributed widely throughout the eastern United States. As graphically demonstrated by Figure 13, an affinity for the Appalachians is indicated by 9.8 percent of the flora having a distribution in the mountains with 5.7 percent classified as

Table 3
FLOWERING AND FRUITING PHENOLOGY

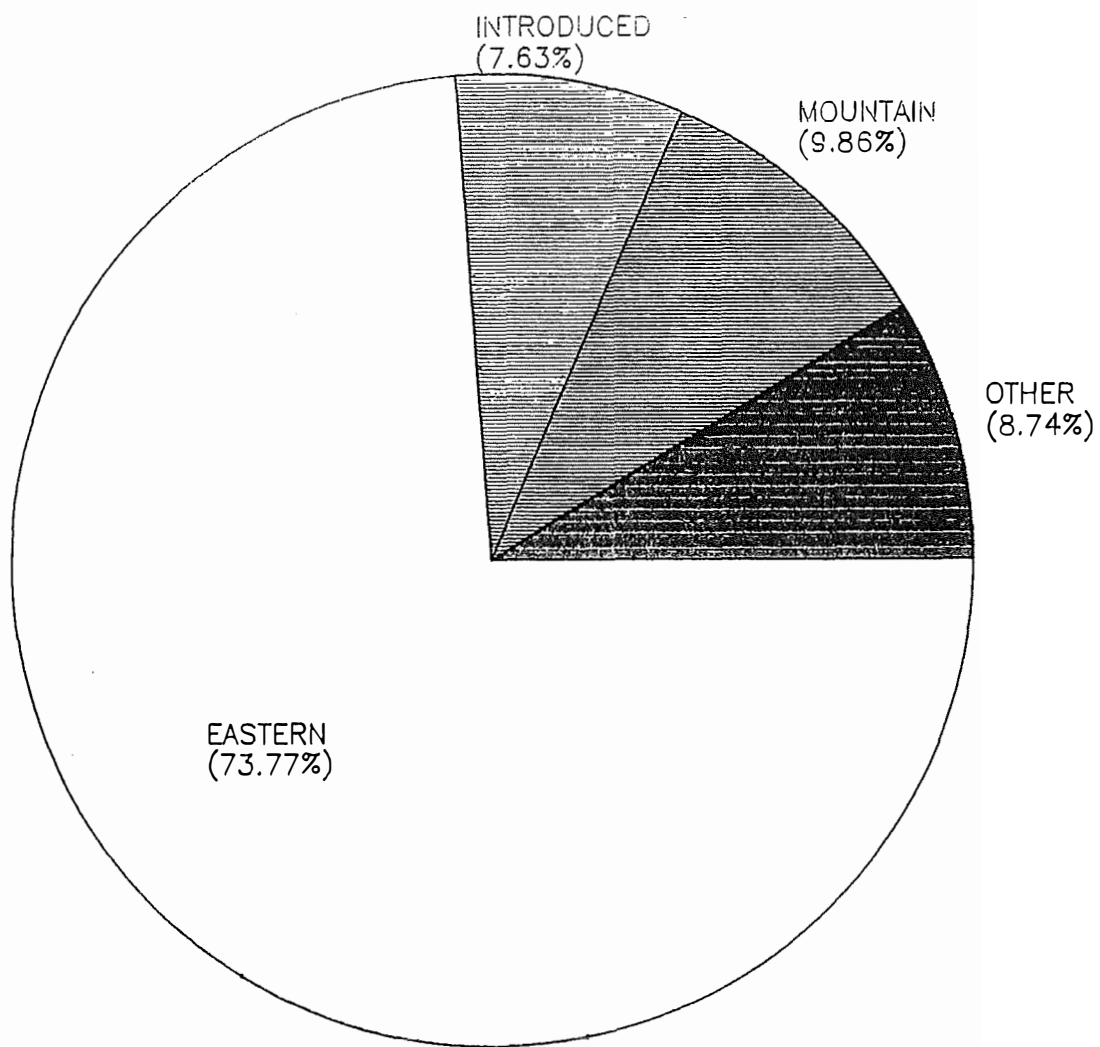
Month	Number of taxa flowering		Number of taxa fruiting	
January		0	.....	0
February		3	.....	1
March		25	.....	6
April		101	.....	18
May		158	.....	62
June		95	.....	64
July		87	.....	74
August		88	.....	85
September		92	.....	102
October		49	.....	101
November		6	.....	11
December		0	.....	0



endemic to the Southern Appalachian. A coastal plain affinity is demonstrated with 10.9 percent of the flora occurring on the coastal Plain. Introduced species account for 7.6 percent of the flora.

CONCLUSIONS AND SUMMARY

A total of 773 taxa representing 331 genera, 110 families, and four divisions of vascular plants are documented for the Little River drainage basin. Among the flowering plants, 131 species of monocots in 68 genera and 16 families and 611 species of dicots among 242 genera and 80 families are documented as occurring in the flora. The vascular flora includes 14 species considered threatened in Alabama and 2 species listed by the Fish and Wildlife Service as threatened. This survey produced 57 species new to the Cumberland Plateau in Alabama. A total of 133 county records were discovered: 24 species new to Cherokee County, 17 species new to DeKalb County, and 92 species new to both Cherokee and DeKalb counties.



NON-VASCULAR FLORA

Algae

In *Plant Life of Alabama*, Mohr (1901) noted that algae have "received scarcely any attention in Alabama." Primarily marine algae were listed in Mohr's book with the exception of a few freshwater Red algae. Apparently, no previous surveys of the algal flora of Little River have been conducted. Algae of Little River were collected during the summer and fall of 1986 and the winter of 1987. Initially begun as a class project, studies continued to provide a preliminary survey. This aspect of the floristic work is far from complete. The algal flora includes 6 Divisions, 7 Classes, 13 orders, 18 families, and 40 genera.

Sites were chosen in conjunction with a microbiological survey of Little River to sample areas of "pristine" waters on the upper reaches of the East Fork and West Fork of Little River, areas of suspected sewage pollution on the forks, an area just down river from the confluence of the forks, and an area near a heavily traveled highway and picnic-camping area. Care was taken to collect from as many habitats as possible within each site. Usually, several

samples of the various habitats at each site were taken leading to a large total number of samples that were examined. Various methods of collecting and preservation were attempted (Welch 1948, Trainor 1978, Sournia 1978, Prescott 1978, Whitford 1984). Initially, two samples of each habitat were taken. One sample was preserved for later study while one was not preserved but was examined as soon as possible after collection. Examination was begun the day of collection and continued for several days thereafter. Preservatives included 5% formalin, FAA, and 80% alcohol. All preservatives caused excessive degradation of the algae and were not deemed worthwhile. It was found that better results were accomplished by taking fresh samples and keeping them chilled during transport to the lab and during the examination period. Algae survived long periods (several days) if kept very cool. Identification was made to the generic level usually and to the species whenever possible. Basic references included Prescott (1978), and Whitford (1984). No correlations were made with presence or absence of sewage pollution and distribution.

Division I. Chlorophyta

Class I. Chlorophyceae

Order I. Chlorococcales

1. Coelastraceae

1. Coelastrum Nageli.

2. Hydrodictyaceae

1. Pediastrum Meyen.

1. P. biradiatum Meyen

2. P. boryanum (Turp) Meneghini

3. P. duplex Meyen

4. P. sp.

3. Microtiniaceae

1. Golenkinia Chodat

4. Oocystaceae

1. Ankistrodesmus Corda

5. Protosiphonaceae

1. Protosiphon Kleb.

6. Scenedesmaceae

1. Scenedesmus Meyen.

Order II. Oedogoniales

1. Oedogoniaceae

1. Bulbochaete DeBury.

2. Oedogonium Link.

Order III. Ulotrichales

1. Ulotrichaceae

1. Binuclearia Wittrock.

Order IV. Zynematales

1. Desmidicaceae

1. Triploceras Bailey.
2. Staurostrum Meyen.
3. Spirotaenia Brebisson.
4. Pleurotaenium Nageli.
5. Netrium Nageli.
6. Hyalotheca Ehrenberg.
 1. H. dissilens (Smith) Brebisson.
 2. H. mucosa (Dillw.) Ehrenberg.
7. Euastrum Ehrenberg.
 1. E. binale Ehrenberg var. gutwinskii Schmidle.
8. Desmidium Agardh.
9. Cosmarium Corda.
10. Closterium Nitzsch.
11. Bambusina Kutzing.

2. Zygnemataceae

1. Spirogyra Link.

Class II. Charophyceae

Order I. Charales

1. Characeae

1. Nitella Agardh.

Division II. Chrysophyta

Class I. Bacillariophyceae

Order I. Eupodiscales

1. Coscinodiscaceae

1. Stephanodiscus Ehrenberg.

1. S. hantzchii Ehrenberg.

Order II. Fragilariales

1. Tabellariaceae

1. Tabellaria Ehrenberg.

2. Fragillariaceae

1. Fagillaria Lyngbye.

Order III. Naviculales

1. Cymbellaceae

1. Cymbella Agardh.

2. Naviculaceae

1. Stauroneis Ehrenberg.

2. Navicula Bory.

3. Gomphonema Agardh.

Order IV. Surirellales

1. Surillelaceae

1. Surirella Turpin.

Division III. Cryptophyta

Class I. Cryptophyceae

Order I. Cryptomonadales

1. Cryptomonadaceae

1. Cryptomonas Ehrenberg.

Division IV. Cyanophyta

Class I. Cyanophyceae

Order I. Oscillatoriales

1. Stigonemataceae

1. Hapalosiphon Nageli.1. H. intricatas W. & G. S. West.

2. Oscillatoriaceae

1. Oscillatoria Vaucher.2. Anabaena Bory.

3. Rivulariaceae

1. Amphithrix Kutzing.

Division V. Euglenophyta

Class I. Euglenophyceae

Order I. Euglenales

1. Euglenaceae

1. Phacus Dujardin.2. Trachelomonas Ehrenberg.3. Euglena Ehrenberg.

Division VI. Rhodophyta

Class I. Rhodophyceae

Order I. Nemulionales

1. Cryptophyceae

1. Chroomonas Hantsgrig.

Bryophytes

Bryophytes were collected along with vascular plants. The JSU Herbarium did not have a bryophyte collection nor were library facilities adequate for nomenclatural and systematic determinations. All bryophytes were determined by Dr. Steve Timme of Pittsburg State University, Pittsburg, Kansas, and Dr. Frank Bowers, University Wisconsin at Stevens Point, Wisconsin. Determinations of Little River specimens appear in Table 4.

Table 4. Preliminary bryophyte florula of Little River.

<u>Aulacomnium palustre</u> (Hedw.) Schaegr.	<u>Hypnum imponens</u> Hedw.
<u>Cephloziella hyalina</u> Douin	<u>Leucobryum albidum</u> (Brid.) Hedw.
<u>Dicranum condensatum</u> Hedw.	<u>Mnium affine</u> var. <u>rugicum</u> (Laur.) BSG
<u>Dicranum montanum</u> Hedw.	<u>Polytrichum commune</u> var. <u>perigoniale</u> (Mx.) Hampe
<u>Dicranum scoparium</u> Hedw.	<u>Polytrichum juniperum</u> Hedw.
<u>Dicranum montanum</u> Hedw.	<u>Polytrichum ohioense</u> Ren. & Card.
<u>Ditrichum pallidum</u> (Hedw.) Hampe	<u>Ptychomitrium</u> sp.
<u>Fontanalis</u> sp.	<u>Sphagnum</u> sp.
<u>Hedwigia ciliata</u> (Hedw.) P-Beauv.	<u>Thuidium delicatulum</u> (Hedw.) BSG

VASCULAR FLORA

The flora is arranged according to Radford et al. (1968). Standard manuals, i.e., Clark (1971); Correll and Johnston (1970); Correll and Correll (1972); Duncan (1975); Duncan and Foote (1975); Duncan and Duncan (1988); Elias (1980); Fernald (1950); Godfrey and Wooten (1979, 1981); Gould (1975); Great Plains Flora Association (1986); Hitchcock (1950); Lellinger (1985); Little (1971, 1979); Luer (1975); Radford et al. (1968); Rehder (1927); Small (1903, 1933, 1938); Strasbaugh and Core (1971, 1973); Tryon and Tryon (1982); Wunderlin (1982) were used to identify most of the flora. Field guides such as Bell and Taylor (1982), Brown (1972); Chase (1959); Clewell (1985); Dean et al. (1973), Justice and Bell (1968) proved helpful. Numerous monographs and revisions were also used. These specific references are cited at the appropriate location within the flora. The flora is arranged hierarchically by Division and alphabetically by families, genera, specific and infraspecific taxa. The format used for specific and infraspecific taxa is presented in Table 5.

Table 5. Format for specific and infraspecific taxa.

Number. Scientific name and authority. Common name. Life-form; duration; diaspore type. Flowering dates precede those of fruiting and are separated by a semicolon unless data is not available, those are designated by "Flw" or "Fr" prior to the month. Presence of spores (Spo) is noted for ferns and fern-allies. Habitat. Distribution type. * = threatened in Alabama, + = new to Cumberland Plateau in Alabama, C = new to Cherokee County, D = new to DeKalb County, CD = new to both Cherokee and DeKalb counties. Comments.

DIVISION I. LYCOPODIOPHYTA

CLASS I. LYCOPODIOPSIDA

Club-mosses

1. LYCOPODIACEAE

Club-moss Family

Reference: Lellinger, D. B. 1985.

1. Lycopodium Linnaeus

1. L. digitatum Dillen. ex A. Braun. Fan club-moss, running-pine. Chaemephyte; perennial; sporochore. Spo-Apr-Sep. Open pine woods. Type 4. Rare. Largest known population has been destroyed by logging.

CLASS II. ISOETOPSIDA

Quillworts and Spike-mosses

1. SELAGINELLACEAE

Spike-moss Family

1. Selaginella Beauvois

1. S. apoda (Linnaeus) Spring. Meadow spike-moss. Hemicryptophyte; perennial; sporochore. Spo-May. Moist rock faces, waterfalls, moist rocks in ravines. Type 1.

2. S. rupestris Linnaeus. Rock spike-moss.
Hemicryptophyte; perennial; sporochore. Two locations
known. Type 1. *. Rare.

DIVISION II. POLYPODIOPHYTA

Ferns

1. ASPIDIACEAE

1. Athyrium Roth

1. A. asplenioides (Michaux) Alvah. Augustus. Eaton.
Southern lady fern. Geophyte; perennial; sporochore.
Spo-Jul. Along upper river, sandstone ravines, wooded
slopes, alluvium of canyon. Type 1.

2. Dryopteris Adanson

1. D. marginalis (Linnaeus) Gray. Marginal shield fern.
Hemicryptophyte; perennial; sporochore. Spo-May. Wooded
margins, rock outcrops, rocky slopes, alluvium of canyon.
Type 4.

3. Polystichum Roth

1. P. acrostichoides (Michaux) Schott. Christmas fern.
Hemicryptophyte; perennial; sporochore. Spo- May--Sep.
Riverbanks, floodplains, wooded slopes. Type 1.

4. Thelypteris Schmidel

1. T. hexagonoptera (Michaux) Weatherby. Broad beech-fern. Geophyte; perennial; sporochore. Rocky seeps and mesic woods, wooded slopes, alluvium. Type 1.
2. T. noveboracensis (Linnaeus) Nieuwland. New York fern. Geophyte; perennial; sporochore. Spo-Jun--Jul. Moist areas, alluvium, wooded slopes. Type 1.

2. ASPLENIACEAE

Spleenwort Family

1. Asplenium Linnaeus

1. A. montanum Willdenow. Mountain spleenwort. Hemicryptophyte; perennial; sporochore. Bluffs. Spo-Feb--May. Type 14.
2. A. pinnatifidum Nuttall. Lobed spleenwort. Hemicryptophyte; perennial; sporochore. Spo-Apr. Crevices of bluffs in canyon. Type 12.
3. A. platyneuron (Linnaeus) Oakes. Ebony spleenwort. Hemicryptophyte; perennial; sporochore. Spo-Apr--Jul. Rock outcrops, bluffs, alluvium. Type 5.
4. A. rhizophyllum Linnaeus. Walking fern. Hemicryptophyte; perennial; sporochore. Spo-Jul--Oct. On rocks of talus slopes. Two locations are known. Type 14. Rare. New sp. to canyon.

5. A. trichomanes Linnaeus. Maidenhair spleenwort.
Hemicryptophyte; perennial; sporochore. Alluvium and wooded
slopes of ravine. Type 5.

3. BLECHNACEAE

Chain Fern Family

1. Woodwardia Smith

1. W. areolata (Linnaeus) Moore. Netted chain fern.
Hemicryptophyte; perennial; sporochore. Alluvium of
canyon. Type 1.

4. DENNSTAEDTIACEAE

Bracken Family

1. Pteridium Scopoli

1. P. aquilinum (Linnaeus) Kuhn. Bracken fern. Geophyte;
perennial; sporochore. Spo-Aug. Canyon rim and adjacent
woods. Type 19.

5. HYMENOPHYLLACEAE

Filmy Fern Family

1. Trichomanes Linnaeus

1. T. boschianum Sturm ex Bosch. Bristle fern.

Hemicryptophyte; perennial; sporochore. Spo-Apr. Moist grottoes of waterfall. Type 7. D. Extremely rare. One ravine is known to shelter this species.

6. OPHIOGLOSSACEAE

Adder's-tongue Family

1. Botrychium Swartz

1. B. virginianum (Linnaeus) Swartz. Rattlesnake fern. Hemicryptophyte; perennial; sporochore. Wooded slopes. Type 19.

7. OSMUNDACEAE

Royal Fern Family

1. Osmunda Linnaeus

1. O. cinnamomea Linnaeus. Cinnamon fern.

Hemicryptophyte; perennial; sporochore. Spo-May. Wooded slopes, floodplains, stream banks along upper river. Type 1.

2. O. regalis Linnaeus var. spectabilis (Willdenow) Gray.

Royal fern. Hemicryptophyte; perennial; sporochore. Spo-Apr--Jul. Floodplains and banks along streams and river. Type 1.

8. POLYPODIACEAE

Polypody Family

1. Polypodium Linnaeus

1. P. polypodioides (Linnaeus) Watt. Resurrection fern. Hemicryptophyte; perennial; sporochore. Spo-Jul. Canyon rim, wooded slopes of canyon. Type 9.

2. P. virginianum Linnaeus. Rock cap fern. Hemicryptophyte; perennial; sporochore. Spo-Apr--Jun. Canyon rim, wooded slopes of canyon. Type 17.

9. PTERIDACEAE

Brake Fern Family

1. Adiantum Linnaeus

1. A. pedatum Linnaeus. Maidenhair fern. Geophyte; perennial; sporochore. Spo-Apr--May. Wooded slopes of canyon. Type 5.

2. Cheilanthes Swartz

1. C. tomentosa Link. Woolly-lip fern. Hemicryptohpyte; perennial; sporochore. Spo-Apr. Wooded slopes of canyon. Type 9.

10. SCHIZAECEAE

Climbing Fern Family

1. Lygodium Swartz

1. Linnaeus palmatum (Bernh.) Swartz. American climbing fern. Hemicryptophyte; perennial; sporochore. Spo-Jun-Jul. Banks and levees along upper river. Type 20. *. Rare.

DIVISION III. PINOPHYTA

Conifers or Gymnosperms

1. CUPRESSACEAE

Cypress Family

1. Juniperus Linnaeus

1. J. virginiana Linnaeus. Red-cedar. Phanerophyte-tree; perennial; endozoochore. Seeds-Aug. Margins of rock outcrops, canyon rim, crevices in rock faces, rock-strewn floodplain of canyon. Type 1. Frequent.

2. PINACEAE

Pine Family

1. Pinus Linnaeus

1. P. echinata Miller. Short-leaf pine. Phanerophyte-tree; perennial; pterochore. Dry hillsides, along canyon rim, wooded slopes of canyon. Type 9. Common.
2. P. strobus Linnaeus. White pine. Phanerophyte-tree; perennial; pterochore. All known specimens are planted. Type 20. D.
3. P. taeda Linnaeus. Loblolly pine. Phanerophyte-tree; perennial; pterochore. Canyon rim, alluvium of canyon. Type 3. Rare.

4. P. virginiana Miller. Scrub pine, Virginia pine.
Phanerophyte-tree; perennial; pterochore. Pollen-Apr;
seeds-Jun. Usually on rocky, dry-mesic soils around rock
outcrops. Type 7. The most common pine in the Little River
area.

DIVISION IV. MAGNOLIOPHYTA

Flowering Plants

CLASS I. MAGNOLIOPSIDA

Dicots or Broadleaf Plants

1. ACANTHACEAE

Acanthus Family

1. Justicia Linnaeus

1. J. americana (Linnaeus) Vahl. Waterwillow.
Hemicryptophyte; perennial; epizoochore. Flw-Jun. Shallows
of river. Type 1.

