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B. Eugene Wofford
B. Eugene Wofford, Major Professor

We have read this dissertation
and recommend its acceptance:

H. R. De Selm

David K. Smith

Peter S. Winter

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July 29, 1985

THE VASCULAR FLORA OF BIG FROG MOUNTAIN,
POLK COUNTY, TENNESSEE

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Zack Ernest Murrell

August 1985

ACKNOWLEDGMENTS

I wish to thank Dr. B. E. Wofford for his help, advice and friendship throughout my study, for initially suggesting Big Frog Mountain as a place worthy of study, for serving as major advisor and chairman of my committee, and for the many enjoyable field trips taken during the past three years.

I wish to thank Drs. H. R. DeSelm, D. K. Smith, and P. S. White for their advice, encouragement and suggestions to improve this study.

The Botany Department of the University of Tennessee is thanked for providing me the opportunity to study here, and for providing travel funds, both for this study and other excursions into the forests of the region.

I wish to express appreciation to the following individuals for their aid in determination of problematic specimens: Dr. J. L. Collins, Dr. A. M. Evans, Dr. Vernon E. McNeilus, and Dr. W. Ann Robinson.

I wish to express my thanks to those who accompanied me on my visits to Big Frog Mountain, especially Steve Bowling, who was responsible for locating Dryopteris campyloptera on the mountain.

To Thomas S. (Trillium) Patrick, a friend always willing to help with taxonomic problems, encouraging my successes and helpfully criticizing my mistakes, who helped get me on the right road to becoming a good taxonomist, I am very grateful.

To Gary L. Walker and Andrew S. Methven, for their friendship, late night discussions and encouragement, I am grateful.

To Mark and Mary Ann MacKenzie, for their friendship and assistance in this study as editor and typist, respectively, I am most appreciative.

To my parents, family and grandmothers, for their support and love, I am grateful.

Finally, I wish to thank my wife, Joann, for her love and continuing support, her company on many of my visits to Big Frog Mountain, and her patience throughout this study.

ABSTRACT

The vascular flora of Big Frog Mountain, a 1228 m peak in the southeast corner of Tennessee has been studied for two growing seasons. A total of 476 taxa were collected on Big Frog Mountain representing 262 genera and 91 families. One taxon, Coreopsis latifolia, is a state record for Tennessee. This taxon and Prenanthes roanensis are federally under study in Category II. Twelve taxa are listed as Endangered, Threatened, or Special Concern in Tennessee, and status reports were prepared for these taxa.

Distributions of the taxa collected were examined in an attempt to understand the phytogeographical significance of the mountain. The flora of Big Frog Mountain has a strong influence from taxa with northern distributions whose ranges extend south in the Appalachians. Three taxa had the southernmost station of their distribution on the mountain. Only 4.2% of the flora is not native to eastern North America, indicating a lack of human disturbance on Big Frog Mountain.

Big Frog Mountain is a relatively undisturbed peak in the southern portion of the Blue Ridge Province. The ruggedness of the terrain, the lack of anthropogenic disturbance, and the number of rare plants found on the mountain make the area well suited for inclusion in the National Forest Wilderness System. On October 30, 1984 a bill was signed into law which will permanently preserve the area as the Big Frog Wilderness Area.

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INTRODUCTION

The seemingly insatiable desire of our civilization to develop the Earth in an economically profitable fashion has resulted in a rapid loss of irreplaceable taxa and natural areas. Taxonomic studies of a floristic nature have become fewer in recent years in spite of this loss. The author believes that a floristic study of Big Frog Mountain (BFM) is imperative as we attempt to protect and preserve some remnants of pre-settlement forests in eastern North America.

BFM is a major peak on the southwest edge of the Blue Ridge Province in Polk County, Tennessee. The southern face of the mountain is included in the Cohutta Wilderness Area and the northern portion was recently designated as the Big Frog Wilderness Area.

In July of 1878, Augustin Gattinger ascended BFM, describing it as a "great conservatory" (Gattinger 1901). Since this time very few botanists have explored this relatively undisturbed area.

The primary objective of this study was to examine the vascular flora of BFM. This inventory has provided new and expanded information on the flora of Tennessee and the Blue Ridge Province. The known ranges of the collected taxa were compared to their distribution on BFM in an attempt to understand the phytogeographical significance of the flora of the mountain. The rare plant populations located on BFM were evaluated as to population size and vigor, with the anticipation that these data can be used by the Forest Service or other agencies in the formulation of management plans for the area.

CHAPTER I

LOCATION

BFM is located in the southeast corner of Tennessee, with the summit 19 km west of the NC/TN state line and 1.5 km north of the GA/TN state line. The northern portion of the mountain lies in the Ocoee Ranger District of the Cherokee National Forest and the southern portion extends into the Cohutta Wilderness Area of the Chattahoochee National Forest. BFM, 12 km west of Copperhill, is the most prominent natural geographic in Polk County, Tennessee.

The study area (Figure 1) lies between latitudes $35^{\circ} 02' 30''$ N and $34^{\circ} 58' 30''$ N and longitudes $85^{\circ} 29' 00''$ W and $84^{\circ} 33' 30''$ W. The topography has been mapped by the United States Geological Survey in cooperation with the Tennessee Valley Authority and is described on three 7.5 minute topographic quadrangles: Caney Creek, TN, 1967; Ducktown, TN, 1974; and Hemp Top, GA-TN, 1959.

The study area (Figure 2) consists of the 2043 ha Big Frog Wilderness Area and an 800 ha area which is included in the Cohutta Wilderness Area. In delineating a study area boundary, the underlying concept was to study the mountain as a geographical entity. This ideal was easily maintained to the north with the boundary coinciding with the streams which drain the mountain. To the south, this concept was complicated by the extension of a ridge 6.4 km south of the summit at elevations above 915 m. Double Spring Gap between BFM and Hemp Top Mountain was chosen as the dividing line between the mountains. The boundaries of the study area (Figure 2) are as follows: The

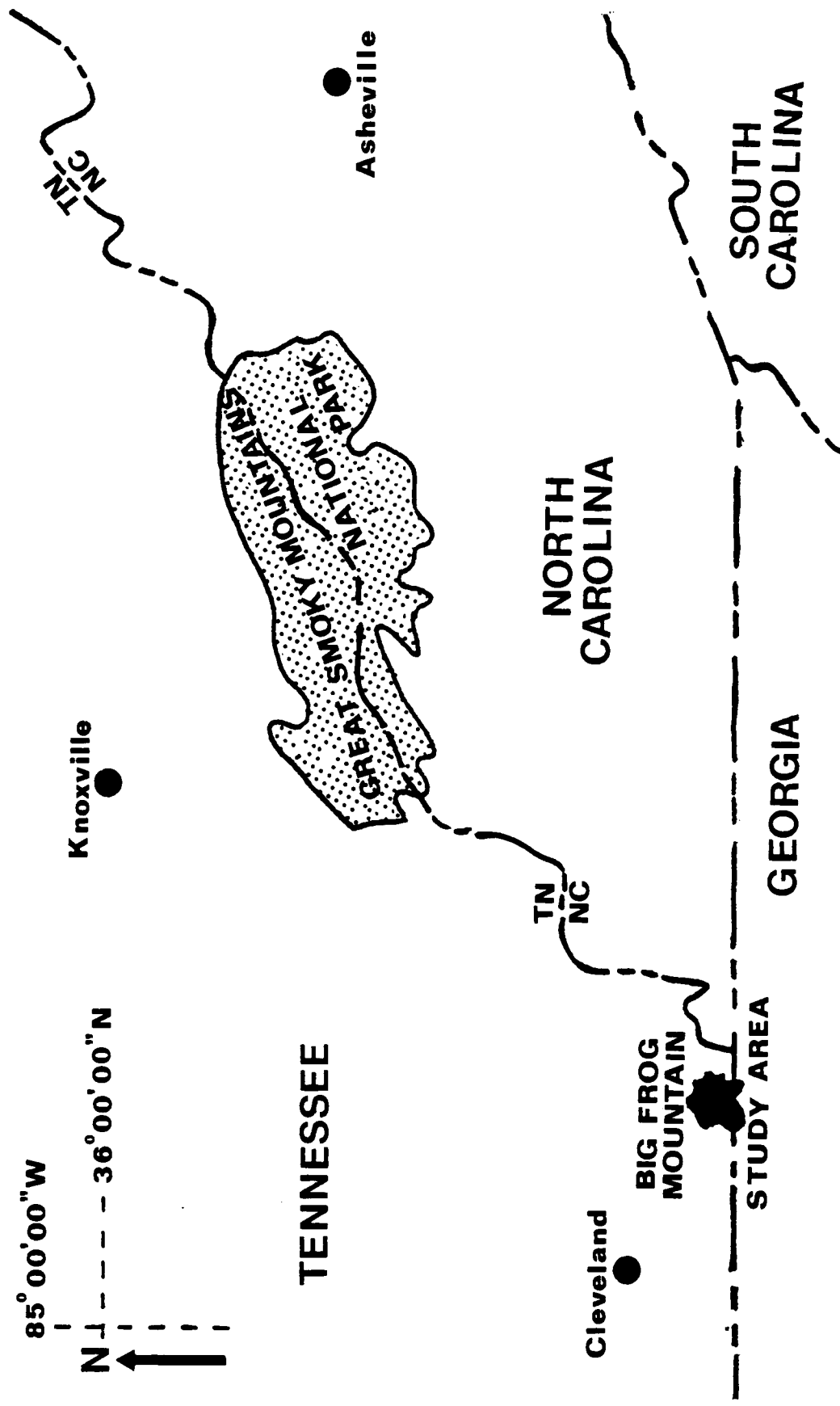


Figure 1. General location of the Big Frog Mountain Study Area.

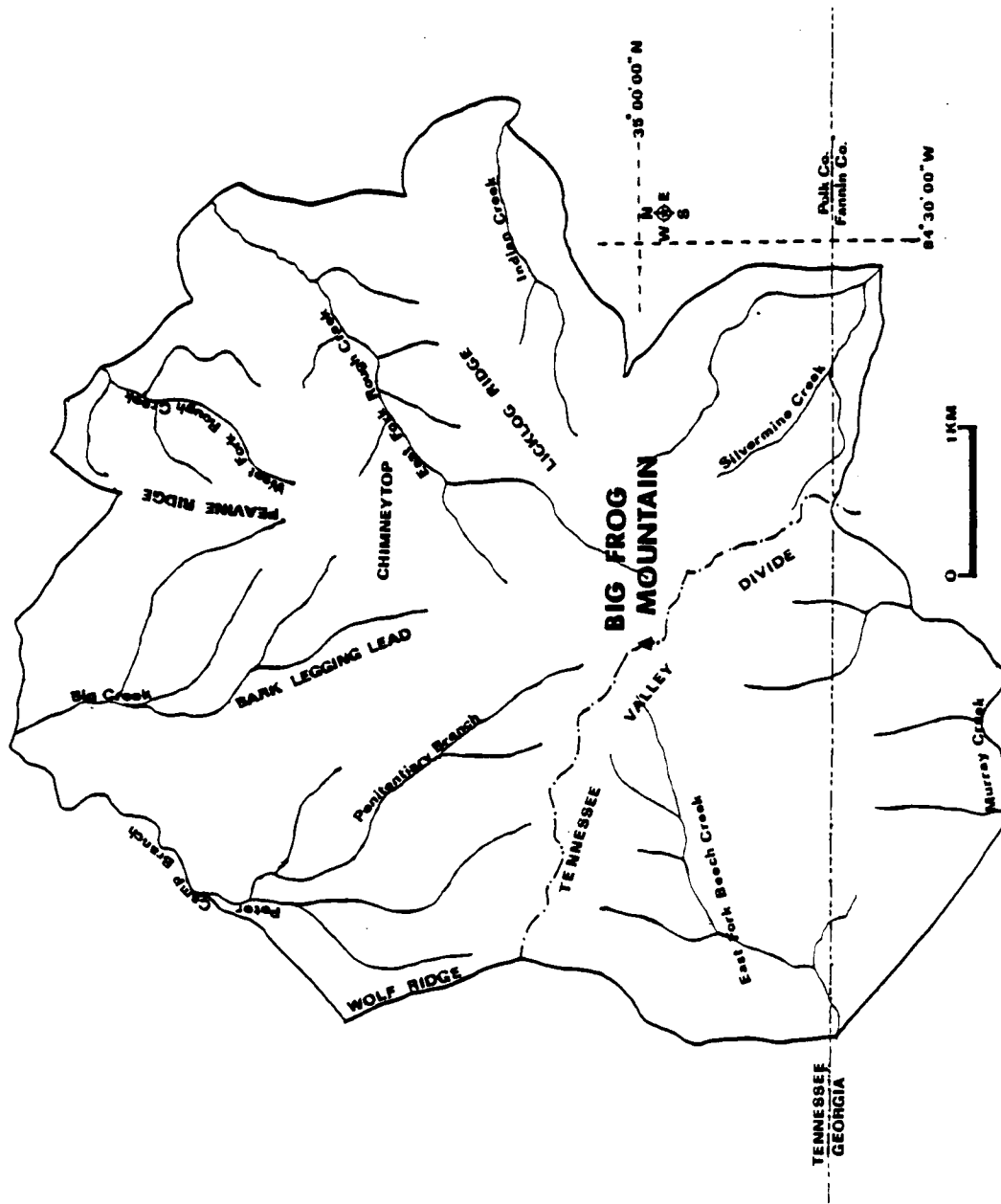


Figure 2. The Big Frog Mountain Study Area.

northern portion of the study area maintains the boundaries of the BFM Wilderness Area. From the Wilderness Area boundary on the Tennessee Valley Divide at the GA/TN state line, the study area boundary extends southwest to Murray Creek, following Murray Creek to the third unnamed branch flowing from the south face of BFM. The study area boundary extends northwest to the intersection of East Fork Beech Creek and West Fork Beech Creek and follows West Fork Beech Creek and rejoins the BFM Wilderness Area at Wolf Ridge.

CHAPTER II

METHODS

Collections of the vascular flora were made on a biweekly basis during the growing seasons from March, 1983 through April, 1985. Collections were made in one to three day periods, with several workers assisting at various times throughout the study. Base camps were set up at one of three sites close to the study area and forays were made daily into the study area. Twenty-six trips were taken to the study area, involving a total of 54 collecting days. Twenty-three workers assisted in this study producing a total of 139 people-collecting days during the study.

The three areas used most frequently as base camps were to the south, north and east of the study area. In the south, the summit of Hemp Top Mountain provided a base camp 2 km from the study area. A large primitive camping area on Peavine Ridge Road at Big Creek was the second base camp, 1.5 km from the study area. The third camp was at the intersection of East Fork Rough Creek and West Fork Rough Creek. From this camp it was possible to drive 1.5 km into the study area along the East Fork Rough Creek Road.

Much of the first growing season involved reconnaissance of the area and identification of botanically significant areas, while the second season involved more intensive collecting of those areas found to be botanically significant. The boundary, all trails, ridges and drainages were hiked at least once and several of the more significant areas were visited several times. The repeatedly visited significant

areas were the Big Creek drainage, the Rough Creek drainage (both the East and West Forks), Wolf Ridge, and the higher elevations on the mountain, above 1,100 m.

Collections were tentatively identified and pressed at the base camp and were dried upon return to the University of Tennessee, Knoxville. Collections were later identified using the facilities at the University of Tennessee Herbarium, Knoxville (TENN). A voucher specimen of each taxon collected will be deposited in TENN. Duplicate specimens will be distributed at a later date.

CHAPTER III

GENERAL DESCRIPTION

Physiography

BFM is on the southwest edge of the Blue Ridge Province in the southern Appalachians. Fenneman (1938) describes the topography of the southern Blue Ridge Province, which is the area south of the Roanoke River, as "subdued." Fenneman believed that over time the once rugged topography had been eroded to a gentler type. Crags, bare cliffs and talus slopes are rare. Correspondingly, the topography of BFM is typical for this region.

Fenneman (1938) describes the southern Blue Ridge Province as having precipitous slopes associated with recently deepened gorges with the "summits commonly rounded and the higher slopes less steep than the valley sides." This description is applicable to BFM. Even though bare cliffs and crags are few, the terrain is steep and rugged, with the elevation rising from 451.4 m at the junction of Peter Camp Branch and Big Creek, to 1288.3 m at the summit. The 1972 Forest Service Master Fire Plan classified 9% of the area as 19-36% slope with the remaining land steeper than 36% and a majority of the area reaching 54% slope or more (USDA Forest Service 1982).

BFM consists of a series of long ridges which converge at the summit, with the drainage developing in a radial pattern. Four major ridges radiate from the summit of BFM and these ridges are in turn dissected at the lower elevations. The Tennessee Valley Divide follows Wolf Ridge east to the summit and then extends south to Hemp

Top Mountain. The waters flowing southwest from the summit form Murray and Beech Creeks, which eventually flow into the Alabama River and the Gulf of Mexico. The other streams flow north to the Ocoee River which then flows into the Tennessee River.

The headwaters of 10 streams originate at BFM. Most of the streams on BFM are intermittent at elevations above 900 m. There is a small spring near the summit which flows from September to June, only flowing enough to moisten the soil in the dry summer months. In the spring, heavy rains transform the intermittent streams into raging torrents. There are a few waterfalls on the mountain, most are between the elevations of 800 and 1100 m. Some of the falls reach 8 m in height, but there is usually very little streamflow at these elevations through most of the year.

Trails and Roads

Three "light motor roads" circumnavigate all but the southwest portion of the study area. These three roads, Peavine Road in the north, Big Frog Road in the west, and Tumbling Creek Road in the east, generally follow the study area boundary at a distance of 1.0 to 1.5 km.

Three "poor motor roads" access the study area. Hemp Top Road, a branch of Tumbling Creek Road, terminates at the summit of Hemp Top Mountain, 2.0 km from the study area boundary at Low Gap. The other two "poor motor roads" follow the East Fork Rough Creek and West Fork Rough Creek to reach the boundary of the study area, and the road along East Fork Rough Creek extends 1.5 km into the study area.

Access from Ocoee No. 3 Powerhouse on Highway 64 or from an unnamed road off of Highway 68, 1.5 km south of the intersection of Highways 64 and 68 are the two best methods to reach the study area. Driving time from these two points to the trailheads of the access trails is from 30 to 45 minutes.

Eight trails access the study area (Figure 3). Hemp Top Trail in the south, Chestnut Mountain Trail and Wolf Ridge Trail in the west, Big Creek Trail and Low Gap Trail in the north and Rough Creek Trail and Licklog Ridge Trail in the northeast are the access trails to the study area. Each of these trails involves a walk of ca. 1.5 km to reach the study area boundary.