2. ACERACEAE

Maple Family

1. Acer Linnaeus

1. A. negundo Linnaeus. Box-elder, Ash-leaved Maple.

Phanerophyte-tree; perennial; pterochore. Fr-Jul. Wooded slopes of canyon. Type 5.

2. A. rubrum Linnaeus var. rubrum. Red Maple.

Phanerophyte tree; perennial; pterochore. Fr-Apr--May. Roadsides; rock outcrops and bluffs along canyon; alluvium and wooded slopes of canyon; along upper river. Type 6.

3. A. saccharum Marshall var. floridanum (Chapman)

Desmarais. Southern Sugar Maple. Phanerophyte-tree; perennial; pterochore. Fr-Sep. River banks; floodplains and wooded slopes of canyon; rock outcrops on canyon rim. Type 1.

3. ANACARDIACEAE

Sumac Family

1. Rhus Linnaeus

1. R. copallina Linnaeus. Winged sumac. Phanerophyte-shrub; perennial; endozoochore. Jul; Aug. Rock outcrops along canyon rim; thin, sandy soils along unimproved roads; wooded slopes of canyon. Type 1.

2. R. glabra Linnaeus. Smooth or common sumac.

Phanerophyte-shrub; perennial; endozoochore. Flw-Jun. Oak-pine woods and rock outcrops along canyon rim. Type 1.

2. Toxicodendron Miller

1. T. radicans (Linnaeus) Kuntze. Poison-ivy.
Phanerophyte-vine; perennial; endozoochore. Throughout.
Type 5.

4. ANNONACEAE

Custard-Apple Family

1. Asimina Adanson.

1. A. parviflora (Michaux) Dunal. Dwarf Pawpaw.
Phanerophyte-shrub; perennial; endozoochore. Flw-Apr; Fr-Sep. Along river and floodplain in canyon. Type 9.
2. A. triloba (Linnaeus) Dunal. Pawpaw. Phanerophyte-shrub; perennial; endozoochore. Ravines. Type 9.

5. APIACEAE OR UMBELLIFERAE

Carrot Family

1. Angelica Linnaeus

1. A. venenosa (Greenway) Fernald. Hemicryptophyte; perennial; atelechore. Fr-Oct. Sandstone outcrops along canyon rim. Type 9. CD. Occasional.

2. Oxypolis Rafinesque

1. O. rigidior (Linnaeus) Rafinesque. Cowbane, water-dropwort. Hemicryptophyte; perennial; atelechore.

Roadsides along canyon. Type 1.

3. Ptilimnium Rafinesque

1. P. nodosum (Rose) Mathias. Piedmont bishop-weed, Harperella. Hemicryptophyte; annual; hydrochore. Jul--Sep; Sep. Rocky shallows. Type 7.

4. Sanicula Linnaeus

1. S. canadensis Linnaeus Snakeroot. Hemicryptophyte; perennial; epizoochore. Fr-May--Jun. Wooded slopes of canyon. Type 1.

5. Taenidia (Torrey and Gray) Drude

1. T. integerrima (Linnaeus) Drude. Golden Alexander. Hemicryptophyte; perennial; atelechore. Flw-Jun; Fr-Jun. Floodplains of canyon. Type 14. Rare.

6. Thaspium Nuttall

1. T. barbinode (Michaux) Nuttall. Meadow-parsnip. Hemicryptophyte; perennial; atelechore. Apr-Jun; Aug. Slopes of canyon. Type 4. CD.

6. APOCYNACEAE

Dogbane Family

1. Amsonia Walter Blue-star

1. A. tabernaemontana Walter var. salicifolia (Pursh) Woodson. Hemicryptophyte; perennial; atelechore. Flw-Apr. Alluvium of canyon, bottomland hardwoods. Type 9.

Occasional.

2. A. tabernaemontana Walter var. tabernaemontana.

Hemicryptophyte; perennial; atelechore. Flw-May. Wooded slopes along river. Type 9. Occasional.

2. Apocynum Linnaeus

1. A. cannabinum Linnaeus Indian-hemp. Hemicryptophyte; perennial; pogonochore. Flw-Jun. Clay roadsides. Type 1.

3. Trachelospermum Lemaire

1. T. difforme (Walter) Gray. Phanerophyte-vine; perennial; atelechore. Dry, second growth woodland. Type 9.

7. AQUIFOLIACEAE

Holly Family

1. Ilex Linnaeus

1. I. decidua Walter var. decidua. Possum-haw. Phanerophyte-shrub; perennial; endozoochore. Fr-Aug. Gentle wooded slopes. Type 9.

2. I. decidua Walter var. longipes (Chapman) Ahles. Possum-haw. Phanerophyte-shrub; perennial; endozoochore. Flw-May; Fr-Sep. Along river and along canyon rim. Type 9.

3. I. opaca Aiton. Holly. Phanerophyte-tree; perennial; endozoochore. Flw-May; Fr-Jun. Sandstone ravine, wooded slopes along stream, talus, canyon rim. Type 9.

Frequent.

4. I. verticillata (Linnaeus) Gray. Black-alder, winterberry. Phanerophyte-tree; perennial; endozoochore. Flw-Jun; Fr-Aug--Sep. Gentle wooded slopes along creeks and river; sandstone along river; wooded slopes and wet area of canyon. Type 1.

8. ARALIACEAE

Ginseng Family

1. Aralia Linnaeus

1. A. spinosa Linnaeus. Devil's Walking-stick. Phanerophyte-tree; perennial; atelechore. Flw-Jul. Sandstone outcrops along river, wooded slopes of canyon, rock outcrops along canyon rim. Type 1. Occasional, locally abundant.

9. ARISTOLOCHIACEAE

Birthwort Family

1. Aristolochia Linnaeus

1. A. serpentaria Linnaeus. Birthwort. Geophyte; perennial; atelechore. Flw-Jun. Clay roadsides. Type 9.

2. Hexastylis Rafinesque

1. H. arifolia (Michaux) Small. Arrowleaf-ginger.

Hemicryptophyte; perennial; endozoochore. Flw-Apr-May.

Floodplain of upper river; floodplain and wooded slopes of canyon. Type 6.

2. H. shuttlesworthii (Britton & Baker) Small. Heart-leaf, wild-ginger. Hemicryptophyte; perennial; endozoochore. Mar-Jun. Floodplain of upper river and canyon, rim of canyon. Type 7.

3. H. virginica (Linnaeus) Small. Wild-ginger. Hemicryptophyte; perennial; endozoochore. Flw-Apr--May. Floodplain of upper river, wooded slopes of canyon and along intermittent streams on canyon rim. Type 6.

10. ASCLEPIADACEAE

Milkweed Family

1. Asclepias Linnaeus Milkweed

1. A. amplexicaulis Smith. Hemicryptophyte; perennial; pogonochore. Flw-May; Fr-Jul. Sandy soils roadsides, roadside rock outcrops. Type 1. CD.

2. A. quadrifolia Jacquin. Hemicryptophyte; perennial; pogonochore. Flw-May. Sandstone ridges. Type 4.

3. A. tuberosa Linnaeus. Butterfly-weed, pleurisy-root. Hemicryptophyte; perennial; pogonochore. Flw-Jun. Oak-Hickory-Pine woods with sandstone outcrops, roadsides. Type 2.

Occasional but formerly more abundant. Its demise

thought to be due to herbicide usage along roadsides.

4. A. variegata Linnaeus. Hemicryptophyte; perennial; pogonochore. Flw-May. Wooded slopes along upper river, alluvial woods in canyon. Type 1.

5. A. verticillata Linnaeus. Milkweed. Hemicryptophyte; perennial; pogonochore. Aug-Sep; Sep. Sandy soil of ridges, sandstone bluffs. Type 1.

11. ASTERACEAE or COMPOSITAE

Aster Family

Reference: Cronquist, A. 1980.

1. Achillea Linnaeus

1. A. millefolium Linnaeus. Yarrow. Hemicryptophyte; perennial; pterochore. Flw-Jun. Intermittent streams and adjacent roadsides. Type 10.

2. Ambrosia Linnaeus

1. A. artemisiifolia Linnaeus. Ragweed. Therophyte; annual; atelechore. Flw-Sep; Fr-Sep. Sandstone outcrops along river, open wooded areas near canyon rim, sandy roadsides. Type 2. Frequent.

3. Antennaria Gaertner

1. A. plantaginifolia (Linnaeus) Richardson. Pussytoes. Chamaephyte; perennial; pogonochore. Flw-Apr. Roadsides along canyon rim, woods in canyon, oak-pine woodlands near

upper river. Type 1. Frequent.

2. A. solitaria Rydberg. Solitary pussytoes. Chamaephyte; perennial; pogonochore. Flw-Mar--Apr. Wooded floodplains and talus slopes of canyon. Type 9. Rare. See fig. 11.

4. Anthemis Linnaeus

1. A. cotula Linnaeus. Dog-fennel. Therophyte; annual; atelechore. Flw-Jun--Nov; Fr-Jun--Nov. Shaded riverbanks, ravines. Type 8. CD.

5. Aster Linnaeus

1. A. acuminatus Michaux. Hemicryptophyte; perennial; pogonochore. Flw-Sep. Sandstones along river. Type 20. +.

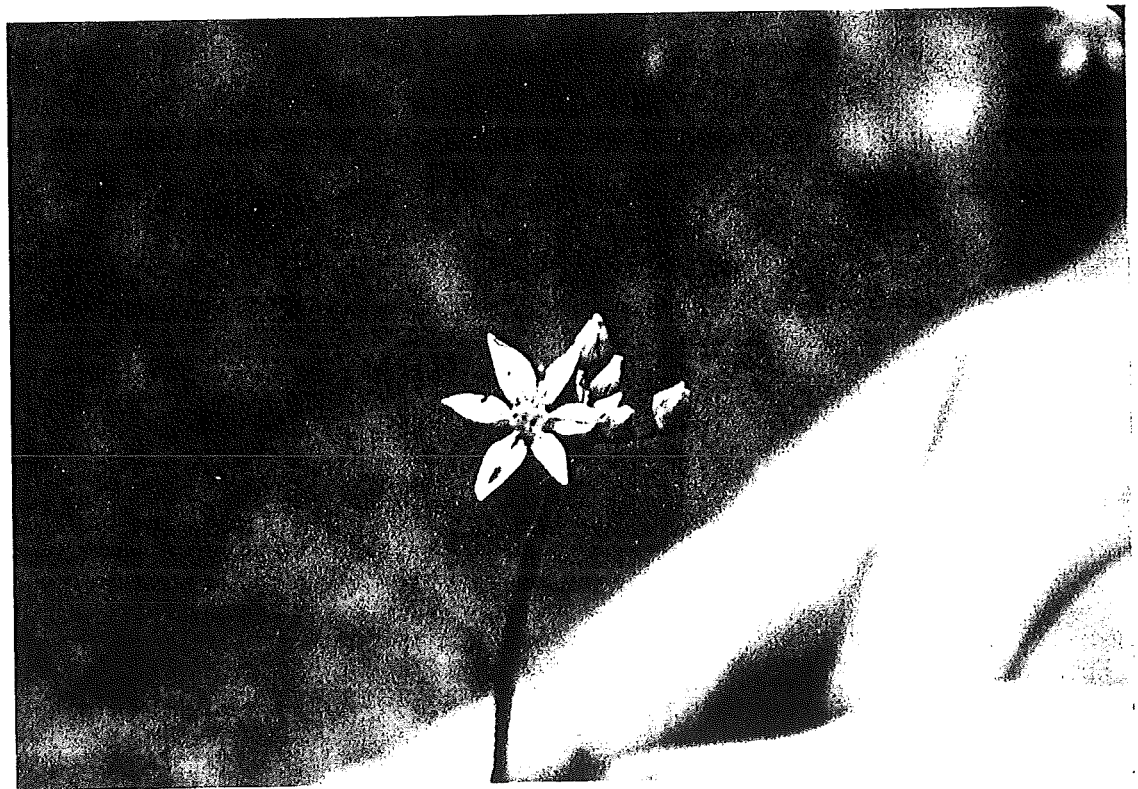
2. A. concolor Linnaeus. Hemicryptophyte; perennial; pogonochore. Flw-Oct. Moist roadsides. Type 1.

3. A. divaricatus Linnaeus. Heart-leaved aster. Hemicryptophyte; perennial; pogonochore. Flw-Jul. Oak-hickory woods; slopes of canyon. Type 1.

4. A. dumosus Linnaeus. Hemicryptophyte; perennial; pogonochore. Flw-Oct. Moist roadsides. Type 1.

5. A. gracilis Nuttall. Flw-Aug. Hemicryptophyte; perennial; pogonochore. Sandstone outcrops near canyon, thin soils. Type 6. +.

6. A. lateriflorus (Linnaeus) Britton. Starved aster. Hemicryptophyte; perennial; pogonochore. Flw-Oct. Ravine. Type 1. CD.



7. A. linariifolius Linnaeus. Stiff-leaved aster.
Hemicryptophyte; perennial; pogonochore. Sandy soils. Type 1.
8. A. patens Aiton. Hemicryptophyte; perennial;
pogonochore. Flw-Sept. Sandstone outcrops and bluffs.
Type 6.
9. A. pilosus Willdenow var. demotus Blake. Frost aster.
Geophyte; perennial; pogonochore. Flw-Oct. Seeps at base
of sandstone cliffs. Type 1.
10. A. shortii Lindley. Geophyte; perennial; pogonochore.
Oct-Nov; Oct-Nov. Floodplains of canyon and along canyon
rim. Type 1. Reference: Strausbaugh, P. D. and E. L. Core.
1977.
11. A. solidagineus Michaux. White-topped aster.
Geophyte; perennial; pogonochore. Flw-Jul. Sandy soils
along roadsides. Type 1. +.
12. A. surculosus Michaux. Geophyte; perennial;
pogonochore. Flw-Oct. Moist roadsides. Type 7.
13. A. vimineus Lam. Hemicryptophyte; perennial;
atelechore. Flw-Oct; Fr-Oct. Ravines. Type 16. +.

7. Bidens Linnaeus

1. B. aristosa (Michaux) Britton. Beggar-ticks.
Therophyte; annual; epizoochore. Fr-Sep. Wet depressions,
roadsides. Type 1. CD.
2. B. frondosa Linnaeus. Beggar-ticks. Therophyte;
annual; epizoochore. Flw-Oct. Ravines. Type 1.

3. B. laevis (Linnaeus) Britton, Sterns & Poggenburg.

Beggar-ticks. Therophyte; annual; epizoochore. Fr-Nov.

Ravines. Type 5. CD.

4. B. polylepis Blake. Beggar-ticks. Therophyte; annual;

epizoochore. Flw-Aug. Sandy soils along roadsides. Type

1. CD.

8. Bigelowia De Candolle

Reference: Anderson, L. C. 1970.

1. B. nuttallii L. C. Anderson. Rayless-goldenrod.

Hemicryptophyte; perennial; pogonochore. Flw-Aug--Nov.

Sandstone outcrops. Type 6. Common. See fig. 13.

9. Boltonia L'Heritier

1. B. asteroides (Linnaeus) L'Heritier. Hemicryptophyte;

perennial; pterochore. Flw-Aug; Fr-Aug. Moist roadsides.

Type 1. +.

10. Cacalia Linnaeus

1. C. atriplicifolia Linnaeus. Pale Indian-plantain.

Hemicryptophyte; perennial; pogonochore. Flw-Nov; Fr-Nov.

Alluvium and wooded slopes of canyon. Type 9. Frequent.

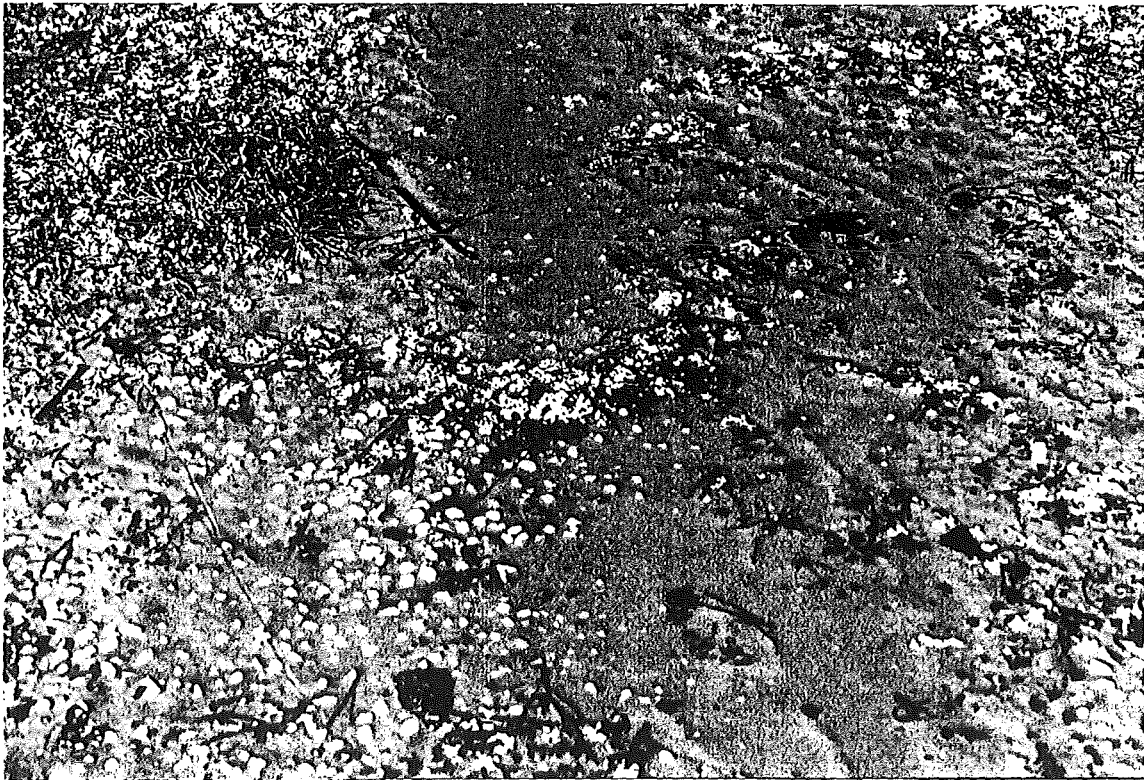
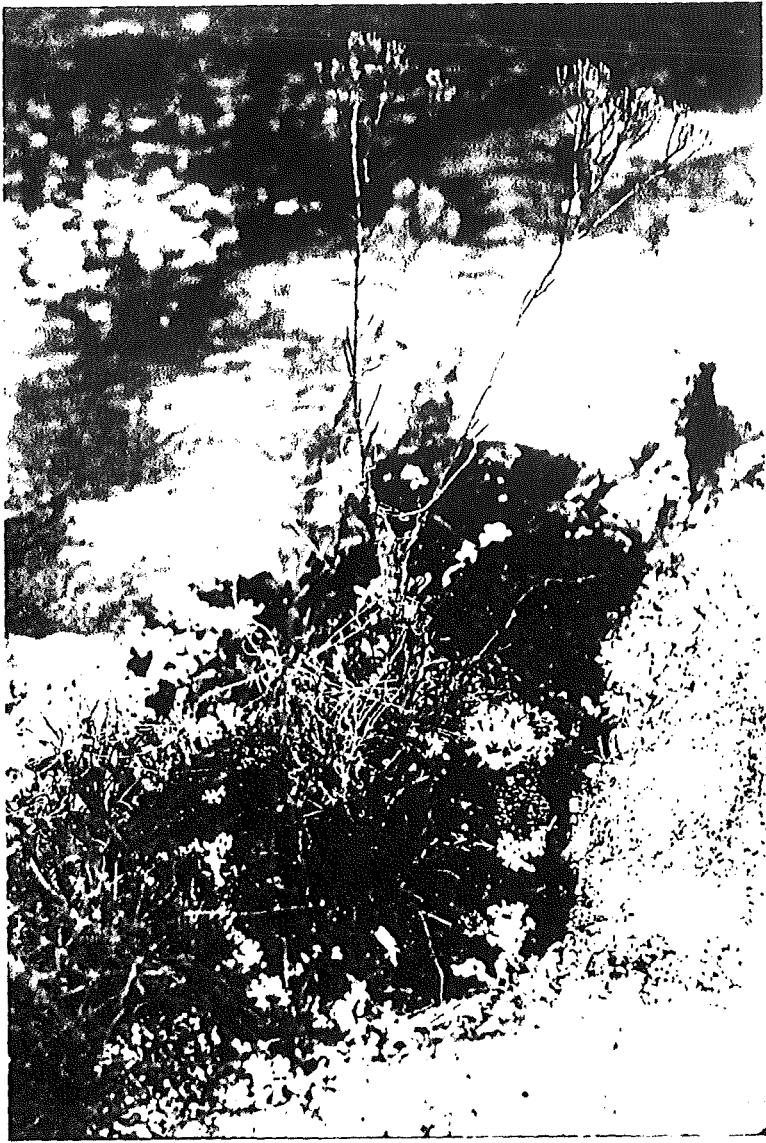
2. C. suaveolens Linnaeus. Indian-plantain.