The trail system within the area is described by the Forest Service as one of the most extensive and best maintained trail systems in the Cherokee National Forest. Eight foot trails totalling more than 41 km were hand built by the Civilian Conservation Corps in the 1930's. The entire trail system was refurbished in 1978 (USDA Forest Service 1982).

Forests

Braun (1950), K  chler (1964), and the Society of American Foresters (Eyre 1980) have mapped the vegetation of North America or eastern North America. The Forest Service (USDA Forest Service 1982) surveyed the forests of the BFM Wilderness Study Area in terms of the marketable timber present on the mountain. Due to the floristic nature of this study, quantitative data on the forest types of BFM were not obtained. The author's comments on the forests of BFM are

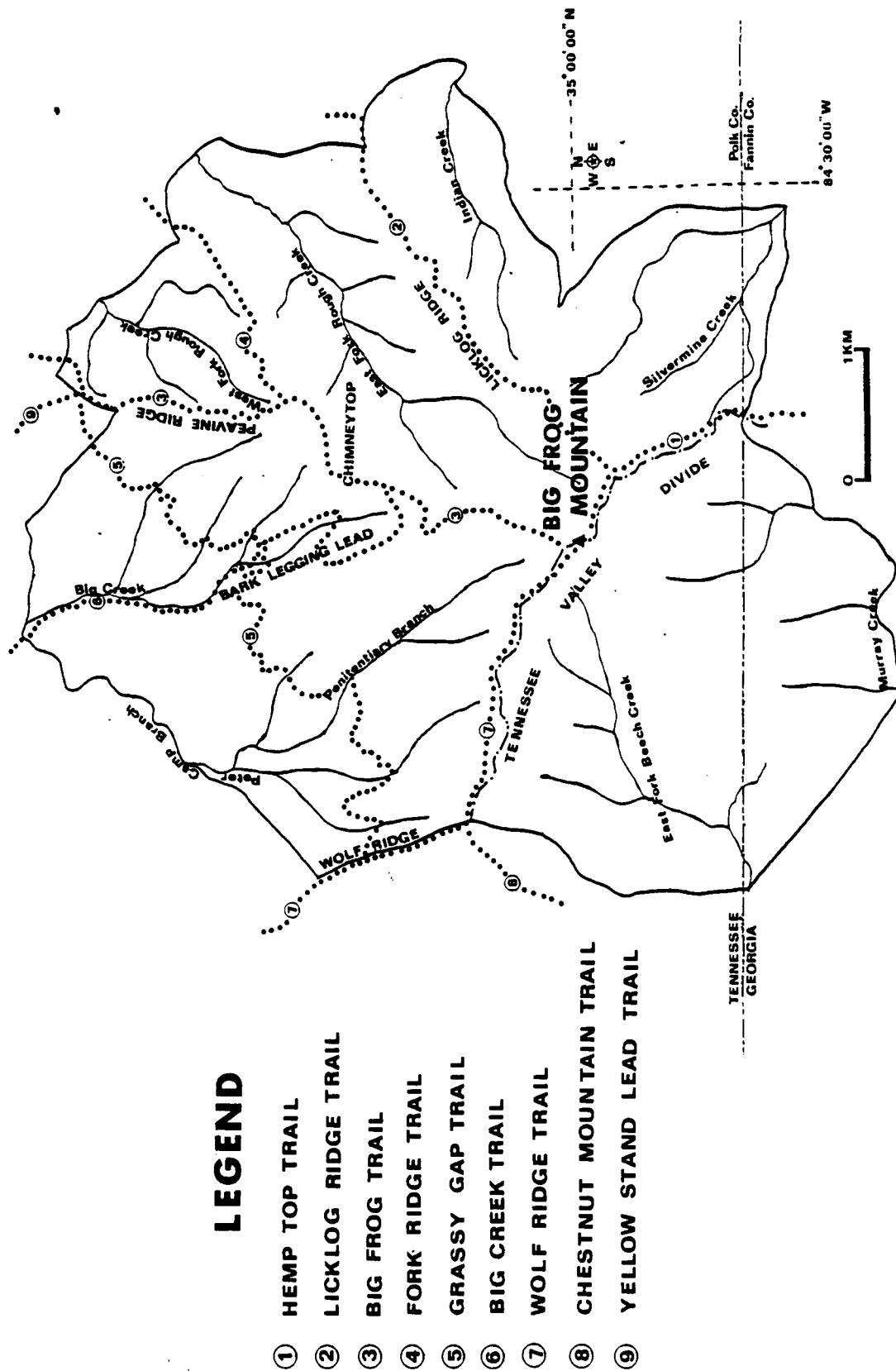


Figure 3. Trail system of the Big Frog Mountain Study Area.

based entirely upon general impressions formulated through two years of field work on the mountain, and are found in Chapter VII.

BFM is within the area described by Braun (1950) as the Oak-Chestnut Forest region. Braun divided the Oak-Chestnut forests into three principal groups, each with a number of forest types. The three principal types are the northern forests, moist slope and cove forests, and dry slope and ridge forests. The northern forests are described as high elevation associations of spruce-fir, hemlock-yellow birch, and northern hardwoods. Basswood-buckeye, northern red oak, cove hardwoods, yellow poplar, cove hemlock, white pine, chestnut and chestnut oak are included in moist slope and cove forest of moderate elevations. The dry ridge and slope forest, also of moderate elevations, includes chestnut oak, black oak-scarlet oak and pitch pine-mountain pine. As a consequence of the chestnut blight, the Oak-Chestnut Forest region is no longer found in its original condition and this may account for some of the discrepancy between Braun's findings and that of more recent workers.

BFM is included in the area which K  chler (1964) mapped as the Appalachian oak forest. It must be emphasized that this is the potential natural vegetation which K  chler (1964) defined as the forest which would be present if "man were removed from the scene and if the resulting plant succession were telescoped into a single moment." This forest is dominated by white oak and northern red oak, with American chestnut as a former codominant. Associates of this forest are Acer rubrum, A. saccharum, Betula lenta, Carya cordiformis, C. glabra, C. tomentosa, Fagus grandifolia, Liriodendron tulipifera,

Pinus strobus, Quercus coccinea, Q. ilicifolia, Q. muhlenbergii, Q. prinus, Q. velutina and Tsuga canadensis.

The Society of American Foresters (Eyre 1980) shows BFM on the ecotone of the Oak-Pine Forest and Oak-Hickory Forest. These forest types are separated into several subgroups, the Oak-Pine Forest with four subgroups and the Oak-Hickory Forest with 11 subgroups in the southern Appalachian region. The four subgroups of the Oak-Pine Forest are shortleaf pine-oak, Virginia pine-oak, loblolly pine-hardwood, and slash pine-hardwood. The 11 subgroups of the Oak-Hickory Forest are post oak-blackjack oak, chestnut oak, white oak-black oak-northern red oak, white oak, black oak, northern red oak, black locust, yellow poplar, yellow poplar-eastern hemlock, yellow poplar-eastern hemlock-northern red oak, and sassafras-persimmon.

According to the USDA Forest Service Wilderness Study Report (1982), BFM has a typical southern Appalachian second growth forest. This report states that most of the area consists of immature timber stands of uniform age. Due to the effects of logging at the lower elevations, and a combination of fire and chestnut blight at the upper elevations, 86% of the trees in the area are thought to be between the ages of 50 and 70 years old; very little old growth is present.

The Forest Service describes the forest in three "forest working groups": Virginia Pine, Upland Hardwoods and Cove Hardwoods. The Virginia Pine working group is described as a pure or mixed stand on ridge tops and middle elevation west facing slopes. These stands occur below 915 m and may have a small component of shortleaf pine and upland hardwoods. The Upland Hardwood stands are described as white

oak, red oak, and hickory associations found in shallow coves which may also contain a large component of white pine. The Cove Hardwood stands are reportedly in the deeper coves and along streams. These cove hardwood stands consist of yellow poplar, white oak and northern red oak, which may be mixed with white pine or hemlock. Intermingled in this forest working group the Forest Service reports the presence of beech, basswood, birch, red maple, black gum, silverbell, black cherry or walnut. These forest working groups were divided according to percent of cover within the 2043 ha Big Frog Wilderness Area and were found to be present in the following amounts: Virginia Pine, 34% (688 ha); Upland hardwood, 47% (966 ha); and Cove hardwood, 19% (390 ha) (USDA Forest Service 1982).

Wildlife

The wildlife found in the study area is similar to that found elsewhere in the southern Appalachians. Statistics for the Great Smoky Mountains indicates a population of one bear per square mile, which is comparable to the bear population at BFM. Fifty bears were released in the Ocoee Ranger District between 1973 and 1982, with the majority being released in the vicinity of Rough Creek, artificially increasing the density of black bear in the area. Estimates of the European wild boar population in the Ocoee Ranger District would indicate a population of 24 boar or one boar per 114 ha on BFM. The deer population is limited in the area due to the low habitat diversity. Squirrel, grouse, turkey, fox, raccoon, quail and rabbit along with non-game animals such as songbirds, raptors, and furbearers

are present in the study area, but no formal inventories have been done to measure the population densities (USDA Forest Service 1982).

Several streams in the study area are fishable trout streams, with the principle fish species being the introduced rainbow trout. Approximately 45.8 km of fishable streams drain BFM, with Big Creek and its tributaries (19.3 km) being the longest. The other major streams are East Fork Rough Creek (7.9 km), West Fork Rough Creek (4 km), Indian Creek (2.9 km), Silvermine Creek (5.3 km), East Fork Beech Creek (1.6 km), West Fork Beech Creek (1.6 km), and Murray Creek (3.2 km). Big Frog Mountain is within the historical range of the brook trout, but evidently habitat destruction and competition from rainbow trout have extirpated the brook trout in the area (USDA Forest Service 1982).

CHAPTER IV

GEOLOGY AND SOILS

Geology

The Blue Ridge Province in northern Georgia and southeast Tennessee contains a thick sequence (1-5 km thick) of sedimentary rock overlain by a 6-15 km thick layer of metamorphic rock that has moved northwestward 100 km or more over the younger sedimentary rocks (Slack, Gazdik, and Dunn 1982). The metamorphic rock, called the Ocoee series, of the later Precambrian age, is of sedimentary origin but has been metamorphosed to varying degrees (King et al. 1958).

The Ocoee series can be divided into three groups, the Snowbird group, the Great Smoky group and the Walden Creek group. The Snowbird group lies beneath the Greenbriar Fault in the foothills north of the main Great Smoky Mountains. The upper plate of the Greenbriar fault is the Great Smoky group, which terminates to the northwest along the trace of the fault, extending 32-40 km southeastward, and continuing 160 km southwest into north Georgia. In the northwesternmost foothills of the Great Smoky Mountains the Walden Creek group forms a belt up to 13 km wide, extending several miles northeast and southwest along the strike (King et al. 1958).

BFM contains two of the major units of the Ocoee Supergroup, the Great Smoky group and the Snowbird group. The Greenbriar Fault, which separates these two groups, divides the northwest part of the study area extending from Low Gap Branch in the north, parallel to Peter Camp Branch, across Wolf Ridge at 1040 m and southward near East Fork

Beech Creek. The fault separates the fine-grained pyritic slate and slaty metasiltstone of the Snowbird group to the northwest and the courser metasandstone and minor interbedded slate of the Great Smoky group to the southeast (Slack, Gazdik, and Dunn 1982).

Soils

The soils of BFM have been mapped by Slack, Gazdik, and Dunn (1982) in the Big Frog Mountain Wilderness Area and by Gair, Gazdik, and Dunn (1982) in the Cohutta Wilderness Area. Metamorphosed sandstone banded with green schist, arkose, graywacke, and dark slate of the Ocoee Supergroup comprise the rocks of the area. The soils of BFM are derived from slate, residuum (arkose and graywacke), phyllites, and sandstone.

A large portion of the area has been mapped as the Slyco soil type which is skeletal in nature and exhibits many rock outcrops. Small amounts of the Wallen series have been mapped on the ridges and upper slopes. Most of the soil is classed as dry to droughty and this has resulted in very low rates of soil development over most of the area. High levels of moisture, faster weathering, and deposition of colluvium have resulted in better developed soils of the Spivey soil type along the streams.

No mineral deposits of economic value have been found in the study area. Local rumors persist which indicate the presence of silver and tin in the area, but only very small quantities of these deposits have been found.

CHAPTER V

CLIMATE

A Tennessee Valley Authority study (TVA 1959), over a 25 year period from 1935-1959, in the Tennessee River Basin indicates that the average yearly precipitation at BFM is between 165 and 177 cm per year. This average is comparable with the Tennessee Valley Divide in the mountains of North Carolina and Georgia and with the high levels seen in the Great Smoky Mountains. These areas of high yearly precipitation are evidently influenced by the differences in elevation between the mountains and the surrounding region.

Even though the general climate of BFM is similar to the surrounding areas, the variation in elevation does have some effect on the mountain's climate. In general, the mountain is colder and wetter than the surrounding region due to the elevational gradient (USDA Forest Service 1982). The climatic effects on the vegetation as the elevation changes from 451 m at the base of the mountain to 1288 m at the summit, over a distance of 4.5 km, correlate well with the variation described by Shanks (1954) and Whittaker (1956) for the Great Smoky Mountains, although the elevation is not as great at BFM.

Cloud cover and fog are associated with the summit of BFM throughout much of the year. A journal written by Rosine Parmentier (1852), a visitor to the area from New York, stated that Big Frog Mountain was actually a misnomer. She concluded that the correct name of "Big Fog Mountain" was an indication of the high level of moisture associated with the mountain.

Air quality at BFM is described as moderate to good. Prevailing winds are from the west and southwest. These winds occasionally bring pollutants from Chattanooga, Tennessee. Infrequently, periods of extreme air stagnation or shifts in prevailing wind patterns results in the degradation of air quality from pollutants produced by industrial activity at Copperhill, Tennessee (USDA Forest Service 1982).

CHAPTER VI

HISTORY OF THE AREA

Human Habitation and Use

According to the USDA Forest Service (1982), BFM has a low potential for cultural site occurrence. Cultural sites in the Cherokee National Forest are almost invariably found in areas which have slopes not exceeding 13.5% and have a readily available supply of water. The 1972 Master Fire Plan for BFM classified 9% of the area as having 19 to 36% slope and the remaining land steeper than 36%. Therefore, there is very little land in the study area which would have been suitable for human habitation.

The mountains of Tennessee, Georgia, and the Carolinas were the home of the Cherokee Indians in the seventeenth and eighteenth centuries. In 1775, it is estimated that the Cherokee population totalled 15,000 people scattered in 40 towns and villages (Cotterill 1954). The Cherokees must have traveled and hunted in the area of BFM, but no remains of habitation have been found (USDA Forest Service 1982). John Roy Brackett, a local amateur archeologist and former Cherokee National Forest Ranger, has hiked extensively in the area and has been unable to locate any Indian sites on the mountain (John Roy Brackett pers. comm.).

A nineteenth century Dutch settlement, called Bayer's settlement, was located at Pace Gap at Dutch Fields, on the west side of Wolf Ridge outside of the study area (Gattinger 1901). Even though most of the settlers were thought to have left during the Civil War (Kirk

Johnson pers. comm.), Gattinger (1901) described it as a secluded, but inhabited, small settlement. This area is now being considered as a Cultural Area in the Cherokee National Forest, and would be managed as such if the Draft Management Plan is approved (USDA Forest Service 1984).

The only other known homesite near the study area is the Van Arter or Vann Arthur homesite near Chestnut Mountain on Big Frog Road (John Roy Brackett pers. comm.). This homesite is also the location of an old Indian campsite and was the first meeting place of the annual Polk County Ramp Tramp, a spring festival which has been celebrated by the local residents since 1958 and now attended by ca. 200 people annually (Lillard 1983).

The rich mineral resources of the nearby Copper Basin were discovered by gold miners in the 1830's but open pit mining did not begin in the area until 1847. By 1857 copper smelting began using heap roasting techniques. The effects of the sulphur dioxide effluents from the smelting process and the use of local timber to fuel the smelters resulted in the deforestation of the Copper Basin during this time. The crude smelting method later became unprofitable and by 1879 the mining operations were idle. In 1890 newer smelting methods revived the industry, but by 1904 heap roasting was halted and equipment was installed to recover the sulphur as sulphur dioxide. The area was slowly unified into the Tennessee Copper Company which was later sold to the Cities Service Minerals Company. The operation was sold to the Tennessee Chemical Company in 1984 and they continue to extract copper, zinc ore concentrates,

sulphuric acid, liquid sulphur dioxide, and iron sinter today (Maher 1973).

Several suggestions have been made concerning the origin of the mountain's name, but the author was unable to ascertain which is actually correct. Parmentier (1852) stated that the name was actually Big Fog Mountain due to the cloud cover which frequently envelops the mountain. She also said that Mr. Guerin, an acquaintance and Polk County native, had attempted to persuade the local people to use the correct name to no avail. Some of the local residents claim that the mountain's name stems from the topography of the area, which is thought to resemble a frog (John Roy Bracket pers. comm.). Other suggestions for the origin of the name were that there was a "preponderance of frogs" in the area or that there was once an Indian chief named Big Frog (Lillard 1983).

The Forest Service purchased BFM as part of a larger tract from the Tennessee Timber Company in 1916. The upper slopes could not be logged due to the difficult terrain, but the lower slopes were first logged 60 years ago. The early logging was done with mules and oxen and the logs were dragged down streambeds to loading areas (USDA Forest Service 1982).

The study area is included in two Wilderness Areas of the National Forest, the 13,800 ha Cohutta Wilderness Area and the 2,045 ha Big Frog Wilderness Area. In 1975, Congress passed the Eastern Wilderness Act which designated the Cohutta as a Wilderness Area and Big Frog as a Wilderness Study Area. The Cohutta was designated Wilderness with little controversy, but the Big Frog Wilderness Area

did not receive Wilderness designation until October, 1984 after lengthy discussion between pro- and antiwilderness groups (Brewer 1983).

Public interest in the preservation of BFM through Wilderness designation first became apparent in the 1960's. This interest reached its highest point during the Roadless Area Review and Evaluation II (RARE II) in 1977 and 1978. Using the Wilderness Attribute Rating System (WARS) during the RARE II analysis, areas were assessed for natural integrity, apparent naturalness, opportunities for solitude, and primitive recreation. With a total score of 28 possible, Big Frog Wilderness Study Area was rated 21, the highest rating of the inventoried Cherokee National Forest roadless areas (USDA Forest Service 1982).

The Forest Service published a Draft Environmental Impact Statement separately for Big Frog and nearby Citico Creek in 1982. In the Big Frog publication, the Cherokee National Forest recommended that the upper 960 ha of the Big Frog Wilderness Study Area be made Wilderness and the lower 1085 ha be designated non-Wilderness (USDA Forest Service 1982). In response to the recommendation that only the upper portion of Big Frog and none of Citico Creek be designated as Wilderness, 31,000 people commented on the Forest Service Plan and two-thirds of those commenting were in favor of Wilderness designation in both areas (Brewer 1983). In October, 1984, Congress passed a bill (S.590) which incorporated all of the Big Frog Wilderness Study Area into the National Wilderness system, and this bill was signed into law

by President Ronald Reagan on October 30, 1984 (Will Skelton pers. comm.).

History of Botanical Explorations

Parmentier's (1852) journal provides the first written mention of the flora of BFM. Parmentier was a wealthy New Yorker visiting in the area of Polk County and collecting plants for inclusion in a botanical garden in the Northeast. She ascended the mountain on October 19, 1852 accompanied by Mr. and Mrs. Edward Bayer (owners of Bayer's settlement), M.E. Guerin and A. Chable. In her journal, she described the area called "Sugar orchard" and the summit as having ". . . tall plants and aromatic herbs, they have but little smell at present but it appears that in the summer it is so strong that it gives one a headache merely to pass through them." On return from the summit, she described seeing "many pretty flowers which were not yet faded among the pink phlox, and a scarlet flower which Adile [evidently referring to Mrs. Bayer] believed to be a *Lychnis*." Miss Parmentier also described an abundance of Chestnuts on the mountain, and said that six states (Tennessee, North Carolina, Kentucky, Virginia, Georgia and Alabama) could be seen from the summit.

In July, 1878, Gattinger, a renowned Tennessee botanist and author of the only published flora of Tennessee, ascended BFM from "Beyers Settlement" near Pace Gap at the north end of Wolf Ridge. The party spent one night at "Sugar Orchard" which was evidently the area on Wolf Ridge at 1052 m now known as Horse Camp Flat. Gattinger (1901) described the summit as an area in which

trees become scarce and more scattered, with great bald spaces between, with very low trunks in proportion to size of limb and crown. The chestnuts ramify so close to the ground that the lower limbs can be grasped with the hand.

Gattinger described the area as a great conservatory and said that the gems of this conservatory "are the herbaceous plants, which thrive here with unusual vigor." In the description of BFM, Gattinger listed 27 taxa which he found on BFM or in the general vicinity. A discussion of this list can be found in Chapter VIII.

There are two other references to BFM by Gattinger. On May 15, 1884, Gattinger spoke to the Agricultural Dairy and Livestock Convention in Nashville, Tennessee. In this speech he described the ascent of BFM and indicated that he found the temperature at the summit similar to that found in northern Ohio at 40° north latitude. In August, 1878, Gattinger wrote to Asa Gray describing his expedition to BFM and stated that

the vegetation made up of very diverse species was, in the upper part of the mountain exceedingly dense and luxurious rendering the ascent very tiresome. 6-7 feet was the average height of the tangles."

He also described the summit as being timbered with chestnuts in full bloom with black oak and Carpinus Americana (Oakes 1932).

Gattinger's Flora of Tennessee and A Philosophy of Botany (1901), contained an annotated checklist of the plants of Tennessee. There were 24 plants on this list which he described as being found at "Frog Mt.," "Frog Mts.," "Big Frog Mts.," or "Big Frog Mt." These taxa are discussed in Chapter VIII.

Since Gattinger's trip to BFM in 1878, very few botanists have collected in the area. An inventory of The University of Tennessee Herbarium, Knoxville (TENN) revealed 720 taxa collected in Polk County, Tennessee. Only 32 of these taxa were collected on BFM. Of these 32 collections, 25 were made by B. E. Wofford, T. S. Patrick, and F. F. Fusiak on September 17, 1981 along Wolf Ridge Trail to the summit. Of the remaining specimens, two were collected by Gattinger, two by W. R. Partridge, one by M. B. Wilson and two by A. Ruth. These taxa along with the label data are listed in Table I.

It is likely that several Gattinger collections were made from BFM, but most of his collections were lost in a fire which burned the University of Tennessee Herbarium in 1934. One Gattinger collection, located at the New York Botanical Garden (NY), is dated July 1878 and locality data is given as the summit of BFM. This unnumbered specimen is labelled M. virginicum L. It is annotated as M. latifolium Desr. by a penciled annotation of unknown authorship and date; T. S. Patrick annotated the specimen as M. latifolium, dated August 1984 (T. S. Patrick pers. comm.).

Albert Ruth collected Trillium erectum on BFM on May 15, 1892 and misidentified the collection as Trillium erythrocarpon. This specimen was in the Herbarium of T. M. Kearney and is now on deposit in the Herbarium of Ohio State University (OS) (T. S. Patrick pers. comm.).

A report to the Forest Service by L. Williams of Fort Olgethorpe, Georgia and K. Johnson of Chattanooga, Tennessee concerning the Wilderness designation of the Big Frog area included mention of the presence of Cymophyllus fraseri (Andr.) MacKenzie on Rough Creek Road

Table I. Previous collections from Big Frog Mountain in the University Tennessee Herbarium (TENN). The taxa are listed after the collector(s) with locality data from the label when appropriate.

B. E. Wofford, F. F. Fusiak and T. S. Patrick
 All of these collections were from Wolf Ridge Trail, 3400-4300'.

Agastache scrophulariaefolia (Willd.) Kuntze
Angelica triquinata Michaux
Aster linarifolius L.
Athyrium asplenioides (Michaux) A. A. Eaton
Clitoria mariana L.
Convallaria majalis var. montana (Raf.) Ahles
Crataegus flabellata (Spach) Kirchn.
Cuscuta compacta Jussieu
Dryopteris marginalis (L.) Gray
Galium latifolium Michaux
Helianthus strumosus L.
Heracleum maximum Bartram
Heuchera villosa Michaux
Lechea racemulosa Michaux
Liatris scariosa (L.) Willd.
Onoclea sensibilis L.
Paronychia canadensis (L.) Wood
Paronychia fastigiata (Raf.) Fern.
Prenanthes altissima L.
Prenanthes roanensis (Chickering) Chickering
Ptelea trifoliata L.
Pycnanthemum montanum Michaux
Silene ovata Pursh.
Thermopsis fraxinifolia M. A. Curtis
Veratrum parviflorum Michaux

V. R. Partridge
 Big Frog Mountain

Clintonia umbellulata (Michaux) Morong
Convallaria majalis var. montana (Raf.) Ahles

Table I (Continued)

A. Gattinger	
<u>Stenanthium</u> <u>graminium</u> (Ker.)	Frog Mountain, East Tennessee
Morong	
<u>Trautvatteria</u> <u>caroliniensis</u>	Summit, Big Frog Mountain
(Walter) Vail	
M. B. Wilson	
Frog Mts., 10 mi. west of Ducktown	
<u>Vaccinium</u> <u>pallidum</u> Aiton	
A. Ruth	
Top of Big Frog Mt., East Tennessee	
<u>Ranunculus</u> <u>hispidus</u> Michaux	

within what is now the Big Frog Wilderness Area (Johnson 1978). This information was later found to be incorrect (Williams pers. comm.).

Surveys of the Cohutta Wilderness Area were completed by H. DiGioia in 1970 and by B. Sanders in 1983. Both of these studies were done by road and did not involve the study area (DiGioia pers. comm.).

CHAPTER VII

RESULTS

Flora

A total of 476 taxa were identified from 994 BFM vascular plant collections. These taxa represent 262 genera and 91 families (Table II). Appendix A contains a list of the 476 taxa with a brief description of habitat and frequency on BFM. Several sources were used for taxonomic justification, and Appendix A indicates which source was used for each taxon. Two hundred twenty of the taxa were county records, which are indicated in Appendix A.

Rare Plants

Twelve of the taxa found at BFM are listed as Endangered, Threatened, or Special Concern in Tennessee (Table III) (Somers 1985). One taxon, Coreopsis latifolia, is a state record for Tennessee and is federally under study in Category II. Prenanthes roanensis is Threatened in Tennessee and is federally under study in Category II. A population status report for each taxon can be found in Appendix B.

Due to the proximity of North Carolina, South Carolina and Georgia to the study area, the rare plant lists for these states were evaluated to verify the presence of any of the collected taxa on these lists. Seven taxa were listed in North Carolina (Sutter et al. 1983), three in Georgia (McCollum and Ettman 1977) and 30 in South Carolina (South Carolina Advisory Committee 1984). This information is summarized in Table IV.

Table II. Summary of the flora of Big Frog Mountain.

	Pteridophytes	Gymnosperms	Angiosperms	Total
Families	8	1	82	91
Genera	14	2	246	262
Species	24	3	436	463
Varieties	0	0	11	11
Hybrids	0	0	2	2
Total taxa = 476				

Table III. Tennessee rare plants on Big Frog Mountain (based on Somers 1985).

STATUS	TAXA
I. ENDANGERED	<u>Coreopsis latifolia</u> Michaux (State record) <u>Thermopsis fraxinifolia</u> M. A. Curtis
II. THREATENED	<u>Diervilla lonicera</u> Miller <u>Panax quinquefolius</u> L. <u>Prenanthes roanensis</u> (Chickering) Chickering <u>Scutellaria saxatilis</u> Riddell <u>Silene ovata</u> Pursh
III. SPECIAL CONCERN	<u>Agastache scrophulariaefolia</u> (Willd.) Ktze. <u>Euonymus obovatus</u> Nuttall <u>Heracleum maximum</u> Bartram <u>Lonicera dioica</u> L. <u>Prunus virginiana</u> L.

Table IV. Rare, threatened or endangered plants from Big Frog Mountain listed for North Carolina, South Carolina, and Georgia.

Taxon	NC	SC	GA
<u>Aconitum uncinatum</u>		T	
<u>Aristolochia durior</u>		T	
<u>Asplenium rhizophyllum</u>		T	
<u>Athyrium pycnocarpon</u>		T	
<u>Betula allegheniensis</u>		T	
<u>Boykinia aconitifolia</u>		T	
<u>Campanula americana</u>		T	
<u>Carex purpurifera</u>	E		T
<u>Caulophyllum thalictroides</u>		T	
<u>Cimicifuga americana</u>		SU	
<u>Cladrastis kentukea</u>		T	
<u>Convallaria majalis</u> var. <u>montana</u>		T	
<u>Coreopsis latifolia</u>	E	E	
<u>Cypripedium acaule</u>			T
<u>Cypripedium calceolus</u> var. <u>pubescens</u>			T
<u>Dicentra cucullaria</u>		T	
<u>Disporum maculatum</u>	SRS		
<u>Dryopteris goldiana</u>		E	
<u>Dryopteris intermedia</u>		SU	
<u>Gaultheria procumbens</u>		T	
<u>Hydrophyllum canadense</u>		T	
<u>Juglans cinerea</u>		SU	

Table IV (Continued)

Taxon	NC	SC	GA
<u>Monarda didyma</u>		SU	
<u>Osmorhiza claytonii</u>		SU	
<u>Panax quinquefolius</u>	SC	T	
<u>Phacelia bipinnatifida</u>		T	
<u>Prenanthes roanensis</u>	SRS		
<u>Silene ovata</u>	PP	SU	
<u>Solidago bicolor</u>		T	
<u>Stachys tenuifolia</u> var. <u>latidens</u>		T	
<u>Stewartia ovata</u>		T	
<u>Trautvetteria caroliniensis</u>		SU	
<u>Trillium undulatum</u>		SU	
<u>Triphora trianthophora</u>		T	

North Carolina

E = Endangered
 T = Threatened
 SC = Special Concern
 PP = Primary Proposed
 SRS = Significantly Rare Species

South Carolina

E = Endangered
 T = Threatened
 SU = Status Unresolved

Georgia

E = Endangered
 T = Threatened

Forests

The forest types on BFM can be divided into the three principal groups used by Braun (1950) to describe the Oak-Chestnut Forest region. Eight of the subgroups designated by the Society of American Foresters (Eyre 1980) as components of the Oak Pine-Forest and the Oak-Hickory Forest were found at BFM, and three subgroups of the Maple-Beech-Birch Forest not mapped for the BFM area (Eyre 1980) were also present on the mountain. These subgroups will be discussed within the framework of Braun's principal groups.

The northern forest described by Braun (1950) occurs at BFM in the mesic rocky coves, above 1100 m, which form the headwaters of Big Creek, East Fork Rough Creek, Penitentiary Branch and Indian Creek. Yellow birch, sugar maple, beech and buckeye are dominant in these sites; the herbaceous layer is dominated by southern lady fern (Athyrium asplenoides), mountain woodfern (Dryopteris campyloptera), and mountain bugbane (Cimicifuga americana). Mayflower (Maianthemum canadense) and mountain maple (Acer spicatum) are present though not prevalent, indicating the northern relationship of the cove flora, according to Braun (1950). This community would correspond with the sugar maple, sugar maple-beech-yellow birch, and sugar maple-basswood subgroups of the Maple-Beech-Birch Forest described by the Society of American Foresters (Eyre 1980). This is a northern forest type not mapped south of Virginia by Society of American Foresters (Eyre 1980), but is recognized farther south by K  chler (1964) and Shantz and Zon (1924).

In the mesic coves below 1100 m the forest conforms with Braun's (1950) description of the moist slope and cove mixed mesophytic forests. The typical basswood-buckeye, sugar maple and hemlock community occurs in these coves. The Society of American Foresters (Eyre 1980) subgroups of yellow poplar and yellow poplar-eastern hemlock occur at the lowest elevations to approximately 800 m. A few predominately hemlock stands occur on Peter Camp Branch and East Fork Rough Creek.

The mixed mesophytic basswood-buckeye-sugar maple community is prevalent in the rocky mesic coves, hemlock is a common associate. Other associates include black cherry (Prunus serotina), fraser magnolia (Magnolia fraseri), ash (Fraxinus americana), yellow birch (Betula allegheniensis) and yellowwood (Cladrastis kentukea). The shrub layer is dominated by rosebay (Rhododendron maximum) along the streams and some of the mesic north-facing slopes where dense "rhododendron hells" are present, but spicebush (Lindera benzoin) and Hydrangea arborescens are more prevalent away from the streams. The herbaceous layer is thick and heterogeneous; some of the taxa present are Canada violet (Viola canadensis), sweet cicely (Osmorhiza claytonii), meadow rue (Thalictrum thalictroides), bloodroot (Sanguinaria canadensis), foamflower (Tiarella cordifolia), toothwort (Dentaria diphylla), and mayapple (Podophyllum peltatum).

The dry slope and ridge forest described by Braun (1950) occurs on the rocky ridges and slopes and is the dominant community type on the mountain. The white pine-Virginia pine-chestnut oak complex is dominant on some of the drier slopes, a few of the sub-xeric slopes on

the west side of the mountain are forested entirely by chestnut oak. These forests would correspond with the Society of American Forests (Eyre 1980) subgroups of Virginia pine, Virginia pine-oak, and chestnut oak. Sourwood (Oxydendrum arboreum), red maple (Acer rubrum), Vaccinium spp., Gaylussacia spp., and Galax urcelolata are usually present in these forests.

Above 1160 m the ridges gently slope to the mountain crest. On these crests the white oak community is prominent with a strong element of northern red oak and black oak. Hawthorn (Crataegus iracunda) is common and at times forms fairly thick stands in the understory. Azalea (Rhododendron calendulaceum) and holly (Ilex montana) are strong elements in the understory and the hayscented fern (Dennstaedtia punctilobula) is nearly ubiquitous. This forest conforms to the Society of American Foresters (Eyre 1980) subgroups of white oak-black oak-northern red oak, and northern red oak. At the highest elevations (1220 to the summit), dwarfing becomes pronounced and the stands become more open. This is evidenced by the park-like quality of the summit forest where two major ridges, Bark Logging Lead and Licklog Ridge, extend approximately 0.8 km north and east, respectively, while only dropping from 1288 m at the summit to an elevation of 1220 m. On these ridges an "orchard" white oak community is present, sometimes mixed with northern red oak and black oak. A minor element of black cherry (Prunus serotina) and bitternut hickory (Carya cordiformis) is also present. Dominants in the herbaceous layer are bottlebrush (Hystrix patula) giant hyssop (Agastache scrophulariaefolia), and hayscented fern (Dennstaedtia punctilobula).

A small stand of shrubby beech occurs at 1250 m elevation, 0.25 km east of the summit. This stand is 20 m in diameter with all individuals less than 6 m in height. This population is on the edge of a mixed northern hardwood forest near the headwaters of East Fork Rough Creek.

On the south side of the mountain, 1.25 km southwest of the summit, a small bog occurs at 915 m. This bog, Bear Wallow Bog, is nearly dry in the summer and is frequently disturbed by wild boar. The surrounding forest is a mesic cove hardwood forest; Oxypolis rigidior, Plantanthera clavellata, Gratiola virginiana and Sphagnum spp. are dominant in the bog.

A small clearing with several introduced wildlife forage taxa, such as Elaeagnus umbellulata, is at 450 m near the intersection of Big Creek and Peter Camp Branch. The only other disturbed areas with a large influence from introduced taxa are the East Fork Rough Creek Road and the Hemp Top Trail.

Distributions of Taxa

Distributional data of the taxa collected were examined in an attempt to understand the phytogeographical significance of BFM. Using information from Gray's Manual of Botany (Fernald 1950), various state floras and the University of Tennessee Herbarium (TENN), the taxa were separated into groups with similar geographical distributions. Using the distributional information, the taxa could be divided into six groups with northern and southern affinities separating each group for a total of 11 groups (the introduced taxa

were not divided into northern and southern affinities). This information is shown in Table V.

A second method of analysis was used to group the taxa into six floristic elements. The taxa were first divided into intraneous, extraneous and introduced as prescribed by Cain (1971). The intraneous group was divided into three subgroups of those taxa found in North America or eastern North America, those found in the southeastern region of North America, and those taxa which are endemic to the Blue Ridge or the southern Appalachians. The extraneous taxa were divided into two groups, those found from Canada south to Tennessee and north Georgia, and the taxa found in the Appalachian Mountains. The taxa with a distribution from Canada south to Tennessee and north Georgia have a funnel-shaped distribution with a broad distribution in the north which narrows as it extends southward. Table VI summarizes these data.

Three of the taxa were endemic to the Blue Ridge Province and 29 were endemic to the southern Appalachians. The Blue Ridge Province boundary used here follows Fenneman (1938). Appalachian Provinces (Hunt 1974) used here include the Appalachian Plateaus Province, the Ridge and Valley Province and the Blue Ridge Province. The endemics to both areas are listed in Table VII.