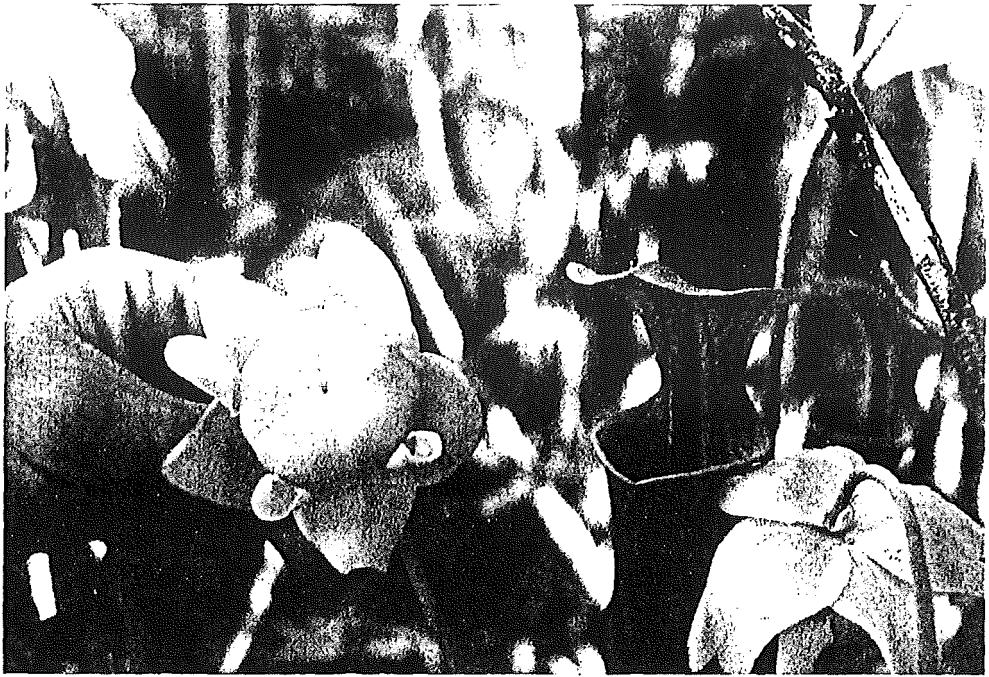
Hemicryptophyte; perennial; pogonochore. Oct; Oct.

Floodplain of river. Type 14. +. Rare.

11. Chrysanthemum Linnaeus

1. C. leucanthemum Linnaeus. Ox-eye daisy.





Hemicryptophyte; perennial; pterochore. Flw-May--Jun.
 Wooded margins of roadsides, rock outcrops. Type 10.
 Occasional.

12. Chrysopsis Elliott

1. C. graminifolia (Michaux) Elliott. Golden-aster.
 Hemicryptophyte; perennial; pogonochore. Flw-Oct; Fr-Oct.
 Sandstone outcrops along canyon rim, floodplain of canyon,
 clearcuts, sandy roadsides. Type 1. +. Common.
2. C. mariana (Linnaeus) Elliott. Hemicryptophyte;
 perennial; pogonochore. Flw-Sep--Oct. Moist roadsides.
 Siliceous, acidic soils. Type 9.

13. Cirsium Miller

1. C. carolinianum (Walter) Fernald & Schubert. Thistle.
 Hemicryptophyte; biennial; pogonochore. Flw-Jun; Fr-Jun.
 Intermittent streams, roadsides. Type 12. CD. Rare.
2. C. discolor (Muhlenberg) Sprengel. Hemicryptophyte;
 perennial; pogonochore. May; May. Sandy soils. Type 1.
 CD.
3. C. canadensis (Linnaeus) Cronquist var. canadensis.
 Therophyte; annual; pogonochore. Flw-Sep; Fr-Sep. Ravine.
 Type 5. CD.

14. Coreopsis Linnaeus

Reference: Smith, E. B. 1976.

1. C. auriculata Linnaeus. Hemicryptophyte; perennial;
 atelechore. Flw-Jul. Alluvium and wooded slopes of canyon.

Type 6.

2. C. lanceolata Linnaeus. Hemicryptophyte; perennial; pterochore. Flw-May. Wooded margins of rock outcrops along canyon rim. Type 1.

3. C. major Walter. Hemicryptophyte; perennial; atelechore. Flw-May--Sep; Fr-Jun--Sep. Alluvium and wooded slopes of canyon; rock outcrops along canyon rim. Type 9. Frequent.

4. C. pubescens Elliott var. pubescens. Hemicryptophyte; perennial; pterochore. Flw-Sep; Fr-Sep. Ravines of canyon. Type 9.

5. C. pulchra F. E. Boynton. Woodland tickseed. Hemicryptophyte; perennial; atelechore. Flw-Jul--Sep; Fr-Aug--Sep. Roadsides along canyon rim, sandstone benches along rims of canyon. Type 7.

6. C. tripteris Linnaeus. Hemicryptophyte; perennial; pterochore. Flw-Sep--Oct; Fr-Sep--Oct. Sandstones along river, disturbed rock outcrops. Type 1.

15. Elephantopus Linnaeus

1. E. carolinianus Willdenow. Elephant's-foot. Hemicryptophyte; perennial; pogonochore. Sandy soils, wooded slopes. Type 9.

2. E. tomentosus Linnaeus. Elephant's-foot. Hemicryptophyte; perennial; pogonochore. Flw-Sep. Sandstone along river. Type 6. Occasional.

16. Erechtites Rafinesque

1. E. hieracifolia (Linnaeus) Rafinesque. Fireweed.
Therophyte; annual; pogonochore. Flw-Sep; Fr-Oct. Sandy
soils of roadsides, rock outcrops, alluvium of canyon. Type
1. CD. Occasional.

17. Erigeron Linnaeus

1. E. annuus (Linnaeus) Persoon. Daisy fleabane.
Therophyte; annual; pogonochore. Flw-May--Aug. Edge of
sandstone outcrops, roadside ditches. Type 5.
2. E. pulchellus Michaux. Robin's-plantain.
Hemicryptophyte; biennial; pogonochore. Flw-Apr. Alluvium
and wooded slopes of canyon. Type 1.
3. E. strigosus Muhlenberg ex Willdenow. Daisy fleabane.
Therophyte; annual; pogonochore. Flw-May--Jul. Rock
outcrops along canyon rim, wooded slopes along upper river.
Type 5. CD.

18. Eupatorium Linnaeus

1. E. album Linnaeus var. album. Hemicryptophyte;
perennial; pogonochore. Flw-Sep. Sandstone outcrops on
ridge. Type 1. +.
2. E. album Linnaeus var. vaseyi (T. C. Porter) Cronquist.
Hemicryptophyte; perennial; pogonochore. Flw-Sep.
Sandstone bluffs. Type 15. +.
3. E. aromaticum Linnaeus. Hemicryptophyte; perennial;
pogonochore. Flw-Sep; Fr-Sep. Sandy soils along roads,

alluvium. Type 1. CD.

4. E. fistulosum Barratt. Queen-of-the-meadow, Joe-pye-weed. Hemicryptophyte; perennial; pogonochore. Flw-Aug--Sep; Fr-Sep. Outcrops along river, bars and islands in river in canyon. Type 1. +. Frequent.

5. E. hyssopifolium Linnaeus. Hemicryptophyte; perennial; pogonochore. Flw-Oct; Fr-Oct. Disturbed sandstone outcrops. Type 1. +.

6. E. perfoliatum Linnaeus. Hemicryptophyte; perennial; pogonochore. Fr-Oct. Roadsides, bars and islands in river in canyon. Type 1. Frequent.

7. E. recurvans Small. Hemicryptophyte; perennial; pogonochore. Flw-Aug; Fr-Aug. Rock outcrops along canyon rim. Type 3. +.

8. E. rotundifolium Linnaeus var. rotundifolium. Hemicryptophyte; perennial; pogonochore. Flw-Jul--Aug. Floodplains of canyon, sandstone outcrops. Type 1. +.

9. E. rotundifolium Linnaeus var. scabrum (Elliott) Gray. Hemicryptophyte; perennial; pogonochore. Flw-Aug. Moist roadsides. Type 1.

10. E. rugosum Houttuyn. White snakeroot. Hemicryptophyte; perennial; pogonochore. Fr-Sep. Alluvium and wooded slopes of canyon. Type 1. +.

11. E. sessilifolium Linnaeus. Hemicryptophyte; perennial; pogonochore. Flw-Aug; Fr-Aug. Sandy roadsides. Type 1.

19. Gnaphalium Linnaeus

1. G. obtusifolium Linnaeus. Rabbit-tobacco. Therophyte; annual; pogonochore. Flw-Aug--Oct. Rock outcrops, sandy roadsides, rocky shoals and boulders of canyon. Type 1. Frequent.
2. G. purpureum Linnaeus. Cudweed. Therophyte; annual; pogonochore. Thin sandy soils along roadsides. Type 1. CD.

20. Helenium Linnaeus

1. H. amarum (Rafinesque) H. Rock. Bitter-weed. Therophyte; annual; pterochore. Flw-Jun. Sandstone ravines. Type 9. Occasional.

21. Helianthus Linnaeus Sunflower

Reference: Heiser, C. B., Jr. 1969.

1. H. angustifolius Linnaeus. Hemicryptophyte; perennial; pterochore. Flw-Oct; Fr-Oct. Low, sandy swales and seepage along roadsides. Type 9. CD.
2. H. atrorubens Linnaeus. Hemicryptophyte; perennial; atelechore. Flw-Aug. Sandy soils along roadsides. Type 9.
3. H. divaricatus Linnaeus. Geophyte; perennial; atelechore. Flw-Aug; Fr-Oct. Sandy soils along roadsides. Type 1.
4. H. longifolius Pursh. Geophyte; perennial; atelechore. Flw-Aug--Sep. Rock outcrops along canyon rim, moist roadsides. Type 3. Occasional but locally abundant.

22. Hieracium Linnaeus

1. H. gronovii Linnaeus. Hemicryptophyte; perennial; pogonochore. Flw-Jul--Aug; Fr-Jul. Moist roadsides, margins of sandstone outcrops. Type 1.
2. H. venosum Linnaeus. Rattlesnake-weed. Hemicryptophyte; perennial; pogonochore. Flw-Apr--May. Roadsides, canyon rim, wooded slopes of canyon. Type 15.

23. Krigia Schreber

1. K. biflora (Walter) Blake. Hemicryptophyte; perennial; pogonochore. Flw-May; Fr-May. Sandy roadsides, alluvium of canyon. Type 1. Occasional.
2. K. dandelion (Linnaeus) Nuttall. Hemicryptophyte; perennial; pogonochore. Flw-Apr. Alluvium and wooded slopes of canyon. Type 9. Occasional.
3. K. oppositifolia Rafinesque. Therophyte; annual; atelechore. Wooded slopes. Type 9.
4. K. virginica (Linnaeus) Willdenow. Dwarf-dandelion. Therophyte; annual; pogonochore. Flw-May; Fr-May. Rock outcrops, canyon rim. Type 1. CD. Occasional.

24. Lactuca Linnaeus

1. L. canadensis Linnaeus. Wild lettuce. Hemicryptophyte; biennial; pogonochore. Flw-Jul; Fr-Jul--Aug. Sandy soil of roadsides. Type 1.
2. L. floridana (Linnaeus) Gaertner. Wild lettuce. Hemicryptophyte; biennial; pogonochore. Flw-Aug. Red clay

road-cuts. Type 1.

25. Liatris Schreber Blazing-star

1. L. microcephala (Small) K. Schumann. Geophyte; perennial; pogonochore. Flw-Aug; Fr-Oct. Sandstone outcrops. Type 6. Common.

2. L. spicata (Linnaeus) Willdenow. Geophyte; perennial; pogonochore. Flw-Aug; Fr-Aug. Sandy soils along roadsides. Type 1. CD. Rare.

3. L. squarrosa (Linnaeus) Michaux. Geophyte; perennial; pogonochore. Flw-Aug. Sandy soils. Type 9. CD. Rare.

4. L. squarrulosa Michaux. Geophyte; perennial; pogonochore. Flw-Sep. Sandy soils. Type 9. +.

26. Marshallia Schreber

Reference: Beadle, C. D. and F. E. Boynton, 1901.

1. M. trinervia (Walter) Trelease. Hemicryptophyte; perennial, Flw-May--Jun. Wooded slopes along upper river, alluvium of canyon. Type 6. Frequent.

27. Parthenium Linnaeus

1. P. integrifolium Linnaeus. Wild-quinine. Hemicryptophyte; perennial; pterochore. Flw-May--Jun. Alluvium and wooded slopes. Type 12.

28. Polymnia Linnaeus

1. P. uvedalia Linnaeus. Bearsfoot. Hemicryptophyte; perennial; atelechore. Flw-Jul. Wooded slopes. Type 4.

29. Prenanthes Linnaeus

1. P. altissima Linnaeus. Hemicryptophyte; biennial; pogonochore. Flw-Nov; Fr- Nov. Floodplain of river. Type 1. CD.

2. P. serpentaria Pursh. Gall-of-the-Earth, Lion's-foot. Hemicryptophyte; biennial; pogonochore. Flw-Oct; Fr-Oct. Moist roadsides, floodplain of canyon. Type 1. CD.

30. Rudbeckia Linnaeus

1. R. heliopsidis Torrey and Gray. Black-eyed Susan. Hemicryptophyte; perennial; epizoochore. Flw-Aug; Fr-Oct. Outcrops along river, moist roadsides. Type 7.

2. R. hirta Linnaeus var. pulcherrima Farwell. Black-eyed Susan. Hemicryptophyte; perennial; atelechore. Flw-Jul--Aug. Roadsides, margins of rock outcrops. Type 1.

31. Senecio Linnaeus

1. S. anonymus A. Wood. Small's groundsel. Hemicryptophyte; perennial; pogonochore. Flw-Apr--May. Roadsides along canyon rim. Type 9.

32. Sericocarpus Nees

1. S. asteroides (Linnaeus) Britton-Sterns-Poggenburg. White-topped-aster. Hemicryptophyte; perennial; pogonochore. Flw-Jun. Intermittent streams, roadsides. Type 1.

2. S. linifolius (Linnaeus) Britton-Sterns-Poggenburg. White-topped-aster. Hemicryptophyte; perennial; pogonochore. Flw-Aug; Fr-Oct. Moist roadsides, sandstone

terraces above river, sandy soils. Type 9.

33. Silphium Linnaeus

1. S. astericus Linnaeus. Hemicryptophyte; perennial; pterochore. Flw-Jul. Wooded slopes, ravines. Type 9. Occasional.

2. S. compositum Michaux. Rosin-weed. Hemicryptophyte; perennial; pogonochore. Flw-Jul. Shallow soils, roadsides. Type 7. CD. Occasional.

34. Solidago Linnaeus Goldenrod

1. S. arguta Aiton var. bootii (Hooker) Palmer & Steyermark. Hemicryptophyte; perennial; pogonochore. Flw-Jul. Shallow soils, wooded slopes. Type 9.

2. S. arguta Aiton var. caroliniana Gray. Hemicryptophyte; perennial; pogonochore. Flw-Aug; Fr-Oct. Sandy soils. Type 9. Frequent.

3. S. caesia Linnaeus. Blue-stem goldenrod, wreath goldenrod. Hemicryptophyte; perennial; pogonochore. Flw-Oct; Fr-Oct. Wooded slopes of canyon. Type 1.

4. S. erecta Pursh. Erect goldenrod. Hemicryptophyte; perennial; pogonochore. Flw-Aug-Sep; Fr-Sep-Oct. Moist roadsides, sandstone terraces, woodlands, canyon rim. Type 4. Frequent.

5. S. flexicaulis Linnaeus. Hemicryptophyte; perennial; pogonochore. Steep, rocky wooded slopes. Type 4. CD.

6. S. nemoralis Aiton var. haleana Fernald.

Hemicryptophyte; perennial; pogonochore. Flw-Sep; Fr-Oct.
Moist roadsides, sandstone outcrops, canyon rim. Type 1.
Occasional.

7. S. odora Aiton. Scented goldenrod. Hemicryptophyte;
perennial; pogonochore. Fr-Sep. Sandstone outcrops on
ridge. Type 1.

8. S. sphacelata Rafinesque. Goldenrod. Hemicryptophyte;
perennial; pogonochore. Flw-Sep. Sandstone bluffs. Type
12.

35. Taraxacum Wiggers

1. T. officinale Wiggers. Common dandelion.
Hemicryptophyte; perennial; pogonochore. Flw-May.
Roadsides, alluvium and wooded slopes of canyon. Type 10.
CD. Occasional.

36. Verbesina Linnaeus

1. V. occidentalis (Linnaeus) Walter. Hemicryptophyte;
perennial; epizoochore. Flw-Aug--Oct; Fr-Oct. Woods along
roadsides, wooded slopes of canyon. Type 9.

37. Vernonia Schreber

1. V. flaccidifolia Small. Ironweed. Hemicryptophyte;
perennial; pogonochore. Flw-Jul; Fr-Jul. Wooded slopes.
Type 7.

12. BERBERIDACEAE

Barberry Family

1. Podophyllum Linnaeus

1. P. peltatum Linnaeus. May-apple, mandrake. Geophyte; perennial; endozoochore. Fr-Jul. Wooded slopes of canyon. Type 1. Occasional.

13. BETULACEAE

Birch Family

1. Alnus Miller

1. A. serrulata (Aiton) Willdenow. Tag alder. Phanerophyte-shrub; perennial; hydrochore. Flw-Feb--Apr, Fr-Mar--Sep. Streamside in ravines and canyons, riverbanks along upper river, bottomland hardwoods. Type 1. Common.

2. Betula Linnaeus

1. B. lenta Linnaeus. Cherry birch. Phanerophyte-tree; perennial; pterochore. Flw-May; Fr-Sep--Oct. Ravines and wooded slopes of canyon, canyon rims. Type 14. Common.
2. B. nigra Linnaeus. River birch. Phanerophyte-tree; perennial; pterochore. Flw-Apr. Alluvium, wooded slopes, ravines of canyon, canyon rims. Type 1. Occasional.

3. Carpinus Linnaeus

1. C. caroliniana Walter. Ironwood, blue-beech, musclewood. Phanerophyte-tree; perennial; pterochore. Flw-Apr, Fr-Jul--Nov. Wooded slopes of canyon, outcrops along canyon, sandstone ravines. Type 1.

4. Corylus Linnaeus

1. C. americana Walter. Hazel-nut. Phanerophyte-shrub; perennial; zoochore. Wooded slopes of canyon. Type 4. CD. Occasional.
2. C. cornuta Marshall. Beaked hazel-nut. Phanerophyte-shrub; perennial; zoochore. Fr-Jun. Wooded slopes of canyon, intermittent streams, wooded slopes along upper river. Type 10. Rare.

5. Ostrya Scopoli

1. O. virginiana (Miller) K. Koch. Hop-hornbeam. Phanerophyte-tree; perennial; pterochore. Fr-Sept. Canyon rims and slopes of canyon. Type 1. Common.

14. BIGNONIACEAE

Trumpet-creeper Family

1. Anisostichus Bureau

1. A. capreolata Linnaeus. Cross vine. Phanerophyte-vine; perennial; pterochore. Flw-Apr--May. Wooded slopes of canyon, rock outcrops, sandy soils along roads. Type 9. Common.

2. Campsis Loureiro

1. C. radicans (Linnaeus) Seemann. Trumpet-creeper, cow-itch vine. Phanerophyte-vine; perennial; pterochore. Fr-May. Sandy soils. Type 9. Occasional.

3. Catalpa Linnaeus

- 1.
- C. bignonioides
- Walter. Indian-cigar tree.

Phanerophyte-tree; perennial; pterochore. Flw-May. Wooded slopes along upper river. Type 9. Occasional.

15. BORAGINACEAE

Borage Family

1. Cynoglossum Linnaeus

- 1.
- C. virginianum
- Linnaeus. Wild comfrey.

Hemicryptophyte; perennial; epizoochore. Fr-Aug. Mixed woodlands, power line rights-of-way. Type 9.

2. Lithospermum Linnaeus

- 1.
- L. canescens
- (Michaux) Lehmann. Hoary-puccoon.

Hemicryptophyte; perennial; zoochore. Flw-Apr. Along river in canyon. Type 4.

3. Onosmodium Linnaeus

- 1.
- O. virginianum
- (Linnaeus) A. De Candolle.

Hemicryptophyte; perennial; epizoochore. Flw-May. Alluvium and wooded slopes of canyon. Type 16.

16. BRASSICACEAE or CRUCIFERAE

Mustard Family

1. Arabis Linnaeus

1. A. laevigata (Muhlenberg ex Willdenow) Poir. Rock cress. Hemicryptophyte; biennial; atelechore. Fr-Jun. Roadsides along canyon rim. Type 4.

2. Barbarea R. Brown ex Aiton

1. B. verna (Miller) Ascherson. Winter cress. Therophyte; annual; atelechore. Flw-Mar--Apr. Bottomland hardwoods. Type 10.

3. Cardamine Linnaeus

1. C. angustata O. E. Schultz. Toothwort. Geophyte; perennial; atelechore. Flw-Mar--Apr. Wooded slopes of canyon. Type 12. Occasional.

2. C. bulbosa (Schreber) Britton, Sterns & Poggenburg. Geophyte; perennial; atelechore. Flw-Mar--April; Fr-April. Floodplains of canyon, bottomland hardwoods. Type 12. Occasional.

3. C. concatenata (Michaux) Ahles. Geophyte; perennial; atelechore. Flw-Mar--May; Fr-Apr. Wooded slope. Type 15.

4. C. hirsuta Linnaeus. Hairy bittercress. Therophyte; annual; atelechore. Fr-Apr. Roadsides along canyon rim. Type 8.

5. C. pennsylvanica Muhlenberg. Bittercress. Therophyte; annual; atelechore. Fr-Mar. Wooded slopes of canyon. Type 1. CD.

4. Draba Linnaeus

1. D. verna Linnaeus. Whitlow-grass. Therophyte; annual;

sporochores. Flw-Feb--Mar, Fr-Mar. Wet cultivated fields, bottomland hardwoods. Type 10.

5. Lepidium Linnaeus

1. L. virginicum Linnaeus. Poor-man's-pepper. Therophyte; annual; atelechore. Fr-May. Canyon rim. Type 5.

6. Sibara Greene

1. S. virginica (Linnaeus) Rollins. Therophyte; annual; atelechore. Fr-May. Wooded slopes along upper river. Type 16.

17. CALLITRICHACEAE

Water-starwort Family

1. Callitriche Linnaeus

1. C. heterophylla Pursh. Water-starwort. Hydrophyte; perennial; hydrochore. Fr-Mar--April. Bottomland hardwoods. Type 5.

18. CALYCANTHACEAE

Sweet-shrub Family

1. Calycanthus Linnaeus

1. C. floridus Linnaeus. Sweet-shrub. Phanerophyte-shrub; perennial; endozoochore. Flw-Apr--Jun; Fr-May. Intermittent streams, wooded slopes of canyon dry, clay

ridges. Type 6. Common.

19. CAMPANULACEAE

Bellflower Family

1. Campanula Linnaeus

1. C. divaricata Michaux. Bluebells. Chamaephyte; perennial; atelechore. Flw-Sep; Fr-Nov. Sandstones along river, wooded slopes of canyon. Type 12. Occasional.

2. Lobelia Linnaeus

1. L. cardinalis Linnaeus. Cardinal flower. Hemicryptophyte; perennial; atelechore. Flw-Jul--Sep. Rocky banks, islands and terraces of river. Type 1. CD. Frequent.

2. L. inflata Linnaeus. Indian-tobacco. Therophyte; annual; atelechore. Flw-Jul--Nov; Fr-Oct--Nov. Steep, rocky, wooded slopes, moist roadsides, shaded bottomlands, riverbanks. Type 1.

3. L. nuttallii Roemer & Schultes. Therophyte; annual; atelechore. Flw-Jun--Oct; Fr-Aug--Sep. Sandstone outcrops, moist roadsides, riverbanks. Type 3.

20. CAPRIFOLIACEAE

Honeysuckle Family

Reference: Hardin, J. W. 1968.

1. Diervilla Miller

1. D. rivularis Gattinger. Bush-honeysuckle.

Phanerophyte-shrub; perennial; atelechore. Flw-May--Jul; Fr-Jun--Oct. Stream banks, slopes and outcrops, canyon rims, alluvial floodplain of canyon, bottomland hardwoods. Type 7. Frequent.

2. D. sessilifolia Buckley. Bush-honeysuckle.

Phanerophyte-shrub; perennial; atelechore. Flw-Jul; Fr-Jul. Streamside slopes, canyon rim, alluvial floodplain of canyon. Type 7. Occasional.

2. Lonicera Linnaeus

1. L. flava Sims. Yellow honeysuckle. Phanerophyte-vine; perennial; endozoochore. Flw-Apr--May. Canyon rims, ridges. Type 7. Rare.

2. L. japonica Thunberg. Japanese honeysuckle.

Phanerophyte-vine; perennial; endozoochore. Flw-May; Fr-Sept. Type 8. Common.

3. L. sempervirens Linnaeus. Coral honeysuckle.

Phanerophyte-vine; perennial; endozoochore. Flw-May--Jun. Wooded hills and slopes along river, sandstone outcrops along rim, stream banks. Type 9. Occasional.

3. Sambucus Linnaeus

1. S. canadensis Linnaeus. Elderberry. Phanerophyte-shrub; perennial; endozoochore. Slopes along river. Type 1.

4. Viburnum Linnaeus

1. V. acerifolium Linnaeus. Mapleleaf viburnum.
Phanerophyte-shrub; perennial; endozoochore. Flw-May; Fr-May--Nov. Stream banks, wooded slopes and talus in canyon, wooded margins of rock outcrops. Type 1. Common.
2. V. dentatum Linnaeus. Toothed viburnum. Phanerophyte-shrub; perennial; endozoochore. May; Sep-Oct. Wooded slopes of canyon, ravines. Type 1. Common.
3. V. nudum Linnaeus var. cassinoides Torrey & Gray.
Phanerophyte-shrub; perennial; endozoochore. Flw-May; Fr-Jun. Rocky banks and floodplain of streams and river. Type 9. Occasional.
4. V. rufidulum Rafinesque. Blue-haw. Phanerophyte-shrub; perennial; endozoochore. Floodplain of canyon. Type 9.

21. CARYOPHYLLACEAE

Carnation or Pink Family

1. Cerastium Linnaeus

1. C. glomeratum Thuillier. Mouse-ear chickweed.
Therophyte; annual; sporochores. Flw-Mar; Fr-Mar. Alluvium of canyon. Type 10. CD.
2. C. semidecandrum Linnaeus. Mouse-ear chickweed.
Therophyte; annual; sporochores. Flw-Apr; Fr-Apr. Sandstone outcrops along canyon rim. Type 15. +.

2. Minuartia Linnaeus

1. M. glabra (Michaux) Mattf. Sandwort. Therophyte; annual; sporochores. Flw-Apr--May; Fr-May. Sandstone rock outcrops. Type 4. Common.

3. Paronychia Miller

1. P. argyrocoma (Michaux) Nuttall. Silverling, silvery Whitlow-wort. Geophyte; perennial; atelechores. Fr-May. Ridges. Type 14. Rare. +.
2. P. fastigiata (Rafinesque) Fernald. Therophyte; annual; atelechores. Flw-Aug; Fr-Aug. Sandy power line clearings. Type 15. +.

4. Silene Linnaeus

1. S. stellata (Linnaeus) Aiton f. Starry campion. Hemicryptophyte; perennial; atelechores. Flw-Sept. Floodplains and wooded slopes of canyon, sandy road-cuts along upper river. Type 4. Occasional.

5. Stellaria Linnaeus

1. S. pubera Michaux. Giant chickweed. Chamaephyte; perennial; atelechores. Flw-Apr--May; Fr-May. Floodplain of canyon, ridges. Type 9. Occasional.

22. CELASTRACEAE

Bittersweet Family

1. Euonymus Linnaeus

1. E. americanus Linnaeus. Strawberry bush. Phanerophyte-shrub; perennial; endozoochore. Flw-May; Fr-May--Nov. Wooded slopes, stream banks and floodplains, frequently over sandstone bedrock. Type 12. Common.

23. CISTACEAE

Rock-rose Family

1. Lechea Linnaeus

1. L. minor Linnaeus. Pin-weed. Hemicryptophyte; perennial; sporochores. Flw-Aug--Sep; Fr-Aug--Sep. Sandy roadsides; rock outcrops along canyon rim. Type 1. CD. Occasional.
2. L. racemulosa Michaux. Hemicryptophyte; perennial; sporochores. Jun-Sep; Aug-Oct. Sandy soil of ridges, sandstone bluffs. Type 12.

24. CLUSIACEAE

Hypericum Family

1. Hypericum Linnaeus

1. H. cistifolium Lamarck. Phanerophyte-shrub; perennial; sporochores. Flw-Oct; Fr-Oct. Disturbed rock outcrops, wooded intermittent streams on canyon rim. Type 3. +.
2. H. frondosum Michaux. Phanerophyte-shrub; perennial;

sporochore. Flw-Jul--Aug; Fr-Aug. Rock outcrops, wooded slopes, sandy soils. Type 9. Common.

3. H. gentianoides (Linnaeus) Britton, Sterns & Poggenburg. Pineweed. Therophyte; annual; sporochore. Flw-Jul--Sep; Fr-Aug--Oct. Sandstone outcrops, wet areas, sandy soils. Type 1. Common.

4. H. hypericoides (Linnaeus) Crantz. St. Andrew's cross. Phanerophyte-shrub; perennial; sporochore. Fr-Aug--Sep. Canyon rim, sheltered cliffs and ravines, wooded slopes. Type 6. CD. Common.

5. H. mutilum Linnaeus. Hemicryptophyte; perennial; sporochore. Ravines, waterfalls. Type 1. Occasional.

6. H. prolificum Linnaeus. Phanerophyte-shrub; perennial; sporochore. Flw-Jul. Ravines. Type 9. Frequent.

7. H. pseudomaculatum Bush. Hemicryptophyte; perennial; sporochore. Flw-Jul. Rocky slopes. Type 9.

8. H. punctatum Lamarck. Hemicryptophyte; perennial; sporochore. Flw-Jul; Fr-Jul. Wooded margins of sandstone outcrops. Type 1. Occasional.

9. H. stans (Michaux) P. Adams & Robson. St. Peter's wort. Chamaephyte; perennial; sporochore. Flw-Aug; Fr-Aug--Oct. Sandstone outcrops, wooded slopes, alluvium. Type 9. Frequent.

10. H. stragalum Adams & Robson. Chamaephyte; perennial; sporochore. Fr-Sep--Oct. Rock outcrops, sandy soils. Type .

4. Common.

25. CONVOLVULACEAE

Morning-glory Family

1. Bonamia Du Petit-Thouars.

1. B. humistrata (Walter) Gray. Geophyte; perennial; atelechore. Flw-July. Alluvium, wooded slopes, and ravines of canyon, thin, sandy soils along unimproved road. Type 3. CD. Frequent.

2. Cuscuta Linnaeus

Reference: Yuncker, T. G. 1921.

1. C. compacta Jussieu. Compact dodder. Parasite; perennial; atelechore. Flw-Sept. Floodplains. Type 1. Occasional.

2. C. harperi Yuncker. Harper's dodder. Parasite; perennial; atelechore. Aug-Oct; Aug-Oct. Sandstone outcrops along canyon rim. Type 7. Occasional but locally abundant. See fig. 11.

3. Ipomoea Linnaeus

1. I. pandurata (Linnaeus) G. F. W. Meyer. Man-root. Hemipterophyte; perennial; atelechore. Flw-Jun--Sep. Floodplain of canyon; sandstone outcrop on ridge. Type 1. Frequent.

26. CORNACEAE

Dogwood Family

1. Cornus Linnaeus

1. C. alternifolia Linnaeusf. Alternateleaf dogwood.

Phanerophyte-tree; perennial; endozoochore. Wooded slopes of canyon. Type 1. Rare.

2. C. amomum Miller. Red-osier dogwood. Phanerophyte-shrub; perennial; atelechore. Flw-Jun-Jul; Fr-Jun-Oct.

Rocky shoals and sandstone boulders at river's edge; roadsides, rock outcrops along canyon rim. Type 1.

Frequent.

3. C. florida Linnaeus. Flowering dogwood. Phanerophyte-tree; perennial; endozoochore. Flw-Apr--May; Fr-May.

Alluvium and wooded slopes of canyon, woods on plateau surface, rock outcrops along canyon rim. Type 1. Common.

4. C. foemina Miller. Swamp dogwood. Phanerophyte-shrub; perennial; endozoochore. Flw-May; Fr-Jun--Nov. Moist,

shady stream banks. Type 9. Occasional.

27. CRASSULACEAE

Sedum Family

1. Diamorpha Nuttall

1. D. cymosa (Nuttall) Britton ex. Small. Stonecrop.

Therophyte; annual; atelechore. Flw-Apr--May; Fr-Apr--May.
 Vernal pools of sandstone outcrops. Type 7. C. Common.
 Red rosettes appear as early as October. See fig. 14.

2. Sedum Linnaeus

1. S. ternatum Michaux. Stonecrop. Succulent; perennial;
 atelechore. Flw-Apr. Sandstone outcrops on mountain top
 and in canyon, woods of canyon, talus below canyon rim.
 Type 4. Occasional.

28. DIAPENSIACEAE

Beetle-weed Family

1. Galax Linnaeus

1. G. urceolata (Poirot) Brummitt. Beetle-weed.
 Chamaephyte; perennial; atelechore. Flw-Apr--Jun; Fr-Jun--
 Jul. Talus below canyon rim. Type 7. Common.

29. DROSERACEAE

Sundew Family

Reference: Shinnars, L. H. 1962.

1. Drosera Linnaeus

1. D. leucantha Shinnars. Sundew. Therophyte; annual;
 hydrochore. Flw-Apr--May. Moist, grassy spots with seeps

along canyon rim, particularly near canyon shoulders. Type 3. +. Rare, one remaining location known. Site is subject to vehicular traffic. See fig. 16.

30. EBENACEAE

Ebony Family

1. Diospyros Linnaeus

1. D. virginiana Linnaeus. Persimmon. Phanerophyte-tree; perennial; endozoochore. Flw-May; Fr-Aug. Gentle slopes above creeks, alluvium above canyon, cut-over woods. Type 9. Frequent.

31. ERICACEAE

Heath Family

1. Chimaphila Pursh

1. C. maculata (Linnaeus) Pursh. Spotted-wintergreen, Pipsissewa. Chamaephyte; perennial; atelechore. Flw-Jun; Fr-Jul--Aug. Alluvium and wooded slopes of canyon. Type 4. Frequent.

2. Epigaea Linnaeus

1. E. repens Linnaeus. Trailing arbutus. Chamaephyte; perennial; endozoochore. Flw-Mar--Apr. Sandy woods, wooded slopes. Type 1. Occasional.

3. Kalmia Linnaeus

1. K. latifolia Linnaeus. Mountain-laurel. Phanerophyte-shrub; perennial; atelechore. Flw-Apr--May; Fr-May--Jul. Canyon rim and wooded slopes of upper river and canyon. Type 1. Common.

4. Lyonia Nuttall

1. L. ligustrina (Linnaeus) De Candolle. Male-berry. Phanerophyte-shrub; perennial; epizoochore. Flw-May--Jun; Fr-May--Oct. Sandy, roadside seeps, intermittent streams. Type 1. Frequent.

5. Monotropa Linnaeus

1. M. hypopithys Linnaeus. Pine-sap. Geophyte; perennial; epizoochore. Fr-Aug. Mixed woods. Type 5. Rare.
2. M. uniflora Linnaeus. Indian-pipe. Geophyte; perennial; epizoochore. Flw-Oct. Wooded canyon slopes. Type 5. Rare.

6. Oxydendrum De Candolle

1. O. arboreum (Linnaeus) De Candolle. Sourwood. Phanerophyte-shrub; perennial; atelechore. Flw-May--Jul; Fr-Aug--Sept. Subcanopy component throughout the area. Type 9. Common.

7. Rhododendron Linnaeus

1. R. alabamense Rehder. Alabama azalea. Phanerophyte-shrub; perennial; sporochochore. Flw-Jul. Riverbanks along upper river. Type 6. CD. Rare.

2. R. arborescens (Pursh) Torrey. Smooth azalea.
Phanerophyte-shrub; perennial; sporochore. Flw-May--Jun;
Fr-Sep. Moist, shady stream banks, along upper river. Type
7.

3. R. canescens (Michaux) Sweet. Wild azalea.
Phanerophyte-shrub; perennial; sporochore. Flw-Apr--May;
Fr-May--Jun. Woodland edges of marshes, woods along canyon
rim, shady stream banks, along upper river. Type 3.
Common.

4. R. catawbiense Michaux. Mountain rosebay, purple-
laurel. Phanerophyte-shrub; perennial; sporochore. Flw-
May, Fr-Jul. Moist, shady, stream banks, talus slopes,
bases of bluffs. Type 16. Common.

5. R. periclymenoides (Michaux) Shinnars. Wild azalea,
pinxter-flower, pink bush-honeysuckle. Phanerophyte-shrub;
perennial; sporochore. Flw-Apr; early Fr-Jun. Bottomland
hardwoods, wooded slopes of canyon. Type 1.

8. Vaccinium Linnaeus

1. V. arboreum Marshall. Sparkleberry. Phanerophyte-
shrub; perennial; endozoochore. Flw-May--Jun; Fr Sep.
Sandy woods of canyon, periphery of rock outcrops. Type 9.
Common.

2. V. atrococcum (Gray) Porter. Black highbush blueberry.
Phanerophyte-shrub; perennial; endozoochore. Flw-Mar; Fr-
May--Jun. Bottomland hardwoods, alluvium of canyon, talus

below canyon rim. Type 1. Frequent.

3. V. constablaei Gray. Highbush blueberry. Phanerophyte-shrub; perennial; endozoochore. Flw-May; Fr-May--Jun.

Pine-heath on canyon rim, wooded margins of rock outcrops, banks along upper river. Type ?. +. Frequent.

4. V. corymbosum Linnaeus. Highbush blueberry.

Phanerophyte-shrub; perennial; endozoochore. Fr-May--Jun. Sandstone ravines, canyon slopes. Type 1.

5. V. elliottii Chapman. Phanerophyte-shrub; perennial; endozoochore. Flw-Mar--Apr; Fr-May. Canyon slopes, moist, shaded stream banks in canyon. Type 3. C. Frequent.

6. V. stamineum Linnaeus. Squaw-huckleberry.

Phanerophyte-shrub; perennial; endozoochore. Flw-May; Fr-Jul. Dry, disturbed ridges, pine-oak woodlands, rock outcrops along canyon rim. Type 1. Frequent.

7. V. vacillans Torrey. Phanerophyte-shrub; perennial; endozoochore. Flw-May, Fr-May--Jun. Pine-heath, canyon rim, pine-oak woodlands, rock outcrops. Common. **Type?** +.

31. EUPHORBIACEAE

Spurge Family

1. Acalypha Linnaeus

1. A. gracilens Gray. Three-seeded mercury. Therophyte; annual; atelechore. Flw-Sep; Fr-Sep. Sandstones along

river. Type 1. CD.

2. Crotonopsis Michaux

1. C. elliptica Willdenow. Therophyte; annual; atelechore. Flw-Jul--Oct; Fr-Jul--Oct. Sandstone outcrops. Type 9. Common.

3. Euphorbia Linnaeus

1. E. corollata Linnaeus var. corollata. Flowering spurge. Geophyte; perennial; atelechore. Flw-Apr--Sep. Thin, sandy soils along roadsides, rock outcrops along canyon rim. Type 1. Frequent.

2. E. mercurialina Michaux. Geophyte; perennial; atelechore. Flw-Apr--May; Fr-May. Floodplain, wooded slopes. Type 7. Rare.

3. E. serpens Humboldt-Bonpland-Kunth. Therophyte; annual; atelechore. Sep-Oct; Sep-Oct. Canyon rim outcrops. Type 9. CD. Reference - Correll, Donovan S. and Marshall c. Johnston. 1970. Manual of the vascular plants of Texas. Contr. Texas Research Foundation Bot. Stud. Vol. 6.

4. E. supina Rafinesque. Milk-purslane. Geophyte; perennial; atelechore. Flw-Sep; Fr-Sept. Sandstone outcrops. Type 16.

32. FABACEAE or LEGUMINOSAE

Legume Family

Reference: Mahler, W. F. 1970.

1. Albizzia Durazzini

1. A. julibrissin Durazzini. Silk-tree, mimosa (sic).
Phanerophyte-tree; perennial; pterochore. Flw-May. Cut-
over woods, floodplains and rock terraces along river. Type
8. Occasional.

2. Amorpha Linnaeus

1. A. fruticosa Linnaeus. Phanerophyte-shrub; perennial;
Flw-Jul--Aug; Fr-Jul-Aug. Wooded slopes of canyon, ravines,
thin soils along unimproved roads. Type 5.