Table V. Analysis of the floristic elements and centers of distributions of the flora of Big Frog Mountain.

Categories of Elements	Number	Percent	Example
I. Canada south to Florida and Texas (N)	116	24.4	<u>Amphicarpa bracteata</u>
Florida and Texas north to Canada (S)	46	9.7	<u>Lobelia cardinalis</u>
II. New England and Upper Midwest south to Florida and Texas (N)	81	17.0	<u>Stenanthium gramineum</u>
Florida and Texas north to New England and Upper Midwest (S)	61	12.8	<u>Lycopus virginicus</u>
III. Virginia and West Virginia west to Central Midwest and south to Florida and Texas (N)	4	0.8	<u>Gentiana decora</u>
Florida and Texas west to Central Midwest and north to Virginia and West Virginia (S)	11	2.3	<u>Sanicula smallii</u>
IV. Canada south to Tennessee and north Georgia (N)	78	16.4	<u>Trillium erectum</u>
Florida north to Tennessee (S)	0	0.0	
V. Appalachian interior (N)	8	1.7	<u>Dryopteris campyloptera</u>
Appalachian interior (S)	50	10.5	<u>Vaccinium hirsutum</u>
VI. Introduced	21	4.4	
	476	100.0	

N = northern, S = southern (Fernald 1950)

Table VI. Analysis of the geographical affinities of the vascular flora of Big Frog Mountain.

	Number of Taxa	Percent
<u>INTRANEIOUS</u>		
I. North America/Eastern North America	304	63.9
II. Southeast	15	3.1
III. Strict Endemic	32	6.7
<u>EXTRANEIOUS</u>		
IV. Canada south to Tennessee and north Georgia	78	16.4
V. Appalachian Uplands	26	5.5
<u>INTRODUCED</u>		
VI. Introduced	<u>21</u> 476	<u>4.4</u> 100.0

Table VII. A List of Southern Appalachian endemics (sensu Harper 1947) and Blue Ridge Province endemics (sensu Fernald 1950) present on Big Frog Mountain. Blue Ridge Province endemics are indicated by an asterisk (*).

<u>Angelica triquinata</u>	<u>Pyrularia pubera</u>
<u>Aster curtisii</u>	<u>Rhododendron calendulaceum</u>
<u>Astilbe biternata</u>	<u>Rhododendron catawbiense</u>
<u>Boykinia aconitifolia</u>	<u>Robinia hispida</u> var. <u>rosea</u>
<u>Campanula divaricata</u>	<u>Stewartia ovata</u>
<u>Carex austro-caroliniana</u>	<u>Solidago curtisii</u>
<u>Carex purpurifera</u>	<u>Solidago roanensis</u>
<u>Cimicifuga americana</u>	<u>Stachys tenuifolia</u> var. <u>latidens</u>
<u>Convallaria majalis</u> var. <u>montana</u>	<u>Thalictrum clavatum</u>
* <u>Coreopsis latifolia</u>	<u>Thermopsis fraxinifolia</u>
<u>Galax urceolata</u>	<u>Thermopsis mollis</u>
<u>Galium latifolium</u>	<u>Trillium simile</u>
* <u>Gaylussacia ursina</u>	<u>Vaccinium erythrocarpum</u>
<u>Magnolia fraseri</u>	<u>Vaccinium hirsutum</u>
* <u>Prenanthes roanensis</u>	<u>Vaccinium pallidum</u>
<u>Pycnanthemum montanum</u>	<u>Veratrum parviflorum</u>

CHAPTER VIII

DISCUSSION

An evaluation of the floristic and phytogeographical significance of BFM requires a reconstruction, from the literature, of the prehistoric and historic flora of the region. The data gleaned from this reconstruction can be compared to the known present day flora of BFM to ascertain the effects of the mountain, as a geological and topographic entity, on plant migrations. The author acknowledges the difficulties and controversy which surround some of this reconstruction, but believes that the significance of the floristic elements at BFM can best be understood in light of this accumulated body of knowledge. This idea was best stated by Cain (1947) who said,

It is certainly true that any natural area which one wishes to study can not be wholly understood in terms of present day conditions. There are always aspects of the communities, and of the component fauna and flora, which can be understood only in the light of past evolution and migration. And these, in turn, are related to past changes in geology, climate, etc.

To this end, the author will begin with an examination of the floristic and vegetational history of the region and will complete the chapter with an analysis of how these data relate to the present day flora of BFM.

To understand the development of the land surface and the effects on vegetation, the Paleozoic Era is not significant to the study of modern forests, and it is reasonable to begin when the earliest known angiosperms grew in eastern North America at the close of the

Paleozoic Era (Graham 1964). This was a time of intense folding and faulting of the accumulated sediments of the Appalachian geosyncline, due to the vice-like force exerted by the continental masses of North America and Africa (Rodgers 1970). The eastern and southern parts of the old land area called Appalachia sank forming the sedimentary platform of the Atlantic and on the western side new land was added forming the Appalachian Highland. The Gulf Coast region, which was probably continuous with Appalachia, sank and the Ouachitas and Ozarks were formed. Erosion then began to work on the high mountains and plateaus which had been formed (Braun 1950). From this time to the present there have been high mountains in eastern North America (Graham 1964).

In the early Mesozoic, 200 million years ago (mya), the configuration of land masses formed a single "super continent," Pangaea. The position of Pangaea, prior to breakup, was considerably south and east of the position presently occupied by the respective continents. By calculating the age of the outpourings of basaltic rocks along the continental margins, Schuster (1972) dated the initial breakup of Pangaea at 200 mya, in the middle of the Triassic Period. Pangaea split into Laurasia in the north and Gondwanaland in the south. Gondwanaland then split forming the Africa-South America bloc, the Antarctic-Australia bloc and the smaller India bloc. Therefore, at the beginning of the Jurassic Period, 180 mya, there was a rift between Laurasia and the three blocs comprising Gondwanaland (Schuster 1972).

The Mesozoic Era is thought to have been the period of the first appearance of angiosperms in the fossil record, followed by a rapid increase in numbers and area (Braun 1955, Daubenmire 1978). The first fossil evidence of angiosperms in the eastern United States is from the Lower to Middle Cretaceous (Graham 1964). In the later part of the Mesozoic, the angiosperms increased in proportion to the gymnosperms. The number of broad-leaved genera at this time is an indication of a dominant broad-leaved forest in eastern North America in the Mesozoic (Braun 1950).

During the Jurassic Period, the North American and Eurasian continents began to split from north to south, although they remained broadly united in the north. In the early Tertiary Period, 60-65 mya, the east-west migratory route of Eurasia and North America still remained and the temperate and warm temperate taxa which existed in the Greenland area indicates that there were no climatic barriers to this migration (Schuster 1972). This open pathway of migration from Asia to North America via Europe is not accepted by Raven and Axelrod (1974) who suggest that Beringia was the major migratory route, with the European pathway only available to cold-climate plants.

The early Tertiary broad-leaved forest of eastern North America extended over much of the continent from the area of the present day Rocky Mountains eastward. The southern and lower elevation areas probably contained a greater number of warm temperate and tropical forms than now occur and at higher elevations and northward the forest was temperate and essentially modern (Braun 1950). The temperate forest of the northern hemisphere which existed at this time has been

referred to by various authors as "Arcto-Tertiary" (Cain 1943, Braun 1950, Graham 1964) or the "Tertiary-mesophytic" (Li 1952) and is thought to be very similar to the Mixed Mesophytic Forest of today. The major genera of this forest included Fagus, Castanea, Ulmus, Alnus, Betula, Corylus, Populus, Juglans, Carpinus, Liquidambar, Sequoia and Ginkgo (Cain 1943). Although herbaceous fossils are non-existent, it is generally believed that these deciduous broad leaved forests had a well developed herbaceous layer similar to that of today (Cain 1943). This Arcto-Tertiary forest may have been relatively homogeneous and occupied an extensive circumboreal territory, "but at no time has there been an absence of climatic gradations related to latitude, altitude and continentality, or of floristic areas of some degree of differentiation" (Cain 1947). Braun (1950) thought that the altitudinal and latitudinal variation of the deciduous forest of the Eocene Epoch was comparable to the altitudinal and latitudinal variations seen today.

The theory of a widespread and uniform Arcto-Tertiary flora is not accepted by many workers. Wolfe (1972) studied the fossil evidence of Alaskan Tertiary floras and found evidence of tropical forest elements. Wolfe is concerned with confusion between the history of vegetation and the history of lineages. He argues that the Mixed Mesophytic Forest developed largely independently in several areas and the lineages are in the Mixed Mesophytic Forest coincidentally, having entered and departed in response to changes in parameters. This close-up examination of the fossil evidence suggests that the Arcto-Tertiary flora was very diverse and dynamic. In spite

of Wolfe's data, the generalized view of the forests at mid-Tertiary in boreal Asia, North America and Europe and extending southward in climatically and physiographically favorable areas, such as southeastern and western United States, eastern Asia and central Europe, is one of a diverse broad-leaved deciduous forest which was the progenitor of the Mixed Mesophytic Forest (Graham 1964).

It has been said that the similarities of the forests of eastern Asia and the southern Appalachians are so great that "a sense of *deja vu* is experienced by botanists of one of the regions visiting the other" (Boufford and Spongberg 1983). This similarity has been construed by many to indicate that these floristic elements are actually remnants of the widespread Arcto-Tertiary forest (Cain 1943, Li 1950, Braun 1950, 1955, Wood 1970). Wood (1970) describes four areas where genera which were widespread in the Tertiary have survived; eastern Asia, southeastern Europe and Asia Minor, southeastern North America, and western North America, especially northern California, eastern Oregon and Washington. By studying the similarities and the fossil record, attempts have been made to reconstruct this flora. Braun (1950) lists Aralia, Aristolochia, Asimina, Bumelia, Celastrus, Cercis, Cladrastis, Cornus, Diospyros, Euonymus, Ilex, Liquidambar, Lygodium, Magnolia, Rhamnus, and Taxodium as elements of this flora which have modern representatives. Li (1952) recognized Carya, Liriodendron, Sassafras, Gymnocladus, Cladrastis, Stewartia, Halesia, Magnolia, Gordonia, Catalpa, Hamamelis, Pachysandra, Chiogenes, Chionanthus, Mitchella, Illicium, Itea, Pieris, Lyonia, Decumaria, Schisandra, Wisteria, Parthenocissus

and Campsis as woody genera which were once dominant elements in the Tertiary forests. Li believes that the eastern Asian-eastern North American disjunct herbaceous species were almost all perennials with heavy rootstocks and a few large leaves such as Podophyllum, Jeffersonia, Diphylleia, Caulophyllum, Saururus, and Panax.

Li (1952) listed 37 genera of trees, shrubs and herbs which were restricted to the temperate regions of eastern North America and eastern Asia. He listed 19 genera with this pattern of distribution which were also tropical in one or both areas. When this information is compared to BFM, 16 genera found there are in the first list and eight genera are in the second list. The lists compiled by Li are found in Table VIII with an indication of those which are found at BFM. Several of the genera not present on BFM are not expected to be present since they are calciphiles and these genera are indicated by (C) in Table VIII. The genera listed by Li which are found on BFM are found in many mountain coves in the southern Blue Ridge which are relatively undisturbed; these genera are the lingering effects of the Arcto-Tertiary forest on the present day forests of the southern Appalachians.

The Arcto-Tertiary forest is not thought to have been uniform, but was affected by latitude and altitude as are modern forests. During the Tertiary, the Blue Ridge may have been from 300 to 1,000 m above sea level (Cain 1943). This would have made the forests of the mountain regions temperate, even though the flora of the surrounding area was probably warm temperate or subtropical in the early Tertiary Period through the Oligocene Epoch (Braun 1959, Graham 1972).

Table VIII. A list of genera which Li (1952) found to be present in eastern Asia and eastern North America. An asterisk (*) preceeds those genera which are present at BFM. Calciphiles are indicated by (C).

Genera Present in the Temperate Regions of Both Areas

<u>Apios</u>	(C) <u>Menispermum</u>
<u>Buckleya</u>	* <u>Mitchella</u>
* <u>Carya</u>	(C) <u>Neviusia-Rhodotypus</u> and <u>Kerria</u>
* <u>Caulophyllum</u>	(C) <u>Pachysandra</u>
(C) <u>Chionanthus</u>	(C) <u>Penthorum</u>
* <u>Cladrastis</u>	* <u>Panax</u>
* <u>Decumaria</u>	* <u>Podophyllum</u>
<u>Diarrhena</u>	* <u>Phryma</u>
* <u>Diervilla-Weigela</u>	* <u>Sassafras</u>
<u>Diphylleia</u>	<u>Shortia</u>
<u>Elliottia-Tripetaleia</u>	* <u>Stewartia</u>
* <u>Epigaea</u>	(C) <u>Stylophorum</u>
(C) <u>Gymnocladus</u>	<u>Symplocarpus</u>
* <u>Halesia</u>	* <u>Tipularia</u>
* <u>Hamamelis</u>	(C) <u>Triosteum</u>
<u>Helonias-Heloniopsis</u>	(C) <u>Veronicastrum</u>
(C) <u>Hydrastis-Glaucidium</u>	<u>Wisteria</u>
(C) <u>Jeffersonia</u>	<u>Zizania</u>
* <u>Liriodendron</u>	

Genera Present in the Temperate Regions and Also the Tropical Regions of One or Both Areas

* <u>Ascyrum-Hypericum</u>	* <u>Lyonia</u>
* <u>Astilbe</u>	* <u>Magnolia</u>
<u>Campsis</u>	* <u>Nyssa</u>
<u>Catalpa</u>	* <u>Parthenocissus</u>
<u>Croomia</u>	<u>Pieris</u>
<u>Gelsemium</u>	* <u>Pyrularia</u>
<u>Gordonia</u>	<u>Saururus</u>
<u>Illicium</u>	<u>Schisandra</u>
<u>Itea</u>	* <u>Tovara</u>
* <u>Lindera</u>	

By the Oligocene Epoch, 34 mya, all of the elements of the modern forests were known to have been present (Braun 1950). Climatic changes toward temperate conditions evidently resulted in an expansion of the temperate component of the flora and a reduction in the tropical elements, and the broad-leaved deciduous forest became the dominant association in eastern North America (Graham 1972).

During the Miocene and Pliocene Epochs, the slow rise of the Rocky Mountains resulted in increased dryness in the Western interior. Development of grassland was favored and the Arcto-Tertiary forest retreated eastward. The effect of this was to separate (floristically) the eastern portion of North America and the Mexican highlands, creating disjunct populations which are still present today (Graham 1972). The Oak-Hickory Forest probably was formed during this period in response to the dry conditions. The Mixed Mesophytic Forest was probably retained in the coves of the mountains, but an oak-chestnut formation began to dominate in the Ridge and Valley and the drier ridges of the mountainous areas. The Oak-Pine Forest began to develop at this time in the Piedmont region (Braun 1950).

The Pleistocene Epoch of the Quaternary Period lasted for two to three million years (Wright 1976). This was a time of globally fluctuating climates which was dominated by cold rather than warm climates (Flint 1971). The cold climates were interrupted every 100,000 years by warmer interglacial periods of 10,000 to 30,000 years in duration. Study of ocean sediment cores has revealed 18-20 cold periods comparable to the length and severity of the Wisconsin glaciation that have occurred before this time, making it difficult to

match these periods with the four traditionally recognized stages of North American glaciation; Nebraskan, Kansan, Illinoian, and Wisconsin (Butzer 1976, Wright 1976, Davis 1983).

Each period of glaciation or cooling of the climate was associated with migration of plants southward and then northward again during interglacial periods. This southward migration is thought to have been slow due to the need to infiltrate closed communities and compete with established plants, whereas the northward migration into bare or thinly occupied land was much more rapid. This northward migration has been estimated at 30 km per century in North America (Davis 1976).

Plant migrations have been reconstructed from various fossil, pollen and climatic data and are sometimes described incorrectly as movements of forest types in an effort to make the information comprehensible (Dilcher 1973). It is important in dealing with these migrations to understand that "plants migrate as individual species, so that a community may be said to migrate only when most of its component parts change location somewhat in unison" (Daubenmire 1978). Little (1970) described the phenomena of this migration best in writing,

How slow the movement must have been, from seed to tree, seed to tree. A vast extent of time was required for a plant species to hike down the Appalachian Trail and back. Fortunately, eons of time were available. There was no hurry, as man had not arrived on the scene.

The response of the forests to the glacial movements southward was very different in western Europe and eastern North America due to

topography. The north-south trending mountain systems in eastern North America allowed taxa to migrate southward as the glaciers advanced. There are contrasting views concerning the extensiveness of this migration. Some report that the Mixed Mesophytic Forest found refuge in the river valleys south of the Blue Ridge or along the Gulf Coast (Delcourt and Delcourt 1981, Watts 1970), while others report only changes in ecotones of existing communities and introduction of ecologically compatible species (Braun 1950). The final results of this process, regardless of the debate, has been the persistence the Mixed Mesophytic Forest relatively unchanged from Late Tertiary time. The Mixed Mesophytic did not persist in western Europe due to the east-west trending mountains which served as a barrier to migration, resulting in the loss of many elements of the flora (Graham 1972). This idea has recently been questioned by Davis (1983) who argues that the forests of Europe in the late Tertiary were already dominated by conifers. During glaciation, according to Davis, the minor angiosperm component of the European forests was able to survive in the eastern Mediterranean region while the conifers were extirpated, and reforestation of Europe after glaciation was mainly from the few surviving genera and species of angiosperms.

The last glaciation began about 170,000 years before present (yr BP) and is called the Wisconsin glaciation. At glacial maximum approximately 30% of the Earth's surface was covered by ice. The Wisconsin glaciation is divided into four substages which are differentiated by intervals of partial withdrawal of the ice sheet (Flint 1971, Butzer 1976).

Braun (1950) did not believe that the Pleistocene glaciation had much effect on forests south of the glacial boundary in the Southeast. She cited the continued presence of cold sensitive taxa in the Southeast as evidence along with the "wealth of ancient relict endemics of Asiatic relationship" which she stated could not possibly have migrated away from and then returned to the few areas which retained their Miocene topography. Braun concluded that the position of the vegetation of the Cumberland Plateau and the southern Appalachian Mountains had not shifted dramatically during the Pleistocene Period.

In contrast to this theory, the more recent work of Delcourt (1980), Delcourt and Delcourt (1981), Watts (1970), Graham (1965), and Davis (1983) indicates that there was significant modification of the forests of the Southeast during the Pleistocene. This theory is based upon pollen cores of several bogs in the Southeast and is probably best characterized by Delcourt and Delcourt (1981).