3. Amphicarpa Elliott ex Nuttall

1. A. bracteata (Linnaeus) Fernald. Hog-peanut.
Therophyte; annual; Flw-Aug. Sandstone ravines. Type 1.

4. Apios Medicus

1. A. americana Medicus. Geophyte; perennial; zoochore.
Flw-Aug--Oct; Fr-Aug---Oct. Thin, sandy soils of ridge.
Type 1.

5. Cassia Linnaeus

1. C. fasciculata Michaux. Therophyte; annual;
endozoochore. Jul--Aug; Jul--Aug. Sandstone ridges. Type
1.
2. C. nictitans Linnaeus. Wild sensitive plant.
Therophyte; annual; zoochore. Fr-Sep. Rock outcrops and
adjacent woods along river, ridges with rock outcrops. Type
1.
3. C. obtusifolia Linnaeus. Sicklepod. Therophyte;

annual; zoochore. Fr-Sep. Rock outcrops and adjacent woods along river. Type 9. CD.

6. Centrosema (De Candolle) Benth

1. C. virginianum (Linnaeus) Benth. Butterfly-pea. Hemicryptophyte; perennial; ballochore. Jun--Aug; Aug. Thin, sandy soils of ridges. Type 9.

7. Cercis Linnaeus

1. C. canadensis Linnaeus. Redbud. Phanerophyte-tree; perennial; pterochore. Rocky shoals in river in canyon. Sapling from one location. Type 9. Rare.

8. Clitoria Linnaeus

1. C. mariana Linnaeus. Butterfly-pea. Hemicryptophyte; perennial; epizoochore. Flw-Jul--Sept; Fr-Sep. Disturbed river beds, rock terraces, sandy roadsides, alluvium of upper river. Type 9. Occasional.

9. Desmodium Desvaux

1. D. glutinosum (Muhlenberg ex Willdenow) Wood. Hemicryptophyte; perennial; epizoochore. Flw-Jun. Clay road-cuts, dry wooded slopes. Type 1.
2. D. marilandicum (Linnaeus) De Candolle. Beggar-lice, beggar-ticks. Hemicryptophyte; perennial; epizoochore. Flw-Sep. Alluvium of upper river. Type 1. D.
3. D. nudiflorum (Muhlenberg ex Willdenow) Wood. Hemicryptophyte; perennial; epizoochore. Flw-Jun--Jul; Fr-Jul. Roadsides, wooded slope. Type 1.

4. D. obtusum (Muhlenberg ex Willdenow) De Candolle.

Beggar-lice, beggar-ticks. Hemicryptophyte; perennial; epizoochore. Flw-Sep; Fr-Sep. Rock outcrops. Type 1. +.

5. D. rotundifolium De Candolle. Hemicryptophyte; perennial; epizoochore. Wooded slopes of canyon. Type 1.

10. Lespedeza Michaux

1. L. cuneata (Dumont) G. Don. Sericea. Hemicryptophyte; perennial; zoochore. Flw-Sep. Ridges, rock outcrops. Type 8.

2. L. hirta (Linnaeus) Hornemann. Hemicryptophyte; perennial; zoochore. Flw-Sept. Alluvium along upper river. Type 1. CD.

3. L. intermedia (Watson) Britton. Hemicryptophyte; perennial; Flw-Sep; Fr-Oct. Alluvium along upper river, bluffs, ridges, sandstone roadsides, rocky shoals and boulders in canyon. Type 1. C.

4. L. repens (Linnaeus) Barton. Hemicryptophyte; perennial. Flw-Sep; Fr-Sep. Alluvium along river, sandstone roadsides. Type 1.

5. L. striata (Thunberg) Hooker & Arnott. Therophyte; annual; zoochore. Flw-Sept. Alluvium along upper river, rock outcrops and adjacent woods along river, bluffs. Type 8. CD.

6. L. stuevei Nuttall. Hemicryptophyte; perennial. Flw-Aug. Thin, sandy soils along unimproved roads. Type 1.

7. L. violacea (Linnaeus) Persoon. Hemicryptophyte; perennial; Flw-Sep; Fr-Sep. Sandstone outcrops. Type 4. CD.

8. L. virginica (Linnaeus) Britton. Hemicryptophyte; perennial; Flw-Sep. Alluvium along upper river, rock outcrops and adjacent woods along river. Type 1.

11. Medicago Linnaeus

1. M. lupulina Linnaeus. Black medic. Therophyte; annual; epizoochore. Flw-May; Fr-May. Roadside rock outcrops. Type 10.

12. Psoralea Linnaeus

1. P. psoralioides (Walter) Cory var. eglandulosa (Elliott) Freeman. Sampson snakeroot. Hemicryptophyte; perennial; Flw-May; Fr-Aug. Wooded slopes along upper river, dry, sandy alluvial soil of canyon, thin, sandy soils of ridge. Type 6.

13. Pueraria De Candolle

1. P. lobata (Willdenow) Ohwi. Kudzu. Phanerophyte-vine; perennial. Woods around rock outcrops along canyon rim. Type 8. Infrequent.

14. Robinia Linnaeus

Reference: Isely, D. and Peabody 1980.

1. R. hispida Linnaeus var. hispida. Bristly locust. Phanerophyte-shrub; perennial; endozoochore. Flw-Apr. Slopes of canyon. Type 15.

2. R. hispida Linnaeus var. rosea Pursh. Phanerophyte-shrub; perennial; atelechore. Flw-May. Thin, sandy soils along unimproved road, thin soils on ridge. Type 15. Specimens have white flowers and were formerly called Robinia boyntonii Ashe. Several specimens appear to be hybrids with R. pseudoacacia Linnaeus fide Mahler (1970) and Isely and Peabody (1980).

15. Schrankia Willdenow

1. S. microphylla (Solander ex Smith) Macbride. Sensitive-brier. Hemicryptophyte; perennial; epizoochore. Flw-Jun. Roadsides, wooded slopes along river and intermittent streams, dry alluvium. Type 6. Frequent.

16. Stylosanthes Swartz

1. S. biflora (Linnaeus) Britton, Sterns & Poggenburg. Pencil-flower. Hemicryptophyte; perennial; epizoochore. Flw-May--Jul; Fr-Jul. Wooded slopes along upper river, wooded margins of rock outcrops, thin, sandy soils. Type 1.

17. Tephrosia Persoon

1. T. spicata (Walter) Torrey & Gray. Hemicryptophyte; perennial; Flw-May--Jun. Wooded slopes along upper river, canyon rim, roadsides. Type 6. Frequent.

2. T. virginiana (Linnaeus) Persoon. Goat's rue. Hemicryptophyte; perennial; Flw-May. Wooded slopes along upper river, canyon rim. Type 1. CD.

18. Trifolium Linnaeus

1. T. arvense Linnaeus. Rabbit's foot clover.
Therophyte; annual; pterochore. Flw-Jun. Roadsides,
wooded slopes along river. Type 8. +.
2. T. campestre Schreber. Big-hop clover. Therophyte;
annual; pterochore. Flw-May. Roadsides. Type 8.
3. T. incarnatum Linnaeus. Crimson clover. Therophyte;
annual; pterochore. Flw-April. Roadsides. Type 10. CD.
4. T. pratense Linnaeus. Red clover. Hemicryptophyte;
perennial or biennial; pterochore. Flw-Jul. Wooded margins
of rock outcrops. Type 8.
5. T. repens Linnaeus. White clover. Hemicryptophyte;
perennial; pterochore. Flw-Apr--May. Roadsides. Type 10.

19. Vicia Linnaeus

1. V. angustifolia Reichard. Vetch. Therophyte; annual;
zoochore. Flw-Apr. Roadsides. Type 10. CD.
2. V. caroliniana Walter. Hemicryptophyte; perennial;
zoochore. Flw-Mar--April; Fr-Mar. Floodplain of canyon,
along upper river. Type 1.

33. FAGACEAE

Beech Family

1. Castanea Miller

1. C. dentata (Marshall) Borkhausen. American chestnut.
Phanerophyte-tree; perennial; polychore. Floor of canyon,

cut-over woods along unimproved roads. Type 1. C. No large trees were located within the flora. Most were under 5 m in height.

2. C. pumila (Linnaeus) Miller. Chinquapin.

Phanerophyte-tree; perennial; polychore. Thin, sandy soils along unimproved road. Type 3. CD.

2. Fagus Linnaeus

1. F. grandifolia Ehrhart. Beech. Phanerophyte-tree; perennial; polychore. Floodplain and talus slopes of canyon; ravines. Type 1. C. Frequent.

3. Quercus Linnaeus Oak

1. Q. alba Linnaeus. White oak. Phanerophyte-tree; perennial; polychore. Fr-Oct. Cut-over woods on escarpment, slopes along upper river, rock outcrops, canyon rim. Type 1. Common.

2. Q. coccinea Muenchhausen. Scarlet oak. Phanerophyte-tree; perennial; polychore. Cut-over woods on eastern escarpment, woods around the rock outcrops, talus slopes, slopes along upper river. Type 1. Common.

3. Q. falcata Michaux. Southern red oak. Phanerophyte-tree; perennial; polychore. Fr-Sep. Canyon rim, slopes of canyon, slopes along upper river. Type 9. Common.

4. Q. laurifolia Michaux. Laurel oak. Phanerophyte-tree; perennial; polychore. Fr-Sep. Wooded slopes of canyon; along creek in mouth park. Type 3. C.

5. *Q. marilandica* Muenchhausen. Black-jack oak.
Phanerophyte-tree; perennial; polychore. Cut-over woods on eastern escarpment; woods around rock outcrops, canyon rim, talus slopes. Type 9. C. Common.
6. *Q. montana* Willdenow. Rock chestnut oak. Phanerophyte-tree; perennial; polychore. Very early Fr-May. Woods around the rock outcrops, canyon rim, ravines. Type 4. Common.
7. *Q. rubra* Linnaeus. Red oak. Phanerophyte-tree; perennial; polychore. Early fr-Oct. Talus slopes, cut-over woods. Type 1. Common.
8. *Q. shumardii* Buckley. Shumard's oak. Phanerophyte-tree; perennial; polychore. Woods around rock outcrops, canyon rim. Type 9. Common.
9. *Q. stellata* Wang. Post oak. Phanerophyte-tree; perennial; polychore. Fr-Oct. Cut-over woods, woods around canyon rim, thin sandy soils along unimproved roads. Type 9. Common.
10. *Q. velutina* Lamarck. Black oak. Phanerophyte-tree; perennial; polychore. Cut-over woods, talus slopes, bluffs, rock outcrops. Type 1. Common.

34. GENTIANACEAE

Gentian Family

1. Bartonia Muhlenberg ex Willdenow

1. B. virginica Britton, Sterns & Poggenburg. Therophyte; annual; atelechore. Fr-Oct. Moist, sandy roadsides. Type 1. Rare but easily overlooked.

2. Gentiana Linnaeus

1. G. decora Pollard. Gentian. Flw-Oct. Hemicryptophyte; perennial; sporochores. Sandstone outcrop on canyon rim. Type 1. +. Rare. Our specimens has features reminiscent of G. saponaria.
2. G. saponaria Linnaeus. Gentian. Hemicryptophyte; perennial; sporochores. Flw-Oct. Sandy roadsides. Type 9. *. Rare.

3. Obolaria Linnaeus

1. O. virginica Linnaeus. Pennywort. Parasite; perennial; sporochores. Wooded slopes, ravines. Type 9. Occasional.

4. Sabatia Adanson

1. S. brachiata Elliott. Therophyte; annual; sporochores. Flw-Jul--Aug; Fr-Aug. Moist, sandy roadsides, rocks along river. Rare.
2. S. campanulata (Linnaeus) Torrey. Therophyte; annual; sporochores. Flw-Aug--Sep; Fr-Sep. Moist, sandy roadsides. Type 9. Occasional.
3. S. capitata (Rafinesque) Blake. Therophyte; annual; sporochores. Flw-Jul. Moist, sandy roadsides, banks along upper river. Type 16. Frequent.

4. S. gentianoides Elliott. Hemicryptophyte; perennial; sporochore. Flw-Aug. Sandstone outcrops. Type 3. +. Occasional.

35. GERANIACEAE

Geranium Family

1. Geranium Linnaeus

1. G. carolinianum Linnaeus. Carolina geranium. Therophyte; annual; epizoochore. Fr-May--Oct. Alluvium of canyon, sandstone outcrops. Type 5. Occasional.

2. G. maculatum Linnaeus. Woods geranium. Hemicryptophyte; perennial; epizoochore. Flw-Apr--May; Fr-May. Bottomland hardwoods, floodplain and adjacent talus. Type 4. Occasional.

36. HAMAMELIDACEAE

Witch-hazel Family

1. Fothergilla Linnaeus

1. F. major (Sims) Loddiges. Witch-alder. Phanerophyte-shrub; perennial; atelechore. Flw-Apr; Fr-Jun--Jul. Wooded slopes of canyon, alluvium. Type 7. Occasional.

2. Hamamelis Linnaeus

1. H. virginiana Linnaeus. Witch-hazel. Phanerophyte-

shrub; perennial; ballochore. Flw-Nov; Fr-Jun--Jul.

Alluvium and wooded slopes of canyon, ravines, wooded slopes along upper river. Type 1. Common.

3. Liquidambar Linnaeus

1. L. styraciflua Linnaeus. Sweet-gum. Phanerophyte-tree; perennial; pterochore. Alluvium of canyon; rock outcrops along canyon rim. Type 9. Occasional.

38. JUGLANDACEAE

Walnut Family

1. Carya Nuttall

1. C. glabra (Miller) Sweet. Pignut hickory.

Phanerophyte-tree; perennial; polychore. Fr-Sep--Oct.

Slopes, canyon rim, wooded margins of rock outcrops. Type

1. D. Common.

2. C. ovalis (Wangenheim) Sargent. Sweet pignut hickory.

Phanerophyte-tree; perennial; polychore. Woods around rock outcrops, canyon rim. Type 9. C. Occasional.

3. C. ovata (Miller) K. Koch. Shagbark hickory.

Phanerophyte-tree; perennial; polychore. Wooded slopes.

Type 1. Occasional.

4. C. pallida (Ashe) Engler & Graebner. Pale hickory.

Phanerophyte-tree; perennial; polychore. Floodplain of canyon, canyon rim. Type 9. C. Rare. Reference: Kurz,

H. and R. K. Godfrey. 1962.

5. C. tomentosa (Poiret) Nuttall. Mockernut hickory.
Phanerophyte-tree; perennial; polychore. Fr-Jun--Sep.
Wooded slopes throughout. Type 1. Common.

2. Juglans Linnaeus

1. J. nigra Linnaeus. Black walnut. Phanerophyte-tree;
perennial; polychore. Cut-over woods. Type 4. Occasional.

38. LAMIACEAE or LABIATAE

Mint Family

Reference: Jones, S. B., Jr. 1976.

1. Collinsonia Linnaeus

1. C. canadensis Linnaeus. Geophyte; perennial;
atelechore. Flw-Oct. Wooded slopes of canyon. Type 1.

2. C. tuberosa Michaux. Geophyte; perennial; atelechore.
Flw-Oct; Fr-Oct. Rocky floodplains of canyon. Type 7.

2. Isanthus Michaux

1. I. brachiatus (Linnaeus) Britton, Sterns & Poggenburg.
Therophyte; annual; atelechore. Fr-Oct. Outcrops along
canyon rim. Type 15.

3. Lycopus Linnaeus

1. L. virginicus Linnaeus. Hemicryptophyte; perennial;
epizoochore. Flw-Sep; Fr-Oct. Seeps at base of cliffs,
alluvium and rock outcrops along upper river. Type 1.

Common.

4. Monarda Linnaeus

1. M. clinopodia Linnaeus. Bee-balm. Hemicryptophyte; perennial; atelechore. Flw-Jul. Wooded slopes in canyon. Type 4.

5. Pycnanthemum Michaux

Reference: Grant, E. and C. Epling. 1943.

1. P. incanum (Linnaeus) Michaux. Hemicryptophyte; perennial; atelechore. Flw-Jul--Sep. Rock outcrops along river, wooded slopes. Type 12. +. Occasional.
2. P. tenuifolium Schrader. Hemicryptophyte; perennial; atelechore. Flw-Jun--Aug. Outcrops along roadside, sandy soils. Type 1. Frequent.

6. Salvia Linnaeus

1. S. lyrata Linnaeus. Lyre-leaf sage. Hemicryptophyte; perennial; atelechore. Flw-Apr; Fr-May--Sep. Rock outcrops, alluvium and wooded slopes of canyon. Type 9. Occasional.

7. Scutellaria Linnaeus

1. S. elliptica Muhlenberg. Skullcap. Hemicryptophyte; perennial; epizoochore. Flw-May. Steep, rocky slopes, boulder fields, waterfalls. Type 9. C.
2. S. incana Biehler. Hoary skullcap. Hemicryptophyte; perennial. Flw-Aug--Sep; Fr-Aug--Sep. Rock islands in river, terraces, alluvium, sandstone ravines. Type 9. +.

3. S. integrifolia Linnaeus. Skullcap. Hemicryptophyte; perennial; epizoochore. Flw-May--Jul; Fr-Jul--Sep. Outcrops along roadsides, rock terraces, wooded slopes of canyon. Type 9.

8. Stachys Linnaeus

1. S. riddellii House. Hemicryptophyte; perennial; atelechore. Flw-Jun. Clay road-cuts. Type 7.

9. Trichostema Linnaeus

1. T. dichotomum Linnaeus. Blue-curls. Therophyte; annual; atelechore. Flw-Aug--Sep; Fr-Sep--Oct. Sandstone outcrops along river and canyon rim, paths near rock outcrop. Type 1. Frequent.

2. T. setaceum Houttuyn. Therophyte; annual; atelechore. Flw-Aug. Sandy power line clearings. Type 9. +.

39. LAURACEAE

Laurel Family

1. Lindera Thunberg

1. L. benzoin (Linnaeus) Blume. Spicebush. Phanerophyte-shrub; perennial; endozoochore. Wooded slopes of canyon. Type 1. Occasional.

2. Sassafras Trew ex Blackwell

1. S. albidum (Nuttall) Nees. Sassafras. Phanerophyte-tree; perennial; endozoochore. Flw-Apr; Fr-Jul. Alluvium

of canyon, sandy soils. Type 1. CD. Frequent.

40. LINACEAE

Flax Family

1. Linum Linnaeus

1. L. medium (Planchon) Britton var. texanum (Planchon) Fernald. Flax. Hemicryptophyte; perennial; atelechore. Flw-Jul; Fr-Jul. Rock outcrops. Type 9.
2. L. striatum Walter. Hemicryptophyte; perennial; atelechore. Flw-Aug. Sandy soils, ridges. Type 9. +.

41. MAGNOLIACEAE

Magnolia Family

1. Liriodendron Linnaeus

1. L. tulipifera Linnaeus. Tulip-tree, tulip-poplar. Phanerophyte-tree; perennial; pterochore. Alluvium and wooded slopes of canyon. Type 1. CD. Common.

2. Magnolia Linnaeus

1. M. acuminata Linnaeus. Cucumber tree. Phanerophyte-tree; perennial; endozoochore. Fr-Oct. Alluvium and wooded slopes of canyon. Type 14. Frequent.
2. M. tripetala Linnaeus. Umbrella tree. Phanerophyte-tree; perennial; endozoochore. Wooded slopes of canyon.

Type 9. Occasional.

42. MELASTOMATACEAE

Melastome Family

Reference: Kral, R. and P. E. Bostick. 1969.

1. Rhexia Linnaeus

1. R. mariana Linnaeus. Meadow-beauty. Geophyte; perennial; epizoochore. Flw-Jun--Aug; Fr-Jun--Oct. Open, sunny areas, rock outcrops, roadsides, floodplain of canyon. Type 9. Frequent.

43. MORACEAE

Mulberry Family

1. Morus Linnaeus

1. M. rubra Linnaeus. Red mulberry. Phanerophyte-tree; perennial; endozoochore. Wooded slopes throughout. Type 1. Occasional.

44. NYSSACEAE

Tupelo Family

1. Nyssa Linnaeus

1. N. sylvatica Marshall. Black-gum. Phanerophyte-tree;

perennial; endozoochore. Flw-May; Fr-June--Oct. Ravines, slopes and banks of upper river, cut-over woods, power line rights-of-way, alluvium sandstone outcrops. Type 1. CD. Common.

45. OLEACEAE

Olive Family

1. Chionanthus Linnaeus

1. C. virginicus Linnaeus. Fringe tree, Grandsir's gray beard. Phanerophyte-tree; perennial; endozoochore. Flw-Apr--May; Fr-Jul--Oct. Open, sunny spots of ravines, slopes of canyon, periphery of rock outcrops, rocky, wooded slopes, canyon rim. Type 6. CD. Common.