While attempting to extrapolate from these data to an understanding of the past and present flora of BFM, care must be taken to understand the restrictions and speculations involved in such a process. First, the vegetation maps by Delcourt and Delcourt (1981) are "broad brush" maps (H. Delcourt pers. comm.) and there is a danger in attempting to correlate this to a specific site. Secondly, BFM is on an ecotone in several of the maps which makes the specific considerations even more speculative. Finally, while there are four pollen core or macrofossil sites relatively close to BFM: Bartow

County Ponds, Georgia (Watts 1970, 1973); Pigeon Marsh, Georgia (Watts 1975); Friar Branch, Tennessee (DeSelm and Brown 1978; Delcourt and Delcourt 1979); and Anderson Pond, Tennessee (Delcourt 1979); none of these sites are in the Blue Ridge. This is one more reason to be careful in extrapolating the data to BFM.

Delcourt and Delcourt (1981) have constructed seven maps to plot vegetation in eastern North America at 40,000 yr BP, 25,000 yr BP, 18,000 yr BP, 14,000 yr BP 10,000 yr BP, 5,000 yr BP, and 200 yr BP. Some of their vegetation types are in areas without fossil data, such as the conifers and northern hardwoods at 18,000 yr BP, and these can be considered as conjectural reconstructions. The most significant aspect of this work is evidence indicating that the mixed hardwoods were restricted to the Blufflands, loess-mantled uplands adjacent to the Mississippi Alluvial Valley, and other dissected river drainages in the Southeast during glacial maximum and throughout the forest migrations of this time, contrary to Braun's (1950) conclusions.

At 40,000 yr BP BFM was within the Mixed Conifer-Northern Hardwood Forest which persisted in a narrow band from North Carolina, through Tennessee, to the northern portion of the Mississippi Embayment. This narrow band was bounded to the north by the Jack Pine-Spruce Forest which extended to the north almost to the Great Lakes region. To the south the Oak-Hickory-Southern Pine Region dominated the landscape to the Gulf of Mexico. The narrow dissected valleys of the Alabama River drainage and Chattooga River drainage, which were areas of refugia for the Mixed-Hardwood Forests, extended northward to a position just south of BFM (Delcourt and Delcourt

1981). By BFM's position on the ecotone during this period, one could hypothesize the influence of several of these forest types on the mountain, dependent upon the slope angle and aspect of the ridges and valleys on BFM.

There was a period of mild warming around 25,000 yr BP which resulted in a slight retreat of the ice sheet. The Oak-Hickory-Southern Pine Forest south of BFM in the areas of northern South Carolina, Georgia, Alabama and middle Tennessee was converted to a primarily Oak-Hickory Forest. The other vegetation types were apparently stable during this period (Delcourt and Delcourt 1981).

The peak of the Late Wisconsin glaciation occurred 18,000 yr BP forcing a southern migration of the forests. The Mixed Conifer-Northern Hardwood Forest was pushed southward and replaced by the Jack Pine Forest with a subdominance of spruce and fir in the BFM region. Alpine tundra was mapped for the high elevation regions in the Appalachian Mountains south to the Great Smoky Mountains due to the sorted ground patterns and block fields associated with alpine tundra which are found in this region (Delcourt and Delcourt 1981).

Boulderfields or block fields are also found at BFM on East Fork Rough Creek at 1160 m. Euonymus obovatus, Ribes cynosbati and Acer spicatum occur in the cove associated with this block field. Block fields are also present in Georgia on Rich Mountain, Brasstown Bald and Hightower Bald. Wharton (1978) found Euonymus obovatus, Ribes cynosbati and Rubus odoratus in these block fields and describes these taxa as being diagnostic of that habitat there. This information suggests that the alpine tundra extended farther south than is mapped

by Delcourt and Delcourt (1981), extending to BFM and into Georgia as far south as Rich Mountain. It must be emphasized that even though the temperatures may have been sufficient to cause the formation of block fields and a treeless zone at the higher elevations on BFM, there is no data which support the existence of a tundra flora in this area.

A period of climatic amelioration from 16,500 yr BP resulted in retreat of the ice sheet by 14,000 yr BP. During this time the conifers and northern hardwoods shifted northward while the Oak-Hickory-Southern Pine Forest remained stable. BFM was still within the jack pine dominated forest and this forest was encroached upon from the west by the expansion of the Spruce-Jack Pine Forest, but did not extend east past Kentucky and Middle Tennessee (Delcourt and Delcourt 1981).

The climate continued to warm during the next 4,000 years and by 10,000 yr BP migrations had dramatically changed the vegetation in the region. The Mixed Conifer-Northern Hardwood Forest had migrated north of 37° latitude and the species rich Mixed Hardwood Forest expanded to an area between 34° and 37° latitude. Spruce-Fir Forest is mapped in the Great Smoky Mountains region (Delcourt and Delcourt 1981), and one could conjecture that this type of forest was also present at the higher elevations on BFM.

During the Hypsithermal Interval, between 8,000 and 4,000 yr BP, a warming and drying trend occurred. The prevailing westerly winds increased in strength and the Prairie, Oak Savannah and Oak-Hickory Forests shifted eastward. BFM is still mapped beyond the southern end

of the Spruce-Fir Forest of the Great Smoky Mountain area during this period. The Mixed-Hardwood Forest was restricted to the Cumberland and Allegheny Plateaus and the Oak Chestnut Forest became dominant in the central and southern Appalachians. This was a period of major vegetation change; there was a northward movement of the deciduous forests. A cooling trend over the past 4,000 years has caused a retreat of the prairie peninsula and the southward expansion of the Boreal Forests, but has had very little effect on the forests in the southern Appalachians (Delcourt and Delcourt 1981).

During the Hypsithermal Interval, cool climate taxa were forced to higher elevations, northward, and/or into protected coves. Due to the warming and drying trends, many taxa were forced off the tops of mountains which were too low in elevation to provide suitable cool climate microhabitats, resulting in the extirpation of taxa in some areas (Whittaker 1956). Some of these taxa have been unable to recolonize these areas since the Hypsithermal, and some taxa left relict populations southward as they were eliminated in the southern Appalachians. According to Delcourt and Delcourt (1981), the present distributions of northern taxa which extend south in the southern Appalachians may reflect the remnants of the once extensive boreal forest which has been fragmented during the warming period of the last 12,500 years. Three of the taxa collected at BFM have the southernmost station of their distribution on the mountain and these taxa may provide evidence concerning the former vegetation of the mountain.

Dryopteris campyloptera, the mountain woodfern, occurs on BFM in two north facing coves. One cove, west of Bark Logging Lead, forms the headwaters of Penitentiary Branch and the other forms the headwaters of Rough Creek, east of Bark Logging Lead. These coves vary in steepness from 45% to 75%. The mountain woodfern is found from 1250 m near the summit to a low elevation of 1128 m in both coves, constituting a major portion of the ground cover at the higher elevations. The dominants associated with the coves include yellow birch, buckeye, witch-hazel and sugar maple which are typical components of a northern hardwood forest. Two northern taxa present in these coves are Trillium erectum and Sambucus pubens. Other pteridophytes here include Dryopteris intermedia, D. marginalis and Athyrium asplenioides.

According to Wagner et al. (1970), and Carlson and Wagner (1982), Dryopteris campyloptera has an extensive range in eastern Canada and as it extends south along the Appalachian Mountains this taxon is limited to high elevation forests. The plant is restricted to elevations above 1525 m in the southern Appalachians and occurs in yellow birch, beech and spruce-fir forests. Examination of the specimens at the Herbaria of Western Carolina University (WCU) and TENN revealed one collection at 1189 m at Have Mountain in the Joyce Kilmer Memorial Forest in Graham County, North Carolina. All other collections were above 1494 m in elevation. Three collections are slightly farther north than BFM. These collections are from Shinbone Ridge, Clay County, North Carolina (35° 07' 30" W latitude); Standing Indian Mountain, Macon County, North Carolina (35° 02' 15" W

latitude); and Beech Gap, Transylvania County, North Carolina (35° 17' 30" W latitude).

Prunus virginiana is the second taxa with the southernmost station of its distribution in eastern North America on BFM. This taxon occurs commonly in the north and extends through the Rocky Mountains to Texas in the West. As Prunus virginiana extends southward along the southern Appalachians it becomes more sporadic in its distribution. BFM is approximately 110 km south of the next most southern populations in Blount County, Tennessee and Buncombe County, North Carolina (Little 1977).

Prenanthes roanensis is a Blue Ridge Province endemic which is reported to occur only above 1220 m (Fusiak 1983). This taxon occurs at its southernmost station at BFM at a low elevation of 1128 m in north facing coves. BFM is approximately 110 km south of the closest populations in Blount County, Tennessee and Swain, Jackson, and Transylvania Counties, North Carolina.

These three taxa with their southernmost station at BFM may be an indication of the flora that was there prior to the Hypsithermal Interval. Whittaker (1956) described the red spruce forests of the Great Smoky Mountains and commented on the distribution of this taxon. He found that Betula allegheniensis was the only important canopy associate in the red spruce forests and Dryopteris campyloptera was the dominant in the herbaceous strata. The presence of Dryopteris campyloptera, Prunus virginiana, and Prenanthes roanensis on BFM along with a large percentage of northern taxa are indirect evidence that a spruce-fir forest existed on BFM in the Pleistocene. These northern

taxa found on BFM indicate that the climate can support plants with cool climate tolerances. These taxa evidently have a broader range of tolerances and were able to persist on the mountain while other Northern taxa were either extirpated during climatic ameliorization or were unable to recolonize the area. Whittaker (1956) postulated that the Spruce-Fir Forest extended farther south during the Pleistocene, but was only able to survive above 1525 m during the Hypsithermal Interval and has not been able to reestablish itself since this time.

In light of the summarized paleobotanical record for BFM, it is possible to attempt to understand the composition of the flora of the mountain and its ramifications at the generic and specific levels. Wood (1970) compiled lists of taxa at the generic level grouped by regions of distribution. When these lists are compared to those genera collected at BFM some interesting patterns become evident.

Four categories of distribution compiled by Wood provide insight into the distributional patterns of the taxa collected at BFM. Wood listed 237 genera found continuously from the southern Appalachians to western North America and 95 of these genera are present at BFM. Fifty-two genera were listed as restricted to eastern North America and occur in the southern Appalachians--15 of these were collected at BFM. Wood separated genera into two relict categories. The first is those genera which are Tertiary relicts restricted to eastern North America and eastern Asia, but not occurring in the western North America and Canada. Of these 58 genera, 29 are present at BFM. Wood listed 46 genera known to be relicts of the Arcto-Tertiary forest or showing relict patterns of distribution with survivors in eastern

North America, western North America and one or more other areas notable for refugia of the Arcto-Tertiary forest. Of these 46 genera, 33 are found at BFM. The closer correspondence of the genera of BFM with those of relict areas, as opposed to North American and eastern North American genera, is an indication of the persistence of the Arcto-Tertiary flora in the southern Appalachians.

An evaluation of the distributional data compiled at the specific level is also useful in understanding the composition of the flora of BFM. The number of endemic taxa (32), the number of taxa from Canada south to Tennessee and north Georgia (77), and Appalachian taxa (26) show the strong relationship of BFM floristically to the rest of the Appalachians and southeastern Canada. This is also evidence that BFM has been an area of refuge for northern taxa, Blue Ridge taxa, and southern Appalachian taxa which were probably extirpated during the Hypsithermal Interval or during the more recent anthropogenic disturbance in surrounding areas adjacent to BFM in the southern Appalachians.

Twenty-one taxa (4.4% of the flora) collected on BFM are introduced. This low number of introduced taxa is an indication of the lack of human disturbance in the study area. The flora of the Great Smoky Mountains (White 1983), although a much larger flora (1492 taxa) and a larger area (200,000 ha), can be compared to that of BFM to emphasize the significance of the low number of introduced taxa, since 20% of the Great Smoky Mountain National Park flora is introduced.

One anomalous group of taxa found on BFM are those which are thought to be calciphiles or restricted to circumneutral soils. Nine taxa were collected on BFM which have been described as calciphiles or as being restricted to circumneutral soils by White (1982) or Radford et al. (1968). These taxa are Arabis canadensis, Asplenium rhizophyllum, Campanula americana, Carya ovata, Desmodium nuttallii, Disporum maculatum, Hybanthus concolor, Smilax hugeri and Ulmus rubra. The geological reports by Slack, Gazdik, and Dunn (1982) and Gair, Gazdik, and Dunn (1982) do not indicate the presence of basic soils on the mountain. These taxa may indicate the presence of such soils or they may be evidence that the taxa are not severely restricted by soil basicity parameters.

There are several notable omissions to the flora of BFM. Gattinger (1901) listed 27 taxa (Table IX) from BFM in his description of the area. Twenty-four taxa (Table X) were described in the annotated checklist as being found at "Big Frog Mt.," "Big Frog Mts.," "Frog Mt." or "Frog Mts." This confusion results from the rather sketchy locality data for the listed plants which was typical for botanists during the late nineteenth century, and the presence of Little Frog Mountain 13 km north of BFM. Twenty-five of the listed taxa were not collected by the author, and these are indicated in Tables IX and X.

Several of the taxa mentioned by Gattinger which were not relocated by the author were notable for their rarity or significant distributional patterns. Three of the taxa listed by Gattinger, which were not collected by the author, are listed in Tennessee as

Table IX. A list of taxa found on Big Frog Mountain by Gattinger in July, 1978 and described in The Flora of Tennessee and a Philosophy of Botany (1901), in a description of the trip to Big Frog Mountain. The name used by Gattinger, if different from accepted nomenclature, is found in brackets after the taxon name. An asterisk (*) indicates those taxa which were not located in the present study.

-
- Acer saccharum Marshall [sugar maple]
Acer spicatum Lam.
 * Baptisia alba (L.) R. Br. [white Baptisia]
 * Baptisia tinctoria (L.) R. Br. [yellow Baptisia]
Betula allegheniensis Britt. [yellow birch]
 * Calamagrostis canadensis (Michaux) Nutt.
Castanea dentata (Marsh.) Borkh. [chestnut]
Dennstaedtia punctilobula (Michaux) Moore [Dicksonia punctilobula (Michaux) Gray]
 * Dryopteris spinulosa (O. F. Muell.) Watt. [Aspidium spinulosum (O. F. Muell.) Swartz]
Gaultheria procumbens L.
Heracleum maximum Bartram [H. lanatum Michaux]
Ilex montana T. & G. [I. monticola Gray, I. mollis Gray]
Lilium superbum L. [Carolina lily]
 * Melanthium latifolium Desr. [M. virginicum L., misidentified]
Monarda didyma L.
Muhlenbergia tenuiflora (Willd.) BSP [M. willdenovii Trin.]
 * Prunus pensylvanica L. f.
Prunus virginiana L.
Quercus rubra L. [red oak]
 * Rhododendron arborescens (Pursh) Torrey [Azalea arborescens Pursh]
 * Ribes rotundifolium Michaux
Rubus odoratus L.
 * Salix humilis Marshall (probably the same taxon designated as S. tristis Aiton in this work)
 * Sorbus americana Marshall [Pyrus americana (Marshall) DC.]
Stenanthium gramineum (Ker.) Morong [S. angustifolium Kunth.]
 * Vaccinium angustifolium Aiton [V. pensylvanicum Lam.]
Vaccinium hirsutum Buckley
-

Table X. A list of taxa which Gattinger (1901) indicated in the annotated checklist of The Flora of Tennessee and a Philosophy of Botany as being present on or near Big Frog Mountain. The name used by Gattinger, if different from accepted nomenclature, is found in brackets after the taxon name. An asterisk indicates those taxa not collected in the present study. The descriptions of the locations given by Gattinger for the taxa are also included.

Taxa	Location
* <u>Aralia hispida</u> Vent.	Frog Mts.
* <u>Chrysosplenium americanum</u> Schwein.	Irrigated places in the Frog Mts.
<u>Cimicifuga americana</u> Michaux	Big Frog Mts.
<u>Clintonia umbellulata</u> (Michaux) Morong	Big Frog Mt.
<u>Convallaria majalis</u> L.	Little and Big Frog Mt.
* <u>Cuscuta cephalanti</u> Engelm. [<u>C. tenuiflora</u> Engelm.]	Big Frog Mt.
* <u>Gentiana quinquefolia</u> L.	Frog Mts.
<u>Helianthus stumosus</u> L. [<u>H. tracheliiifolius</u> Mill.]	Big Frog Mts.
* <u>Hepatica americana</u> (DC.) Ker [<u>H. hepatica</u> (L.) Karst]	Big Frog Mts.
* <u>Hypericum densiflorum</u> Pursh [<u>H. glomeratum</u> Small.]	I suppose to be the same as <u>H. prolificum</u> var. <u>montanum</u> , collected in the Frog Mts. about 1870.
<u>Lilium superbum</u> L.	Frog Mt.
<u>Lyonia ligustrina</u> (L.) DC. [<u>Xolisma ligustrina</u> (L.) Britt.]	Big Frog Mts.
* <u>Oenothera tetragona</u> Roth [<u>Kneiffia glauca</u> (Michaux) Spach]	Frog Mts.
* <u>Parnassia asarifolia</u> Vent.	Big Frog Mts.
* <u>Potentilla tridentata</u> Aiton [<u>P. tridentalis</u> (sic)]	Big Frog Mts.
<u>Pycnanthemum montanum</u> Michaux [<u>Koellia montana</u> (Michaux) Kuntz]	Big Frog Mt.
* <u>Rhododendron arborescens</u> (Pursh) Torr. [<u>Azalea arborescens</u> Pursh]	Big Frog Mts.
<u>Rhododendron maximum</u> L.	Big Frog Mts.

Table X (Continued)

Taxa	Location
<u>Rubus odoratus</u> L.	Big Frog Mt.
* <u>Salix humilis</u> Marshall	Summit of Big Frog Mt.
* <u>Solanum tuberosum</u> L.	Big Frog Mt.
<u>Stenanthium gramineum</u> (Ker.) Morong [<u>S. robustum</u> Watson]	Frog Mts.
<u>Vaccinium hirsutum</u> Buckley	Frog Mts.
* <u>Zigadenus leimanthoides</u> Gray	Frog Mts.