2. Fraxinus Linnaeus

1. F. americana Linnaeus var. americana. American or white ash. Phanerophyte-tree; perennial; pterochore. Fr-Oct. Slopes of canyon, cut-over wood along canyon rim. Type 1. Occasional.

2. F. americana Linnaeus var. biltmoreana (Beadle) J. Wright ex Fernald. Biltmore ash. Phanerophyte-tree; perennial; pterochore. Alluvium and wooded slopes of canyon, cut-over woods along canyon rim. Type 1.

Occasional.

3. E. pensylvanica Marshall. Green ash. Phanerophyte-tree; perennial; pterochore. Fr-Sept. Slopes of canyon. Type 1. C. Rare.

46. ONAGRACEAE

Evening-primrose Family

1. Ludwigia Linnaeus

1. L. alternifolia Linnaeus. Seed-box. Hemicryptophyte; perennial; atelechore. Jul--Aug; Sep--Oct. Rocky shoals and boulders in canyon, shallows and banks of river. Type 1. D. Frequent.
2. L. leptocurpa (Nuttall) Hara. Hemicryptophyte; perennial; atelechore. Flw-Sep. Rock terraces along river. Type 3. CD. Rare. One location.

2. Oenothera Linnaeus

1. O. biennis Linnaeus. Evening-primrose. Hemicryptophyte; biennial; atelechore. Flw-May. Roadside rock outcrops, woods along upper river, floodplains, rocky islands and sandy levees. Type 5. Occasional.
2. O. fruticosa Linnaeus. Sun-drops. Hemicryptophyte; perennial; atelechore. Flw-May. Thin soils along unimproved roadsides, wooded margins of rock outcrops, alluvium. Type 1. Frequent.

47. OROBANCHACEAE

Broom-rape Family

1. Conopholis Wallroth

1. C. americana (Linnaeus) Wallroth. Squaw-root.
Parasite; perennial; sporochore. Flw-May; Fr-May--Nov.
Wooded slopes of canyon, steep rocky slopes. Type 1.
Occasional.

2. Epifagus Nuttall

1. E. virginiana (Linnaeus) Barton. Beech-drops.
Parasite; perennial; sporochore. Wooded slopes of canyon.
Type 1. Occasional.

48. OXALIDACEAE

Wood-sorrel Family

Reference: Robertson, K. R. 1975.

1. Oxalis Linnaeus

1. O. corniculata Linnaeus. Creeping lady's sorrel.
Hemicryptophyte; perennial; polychore. Flw-Feb--Mar.; Fr-
Oct. Rock outcrops. Type 18. +.
2. O. dillenii Jacquin. Wood sorrel. Hemicryptophyte;
perennial; polychore. Flw-May--Jun; Fr-May--Jun. Sandy
soils along roadsides, floodplains, rock outcrops, canyon
rim. Type 1. +.

3. O. grandis Small. Wood sorrel. Hemicryptophyte; perennial; zoochore. Flw-May. Alluvial woods of canyon. Type 7. *.

4. O. stricta Linnaeus. Wood sorrel. Hemicryptophyte; perennial; polychore. Fr-Oct. Rocky shoals and boulders of canyon. Type 18. CD.

5. O. violacea Linnaeus. Violet wood sorrel. Geophyte; perennial; zoochore. Flw-Apr. Floodplains, roadsides, wooded slopes of canyon. Type 1.

49. PAPAVERACEAE

Poppy Family

1. Sanguinaria Linnaeus

1. S. canadensis Linnaeus. Bloodroot. Geophyte; perennial; zoochore. Fr-Apr. Wooded slopes. Type 1. Occasional.

50. PASSIFLORACEAE

Passion flower Family

1. Passiflora Linnaeus

1. P. incarnata Linnaeus. Maypops, Passion flower. Hemicryptophyte; perennial; endozoochore. Flw-Jun; Fr-Jul. Thin, sandy soils of roadsides, floodplains. Type 9.

Common.

51. PHYTOLACCACEAE

Poke-salad Family

1. Phytolacca Linnaeus

1. P. americana Linnaeus. Poke salad. Therophyte; annual; endozoochore. Flw-Jun--Oct; Fr-Jun--Oct. Sandstone terraces along river, floodplains, disturbed rock outcrops. Type 1. C. Occasional.

52. PLATANACEAE

Planetree Family

1. Platanus Linnaeus

1. P. occidentalis Linnaeus. Sycamore, planetree. Phanerophyte-tree; perennial; pogonochore. Rocky shoals and boulders in canyon. Type 1. Occasional.

53. PLANTAGINACEAE

Plantain Family

1. Plantago Linnaeus

1. P. aristata Michaux. Plantain. Therophyte; annual; sporochochore. Flw-May--Jul. Rock outcrops along canyon

rim. Type 1. C. Frequent.

2. P. lanceolata Linnaeus. English plantain.

Hemicryptophyte; perennial; sporochore. Fr-May--Sep. Rock outcrops along canyon rim, rock terraces along river, roadsides. Type 10. CD. Common.

3. P. virginica Linnaeus. Plantain. Therophyte; annual; atelechore. Flw-May. Sandstone outcrops on canyon rim. Type 5. Occasional.

54. PODOSTEMACEAE

Riverweed Family

Reference: Graham, S. A. and C. E. Wood, Jr. 1975.

1. Podostemum Michaux

1. P. ceratophyllum Michaux. Riverweed. Hydrochore; Cryptophyte; perennial; hydrochore. Bedrock of creek. Type 12. Rare. Known from two tributaries.

55. POLEMONIACEAE

Phlox Family

1. Phlox Linnaeus

1. P. amoena Sims. Hemicryptophyte; perennial; atelechore. Flw-May. Disturbed, dry pine-oak woodland. Type 6. CD.

2. P. carolina Linnaeus Hemicryptophyte; perennial; atelechore. Flw-Jul. Thin, sandy soils along roadsides.

Type 6.

3. P. divaricata Linnaeus. Blue phlox. Hemicryptophyte; perennial; atelechore. Flw-Apr--May. Roadsides, rock outcrops, bottomland hardwoods. Type 1.

4. P. glaberrima Linnaeus. Hemicryptophyte; perennial; atelechore. Flw-May--Jul. Slopes of canyon, rock terraces along upper river. Type 1.

56. POLYGALACEAE

Milkwort Family

1. Polygala Linnaeus

1. P. cruciata Linnaeus. Therophyte; annual; zoochore. Flw-Sep--Oct; Fr-Oct. Moist roadsides, bogs. Type 3.

2. P. curtissii Gray. Therophyte; annual; zoochore. Flw-May--Oct; Fr-May--Oct. Flat, sandstone outcrops, soils along roadsides, ditches, outcrops along canyon rim. Type 14. +. Common.

3. P. nana (Michaux) De Candolle. Geophyte; perennial--biennial; zoochore. Flw-Apr--Jun; Fr-May. Sandy roadsides and rock outcrops along canyon. Type 3. Rare.

4. P. polygama Walter. Geophyte; biennial; zoochore. Flw-May--Jun; Fr-May--Jun. Banks along upper river, alluvium of canyon. Type 1.

5. P. verticillata Linnaeus var. ambigua (Nuttall) Wood.

Therophyte; annual; zoochore. Flw-Jun--Aug; Fr-Aug. Pine heath along canyon rim, rocks above river, sandy power line clearings. Type 1.

57. POLYGONACEAE

Buckwheat Family

1. Polygonum Linnaeus

1. P. aviculare Linnaeus. Knotweed. Therophyte; annual; sporochores. Fr-Oct. Canyon. Type 16. C.
2. P. cespitosum Blume var. longisetum (DeBruyn) Stewart. Knotweed. Therophyte; annual; atelechore. Flw-Oct; Fr-Oct. Sandstone ravines, rocky shoals and boulders in canyon. Type 8. C.
3. P. erectum Linnaeus. Knotweed. Therophyte; annual; atelechore. Flw-Sep. Ravines. Type 5. CD.
4. P. tenue Michaux. Knotweed. Therophyte; annual; atelechore. Flw-Aug; Fr-Aug. Sandy power line clearings. Type 15. +.

2. Rumex Linnaeus

1. R. acetosella Linnaeus. Sheep-sorrel, sour-grass. Hemicryptophyte; perennial; zoochore. Flw-Apr--May; Fr-May. Foodplots, dry pine-oak woodlands, roadside rock outcrops. Type 10. Common.
2. R. crispus Linnaeus. Hemicryptophyte; perennial;

pterochore. Flw-May. Disturbed, dry clay ridges. Type 10.

58. PORTULACACEAE

Purslane Family

1. Talinum Adanson

Reference: Ware, S. 1967.

1. T. mengesii W. Wolf. Quillflower. Succulent; perennial; sporochores. Flw-May--Jul; Fr-May--Jun. Rock outcrops. Type 7. C. Common.

59. PRIMULACEAE

Primrose Family

1. Lysimachia Linnaeus

1. L. lanceolata Walt. var. hybrida (Michaux) Gray. Fringed loosestrife. Hemicryptophyte; perennial; atelechore. Flw-May--Jun; Fr-Jun. Low woods along river, alluvium of canyon. Type 1. Frequent.
2. L. lanceolata Walt. var. lanceolata. Fringed loosestrife. Hemicryptophyte; perennial; atelechore. Flw-Jun. Woods on banks and islands of river, open sandstone glades, pine heath along canyon rim. Type 1. Common.
3. L. quadrifolia Linnaeus. Whorled loosestrife. Hemicryptophyte; perennial; atelechore. Flw-May--Jun.

Canyon rim and woods of canyon and upper river. Type 4.
Common.

4. L. tonsa (Wood) Kunth. Fringed loosestrife.
Hemicryptophyte; perennial; atelechore. Flw-Jun. Rock
outcrops. Type 7. Rare.

60. RANUNCULACEAE

Crow-foot Family

Reference: Keener, C. S. 1977.

1. Actaea Linnaeus

1. A. pachypoda Elliott. Doll's-eye, baneberry.
Geophyte; perennial; endozoochore. Fr-May. Alluvial woods
of canyon. Type 1. C*. Rare.

2. Anemone Linnaeus

Reference: Keener C. S. 1975.

1. A. quinquefolia Linnaeus. Windflower. Hemicryptophyte;
perennial; epizoochore. Flw-Apr. Alluvium of canyon. Type
4. Frequent.

2. A. virginiana Linnaeus. Thimbleweed. Hemicryptophyte;
perennial; pogonochore. Fr-Jul. Slopes. Type 1.

3. Aquilegia Linnaeus

1. A. canadensis Linnaeus. Columbine. Hemicryptophyte;
perennial; atelechore. Flw-Apr. Woods throughout. Type 1.
D.

4. Consolida (De Candolle) S. F. Gray

1. C. ambigua (Linnaeus) P. B. Ball & Heywood. Therophyte; annual; atelechore. Flw-Jun; Fr-Jun. Clay road-cuts. Type 10.

5. Delphinium Linnaeus

1. D. tricornu Michaux. Larkspur. Hemicryptophyte; perennial; atelechore. Flw-May; Fr-May. Mesic woods. Type 9.

6. Hepatica Miller

Reference: Keener, C. S. 1977.

1. H. nobilis Schreber var. obtusa (Pursh) Steyermark. Liverleaf. Chamaephyte; perennial; zoochore. Flw-Apr. Woods of canyon. Type 1.

7. Ranunculus Linnaeus

Reference: Keener, C.S. 1976.

1. R. recurvatus Poiret. Hemicryptophyte; perennial; epizoochore. Fr-May. Slopes along upper river. Type. 1. CD.

8. Thalictrum Linnaeus

1. T. dioicum Linnaeus. Meadow rue. Hemicryptophyte; perennial; epizoochore. Flw-Apr; Fr-May. Alluvium and slopes of canyon, wooded slopes. Type 4. Frequent.
2. T. thalictroides (Linnaeus) Boivin. Windflower. Geophyte; perennial; epizoochore. Flw-Mar--Apr. Alluvium and wooded slopes of canyon and upper river. Type 1.

Frequent.

9. Trautvetteria Fischer and Meyer

1. T. carolinensis (Walter) Vail. Geophyte; perennial; epizoochore. Flw-Jun. Rocky shoals and banks of river. Type 12. CD. Occasional.

10. Xanthoriza Marshall

1. X. simplicissima Marshall. Yellow-root. Phanerophyte-shrub; perennial; hydrochore. Flw-Mar--May; Fr-May--Sept. Sandstone ravines, shaded stream banks, canyon rim, alluvium and slopes of canyon. Type 16. Common.

61. RHAMNACEAE

Buckthorn Family

1. Rhamnus Linnaeus

1. R. caroliniana Walter. Buckthorn. Phanerophyte-shrub; perennial; endozoochore. Fr-Aug. River sides. Type 7. Occasional.

62. ROSACEAE

Rose Family

1. Agrimonia Linnaeus

1. A. pubescens Wallroth. Agrimony, cocklebur. Hemicryptophyte; perennial; epizoochore. Flw-Jul. Slopes.

Type 1.

2. Amelanchier Medicus

1. A. arborea (Michaux f.) Fernald. Shadbush, serviceberry. Phanerophyte-tree; perennial; endozoochore. Flw-Mar--May; Fr-Apr-May. Rock outcrops throughout, wooded slopes of canyon and along upper river. Type 1. CD.

3. Aronia

1. A. arbutifolia (Linnaeus) Elliott. Red chokeberry. Phanerophyte-shrub; perennial; endozoochore. Flw-May; Fr-Jul--Aug. Sandstone outcrops along canyon rim. Type 1. Frequent.

4. Aruncus Adanson

1. A. dioicus (Walter) Fernald. Goat's-beard. Hemicryptophyte; perennial; epizoochore. Fr-Jul--Oct. Alluvium and wooded slopes of canyon. Type 14.

5. Crataegus Linnaeus

1. C. flabellata (Bosc.) K. Koch. Hawthorn. Phanerophyte-shrub; perennial; endozoochore. Wooded slopes along upper river. Type 1.

2. C. flava Aiton. Hawthorn. Phanerophyte-tree; perennial; endozoochore. Flw-May. Disturbed, dry clay ridges. Type 3. CD.

3. C. marshallii Egglest. Hawthorn. Phanerophyte-shrub; perennial; endozoochore. Flw-May. Xeric rights-of-way

under power lines. Type 3.

4. C. spathulata Michaux. Hawthorn. Phanerophyte-shrub; perennial; endozoochore. Flw-May. Xeric rights-of-way under power lines, wooded slopes of canyon. Type 3.

5. C. viridis Linnaeus. Hawthorn. Phanerophyte-shrub; perennial; endozoochore. Flw-May. Rock outcrops along canyon rim, openings in woodlands. Type 3. CD.

6. Geum Linnaeus

1. G. canadense Jacquin. Avens. Hemicryptophyte; perennial; epizoochore. Fr-Aug. Mixed woodland. Type 9. CD.

7. Malus Miller

1. M. angustifolia (Aiton) Michaux. Crab apple. Phanerophyte-tree; perennial; endozoochore. Flw-Apr--May; Fr-Jul. Sandstone outcrops on canyon rim, margins of pine woods, river sides, power line rights-of-way. Type 8.

2. M. coronaria (Linnaeus) Miller. Crab apple. Phanerophyte-tree; perennial; endozoochore. Immature Fr-May. Dry woods throughout. Type 1.

3. M. pumila Miller. Common apple. Phanerophyte-tree; perennial; endozoochore. Flw-Apr. Sandy roadside next to clearcut. Type 11. +.

8. Physocarpus Maxim

1. P. opulifolius (Linnaeus) Maxim. Ninebark. Phanerophyte-shrub; perennial; atelechore. Flw-Apr; Fr-Jul.

Alluvium of canyon. Type 4. Known from two localities along Little River, near the confluence of Johnny's Creek and from near the confluence of Bear Creek.

9. Porteranthus Britton

1. P. trifoliata (Linnaeus) Britton. Indian-physic. Hemicryptophyte; perennial; atelechore. Flw-Apr--May. Woods throughout. Type 4.

10. Potentilla Linnaeus

1. P. canadensis Linnaeus. Five-fingers. Hemicryptophyte; perennial; atelechore. Flw-Apr--May. Sandstone outcrop, dry-mesic situations. Type 1.

2. P. simplex Michaux. Hemicryptophyte; perennial; atelechore. Flw-Apr. Sandy soils. Type 1.

11. Prunus Linnaeus

1. P. angustifolia Marshall. Chickasaw plum. Phanerophyte-shrub; perennial; endozoochore. Alluvium and wooded slopes throughout. Type 9.

2. P. persica (Linnaeus) Batsch. Peach. Phanerophyte-tree; perennial; zoochore. Fr-Jul. Sandy soils along canyon rim. Type 11. Rare.

3. P. serotina Ehrhart var. serotina. Black cherry. Phanerophyte-tree; perennial; endozoochore. Flw-Apr; Fr-May--Jun. Wooded margins of rock outcrops, wooded slopes of canyon. Type 1. CD. Common.

12. Pyrus Linnaeus

1. P. communis Linnaeus. Pear. Phanerophyte-tree; perennial; endozoochore. Flw-Apr. Thin, sandy soils along unimproved roads. Type 8. CD.

13. Rosa Linnaeus Rose

1. R. carolina Linnaeus. Wild rose. Phanerophyte-shrub; perennial; endozoochore. Fr-Oct. Rock outcrops. Type 1.
2. R. multiflora Thunberg. Multiflora rose. Phanerophyte-vine; perennial; endozoochore. Flw-May. Thin soils along unimproved roadsides. Type 8. D.

14. Rubus Linnaeus

1. R. argutus Link. Phanerophyte-shrub; perennial; endozoochore. Flw-May; Fr-Jul. Rock outcrops along canyon rim, sandy soils along roadsides. Type 9. D. Common.
2. R. flagellaris Willdenow. Dewberry. Phanerophyte-shrub; perennial; endozoochore. Flw-Apr--May; Fr-Jun. Sandstone outcrops, canyon rim, roadsides. Type 1. Common.
3. R. hispidus Linnaeus. Dewberry. Phanerophyte-shrub; perennial; endozoochore. Wooded slopes of canyon. Type 15. +.
4. R. trivialis Michaux. Dewberry. Hemicryptophyte; perennial; endozoochore. Flw-May. Sandstone outcrops and adjacent oak-hickory woods. Type 3.

15. Waldsteinia Willdenow

1. W. fragarioides (Michaux) Tratt. Barren-strawberry. Hemicryptophyte; perennial; atelechore. Flw-Apr. Alluvial

woods of canyon. Type 4. Occasional, locally abundant.

63. RUBIACEAE .

Madder Family

1. Cephalanthus Linnaeus

1. C. occidentalis Linnaeus. Buttonbush. Phanerophyte-shrub; perennial; endozoochore. Flw-Jun; Fr-Oct.

Floodplain of canyon, rocky shoals and boulders of canyon, riverbanks along upper river. Type 5. C. Common.

2. Diodia Linnaeus

1. D. teres Walter. Dryland diodia. Therophyte; annual; endozoochore. Fr-Aug--Sep. Rock outcrops, thin sandy soils along roadsides. Type 1. C. Common.

3. Galium Linnaeus

1. G. pilosum Aiton. Bedstraw. Hemicryptophyte; perennial; epizoochore. Fr-Aug. Rocks along river. Type 1.

2. G. tinctorum Linnaeus. Bedstraw. Hemicryptophyte; perennial; atelechore. Flw-Jun. Open marshes and adjacent woodlands. Type 1.

3. G. triflorum Michaux. Bedstraw. Hemicryptophyte; perennial; epizoochore. Fr-Jul. Wooded slopes. Type 17.

4. Hedyotis Linnaeus

1. H. caerulea (Linnaeus) Hooker. Yellow-centered bluets.

Hemicryptophyte; perennial; atelechore. Flw-Apr; Fr-May.

Sandy soils through out. Type 1. CD. Common.

2. H. purpurea Linnaeus. Hemicryptophyte; perennial; atelechore. Flw-May. Alluvium and slopes of canyon. Type 9.

3. H. pusilla Schoepf. Red - centered bluets. Theophyte; annual; atelechore. Flw-Apr. Rock outcrop. Type 3.

5. Mitchella Linnaeus

1. M. repens Linnaeus. Partridge-berry. Chamaephyte; perennial; endozoochore. May; Oct--Feb. Woods throughout. Type 1. Frequent.

64. SALICACEAE

Willow Family

1. Salix Linnaeus

1. S. nigra Marshall. Black willow. Phanerophyte-tree; perennial; pogonochore. Phanerophyte-tree; perennial; pogonochore. Sandstone outcrops, canyon rim, disturbed woods. Type 1. CD.

65. SANTALACEAE

Sandalwood Family

1. Nestronia Rafinesque

1. N. umbellula Rafinesque. Parasite; perennial; endozoochore. Flw-May. Wooded slopes along upper river. Type 7. *. Rare.

2. Pyrularia Michaux

1. P. pubera Michaux. Buffalo-nut. Parasite; perennial; endozoochore. Fr-Aug. Wooded slopes along upper river. Type 7. *. Rare.

66. SARRACENIACEAE

Pitcher Plant Family

1. Sarracenia Linnaeus

1. S. oreophila (Kearney) Wherry. Mountain pitcher plant. Hemicryptophyte; perennial; hydrophyte. Flw-May--Aug; Fr-Jun--Aug. Rocky shoals, low islands and banks, wet seeps in pine woods. Type 7. Rare, locally abundant. Federally listed species. Reference: Bell, C. R. 1949. See fig. 15.

67. SAXIFRAGACEAE

Saxifrage Family

1. Heuchera Linnaeus

Reference: Wells, E. F. 1984.

1. H. americana Linnaeus. Alumroot. Hemicryptophyte; perennial; epizoochore. Flw-May. Ridges. Type 1. CD.

Frequent.

2. H. parviflora Bartling. Alumroot. Hemicryptophyte; perennial; sporochore. Flw-Oct. Wooded slopes of canyon. Type 12. Frequent.

2. Hydrangea Linnaeus

Reference: Pilatowski, R. E. 1982.

1. H. arborescens Linnaeus. Mountain hydrangea. Phanerophyte-shrub; perennial; sporochore. Flw-May--Aug; Fr-Aug. Wooded slopes of canyon. Type 1. Common.
2. H. cinerea Small. Mountain hydrangea. Phanerophyte-shrub; perennial; sporochore. Flw-Jun. Alluvium and wooded slopes of canyon, shaded rocky places. Type 1. Common.
3. H. quercifolia Bartram. Oak-leaf hydrangea. Phanerophyte-shrub; perennial; sporochore. Flw-May--Sep; Fr-May--Sep. Wooded slopes in canyon, canyon rim. Type 3. D. Common.

3. Itea Linnaeus

1. I. virginica Linnaeus. Virginia-willow. Phanerophyte-shrub; perennial; atelechore. Flw-May--Jun; Fr-Jun--Sep. Streams margins throughout. Type 3. CD. Frequent.

4. Philadelphus Linnaeus

1. P. hirsutus Nuttall. Mock-orange. Phanerophyte-shrub; perennial; epizoochore. Flw-Apr--May. Wooded slopes of upper river, alluvium of canyon. Type 7. Occasional.
2. P. inodorous Linnaeus. Mock-orange. Phanerophyte-

shrub; perennial; epizoochore. Flw-Apr--May; Fr-Jun--Sep.
Wooded slopes of canyon, ravines. Type 7. Frequent.

5. Ribes Linnaeus

1. R. cynosbatii Linnaeus. Gooseberry. Phanerophyte-shrub; perennial; zoochore. Mar-Apr; May-Jul. Wooded slopes of canyon, canyon rim, boulder fields alongside intermittent streams, rock outcrops. Type 12. *. Occasional.

6. Saxifraga Linnaeus

1. S. virginiensis Michaux. Saxifrage. Hemicryptophyte; perennial; sporochochore. Flw-Apr; Fr-Apr. Moist rocks in canyon. Type 7. Occasional.

7. Tiarella Linnaeus

1. T. cordifolia Linnaeus. Foamflower. Hemicryptophyte; perennial; atelechore. Flw-Feb--Apr; Fr-Apr. Alluvium and wooded slopes of canyon. Type 12. Occasional.

68. SCROPHULARIACEAE

Figwort Family

1. Agalinis Rafinesque Gerardia

1. A. purpurea (Linnaeus) Pennell. Parasite; annual; atelechore. Flw-Sep; Fr-Oct. Moist roadsides, sandstone along river. Type 1.

2. A. tenuifolia (Vahl.) Rafinesque. Parasite; annual;

atelechore. Flw-Sep; Fr-Oct. Moist roadsides, rock outcrops along canyon rim. Type 1. C.

2. Aureolaria Rafinesque

1. A. flava (Linnaeus) Farwell. Parasite; perennial; pterochore. Wooded slopes of canyon. Type 1. CD.
2. A. pectinata (Nuttall) Pennell. Parasite; annual; pterochore. Flw-Aug. Moist roadsides. Type 9.
3. A. virginica (Linnaeus) Pennell. Parasite; perennial; pterochore. Flw-Aug--Sep; Fr-Sep. Rock outcrops, sandy soils. Type 1.

3. Castilleja Mutis ex Linnaeus f.

1. C. coccinea (Linnaeus) Sprengel. Indian paint brush. Parasite; annual; sporochores. Flw-Apr--May; Fr-May. Dry, pine-oak woodlands, roadsides, sandstone outcrops. Type 1.
*.

4. Chelone Linnaeus

1. C. glabra Linnaeus. Turtleheads. Hemicryptophyte; perennial; pterochore. Flw-Oct; Fr-Oct. Alluvium along upper river, rocky shoals and boulders in canyon. Type 4. CD. Canyon specimens shows features of C. cuthbertii.

5. Gratiola Linnaeus

1. G. neglecta Torrey. Hedge-hyssop. Therophyte; annual; sporochores. Flw-Apr. Alluvium. Type 1.
2. G. pilosa Michaux. Bedstraw. Therophyte; annual; sporochores. Flw-Aug. Sandy soils of ridge. Type 3.

6. Linaria Linnaeus

1. L. canadensis (Linnaeus) Dumont. Toad-flax.
Hemicryptophyte; biennial; sporochore. Flw-Apr; Fr-Apr.
Roadsides along canyon, sandy soils along unimproved roads.
Type 5. CD.
2. L. vulgaris Hill. Butter-and-eggs. Hemicryptophyte;
perennial; sporochore. Flw-Jul. Roadsides. Type 11. +.

6. Lindernia All.

1. L. saxicola M. A. Curtis. False-pimpernel.
Hemicryptophyte; perennial; sporochore. Flw-Sep; Fr-Sep.
Shallows and sandstone terraces along river. Type 7. *C.
Frequent.

7. Pedicularis Linnaeus

1. P. canadensis Linnaeus. Lousewort, woods betony.
Parasite; perennial; sporochore. Flw-Apr--May. Floodplain
and woods of canyon, disturbed clay ridges. Type 1.

8. Penstemon Mitchell

1. P. canescens Britton. Hemicryptophyte; perennial;
sporochore. Flw-May. Sandy soils. Type 7. D. Frequent.
These specimens have features of *P. pallidus*.

9. Seymeria Pursh.

1. S. cassioides (J. F. Gmelin) Blake. Parasite; annual;
sporochore. Flw-Aug--Sep; Fr-Oct. Open sandstone outcrops
along canyon rim. Type 3. C. Common.

10. Verbascum Linnaeus

1. V. thapsus Linnaeus. Woolly mullein. Hemicryptophyte; perennial; sporochore. Sandy roadsides. Type 10. CD. Occasional.

11. Veronica Linnaeus

1. V. persica Poiret. Therophyte; annual; zoochore. Flw-Apr; Fr-Apr. Floodplain of canyon. Type 8. +.

69. SOLANACEAE

Nightshade Family

1. Nicandra Adanson

1. N. physalodes (Linnaeus) Persoon. Therophyte; annual; zoochore. Flw-Jul; Fr-Jul. Roadsides. Type 8. CD.

2. Physalis Linnaeus

1. P. heterophylla Nees. Geophyte; perennial; endozoochore. Flw-May. Sandy soils. Type 1. CD.

2. P. virginiana Miller. Geophyte; perennial; endozoochore. Flw-May. Sandy soils. Type 1.

3. Solanum Linnaeus

1. S. americanum Miller. Geophyte; perennial; endozoochore. Fr-Oct. Rock outcrops. Type 1. CD. Occasional.

2. S. carolinense Linnaeus. Horse nettle. Geophyte;

perennial; endozoochore. Flw-Jun--Jul. Sandstone outcrops,
canyon rim. Type 6. CD. Occasional.

70. STYRACEAE

Storax Family

1. Halesia Ellis ex Linnaeus

1. H. tetraptera Ellis. Silverbells. Phanerophyte-tree;
perennial; pterochore. Flw-Mar--May; Fr-Jul. Wooded slopes
of canyon, floodplain of upper river. Type 6. D.
Frequent.

71. SYMPLOCACEAE

Horsesugar Family

1. Symplocus Jacquin

1. S. tinctoria (Linnaeus) L'Heritier. Sweet-leaf, horse-
sugar. Phanerophyte-shrub; perennial; endozoochore.
Alluvium and wooded slopes of canyon. Type 3. Frequent.

72. THEACEAE

Camellia Family

1. Stewartia Linnaeus

1. S. malacodendron Linnaeus. Silky-camellia.

Phanerophyte-tree; perennial; atelechore. Alluvium of canyon. Type 3. *. Known from one location below Eberhardt's Point. Plants destroyed by construction of chairlift into canyon.

2. S. ovata (Cav.) Weatherby. Mountain-camellia. Phanerophyte-tree; perennial; atelechore. Flw-Jul. Alluvium of creek. Type 14. *. Rare. Known from one collection on tributary to Little River.

73. TILIACEAE

Basswood Family

1. Tilia Linnaeus

1. T. americana Linnaeus complex. Linden, basswood. Phanerophyte-tree; perennial; pterochore. Slopes of canyon, woods throughout. Type 1. D. Occasional.

74. ULMACEAE

Elm Family

1. Celtis Linnaeus

1. C. laevigata Willdenow. Phanerophyte-tree; perennial; endozoochore. Ravines of canyon. Type 6.

2. C. occidentalis Linnaeus. Hackberry, sugarberry. Phanerophyte-tree; perennial; endozoochore. Fr-May.

Alluvium and slopes of canyon. Type 1. Frequent.

2. Ulmus Linnaeus

1. U. alata Michaux. Winged elm. Phanerophyte-tree; perennial; pterochore. Sandstone ravines, canyon rim, wooded margins of rock outcrops. Type 9. D. Occasional.

75. URTICACEAE

Nettle Family

1. Boehmeria Jacquin

1. B. cylindrica (Linnaeus) Swartz. False-nettle. Geophyte; perennial; epizoochore. Flw-Jul; Fr-Sep--Oct. Sandstone along river; rocky shoals and boulders in canyon. Type 1. CD. Common.

76. VALERIANACEAE

Corn-salad Family

1. Valerianella Miller

1. V. radiata (Linnaeus) Dufr. Corn-salad. Therophyte; annual; atelechore. Flw-Apr. Canyon rim. Type 9. Rare.

77. VERBENACEAE

Verbena Family

1. Callicarpa Linnaeus

1. C. americana Linnaeus. French-mulberry, beautyberry. Phanerophyte-shrub; perennial; endozoochore. Flw-Jul; Fr-Sept--Oct. Wooded slopes, ravines, cut-over woods. Type 9. Occasional.

78. VIOLACEAE

Violet Family

Reference: Russell, N. H. 1965.

1. Viola Linnaeus

1. V. blanda Willdenow. Hemicryptophyte; perennial; polychore. Flw-May; Fr-May. Roadsides. Type 4. CD.
2. V. canadensis Linnaeus var. rugulosa (Greene) C. Linnaeus Hitchcock. Geophyte; perennial; polychore. Flw-Apr. Roadsides. Type 4. Rare.
3. V. cucullata Aiton. Bog violet. Hemicryptophyte; perennial; polychore. Flw-Apr. Boulder-strewn river banks. Type 4. +. Rare.
4. V. eriocarpa Schweinitz var. leiocarpa Fernald & Weigand. Geophyte; perennial; polychore. Flw-Apr. Floodplains. Type 4. Rare.
5. V. hastata Michaux. Geophyte; perennial; polychore. Flw-Mar--Apr. Alluvium and wooded slopes of canyon. Type 9.

6. V. pedata Linnaeus. Bird-foot violet. Geophyte; perennial; polychore. Flw-Mar--May. Sandy roadsides throughout, river banks, bluffs and outcrops. Type 1. D. Frequent.
7. V. primulifolia Linnaeus. Geophyte; perennial; polychore. Flw-Apr--May; Fr-Apr--May. Pine woods, roadside ditches, wooded slopes, floodplains. Type 1. Common.
8. V. rafinesquii Greene. Johnny-jump-up. Therophyte; annual; atelechore. Flw-Apr. Sandy roadsides, floodplain. Type 9.
9. V. rostrata Pursh. Geophyte; perennial; polychore. Flw-Mar--Apr. Alluvium and wooded slopes of canyon. Type 4.
10. V. sagittata Aiton. Geophyte; perennial; polychore. Flw-Apr. Wooded slopes. Type 1.
11. V. tripartita Elliott var. glaberrima (de Candolle) Harper. Hemicryptophyte; perennial; atelechore. Flw-Apr. Wooded slopes of canyon. Type 15. +.

79. VITACEAE

Grape Family

1. Parthenocissus Planchon

1. P. quinquefolia (Linnaeus) Planchon. Virginia creeper.

Phanerophyte-vine; perennial; endozoochore. Flw-May.

Slopes of canyon, woods around rock outcrops, canyon rim, talus. Type 1. D. Common.

2. Vitis Linnaeus

1. V. aestivalis Michaux. Summer grape. Phanerophyte-vine; perennial; endozoochore. Flw-May. Woods along roadsides. Type 1.

2. V. rotundifolia Michaux. Muscadine. Phanerophyte-vine; perennial; endozoochore. Flw-Jun; Fr-Jul--Sep.

Intermittent streams, sandstone outcrops, margin of pine woods. Type 9. D. Common.

3. V. vulpina Linnaeus. Frost grape. Phanerophyte-vine; perennial; endozoochore. Sandstone slopes along river. Type 1.

CLASS II. LILIOPSIDA

MONOCOTS

1. AGAVACEAE

Agave Family

1. Yucca Linnaeus

1. Y. filamentosa Linnaeus. Bear-grass. Chamaephyte; perennial; endozoochore. Floodplain of canyon, canyon rim. Type 6. C. Occasional.

2. ALISMATACEAE

Arrowhead Family

1. Sagittaria Linnaeus

Reference: Kral, R. 1982.

1. S. secundifolia Kral. Kral's water-plantain. Hydrophyte; perennial; hydrochore. Flw-Jul--Aug; Fr-Jul--Aug. Crevices of bedrock in river. Type 7. Cumberland Plateau endemic. **Federally listed species.**

3. AMARYLLIDACEAE

Amaryllis Family

1. Hypoxis Linnaeus

1. H. hirsuta (Linnaeus) Coville var. hirsuta. Yellow-star-grass. Geophyte; perennial; atelechore. Flw-May--Aug; Fr-Jun--Aug. Dry pine-oak woodlands, rocky shoals and banks along river. Type 1.
2. H. hirsuta (Linnaeus) Coville var. leptocarpa (Engelm. and Gray) Fernald. Yellow-star-grass. Geophyte; perennial; atelechore. Flw-Oct; Fr-Oct. Rocky shoals and boulders of canyon. Type 1.
3. H. micrantha Pollard. Yellow-star-grass. Geophyte; perennial; atelechore. Flw-Apr--Jun. Floodplain and wooded slopes. Type 3.

4. ARACEAE

Aroid Family

1. Arisaema Martius

1. A. triphyllum (Linnaeus) Schott. Jack-in-the-pulpit. Geophyte; perennial; endozoochore. Flw-May. Talus below canyon rim. Type 1. Occasional.

2. Orontium Linnaeus

1. O. aquaticum Linnaeus. Golden-club. Hydrophyte; perennial; hydrochore. Flw-May. Rocky shallows of river. Type 1. Occasional, locally abundant.

5. COMMELINACEAE

Day-flower Family

1. Commelina Linnaeus

1. C. communis Linnaeus. Dayflower. Therophyte; annual; atelechore. Flw-Jul--Oct; Fr-Jul--Oct. Roadsides, sandstone outcrops. Type 8. Common.

2. Tradescantia Linnaeus

1. T. subaspera Ker. Spiderwort. Hemicryptophyte; perennial; atelechore. Flw-May--Jul; Fr-Jun--Jul. Wooded canyon slopes, rock terraces, stream banks. Type 7. CD. Frequent.

6. CYPERACEAE

Sedge Family

Reference: Mackenzie, K.K. and H. C. Creutzberg. 1940.

1. Carex Linnaeus

1. C. annectens Bicknell. Hemicryptophyte; perennial; polychore. Flw-Jun. Sandstone ravines. Type 3. +.
2. C. crinita Lamarck. Hemicryptophyte; perennial; epizoochore. Fr-Sep. Wooded slopes along river. Type 1.
3. C. debilis Michaux. Hemicryptophyte; perennial; epizoochore. Early Fr-May. Wooded slopes. Type 1. CD.
4. C. glaucescens Elliott. Hemicryptophyte; perennial; polychore. Flw-July. Low wet areas along roadsides. Type 3. +.
5. C. intumescens Rudge. Hemicryptophyte; perennial; polychore. Flw-Jun; Fr-May--Jun. Wooded slopes along upper river, islands in river. Type 1. CD.
6. C. joorii Bailey. Hemicryptophyte; perennial; polychore. Fr-Aug. Sandstone ravines. Type 3. +.
7. C. lurida Wahlenberg. Hemicryptophyte; perennial; polychore. Flw-Jun; early Fr-Jun. Sandstone ravines. Type 1.
8. C. tribuloides Wahlenberg. Hemicryptophyte; perennial; polychore. Flw-May. Wooded slopes along upper river. Type 1.

2. Cyperus Linnaeus

1. C. globulosus Aublet. Geophyte; perennial; polychore. Flw-Oct; Fr-Oct. Disturbed rock outcrops. Type 3.
2. C. ovularis (Michaux) Torrey. Geophyte; perennial; polychore. Fr-Aug. Sandstone outcrops along canyon. Type 1. CD.
3. C. strigosus Linnaeus. Geophyte; perennial; polychore. Flw-Sep. Sandstone ravines. Type 5.

3. Eleocharis R. Brown

1. E. obtusa (Willdenow) Schultes. Spike-rush. Geophyte; perennial; epizoochore. Flw-Jun--Aug; Fr-Jun--Aug. Sandstone ravines, outcrops, open marshes. Type 1.

4. Rynchospora Vahl

1. R. caduca Elliott. Beak-rush. Hemicryptophyte; perennial; epizoochore. Fr-Jul. Sandy soils along roadsides. Type 1. +.
2. R. globularis (Chapman) Small. Hemicryptophyte; perennial; epizoochore. Fr-Jun--Sep. Around rocky shoals, islands, and banks of river. Type 5. D.
3. R. glomerata (Linnaeus) Vahl. Hemicryptophyte; perennial; epizoochore. Flw-Sep; Fr-Jul--Oct. Sandstone ravines, wet roadsides, rocky shallows. Type 3. C.
4. R. gracilentia Gray. Beak-rush. Hemicryptophyte; perennial; epizoochore. Fr-Oct. Moist roadsides. Type 3.
5. R. macrostachya Torrey. Horned-rush. Hemicryptophyte;

perennial; epizoochore. Fr-Aug. Along river and rock strewn floodplains. Type 1. +.

5. Scirpus Linnaeus

1. S. purshianus Fernald. Club-rush. Hemicryptophyte; annual; atelechore. Flw-Sep. Along rivers. Type 2. +.

6. Scleria Bergius

2. S. triglomerata Michaux. Nut-rush. Geophyte; perennial; endozoochore. Flw-Jun. Pine heath along canyon rim. Type 1.

7. DIOSCOREACEAE

Yam Family

1. Dioscorea Linnaeus

1. D. batatas Dcne. Cinnamon-vine. Geophyte; perennial; endozoochore. Along creeks, sandy roadsides. Type 8. Frequent.

2. D. villosa Linnaeus. Wild yam. Geophyte; perennial; pterochore. Flw-May; Fr-May. Ridges, alluvium and slopes of canyon. Type 1. Common.

8. ERIOCAULACEAE

Pipewort Family

1. Eriocaulon Linnaeus

1. E. compressum Lamarck. Pipewort. Geophyte; perennial; hydrochore. Flw-Aug. River sides along upper river. Type 3. +. Rare.

9. IRIDACEAE

Iris Family

1. Iris Linnaeus

1. I. cristata Aiton. Crested dwarf iris. Geophyte; perennial; zoochore. Flw-Apr. Wooded slopes of canyon. Type 12. Common.
2. I. verna Linnaeus. Dwarf iris. Geophyte; perennial; zoochore. Flw-Apr--May. Banks of streams and river, ravines, wooded slopes. Type 9. Common.

2. Sisyrinchium Linnaeus

1. S. angustifolium Miller. Blue-eyed-grass. Hemicryptophyte; perennial; atelechore. Flw-Apr--May; Fr-May. Wooded slopes of upper river and canyon. Type 1.

11. JUNCACEAE

Rush Family

1. Juncus Linnaeus

1. J. acuminatus Michaux. Hemicryptophyte; perennial; sporocho. Flw-Jun; Fr-Jun. Banks and floodplain of

canyon, ravines. Type 5. CD. Occasional.