Endangered, Threatened or Special Concern. Gattinger's report of Melanthium virginicum on BFM is based upon a misidentification, as discussed in Chapter VII. The specimen [NY] has been correctly identified as M. latifolium, which is listed as Endangered in Tennessee. Zygadenus leimanthoides is listed as Threatened and Potentilla tridentata is listed as Special Concern in Tennessee (Committee for Tennessee Rare Plants 1985). Aralia hispida is not known from Tennessee or North Carolina, its southernmost distribution is in Virginia. Calamagrostis canadensis, Chrysosplenium americanum, Parnassia asarifolia, Potentilla tridentata, Prunus pensylvanica, Ribes rotundifolia, and Sorbus americana are mid- to high elevation plants with northern distributions which Gattinger reported from BFM.

Several factors may have contributed to the omission of some taxa, listed by Gattinger, in the present flora. First, some of the taxa may simply have been missed by the author. Secondly, cattle were allowed to graze on the mountain in the past (John Roy Brackett pers. comm.) and this may have extirpated some of the herbaceous taxa, or favored them by creating openings. Third, it is doubtful that forest clearings affected the upper slopes at BFM, but this could have had a negative effect on the lower elevation taxa listed by Gattinger. A wooden fire tower was erected on the summit in the 1900's (the exact dates could not be verified) which may have caused some disturbance, but this would probably have been minimal. Fourth, fires could have played a role in the eradication of some of the taxa, although there are no records of such at the higher elevations. Evidence of a forest fire were observed on the northwest slope of Licklog Ridge, but no

other areas were observed to have been disturbed by fire. Finally, the chestnut blight may have affected some of the herbaceous growth on the mountain.

Perhaps the most significant disturbance to the vegetation of BFM since Gattinger's visit to the summit in 1878 is the death and replacement of chestnut, Castanea dentata. Chestnut blight, fungus Endothia parasitica, was introduced from Asia around 1900 in New York. It slowly spread southward and by 1926 local infections were reported in western North Carolina and north Georgia. In the Oak-Chestnut Forest region it is estimated that 40% of the trees were chestnut and nearly all of these trees were extirpated by 1940. Survivors were trunk sprouts and young seedlings which succumb to the infestation at an early age, usually before reproducing (Keever 1953). It would seem that the death of 40% of the trees on the summit and the ridges of BFM would affect the herbaceous layer, but Woods and Shanks (1959) did not find the transition from an Oak-Chestnut forest to an Oak dominated forest to be very destructive to the rest of the flora. They found that the infected chestnut trees took from two to ten years to die and this period allowed the codominants to expand their crowns while seedlings and saplings began to fill the developing gaps. This gradual change would evidently have prevented extensive damage to the herbaceous layer and the subcanopy.

In conclusion, the forests of BFM retain the imprint of forests and plant migrations of the past. As is typical for the undisturbed forests of the southern Appalachians, the flora of BFM possesses taxa which were present in the Arcto-Tertiary Forest, which was at one time

the dominant forest in the Northern Hemisphere. Later climatic and topographic changes resulted in the formation of the Oak-Hickory Forest and the Oak-Pine Forest in North America, and these forests are represented on the dryer exposed slopes of BFM today. The recent climatic changes of the Pleistocene Epoch forced migrations of taxa northward and southward over the past two to three million years. Taxa migrated into suitable habitats only to be forced out by later climatic changes. At one time, BFM may have been a treeless tundra at the higher elevations, and as the climate warmed, the area was invaded by Jack Pine and Spruce-Fir Forests. During the climatic ameliorization of the Hypsithermal Interval, the Spruce-Fir Forest along with many other cold climate taxa were forced north of BFM and have not reestablished southward since this time. Though many taxa were forced northward during this period, many northern taxa were able to persist or became reestablished on BFM, presumably due to the topography and climate providing microhabitats similar to those found at latitudes farther north. In the recent past, there has been a loss of some taxa on the mountain, possibly due to human disturbance or the chestnut blight. In spite of this loss, BFM remains as a relatively undisturbed southern Appalachian forest which has maintained and conserved a more typically northern flora due to the extremely rugged topography and the prevailing winds which act in unison to provide high levels of rainfall and create a cool mountain climate in the area.

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APPENDICES

APPENDIX A

AN ANNOTATED CHECKLIST OF THE VASCULAR PLANTS
OF BIG FROG MOUNTAIN

The checklist follows the format of White (1982). The families are arranged alphabetically within four groups: Pteridophyta, Gymnospermae, Angiospermae-Monocotyledoneae, Angiospermae-Dicotyledoneae. The family names are centered on the pages in capital letters, with the genera and subgeneric taxa within each genus listed alphabetically. The genera are also centered on the page in lower case letters.

Whenever possible, taxa are provided with common names. These are mostly from White (1981), Radford et al. (1968) and Wofford (unpublished data). No attempt was made to provide an exhaustive list of common names.

The author's perception of abundance of each taxa within the study area is listed after the common name. White's (1981) categories were used, but unlike his usage, the categories represent distribution within the study area instead of within the particular habitat the plant is found. The categories are as follows:

Very rare	- A single locale, few individuals
Rare	- One or two localities, generally small populations
Scarce	- Several localities, or scattered small populations
Infrequent	- Scattered localities throughout
Occasional	- Well distributed but not anywhere abundant
Frequent	- Generally encountered
Common	- Characteristic and dominant

Hopefully, the use of these categories can also provide a concept of the frequency of specific habitats on the mountain. Some common introduced taxa or pioneer taxa are listed as rare or scarce, and this is an indication of the lack of disturbed areas on the mountain.

Habitat and elevation descriptions follow the abundance category. Description of the habitat focuses on the moisture and topography of the area, along with some indication of the maturity of the forests, openings, or other forest characteristics associated with each taxon. Elevation ranges are not equivalent to White's, though the same designations are used. The categories for elevations are as follows:

Low elevations	450 m - 760 m
Mid-elevations	760 m - 1060 m
High elevations	1060 m - 1288.3 m (summit)

The elevation designations are general and the taxa sometimes may be found in other elevations.

Comments on identification, taxonomy and synonymy follow the distributional information. Fernald (1950), Gleason (1952), Radford et al. (1968), Cronquist (1980), and Wofford (unpublished data) were the major sources used in identifications. Other sources used are

noted in the checklist. References to Radford et al. (1968) are abbreviated R.

County records are indicated with an asterisk (*) before the binomial. Exotic taxa are noted at the end of the entry with an indication of native range.

AN ANNOTATED CHECKLIST OF THE VASCULAR PLANTS
OF BIG FROG MOUNTAIN

PTERIDOPHYTA

ADIANTACEAE

Adiantum L.

Adiantum pedatum L. Maidenhair fern. Frequent, mesic coves and seeps, low to high elevations.

ASPLENIACEAE

Asplenium L.

- * Asplenium montanum Willd. Mountain spleenwort. Frequent, shaded rock outcrops, low to high elevations.
- Asplenium rhizophyllum L. Walking fern. Scarce, on non-calcareous rocks on Indian Creek and Rough Creek, low to mid-elevations.
- Asplenium platyneuron (L.) Oakes. Ebony spleenwort. Occasional, mesic and disturbed woods and woodland borders, low to mid-elevations.

Athyrium Roth

- Athyrium pycnocarpon (Sprengel) Tidestrom. Narrow-leaved spleenwort. Occasional, mesic slopes and coves, mid-elevations.
- Athyrium thelypteroides (Michaux) Desvaux. Silvery spleenwort. Occasional, mesic slopes and coves, mid-elevations.
- Athyrium asplenioides (Michaux) A.A. Eaton. Southern lady fern. Common, mesic coves, low to high elevations.

Cystopteris Bernh.

- Cystopteris protrusa (Weatherby) Blasdell. Southern fragile fern. Occasional, shaded rocky woods, low to high elevations.

Dryopteris Adamson

- * Dryopteris campyloptera Clarkson. Mountain woodfern. Scarce, only found in two north facing coves, forested with northern hardwoods, high elevations.
- * Dryopteris goldiana (Hooker) Gray. Goldie's fern. Scarce, moist rocky coves, mid-elevations.

- * Dryopteris intermedia (Willd.) Gray. Intermediate woodfern.
Common, mesic to subxeric woods, throughout.
- Dryopteris marginalis (L.) Gray, Marginal woodfern. Frequent,
mesic coves, low to mid-elevations.

Onoclea L.

Onoclea sensibilis L. Sensitive fern. Scarce, mid-elevations
along Wolf Ridge.

Polystichum Roth

Polystichum acrostichoides (Michaux) Schott. Christmas fern.
Common, mesic to subxeric woods, throughout.

DENNSTAEDTIACEAE

Dennstaedtia Bernh.

Dennstaedtia punctilobula (Michaux) Moore. Hay scented fern.
Frequent throughout, common at high elevations.

Pteridium Gleditsch

Pteridium aquilinum (L.) Kuhn. Bracken fern. Occasional, dry
woods and ridges, throughout.

LYCOPODIACEAE

Lycopodium L.

- * Lycopodium lucidulum Michaux. Shining clubmoss. Rare, one
population at 1250 m in headwaters of East Fork Rough Creek.
- * Lycopodium flabelliforme (Fernald) Blanchard. Ground pine. Rare,
one population at Double Spring Gap, near the TN/GA state
line.

OPHIOGLOSSACEAE

Botrychium Swartz

Botrychium virginianum (L.) Swartz. Rattlesnake fern.
Occasional, moist woods, throughout.

OSMUNDACEAE

Osmunda L.

Osmunda regalis var. spectabilis (Willd.) Gray. Royal fern.
Infrequent, seeps and streamsides, low to high elevations.

Osmunda cinnamomea L. Cinnamon fern. Occasional, seeps and streamsides, low to high elevations.

POLYPODIACEAE

Polypodium L.

- * Polypodium virginianum L. Common polypody. Frequent, dry rocky woods, on rocks, low to high elevations.

THELYPTERIDACEAE

Thelypteris Schmidel

Thelypteris hexagonoptera (Michaux) Weatherby. Broad beech fern. Frequent, moist woods, low to mid-elevations.

Thelypteris noveboracensis (L.) Nieuwland. New York fern. Common, mesic to subxeric woods, throughout.

SPERMATOPHYTA

GYMNOSPERMAE

PINACEAE

Pinus L.

- * Pinus strobus L. White Pine. Common, dry ridges and slopes, low to high elevations.
- * Pinus virginiana Miller. Virginia pine, scrub pine. Frequent, dry slopes, low to mid-elevations.

Tsuga (Endl.) Carr.

- * Tsuga canadensis (L.) Carr. Eastern hemlock. Common, mesic coves at low to mid-elevations. Infrequent at high elevations.

ANGIOSPERMAE

MONOCOTYLEDONEAE

AMARYLLIDACEAE

Hypoxis L.

Hypoxis hirsuta (L.) Coville. Yellow star grass. Common, dry woods, low to mid-elevations.

ARACEAE

Arisaema Martius

Arisaema triphyllum (L.) Schott. Jack-in-the-pulpit. Common, mesic woods, low to high elevations.

- * Arisaema atrorubens (Ait.) Blume. Jack-in-the-pulpit. Scarce, low to mid-elevations on East Fork Rough Creek. From Fernald (1950). Included in A. triphyllum (L.) Schott in R. Possibly a variety instead of a separate species.

COMMELINACEAE

Tradescantia L.

Tradescantia subaspera Ker. Spiderwort. Occasional, rich submesic woods, mid- to high elevations.

CYPERACEAE

Carex L.

- * Carex aestivalis M.A. Curtis. Summer sedge. Occasional, mesic woods, mid- to high elevations.
Carex austro-caroliniana Bailey. South Carolina sedge. Infrequent, mesic woods, low elevations.
Carex communis Bailey. Common sedge. Frequent, mesic woods, throughout.
Carex crinita Lam. Drooping sedge. Infrequent, wet, boggy areas, low to high elevations.
Carex debilis var. pubera Gray. Hairy necklace sedge. Infrequent, mesic to boggy areas, low to high elevations.
* Carex debilis var. rudgei Bailey. Necklace sedge. Frequent, moist woods, low to high elevations.
Carex digitalis Willd. Sedge. Frequent, mesic woods, low to mid-elevations.
* Carex frankii Kunth. Frank's sedge. Scarce, wet seepy areas, low elevations.
Carex intumescens Rudge. Intumescent sedge. Infrequent, mesic openings and seeps, low elevations.

- Carex laxiflora Lam. var. laxiflora. Broad-leaved sedge. Frequent, mesic woods, low to high elevations.
- Carex lurida Wahlenberg. Smaller hop sedge. Infrequent, mesic or boggy areas, low elevations.
- Carex nigromarginata Schweinitz. Black-margined sedge. Infrequent, mesic woods, low to mid-elevations.
- * Carex pennsylvanica Lam. Pennsylvania sedge. Common, mesic to submesic woods, mid- to high elevations.
- * Carex plantaginea Lam. Plantain-leaved sedge. Infrequent, mesic woods, mid-elevations.
- * Carex purpurifera MacKenzie. Purple-based sedge. Scarce, mesic woods, low to mid-elevations.
- * Carex radiata (Wahlenberg) Dewey. Radiate sedge. Infrequent, submesic to mesic woods, mid- to high elevations. (Included in C. rosea Schkuhr. in R). The complex of C. radiata, C. rosea and C. convoluta MacKenzie are included in C. rosea by R and are taxonomically problematic.
- * Carex scabrata Schweinitz. Rough sedge. Infrequent, open wet areas and mesic woods, low to mid-elevations.
- Carex virescens Muhl. Sedge. Frequent, open wet ground, low to mid-elevations.
- Carex vulpinoidea Michaux. Fox sedge. Infrequent, wet areas and seeps, low to mid-elevations.

Rhynchospora Vahl.

Rhynchospora capitellata Michaux. Beak rush. Scarce, wet open areas, seeps and streamsides, low elevations.

Scirpus L.

- Scirpus atrovirens. Willd. var. atrovirens. Bullrush. Rare, wet open clearing at intersection of Big Creek and Peter Camp Branch, low elevations.
- * Scirpus atrovirens. var. georgianus (Harper) Fernald. Bullrush. Rare, wet open clearing at intersection of Big Creek and Peter Camp Branch. (Included in S. atrovirens Willd. in R). This taxon and S. atrovirens var. atrovirens are found together at BFM and seem to be distinct at the varietal level.
- Scirpus polyphyllus Vahl. Many-leaved bullrush. Scarce, wet open areas, low elevations.
- Scirpus purshianus Fernald. Bullrush. Scarce, wet open areas, low elevations.

DIOSCOREACEAE

Dioscorea L.

Dioscorea villosa L. Wild yam. Common, mesic to submesic woods, low to high elevations.

IRIDACEAE

Iris L.

Iris cristata Aiton. Crested dwarf iris. Common, mesic to submesic woods and along trails, low to mid-elevations.

Iris verna var. smalliana Fernald. Spring dwarf iris. Occasional, xeric woods, mid-elevations.

Sisyrinchium L.

- * Sisyrinchium mucronatum Michaux. Blue-eyed grass. Infrequent, clearings and old logging roads, low to mid-elevations.

JUNCACEAE

Juncus L.

Juncus effusus var. solutus Fern & Wieg. Soft rush. Occasional, moist open areas, low to high elevations. Not in R.

Juncus tenuis Willd. Path rush. Common, trails, open areas, low to high elevations.

Luzula DC.

Luzula acuminata var. carolinae (Watson) Fernald. Wood rush. Occasional, low woods, clearings and roadsides, mesic to submesic, low elevations.

- * Luzula multiflora (Retzius) Lej. Wood rush. Occasional, clearings, trailsides, roadsides, rocky areas, low to high elevations.

LILIACEAE

Allium L.

- * Allium tricoccum Aiton. Ramps, wild leeks. Frequent, moist woods, locally abundant, mid- to high elevations.

Clintonia Raf.

Clintonia umbellulata (Michaux) Morong. Umbellate clintonia, speckled wood-lily. Frequent, moist woods, mid- to high elevations.

Convallaria L.

Convallaria majalis var. montana (Raf.) Ahles. Wild lily-of-the-valley. Infrequent, moist woods, mid- to high elevations.

Disporum Salisbury

Disporum lanuginosum (Michaux) Nicholson. Yellow mandarin.

Frequent, mesic coves and shaded slopes, mid-elevations.

- * Disporum maculatum (Buckley) Britton. Spotted mandarin. Scarce, moist woods, low elevations.

Lilium L.

Lilium michauxii Poiret. Carolina lily. Occasional, xeric to subxeric woods, low to high elevations.

Lilium superbum L. Turk's cap lily. Occasional, mesic woods, low to high elevations.

Maianthemum Desf.

- * Maianthemum canadense Desf. Wild lily-of-the-valley, mayflower. Scarce, mesic woods, high elevations.

Medeola L.

Medeola virginiana L. Indian cucumber. Common, mesic to dry woods, low to high elevations.

Polygonatum Miller

Polygonatum biflorum (Walter) Ell. Smooth Solomon's seal. Common, mesic woods, low to high elevations.

- * Polygonatum canaliculatum (Muhl.) Pursh. Great Solomon's seal. Occasional, moist woods, low to mid-elevations. Specimens from BFM possibly not deserving specific status, instead, a varietal form of P. biflorum. Included in P. biflorum (Walt.) Ell. in R.
- * Polygonatum pubescens (Willd.) Pursh. Hairy Solomon's seal. Frequent, mesic woods, low to high elevations.

Smilacina Desf.

Smilacina racemosa (L.) Desf. False Solomon's seal. Frequent, mesic woods and coves, low to high elevations.

Smilax L.

Smilax glauca (L.) Walter. Glaucous cat briar. Occasional, submesic to xeric woods, especially openings in the canopy, low to mid-elevations.

- * Smilax hugeri Small. Huger's carrion flower. Infrequent, mesic coves, low elevations. S. ecirrhata var. hugeri (Small) Ahles in R.
- * Smilax herbacea L. Carrion flower. Occasional, mesic coves and slopes, low to mid-elevations.

Smilax rotundifolia L. Greenbriar. Occasional, mesic to dry woods and disturbed areas, thickets, low to mid-elevations.

Stenanthium (Gray) Kunth.

Stenanthium gramineum (Ker.) Morong. Featherbells. Frequent, mesic woods, low to high elevations.

Trillium L.

Trillium catesbaei Elliott. Catesby's trillium. Occasional, mesic coves to submesic ridges, low to mid-elevations.

Trillium erectum L. Wake robin. Infrequent, mesic coves and slopes, mid- to high elevations. The typical petal color form is maroon petaled. The white petal color form is Trillium erectum f. albiflorum R. Hoffm. and the cream or yellowish petaled form is T. erectum f. luteum Louis-Marie. The T. erectum at BFM ranged from white petaled to a form with the outer four-fifths of the petal rose-lavender and the inner one-fifth yellow.

* Trillium simile Gleason. White scented trillium. Infrequent, mesic woods, low to high elevations.