2. J. coriaceus Mackenzie. Hemicryptophyte; perennial; sporochore. Flw-Jun; Fr-Jun. Sandy soils along roadsides, ravines, river banks. Type 3. Occasional.

3. J. debilis Gray. Hemicryptophyte; perennial; sporochore. Fr-Jun. Ravines, sandy roadsides, outcrops along river. Type 9. CD. Frequent.

4. J. effusus Linnaeus. Hemicryptophyte; perennial; sporochore. Flw-Jun. Ravines, wooded slopes along upper river. Type 19. Occasional.

5. J. scirpoides Lamarck. Hemicryptophyte; perennial; sporochore. Fr-Aug--Sep. Moist roadsides, thin sandy soils of ridges. Type 3. Occasional.

6. J. secundus Beauvois ex Poiret. Hemicryptophyte; perennial; sporochore. Flw-Jun. Rock outcrops, canyon rim. Type 12. C. Common.

7. J. tenuis Willdenow. Path rush. Hemicryptophyte; perennial; sporochore. Flw-May--Jun; Fr-Jul--Oct. Rock outcrops, ravines, along river. Type 5. CD. Common.

2. Luzula De Candolle

1. L. acuminata Rafinesque. Woodrush. Hemicryptophyte; perennial; epizoochore. Flw-Mar. Floodplain. Type 1. Rare.

2. L. bulbosa (Wood) Rydberg. Woodrush. Hemicryptophyte; perennial; epizoochore. Flw-Mar--Apr. Alluvium of canyon,

floodplains. Type 12. Occasional.

3. L. echinata (Small) Hermann. Woodrush.

Hemicryptophyte; perennial; epizoochore. Flw-Apr; Fr-Apr.

Edges of rock outcrops, floodplains. Type 7. Occasional.

12. LILIACEAE

Lily Family

1. Allium Linnaeus

Reference: Ownby, M. and H. C. Aase. 1959.

1. A. speculae Ownbey and Aase. Ownbey's onion. Geophyte; perennial; atelechore. Flw-May--Jun; Fr-Jun. Rock outcrops along canyon rim. Type 7. *. Frequent, locally abundant. See fig. 12.

2. Amianthium Gray

1. A. muscaetoxicum (Walter) Gray. Fly-poison. Geophyte; perennial; atelechore. Flw-Sep. Roadsides along canyon. Type 6.

3. Medeola Linnaeus

1. M. virginianum Linnaeus. Indian cucumber - root. Geophyte, perennial; endozoochore. Fr-Oct. Slopes of canyon. Type. 1 CD.

4. Muscari Linnaeus

1. M. racemosum Linnaeus. Grape-hyacinth. Geophyte;

perennial; atelechore. Flw-Apr. Floodplains. Type 8. CD.
Rare.

5. Schoenolirion Torrey ex Durand

Reference: Sherman, H. L. 1979.

1. S. wrightii Sherman. Sunnybells. Geophyte; perennial; endozoochore. Mar--May; May. Rocky shoals, banks, and floodplains, sandstone outcrops along canyon rim. Type 3.
*C. Frequent, locally abundant.

6. Smilacina Desf.

1. S. racemosa (Linnaeus) Desf. False Solomon's-seal. Geophyte; perennial; endozoochore. Flw-May; Fr-May. Alluvium and slopes of canyon, rock outcrops. Type 1. Occasional.

7. Smilax Linnaeus

1. S. bona-nox Linnaeus. Phanerophyte-vine; perennial; endozoochore. Flw-May; Fr-May. Woods around rock outcrops, floodplains. Type 1. D. Occasional.
2. S. glauca Walter. White cat-briar. Phanerophyte-vine; perennial; endozoochore. Flw-May. Rock outcrops along canyon rim, floodplains, talus, wooded slopes along upper river. Type 9. CD. Common.
3. S. hispida Muhlenberg. Phanerophyte-vine; perennial; endozoochore. Flw-May. Woods, canyon rim. Type 1. +. Occasional.
4. S. rotundifolia Linnaeus. Cat-briar. Phanerophyte-

vine; perennial; endozoochore. Early Fr-May. Talus, wooded slopes along upper river. Type 1. CD. Frequent.

5. S. walteri Pursh. Phanerophyte-vine; perennial; endozoochore. Flw-May. Sandy soils along upper river, canyon rim. Type 3. Occasional.

8. Stenanthium (Gray) Kunth

1. S. gramineum (Ker) Morong. Featherbells. Geophyte; perennial; epizoochore. Flw-Jul. Moist, sandy, unimproved road. Type 6. Rare, one location known.

9. Trillium Linnaeus

Reference: Patrick, T. S. 1988.

1. T. cuneatum Rafinesque. Little sweet Betsy. Geophyte; perennial; zoochore. Flw-Apr. Sandstone ravines. Type 16. Occasional.

2. T. catesbaei Elliott. Geophyte; perennial; zoochore. Flw-Apr--May. Wooded slopes throughout. Type 7. Frequent.

10. Uvularia Linnaeus

1. U. perfoliata Linnaeus. Bellwort. Geophyte; perennial; zoochore. Flw-Mar. Slope of canyon. Type 16.

13. ORCHIDACEAE

Orchid Family

Reference: Gupton, O. W. and F. C. Swope. 1986.

Luer, C. A. 1975.

1. Calopogon R. Brown

1. C. pulchellus (Salisbury) R. Brown. Grass-pink. Geophyte; perennial; sporochore. Flw-Jun. Pine heath along canyon rim. Type 1. +. Rare.

2. Corallorhiza Chat.

1. C. wisteriana Conrad. Spring coral-root orchid. Geophyte; parasite; perennial; sporochore. Flw-Apr. Slopes. Type 16. *. Rare.

3. Cypripedium Linnaeus

1. C. acaule Aiton. Pink ladies-slipper, pink moccasin flower. Geophyte; perennial; sporochore. Flw-May. Dry clay ridges, wooded slopes. Type 20. *. Occasional, locally abundant.

4. Habenaria Willdenow

1. H. ciliaris (Linnaeus) R. Brown. Yellow-fringed orchid. Geophyte; perennial; sporochore. Flw-Aug. Moist roadsides and boggy places. Type 1. Occasional, locally abundant.

5. Spiranthes Richard

1. S. cernua (Linnaeus) Richard var. cernua. Nodding ladies tresses, fragrant ladies tresses. Hemicryptophyte; perennial; sporochore. Flw-Oct. Moist roadsides. Type 1. Occasional.
2. S. gracilis (Bigelow) Beck var. gracilis. Slender ladies tresses. Geophyte; perennial; sporochore. Flw-Jul. Sandstone outcrops, margins of pine woods, moist roadsides.

Type 1. Occasional.

3. S. praecox (Walter) Watson. Hemicryptophyte; perennial; sporochore. Fr-Aug. Rock outcrops along canyon rim. Type 3. Rare.

6. Tipularia Nuttall

1. T. discolor (Pursh) Nuttall. Crane-fly orchid. Geophyte; perennial; sporochore. Flw-Aug. Woods, power line rights-of-way, alluvium. Type 9. Frequent.

14. POACEAE OR GRAMINEAE

Cereal or Grain Family

1. Agrostis Linnaeus

1. A. eliottiana Schultes. Therophyte; annual; zoochore. Fr-Jun--Sep. Pine heath along canyon rim, sandstone along river. Type 1.
2. A. hyemalis (Walter) Britton, Sterns & Poggenburg. Therophyte; annual; zoochore. Flw-Oct; Fr-Oct. Moist roadsides, woodlands. Type 1.
3. A. perennans (Walter) Tuckerman. Autumn bentgrass. Hemicryptophyte; perennial; zoochore. Flw-Sep. Wooded paths. Type 1. CD.

2. Alopecurus Linnaeus

1. A. carolinianus Walter. Carolina foxtail. Therophyte; annual; epizoochore. Flw-Aug; Fr-Aug. Rock outcrops along

canyon rim. Type 5. D.

3. Andropogon Linnaeus

1. A. elliotii Chapman. Elliott bluestem.

Hemicryptophyte; perennial; pogonochore. Fr-Sep. Outcrops along canyon. Type 9.

2. A. scoparius Michaux. Little bluestem.

Hemicryptophyte; perennial; pogonochore. Fr-Sep. Rock outcrops. Type 16.

3. A. ternarius Michaux. Splitbeard bluestem.

Hemicryptophyte; perennial; pogonochore. Fr-Aug--Oct. Outcrops along canyon, roadsides. Type 9.

4. A. virginicus Linnaeus. Broomsedge bluestem.

Hemicryptophyte; perennial; pogonochore. Flw-Aug--Oct, Fr-Oct. Sandstone outcrops, roadsides. Type 5.

4. Anthoxanthum Linnaeus

1. A. odoratum Linnaeus. Sweet vernal grass. Therophyte; annual; polychore. Flw-May--Oct., Fr-Oct. Pine heath. Type 10.

5. Aristida Linnaeus

1. A. affinis (Schultes) Kunth. Longleaf three awn grass. Hemicryptophyte; perennial; epizoochore. Fr-Oct. Moist roadsides. Type 3.

2. A. dichotoma Michaux var. dichotoma. Churchmouse three awn grass. Therophyte; annual; epizoochore. Fr-Oct. Moist roadsides, outcrops along canyon rim. Type 1.

3. A. longespica Poir. var. longespica. Slimspike three awn grass. Therophyte; annual; epizoochore. Fr-Sep--Oct. Rock outcrops along canyon rim. Type 1.

4. A. purpurascens Poiret var. purpurascens. Arrowfeather three awn grass. Hemicryptophyte; perennial; epizoochore. Fr-Oct. Moist roadsides. Type 1.

5. A. purpurascens Poiret var. virgata (Trin.) Allred. Arrow feather three awn grass. Hemicryptophyte; perennial; epizoochore. Fr-Oct. Moist roadsides. Type 1.

6. Arthraxon Beauvois

1. A. hispidus (Thunberg) Makino var. cryptatherus (Hackel) Honda. Therophyte; annual; epizoochore. Flw-Oct; Fr-Oct. Moist roadsides, sandstone ravines. Type 10.

7. Arundinaria Michaux

1, A. gigantea (Walter) Muhlenberg. Giant cane. Phanerophyte-shrub; perennial. Wooded slopes, stream banks in canyon. Type 9.

8. Bromus Linnaeus

1. B. tectorum Linnaeus. Downy brome grass. Therophyte; annual; zoochore. Fr-May. Dry, pine-oak woodlands. Type 5. CD.

9. Calamagrostis Adanson

1. C. cinnoides (Muhlenberg) Barton. Reed grass. Hemicryptophyte; perennial; epizoochore. Flw-Aug--Oct; Fr-Aug--Oct. Moist roadsides. Type 1.

10. Chasmanthium Link

Reference: Yates, H. O. 1966.

1. C. latifolium (Michaux) Yates. Inland sea oats. Hemicryptophyte; perennial; atelechore. Flw-Sep. Alluvial soils. Type 9.
2. C. laxum (Linnaeus) Yates. Hemicryptophyte; perennial; atelechore. Flw-Sep--Oct. Moist roadsides, shaded bottomlands along river. Type 9. C.
3. C. sessiliflorum (Poir.) Yates. Hemicryptophyte; perennial; atelechore. Flw-Jul--Sep; Fr-Aug--Oct. Rock outcrops, wooded areas, ravines. Type 6.

11. Cynodon Linnaeus Rich

1. C. dactylon (Linnaeus) Pers. Bermuda grass. Hemicryptophyte; perennial; sporochores. Flw-Oct. Ravine. Type 10.

12. Dactylis Linnaeus

1. D. glomerata Linnaeus. Orchard grass. Hemicryptophyte; perennial; polychore. Flw-May--Jun. Pine heaths, canyon rim, rock outcrop. Type 10.

13. Danthonia de Candolle

1. D. sericea Nuttall. Downy oat grass. Hemicryptophyte; perennial; epizoochore. Flw-May; Fr-May. Roadsides, pine-oak woodlands, rock outcrops. Type 9. Frequent.
2. D. spicata (Linnaeus) Beauvois ex Roemer and Schultes. Poverty oat grass. Hemicryptophyte; perennial; epizoochore.

Flw-May; Fr-May--Jun. Pine woods, canyon rim, dry roadsides, rock outcrops. Type 5. Common.

14. Deschampsia Beauvois

1. D. flexuosa (Linnaeus) Trinius. Hemicryptophyte; perennial; epizoochore. Flw-May; Fr-May. Wooded areas, rock outcrops, canyon rim, talus and intermittent creeks. Type 9. Frequent.

15. Dichanthelium (Hitchcock and Chase) Gould

1. D. boscii (Poiret.) Provisional. Hemicryptophyte; perennial; atelechore. Flw-Jun--Jul, Fr-Jul. Roadsides, moist woodlands, wooded slopes in canyon. Type 1. Common.

2. D. clandestinum (Linnaeus) Gould. Hemicryptophyte; perennial; atelechore. Floodplain, islands and bars of river. Type 1. +.

3. D. commutatum (Schultes) Gould. Hemicryptophyte; perennial; atelechore. Flw-Sep. Sandstone along river. Type 1.

4. D. depauperatum (Muhlenberg) Gould. Hemicryptophyte; perennial; atelechore. Fr-May. Pine-oak woodlands. Type 1.

5. D. dichotomum (Linnaeus) Gould. Hemicryptophyte; perennial; atelechore. Flw-Jun; Fr-Jun--Sep. Moist roadsides and woodlands, ravine, outcrops along canyon rim. Type 1. Common.

6. D. laxifolium (Lamarck) Gould. Hemicryptophyte;

perennial; atelechore. Flw-May--Jun; Fr-Jun. Sandy soils, pine heaths along canyon, dry pine-oak woodlands. Type 5.

7. D. sphaerocarpon (Elliott) Gould var. polyanthes (Schultes) Gould. Hemicryptophyte; perennial; atelechore. Flw-Jun--Aug; Fr-Aug--Oct. Sandy and seasonally moist soils, sandstone along river, ravines, roadsides along canyon. Type 9. Common.

8. D. sphaerocarpon (Elliott) Gould var. sphaerocarpon. Hemicryptophyte; perennial; atelechore. Flw-Jun--Jul; Jun--Jul. Sandy soils, pine heaths, sandstone along river. Type 9. Common.

9. D. strigosum Muhlenberg. Hemicryptophyte; perennial; atelechore. Flw-May; Fr-Jun. Open areas, pine heaths, canyon rim. Type 6.

16. Digitaria Heister

1. D. ciliaris (Retzius) Koeler. Southern crabgrass. Therophyte; annual; atelechore. Fr-Aug. Roadsides, outcrops along canyon. Type 8.

2. D. ischaemum (Schreber) Schreber ex Muhlenberg. Smooth crabgrass. Therophyte; annual; atelechore. Flw-Sep; Fr-Aug--Sep. Alluvium of canyon and upper river. Type 10.

3. D. violascens Link. Violet crabgrass. Therophyte; annual; atelechore. Flw-Sep; Fr-Sep. Sandstone along river, ravines. Type 18. +.

17. Echinochloa Beauv.

1. E. crusgalli (Linnaeus) Beauv. Barnyard grass.
Therophyte; annual; endozoochore. Flw-Jul; Fr-Jul.
Ravines. Type 19.

18. Elymus Linnaeus

1. E. virginicus Linnaeus. Virginia wild rye grass.
Hemicryptophyte; perennial; atelechore. Fr-Jun. Roadsides.
Type 5.

19. Erianthus Michaux

1. E. contortus Baldwin ex Elliott. Bent-awn plumegrass.
Hemicryptophyte; perennial; pogonochore. Flw-Sep.
Sandstone along river. Type 6.

2. E. giganteus (Walter) Muhlenberg. Beard grass, plume
grass. Hemicryptophyte; perennial; pogonochore. Fr-Oct.
Moist roadsides. Type 1.

20. Holcus Linnaeus

1. H. lanatus Linnaeus. Velvet grass. Hemicryptophyte;
perennial; epizoochore. Flw-Jun; Fr-Jun. Sandy, moist
soils. Type 10.

21. Hordeum Linnaeus

1. H. pusillum Nuttall. Barley. Therophyte; annual;
epizoochore. Fr-May. Dry, clay ridges. Type 5.

22. Lolium Linnaeus

1. L. perenne Linnaeus. Rye grass. Hemicryptophyte;
perennial; epizoochore. Flw-Jun. Ravines. Type 10. CD.

23. Melica Linnaeus

1. M. mutica Walter. Manna grass. Hemicryptophyte; perennial; pterochore. Flw-May; Fr-Apr. Sandy soils and rock outcrops along canyon. Type 9.

24. Panicum Linnaeus

1. P. anceps Michaux. Geophyte; perennial; atelechore. Flw-Sep; Fr-Oct. Moist roadsides, alluvium along upper river. Type 9.

2. P. dichotomiflorum Michaux. Therophyte; annual; atelechore. Flw-Sep; Fr-Sep-Oct. Canyon, sandstone outcrops along river. Type 5.

3. P. strigosum Muhlenberg. Hemicryptophyte; perennial; atelechore. Fr-May. Canyon rim. Type 6. CD.

4. P. virgatum Linnaeus. Switch grass. Geophyte; perennial; atelechore. Fr-Oct. Moist roadside. Type 16.

25. Paspalum Linnaeus

1. P. dilatatum Poiret. Dallis grass. Hemicryptophyte; perennial; atelechore. Flw-Aug. Sandstone outcrop along canyon rim. Type 10.

2. P. laeve Michaux. Field paspalum. Hemicryptophyte; perennial; atelechore. Flw-Jul--Sep; Fr-Aug--Oct. Moist roadsides, canyon rim, rock outcrops. Type 9.

3. P. setaceum Michaux. Hemicryptophyte; perennial; atelechore. Fr-Oct. Moist roadsides. Type 9.

26. Phyllostachys Siebold & Zucc.

1. P. aurea Riv. Bamboo. Phanerophyte-tree; perennial.

Woods along upper river, cut-over woods, sandy roadsides.

Type 8. CD. Common.

27. Poa Linnaeus

1. P. cuspidata Nuttall. Blue grass. Hemicryptophyte; perennial; atelechore. Flw-Mar--Apr. Bottomland hardwood. Type 7.

28. Secale Linnaeus

1. S. cereale Linnaeus. Rye. Therophyte; annual; atelechore. Flw-Apr. Foodplot. Type 11. CD.

29. Setaria Beauv.

1. S. glauca (Linnaeus) Beauv. Yellow foxtail grass. Therophyte; annual; zoochore. Flw-Oct. Roadside along canyon. Type 10.

30. Sorghastrum Nash

1. S. elliotii (Mohr) Nash. Slender Indian grass. Geophyte; perennial; epizoochore. Flw-Sep. Alluvium of canyon. Type 6. CD.

2. S. nutans (Linnaeus) Nash. Indian grass. Geophyte; perennial; epizoochore. Fr-Sep. Sandy seeps along roadside. Type 1. CD.

31. Sporobolus R. Brown

1. S. junceus (Michaux) Kunth. Pineywoods dropseed. Hemicryptophyte; perennial; atelechore. Flw-May-Sep; Fr-Oct. Sandstone outcrop along canyon rim, alluvium, disturbed rock outcrops. Type 3.

32. Stipa Linnaeus

1. S. avenacea Linnaeus. Blackseed needle grass.
Hemicryptophyte; perennial; epizoochore. Flw-May; Fr-May.
Dry woods, rock outcrops. Type 1.

33. Tridens Roemer & Schultes

1. T. flavus (Linnaeus) Hitchcock. Purpletop.
Hemicryptophyte; perennial; atelechore. Flw-Sep; Fr-Oct.
Disturbed rock outcrops, roadsides, flat-rocks along canyon
rim. Type 1.

34. Vulpia K. C. Gmelin

1. V. octoflora (Walter) Rydberg. Common sixweeks grass.
Therophyte; annual; sporochores. Fr-May. Ridges, sandstone
ravines. Type 10. CD.

15. PONTEDERIACEAE

Pickerel-weed Family

1. Heteranthera R. & P.

1. H. limosa (Swartz) Willdenow. Hemicryptophyte;
perennial; hydrochore. Shallows and rocks along river.
Rare. +.

16. SPARGANIACEAE

Bur-reed Family

1. Sparganium Linnaeus

1. A. americanum Nuttall. Bur-reed. Hydrochore; perennial; polychore. Flw-Jun; Fr-Nov. Sandstone outcrops and pools along river, open freshwater marshes, beaver ponds. Type 1.

17. XYRIDACEAE

Yellow-eyed-grass Family

Reference: Kral, R. 1966.

1. Xyris Linnaeus

1. X. lupicai Richard. Yellow-eyed-grass. Hemicryptophyte; perennial; sporochores. Fr-Oct. Rocky shoals and boulders of canyon. Type 3.

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