* Trillium undulatum Willd. Painted trillium. Scarce, mesic to subxeric coves and ridges, high elevations.

* Trillium vaseyi Harbison. Vasey's trillium. Occasional, mesic woods and coves, low to mid-elevations.

Uvularia L.

* Uvularia grandiflora Smith. Large-flowered bellwort. Frequent, mesic woods, low to high elevations.

* Uvularia perfoliata L. Perfoliate bellwort. Frequent, mesic to subxeric woods, low to high elevations.

Veratrum L.

Veratrum parviflorum Michaux. Small flowered false hellebore. Frequent, moist coves and slopes, low to high elevations.

ORCHIDACEAE

All identifications of Orchidaceae are based upon the work of Luer (1975), whose nomenclature was followed in this list.

Cypripedium L.

* Cypripedium acaule Aiton. Pink lady's slipper. Infrequent, subxeric to xeric woods, low to mid-elevations.

* Cypripedium calceolus var. pubescens (Willd.) Correll. Yellow lady's slipper. Occasional, mesic woods, low to high elevations.

Cypripedium calceolus var. parviflorum (Salisbury) Fernald.
Small flowered yellow lady's slipper. Scarce, mesic to
subxeric woods, high elevations. Included in C. calceolus
var. pubescens in R.

Galearis Raf.

Galearis spectabilis (L.) Raf. Showy orchis. Frequent, mesic
coves and along trails, low to mid-elevations. Orchis
spectabilis in R.

Goodyera R. Brown

Goodyera pubescens (Willd.) R. Brown. Downy rattlesnake plantain.
Frequent, mesic coves to subxeric woods, along trails, low
to mid-elevations.

Malaxis Solander

- * Malaxis unifolia Michaux. Adder's mouth. Very rare, but easily
overlooked, mesic woods, mid-elevations.

Plantanthera Lindley

- * Plantanthera ciliaris (L.) Lindley. Yellow fringed orchid.
Scarce, subxeric woods, low to mid-elevations.
- * Plantanthera clavellata (Michaux) Luer. Green woodland orchid.
Rare, boggy area on the south side of BFM called Bear
Wallow Bog, 915 m elevation.

Tipularia Nuttall

Tipularia discolor (Pursh) Nuttall. Crane-fly orchid.
Occasional, mesic woods, low to mid-elevations.

Triphora Nuttall

- * Triphora trianthophora (Swartz) Rydberg. Three birds orchid.
Scarce, mesic coves, low to mid-elevations.

POACEAE

Agrostis L.

Agrostis perennans (Walt.) Tuckerm. Upland grass. Frequent,
mesic woods and along trails, low to high elevations.

Andropogon L.

Andropogon gerardii Vitm. Big blue stem. Infrequent, subxeric to xeric woods, openings and trailsides, low to high elevations.

Arthraxon Beauvois

Arthraxon hispidus var. cryptatherus (Hack) Honda. Scarce, open areas and clearings low to high elevations. Introduced from E. Asia.

Brachyelytrum Beauvois

- * Brachyelytrum erectum (Schreb.) Beauv. Frequent, mesic to subxeric woods, and along trails, low to high elevations.

Bromus L.

- * Bromus inermis Leyss. Brome grass. Scarce, xeric to subxeric woods, along Hemp Top Trail on south side of mountain. Native to Europe.

Dactylis L.

- * Dactylis glomerata L. Orchard grass. Occasional, xeric to subxeric woods along Hemp Top Trail, south side of BFM, mid- to high elevations. Native to Europe.

Danthonia DC.

- * Danthonia compressa Austin. Mountain oat grass. Occasional, dry woods and roadsides, low to high elevations.
- Danthonia sericea Nutt. Downy oat grass. Occasional xeric to subxeric open woods and trailsides, low to high elevations.
- * Danthonia spicata (L.) Beauv. Poverty grass, poor man's grass. Occasional, subxeric to xeric woods and openings, low to high elevations.

Festuca L.

Festuca elatior L. Meadow fescue. Infrequent, roadsides, clearings and trailside, low to mid-elevations. Native to Europe.

Festuca obtusa Spreng. Woodland fescue. Occasional, mesic woods and coves, low to high elevations.

Holcus L.

- * Holcus lanatus L. Velvet grass. Scarce, xeric to subxeric trailsides on the south side of BFM, mid- to high elevations. Native to Europe.

Hystrix Moench.

- * Hystrix patula Moench. Bottlebrush. Frequent, rich mesic woods, mid- to high elevations.

Muhlenbergia Schreber

Muhlenbergia tenuiflora (Willd.) BSP. Scarce, mesic coves, low elevations.

Panicum L.

- Panicum anceps Michaux. Panic grass. Scarce, mesic roadsides and clearings, low elevations.
Panicum boscii Poir. Panic grass. Infrequent, dry woods, roadsides and trailsides, low to mid-elevations.
Panicum commutatum var. ashei (Pearson) Fern. Common panic grass. Occasional, mesic to submesic woods, trailsides, low to mid-elevations. Included in P. commutatum Schultes in R.
Panicum dichotomum L. Small panic grass. Infrequent, mesic woods and openings, low to mid-elevations.
Panicum lanuginosum Ell. Woolly panic grass. Scarce, moist roadsides, low elevations.
* Panicum latifolium L. Broad-leaved panic grass. Infrequent, roadsides and open woods, low to mid-elevations.

Paspalum L.

Paspalum laeve Michaux. Smooth paspalum. Infrequent, roadsides at low elevations.

Poa L.

Poa cuspidata Nutt. Woodland grass. Frequent, mesic to submesic woods, low to high elevations.

Schizachyrium (Nees.) Trin.

Schizachyrium scoparium (Michx.) Nash. Little blue stem. Frequent, subxeric or xeric woods, rocky woods, trailsides, mid-elevations.

Triodia R. Br.

- * Triodia flava (L.) Smyth. Purple top. Infrequent, clearings, roadsides and borders of woods, low elevations. Tridens flavus (L.) Hitchcock in R. From Fernald (1950).

DICOTYLEDONEAE

ACERACEAE

Acer L.

- Acer rubrum L. Red maple. Common, mesic woods, low to high elevations.
- Acer saccharum Marshal. ssp. saccharum. Sugar maple. Common, mesic coves, mid- to high elevations.
- * Acer spicatum Lam. Mountain maple. Very rare, six individuals on East Fork Rough Creek, in block clearing area, mesic woods, 1100 m elevation.

ANACARDIACEAE

Rhus L.

- * Rhus copallina L. Shining sumac, winged sumac. Scarce, subxeric open woods and clearings, low to mid-elevations.
- Rhus radicans L. Poison Ivy. Occasional, mesic to subxeric woods and thickets, low to mid-elevations.

APIACEAE

Angelica L.

- Angelica triquinata Michaux. Filmy angelica. Occasional, mesic woods and coves, mid- to high elevations.
- * Angelica venosa (Greenway) Fernald. Hairy angelica. Occasional, mesic woods, mid- to high elevations.

Cryptotaenia DC.

- * Cryptotaenia canadensis (L.) DC. Honewort. Frequent, mesic woods, low to high elevations.

Heracleum L.

- Heracleum maximum Bartram. Masterwort. Scarce, mesic open woods, mid- to high elevations, only on Wolf Ridge. H. lanatum Michaux in R.

Ligusticum L.

- Ligusticum canadense (L.) Britt. Lovage. Infrequent, submesic to subxeric woods, low to high elevations.

Osmorhiza Raf.

Osmorhiza claytonii (Michaux) Clarke. Sweet cicely. Common, mesic woods and coves, low to high elevations.

Oxypolis Raf.

Oxypolis rigidior (L.) Raf. Cowbane. Rare, known from a single site, Bear Wallow Bog on the south side of BFM, 915 m elevation.

Sanicula L.

- * Sanicula canadensis L. Canada black snakeroot. Frequent, mesic woods, low to mid-elevations.
- * Sanicula gregaria Bicknell. Sanicle, black snakeroot. Frequent, mesic woods and coves, low to mid-elevations.
- * Sanicula smallii Bicknell. Small's black snakeroot. Occasional, mesic coves and woods low to mid-elevations.

Taenidia (T. & G.) Drude

- * Taenidia integerrima (L.) Drude. Yellow pimpernel. Occasional, mesic to subxeric woods and ridges, low to high elevations.

Thaspium Nutt.

Thaspium barbinode (Michaux) Nuttall. Meadow-parsnip. Frequent, mesic woods and coves, low to mid-elevations.

APOCYNACEAE

Apocynum L.

- * Apocynum androsaemifolium L. Spreading dogbane. Scarce, mesic open woods above 1235 m, mostly on the east side of BFM. This genus is a problem taxonomically. I believe that A. androsaemifolium and A. cannabinum L. vary continuously toward the putative hybrid, A. medium Greene.

AQUIFOLIACEAE

Ilex L.

- Ilex montana T. & G. Mountain holly. Common, mesic to subxeric slopes, mid- to high elevations.
- * Ilex opaca Aiton. American holly. Scarce, mesic woods, low elevations.

ARALIACEAE

Aralia L.

- * Aralia nudicaulis L. Wild sarsparilla. Scarce, mesic slopes and coves, high elevations.
- * Aralia racemosa L. Wild spikenard. Occasional, mesic coves and slopes, low to high elevations.
- * Aralia spinosa L. Devil's walking stick. Infrequent, streamsides and roadsides, low elevations.

Panax L.

- * Panax quinquefolius L. Ginseng. Infrequent, mesic coves, low to mid-elevations.

ARISTOLOCHIACEAE

Aristolochia L.

- * Aristolochia durior Hill. Dutchman's pipe. Common, mesic coves and disturbed cove hardwoods, low to mid-elevations. A. macrophylla Lam. in R.
- Aristolochia serpentaria L. Snakeroot. Scarce, but easily overlooked, submesic hardwood forests on ridges, mid- to high elevations.

Asarum L.

- * Asarum canadense L. Wild ginger. Occasional, mesic rocky woods, mid-elevations.

Hexastylis Raf.

Hexastylis arifolia (Michaux) Small. Little brown jugs. Rare, only found on Indian Creek, a mesic cove, low elevations.

Hexastylis shuttleworthii (B. & B.) Small. Spotted little brown jugs. Common, mesic woods and slopes, low to mid-elevations.

ASCLEPIADACEAE

Asclepias L.

- * Asclepias exaltata L. Poke milkweed. Infrequent, subxeric ridges and trailsides, mid- to high elevations.
- * Asclepias quadrifolia Jacquin. Four-leaved milkweed. Scarce, mesic coves, low to mid-elevations.

- * Asclepias tuberosa L. Butterfly-weed. Very rare, a few individuals on subxeric ridge along Big Frog Trail, 1070 m elevation.

ASTERACEAE

The nomenclature for the Asteraceae follows Cronquist (1980).

Ambrosia L.

- * Ambrosia artemisiifolia L. Common ragweed. Scarce, clearing at intersection of Peter Camp Branch and Big Creek, 457 m elevation.

Antennaria Gaerth.

- Antennaria plantaginifolia (L.) Richardson. Plantain-leaved pussy toes. Infrequent, xeric open woods and trailsides, mid-elevations.
- * Antennaria solitaria Rydberg. Pussy toes. Infrequent, xeric open woods and trailsides, mid-elevations.

Aster L.

- * Aster concinnus Willd. Infrequent, xeric woods and openings, low to high elevations. A. laevis var. concinnus (Willd.) House in R.
- Aster curtisii T. & G. Curtis' aster. Common, mesic to subxeric woods, low to high elevations.
- * Aster divaricatus L. White wood aster. Common, mesic to subxeric woods, low to high elevations.
- Aster dumosus L. Bushy aster. Scarce, clearings and roadsides, low elevations.
- * Aster infirmus Michaux. Entire-leaved aster. Infrequent, clearings and dry woods, low elevations.
- * Aster laevis L. Infrequent, dry woods and ridges, mid- to high elevations.
- * Aster lateriflorus (L.) Britton. Calico aster. Occasional, mesic woods and trailsides, mid- to high elevations.
- Aster linariifolius L. Stiff aster. Occasional, mesic to subxeric woods, low to mid-elevations.
- * Aster macrophyllus L. var. macrophyllus. Big-leaved aster. Occasional, submesic to mesic woods, along Wolf Ridge, mid- to high elevations.
- * Aster patens Aiton. var. patens. Late purple aster. Occasional, dry woods and trailsides, mid- to high elevations.
- * Aster patens var. phlogifolius (Muhl.) Nees. Thin leaved aster. Infrequent, mesic woods, high elevations.
- * Aster paternus Cronq. White-topped aster. Frequent, xeric to submesic woods, mid- to high elevations.

Aster pilosus Willd. Downy aster. Scarce, dry clearings and woodland edges, low elevations. Included in A. phlogifolius Muhl. in R.

Aster sagittifolius Willd. Arrow-leaved aster. Infrequent, mesic to subxeric woods, trailsides, mid- to high elevations.

- * Aster surculosus Michaux. Recurved aster. Infrequent, mesic woods, low to mid-elevations.

- * Aster simplex Willd. Infrequent, mesic woods, low elevations.

Aster undulatus L. Wavy-leaved aster. Common, mesic woods, low to high elevations.

Bidens L.

Bidens frondosa L. Beggar-ticks. Scarce, the only collections are from the clearing at the intersection of Big Creek and Peter Camp Branch, 457 m elevation.

Cacalia L.

- * Cacalia atriplicifolia L. Pale Indian plantain. Occasional, mesic to submesic woods, mid- to high elevations. More abundant on the south side of the mountain.

Chrysanthemum L.

Chrysanthemum leucanthemum L. Ox-eye daisy. Scarce, clearings and open woods, low elevations. Introduced from Europe.

Chrysopsis Elliott.

- * Chrysopsis graminifolia (Michaux) Elliott. Scarce, dry ridge on west side of BFM, near Chestnut Mountain, around 915 m elevation. Heterotheca graminifolia (Michaux) Shinnery in R.

Cirsium Miller

- * Cirsium vulgare (Savi) Tenore. Bull thistle. Very rare, only found in clearing at intersection of Big Creek and Peter Camp Branch, 460 m elevation. Introduced from Europe.

Coreopsis L.

- * Coreopsis latifolia Michaux. Broad-leaved tickseed. Rare, mesic rocky woods, possibly associated with openings in the canopy, low to mid-elevations.

- * Coreopsis major var. rigida (Nutt.) Boynton. Wood tickseed. Common, mesic woods, low to high elevations. Included in C. major var. stellata (Nutt.) Robinson in R.

Elephantopus L.

Elephantopus carolinianus Raeuschel. Elephant's foot. Scarce, clearings and open woods, low elevations. Included in E. carolinianus Willd. in R.

Erechtites Raf.

Erechtites hieracifolia (L.) Raf. Fireweed. Scarce, mesic woods in treefall areas and old campsites, low to high elevations.

Erigeron L.

- * Erigeron annuus (L.) Pers. Daisy-fleabane. Infrequent, mesic woods and roadsides, low to high elevations.
- Erigeron pulchellus Michaux. Robin's plantain. Infrequent, mesic woods, low to mid-elevations.
- * Erigeron strigosus Muhl. ex. Willd. Daisy-fleabane. Occasional, roadsides and clearings, low elevations.

Eupatorium L.

- Eupatorium album L. White eupatorium. Scarce, subxeric woods, low to mid-elevations.
- * Eupatorium purpureum L. Woodland Joe-Pye-weed. Frequent, mesic woods, low to mid-elevations.
- Eupatorium rugosum Houttuyn. White snake root. Frequent, mesic woods and trailsides, low to high elevations.
- Eupatorium sessilifolium L. Upland boneset. Infrequent, mesic to submesic woods, low to high elevations.

Gnaphalium L.

Gnaphalium obtusifolium L. Indian tobacco. Infrequent, roadsides and dry woods, low elevations.

Helenium L.

Helenium flexuosum Raf. Dark-eyed sneezeweed. Scarce, roadsides and clearings, low elevations.

Helianthus L.

The difficulties encountered in identification of taxa within this genus have been alleviated somewhat by the work of Beatley (1963) and Heiser (1969).

Helianthus atrorubens L. Sunflower. Scarce, mesic woods on Wolf Ridge, mid-elevations.

Helianthus decapetalus L. Wide-leaved sunflower. Frequent, mesic to subxeric woods, mid- to high elevations.

- * Helianthus divaricatus L. Sessile-leaved sunflower. Occasional, mesic woods, mid- to high elevations.
- * Helianthus microcephalus T. & G. Small wood sunflower. Frequent, mesic to submesic woods, low to high elevations.
- Helianthus strumosus L. Frequent, mesic to submesic woods, low to high elevations.

Heliopsis Persoon

- * Heliopsis helianthoides (L.) Sweet. Ox-eye. Occasional, mesic, open woods, low to mid-elevations.

Hieracium L.

- Hieracium paniculatum L. Panicked hawkweed. Frequent, xeric woods along trails and openings, mid-elevations.
- * Hieracium venosum L. Rattlesnake hawkweed. Scarce, dry woods, low to high elevations.

Krigia Schreber

- * Krigia virginica (L.) Willd. Virginia dwarf dandelion. Infrequent, clearings and roadsides, low elevations.

Lactuca L.

- * Lactuca biennis (Moench.) Fern. Tall, blue lettuce. Scarce, mesic open woods and meadows, low and high elevations.
- * Lactuca canadensis L. Wild lettuce. Scarce, roadsides, low elevations.
- * Lactuca floridana (L.) Gaertn. Woodland blue lettuce. Scarce, clearings and open mesic woods, low elevations.

Liatris Schreber

- Liatris scariosa (L.) Willd. Blazing star. Scarce, dry woods and trailsides, mid- to high elevations.

Polymnia L.

- Polymnia uvedalia (L.) L. Bear's foot. Scarce, open mesic woods, disturbed woods, mid-elevations.

Prenanthes L.

- Prenanthes altissima L. Tall rattlesnake root. Frequent, subxeric to mesic woods and trailsides, mid- to high elevations.
- Prenanthes roanensis (Chickering) Chickering. Roan's rattlesnake root. Occasional, mesic woods, and openings at high elevations.

- * Prenanthes trifoliata (Cass.) Fern. Lion's foot. Frequent, submesic to subxeric woods and trailsides, mid- to high elevations.

Rudbeckia L.

- Rudbeckia hirta L. Black-eyed susan. Frequent, roadsides, clearings and mesic slopes, low to high elevations.
Rudbeckia laciniata L. Coneflower. Occasional, mesic coves, subxeric woods, mid- to high elevations.

Senecio L.

- Senecio anonymous A. Wood. Yellow ragwort. Common, moist woods, low to high elevations.
Senecio obovatus Muhl. ex Willd. Spatulate-leaved ragwort. Infrequent, subxeric woods and slopes, mid-elevations.
 * Senecio paupercaulis Michaux. Infrequent, mesic woods, mid- to high elevations.

Solidago L.

- Solidago arguta var. caroliniana A. Gray. Sharp-leaved goldenrod. Occasional, subxeric woods and trailsides, low to high elevations.
 * Solidago bicolor L. Silverrod. Infrequent, mesic to subxeric woods and trailsides, mid- to high elevations.
 * Solidago canadensis var. scabra T. & G. Canada goldenrod. Scarce, clearings and roadsides, low elevations.
Solidago curtisii T. & G. Curtis' goldenrod. Common, mesic to subxeric woods, roadsides and trailsides, high to low elevations.
 * Solidago erecta Pursh. Erect goldenrod. Occasional, xeric rocky woods, low to mid-elevations.
Solidago flaccidifolia Small. Thin leaved goldenrod. Occasional, mesic to subxeric woods and coves, low to high elevations.
 * Solidago flexicaulis L. Zig-zag goldenrod. Occasional, mesic woods, low to high elevations.
 * Solidago nemoralis Aiton. Gray goldenrod. Infrequent, clearings and roadsides, low elevations.
Solidago roanensis T. C. Porter. Roan's goldenrod. Frequent, mesic to subxeric woods and openings, trailsides, low to high elevations.

Taraxacum Wiggers.

- Taraxacum officinale Wiggers. Common dandelion. Infrequent, clearings and roadsides, low elevations.

BALSAMINACEAE

Impatiens L.

Impatiens capensis Meerb. Orange jewel-weed, Touch-me-not.

Frequent, mesic openings and roadsides, along streams, low to mid-elevations.

* Impatiens pallida Nuttall. Pale jewel-weed, Touch-me-not.

Frequent, mesic openings, thickets and streamsides, low to high elevations.

BERBERIDACEAE

Caulophyllum Michaux

Caulophyllum thalictroides (L.) Michaux. Blue cohosh. Frequent, mesic woods, low to high elevations.

Podophyllum L.

Podophyllum peltatum L. Mayapple. Frequent, mesic woods, low to high elevations.

BETULACEAE

Betula L.

* Betula allegheniensis Britt. Yellow birch. Common, mesic woods, low to high elevations. B. lutea Michaux f. in R).

Betula lenta L. Black or sweet birch. Frequent, mesic woods and coves, low to high elevations.

Carpinus L.

Carpinus caroliniana Walter. American hornbeam, musclewood.

Frequent, mesic woods and streamsides, low to mid-elevations.

Corylus L.

* Corylus cornuta Marshall. Beaked hazel. Infrequent, subxeric rocky woods, high elevations.

Ostrya Scopoli

Ostrya virginiana (Miller) K. Koch. Hop-hornbeam. Occasional, mesic woods, low to mid-elevations.

BIGNONIACEAE

Anisostichus Bureau

Anisostichus capreolata (L.) Bureau. Cross-vine. Common, mesic woods and streamsides, low elevations.

BRASSICACEAE

Arabis L.

- * Arabis canadensis L. Sicklepod. Occasional, mesic woods, mid- to high elevations.
Arabis laevigata (Willd.) Poir. var. laevigata. Smooth rockcress. Occasional, mesic rocky woods, low to high elevations.

Dentaria L.

Dentaria diphylla Michaux. Toothwort. Frequent, moist woods and coves, streamsides, low to mid-elevations. Cardamine diphylla (Michx.) Wood in R.
Dentaria laciniata Muhl. ex Willd. Cut-leaved toothwort. Frequent, woods, low elevations. Cardamine concatenata (Michx.) Ahles in R.

CALYCANTHACEAE

Calycanthus L.

Calycanthus floridus L. var. floridus. Sweetshrub, spicebush. Common, mesic to submesic woods, openings, logging roads and roadsides, low to high elevations. All plants at BFM with leaves pubescent beneath, in contrast to GSMNP where all plants are with glabrous leaves which is the taxon C. floridus var. laevigatus (Willd.) Torr. & Gray.

CAMPANULACEAE

Campanula L.

Campanula americana L. Tall bell flower. Occasional, mesic woods, roadsides and thickets, low to high elevations.
Campanula divaricata Michaux. Southern harebell. Occasional, xeric to subxeric woods, trailsides and rocky slopes, low to mid-elevations.

Lobelia L.

Lobelia cardinalis L. Cardinal flower. Infrequent, very moist to wet soil, seepy areas and in intermittent streams, low to mid-elevations.

Lobelia inflata L. Indian tobacco. Frequent, mesic woods, trailsides, roadsides and clearings, low to mid-elevations.

- * Lobelia puberula Michaux. Downy lobelia. Infrequent, moist woods and roadsides, low to mid-elevations.

Triodanis Raf.

Triodanis perfoliata (L.) Niewland. Venus' looking glass. Infrequent, clearings and roadsides, low elevations.
Specularia perfoliata (L.) A. DC. in R.

CAPRIFOLIACEAE

Diervilla Miller

Diervilla lonicera Miller. Bush honeysuckle. Scarce, rocky, subxeric woods, mid-elevations. The population at BFM was typical D. lonicera, but other collections from the state seem to intergrade with D. sessilifolia Buckl.--a taxonomic problem. Hardin (1968) presents a good case for the distinctiveness of these taxa.

Lonicera L.

- * Lonicera dioica L. Occasional, mesic to subxeric woods and slopes, mid- to high elevations. Forms small clumps, usually near gaps in canopy.
- * Lonicera japonica Thunberg. Japanese honeysuckle. Rare, only found in the clearing at the intersection of Big Creek and Peter Camp Branch, 475 m elevation.

Sambucus L.

Sambucus canadensis L. American elder. Rare, only found on Silvermine Creek, near the TN/GA state line, low elevation.

- * Sambucus pubens Michaux. Red-berried elder. Frequent, rich mesic woods and steep, shaded slopes, high elevations.

Viburnum L.

Viburnum acerifolium L. Maple-leaved viburnum. Frequent, mesic to subxeric rocky woods, low to high elevations.

Viburnum cassinoides L. Wild raisin. Occasional, submesic to subxeric rocky woods, mid- to high elevations.

Viburnum dentatum L. var. dentatum. Arrow-wood. Occasional, mesic woods, mid- to high elevations.

- * Viburnum nudum L. Occasional, mesic woods and thickets, mid- to high elevations. This taxon is difficult to distinguish from V. cassinoides L.

CARYOPHYLLACEAE

Cerastium L.

- * Cerastium fontanum Baumg. ssp. trivale (Link.) Jalas. Common mouse-ear chickweed. Scarce, disturbed areas, clearings and logging roads, low elevations. Native to Europe. C. holosteoides var. vulgare (Hartman) Hylander in R.

Silene L.

Silene ovata Pursh. Rough-leaved campion. Rare, rich open mesic woods, only known from two localities. 1030 m elevation on Wolf Ridge and on the west side of ridge due south of summit.

Silene stellata (L.) Aiton f. Starry campion. Occasional, submesic to mesic woods and ridges, mid- to high elevations.

Silene virginica L. Fire pink. Infrequent, dry woods and ridges, mid-elevations.

Stellaria L.

Stellaria pubera Michaux. Star chickweed. Common, mesic to submesic coves, slopes and ridges, low to high elevations.

CELASTRACEAE

Euonymus L.

- Euonymus americanus L. Heart's-a-busting. Frequent, moist coves and streamsides, low to mid-elevations.
- * Euonymus obovatus Nuttall. Running strawberry-bush. Scarce, mesic rocky woods, 1030 m elevation, East Fork Rough Creek, in block clearing.

CISTACEAE

Lechea L.

Lechea racemulosa Michaux. Pinweed. Infrequent, xeric rocky woods and trailsides, mid-elevations.

CLUSIACEAE (Hypericaceae in R)

Hypericum L.

Hypericum mutilum L. Dwarf St. John's-wort. Frequent, mesic woods, seeps and streamsides, low to high elevations.

Hypericum punctatum Lam. Dotted St. John's wort. Occasional, clearings and roadsides, low to mid-elevations.

- * Hypericum stragalum P. Adams & Robson. Infrequent, xeric woods and rocky ridges, low to high elevations.

CONVOLVULACEAE

Cuscuta L.

Cuscuta compacta Jussieu. Bracted dodder. Scarce, mesic to submesic woods, low to mid-elevations, Wolf Ridge only.

- * Cuscuta gronovii Willd. ex. R. & S. Dodder. Infrequent, mesic woods, mid-elevations.

CORNACEAE

Cornus L.

- * Cornus alternifolia L. f. Alternate-leaved dogwood. Infrequent, mesic woods and streamsides, low to high elevations.

Cornus amomum Miller. Silky dogwood. Scarce, mesic roadsides and streams, low elevations.

Cornus florida L. Flowering dogwood. Common, mesic to subxeric woods, low to high elevations.

DIAPENSIACEAE

Galax L.

Galax urcelolata (Poir.) Brummit. Galax. Common, submesic to xeric woods, usually with ericaceous shrubs, low to high elevations. G. aphylla L. in R.

ELAEAGNACEAE

Elaeagnus L.

- * Elaeagnus umbellulata Thunberg. Oleaster. Rare, only a few individuals in clearing at intersection of Big Creek and Peter Camp Branch, 475 m elevation. Introduced from E. Asia.

ERICACEAE

Chimaphila Pursh.

Chimaphila maculata (L.) Pursh. Spotted wintergreen, Pipsissewa.
Frequent, subxeric to xeric woods, low to high elevations.

Epigaea L.

Epigaea repens L. Trailing arbutus. Frequent, subxeric to xeric
woods, low to mid-elevations.

Gaultheria L.

Gaultheria procumbens L. Wintergreen. Infrequent, subxeric
woods, low elevations.

Gaylussacia HBK.

Gaylussacia baccata (Wang.) K. Koch. Black huckleberry.
Occasional, xeric woods, low to high elevations.

Gaylussacia ursina (M. A. Curtis) T. & G. ex. Gray. Bear
huckleberry. Occasional, submesic to subxeric woods, mid- to
high elevations.

Kalmia L.

Kalmia latifolia L. Mountain laurel. Common, dry woods, rocky
woods, steep slopes, low to high elevations.

Leucothoe D. Don.

Leucothoe fontanesiana (Steudel) Sleummer. Doghobble.
Infrequent, streamsides, low elevations. L. axillaris var.
editorum (Fernald & Schubert) Ahles. in R.

Lyonia Nutt.

Lyonia ligustrina (L.) DC. Maleberry. Scarce, subxeric to xeric
woods, on Wolf Ridge near Chestnut Mountain, mid-elevations.

Monotropa L.

* Monotropa hypopithys L. Pinesap. Scarce, only seen in subxeric
woods near Bear Wallow Bog on south side of BFM, 915 m
elevation.

* Monotropa uniflora L. Indian pipe. Occasional, mesic woods, low
to mid-elevations.

Oxydendrum DC.

Oxydendrum arboreum (L.) DC. Sourwood. Common, submesic to subxeric woods, low to high elevations.

Rhododendron L.

Rhododendron calendulaceum (Michaux) Torrey. Flame azalea.

Frequent, submesic to xeric woods, low to high elevations.

- * Rhododendron catawbiense Michaux. Catawba rhododendron.

Frequent, subxeric woods and rocky steep slopes, mid- to high elevations.

- * Rhododendron maximum L. Rosebay rhododendron. Common, mesic woods, stream sides, steep slopes, low to high elevations.

- * Rhododendron minus Michaux. Small-leaved rhododendron. Scarce, only one location, on rocky ridge near headwaters of Murray Creek, 854 m elevation.

- * Rhododendron viscosum (L.) Torr. Clammy azalea. Very rare, a few individuals on Wolf Ridge, 1220 m elevation, dry rocky woods.

Vaccinium L.

Vaccinium arboreum Marshall. Farkleberry, sparkleberry. Scarce, dry woods, restricted to west side of study area, low to mid-elevations.

Vaccinium constablei Gray. Tall woodland blueberry. Frequent, xeric woods and slopes, low to mid-elevations. All collections had finely serrulate leaf margins and corolla not constricted at apex, consistent with the description of the taxon in R.

- * Vaccinium erythrocarpum Michaux. Bearberry. Occasional, mesic to xeric woods, rocky slopes, mid- to high elevations.

Vaccinium hirsutum Buckley. Hairy blueberry. Occasional, xeric woods and ridges, mid-elevations.

Vaccinium pallidum Aiton. Pale lowbush blueberry. Frequent, submesic to subxeric woods, mid- to high elevations. V. vacillana, Torr. in R.

Vaccinium stamineum L. Squaw huckleberry, gooseberry. Frequent, dry woods, mid- to high elevations.

EUPHORBIACEAE

Euphorbia L.

- * Euphorbia corollata L. var. corollata. Flowering spurge. Occasional, mesic to dry woods, low to mid-elevations.

- * Euphorbia corollata var. zinniiflora (Small) Ahles. Infrequent, roadsides and clearings, low elevations.

FABACEAE

Amphicarpa Ell. ex. Nutt.

Amphicarpa bracteata (L.) Fernald. Hog peanut. Occasional, mesic woods and thickets, low to mid-elevations.

Cassia L.

- * Cassia fasciculata L. Partridge pea. Infrequent, clearings and roadsides, low elevations.

Cassia nictitans L. Sensitive pea. Infrequent, clearings and roadsides, low elevations.

Cladrastis Raf.

- * Cladrastis kentukea (Dum.-Cours.) Rudd. Yellow wood. Occasional, mesic woods and coves, streamsides, low to high elevations.

Desmodium Desv.

- * Desmodium glutinosum (Muhl. ex. Willd.) Wood. Whorled tick-trefoil. Frequent, mesic to submesic woods, low to high elevations.
Desmodium nudiflorum (L.) DC. Naked flowered tick-trefoil. Frequent, mesic to subxeric woods, low to mid-elevations.
- * Desmodium nuttallii (Schindler) Schubert. Nuttall's tick-trefoil. Scarce, clearings, low elevation.
- * Desmodium paniculatum (L.) DC. var. paniculatum. Panicked tick-trefoil. Occasional, clearings, openings and woodland borders, low to mid-elevation.
- * Desmodium paniculatum var. dillenii (Darl) Isely. Hairy panicked tick-trefoil. Occasional, clearings, roadsides and woodland borders, low to mid-elevation.

Lespedeza Michaux

Lespedeza cuneata (Dumont) G. Don. Cuneate bush-clover. Scarce, clearings and roadsides, low elevations. Native to E. Asia.
Lespedeza repens (L.) Barton. Trailing bush-clover. Infrequent, clearings and roadsides, low elevations.

Robinia L.

- Robinia hispida L. var. hispida. Bristly locust. Occasional, xeric woods and woodland borders, low to mid-elevations.
- * Robinia hispida var. rosea Pursh. Scarce, dry woods, low elevations. The shrubby Robinia are a taxonomically difficult group. This identification is based upon the work of Isely and Peabody (1984). (R. boyntonii Ashe. in R).

- * Robinia pseudo-acacia L. Black locust. Frequent, mesic to submesic disturbed woods and openings, low to high elevation.

Tephrosia Persoon

Tephrosia virginiana (L.) Persoon. Goat's rue. Scarce, dry woods, low elevations, only found on the west side of the mountain.

Thermopsis R. Brown

Thermopsis fraxinifolia M. A. Curtis. Bush-pea. Infrequent, xeric to submesic woods and trailsides, mid-elevations.

Thermopsis mollis (Michaux) M. A. Curtis ex. Gray. Soft bush-pea. Scarce, xeric woods and trailsides, mid-elevations, south side of BFM only.

Trifolium L.

Trifolium pratense L. Red clover. Infrequent, clearings and roadsides, low elevations. Native to Europe.

- * Trifolium repens L. White clover. Infrequent, clearings and roadsides, low elevations. Native to Europe.

FAGACEAE

Castanea Miller

- * Castanea dentata (Marsh.) Borkh. American chestnut. Common on the mountain prior to the chestnut blight, in submesic to dry woods and ridges, low to high elevations. Now persists as rootsprouts on a few mid-elevation subxeric ridges.
- * Castanea pumila (L.) Miller. Allegheny chinquapin. Rare, forest borders, low elevations.

Fagus L.

- * Fagus grandifolia Ehrhart. American beech. Common, mesic woods, low to high elevation. A thick stand of small trees (2-5 cm dbh) is on a northeast facing ridge at 1250 m.

Quercus L.

- * Quercus alba L. White oak. Common, submesic woods, low to high elevations. Forms a park-like community on the summit BFM.
- * Quercus coccinea Muench. Scarlet oak. Frequent, xeric woods and ridges, low to high elevations.
- * Quercus montana Willd. Chestnut oak. Common, xeric to submesic ridges, low to high elevations. (Q. prinus L. in R).

- Quercus rubra L. Northern red oak. Common, submesic to subxeric woods, low to high elevations.
- * Quercus velutina Lam. Black oak. Frequent, dry woods, low to high elevations.

FUMARIACEAE

Dicentra Bernh.

- * Dicentra cucullaria (L.) Bernh. Dutchman's britches. Common, mesic woods, mid- to high elevations.

GENTIANACEAE

Gentiana L.

- * Gentiana decora Pollard. Mountain gentian. Common, mesic to subxeric woods and trailsides, mid- to high elevations. Pringle (1967) has made a major contribution to the understanding of this confusing genus.

Obolaria L.

Obolaria virginica L. Pennywort. Infrequent, mesic woods, low to high elevations.

HAMAMELIDACEAE

Hamamelis L.

- * Hamamelis virginiana L. Witch-hazel. Common, mesic to submesic woods and slopes, low to high elevations.

Liquidambar L.

Liquidambar styraciflua L. Sweetgum. Occasional, mesic and disturbed woods, low elevations.

HIPPOCASTANACEAE

Aesculus L.

- * Aesculus octandra Marshall. Yellow buckeye. Common, moist woods and coves, low to high elevations.

HYDROPHYLLACEAE

Hydrophyllum L.

Hydrophyllum canadense L. Canadian waterleaf. Infrequent, rocky woods near streams, mid-elevations.

Phacelia Jussieu

Phacelia bipinnatifida Michaux. Purple phacelia. Scarce, only found on Murray Creek, low elevations.

JUGLANDACEAE

Carya Nuttall

- * Carya cordiformis (Wang.) K. Koch. Bitternut hickory. Frequent, submesic to subxeric woods, low to high elevations.
- * Carya glabra (Mill.) Sweet. var. glabra. Pignut hickory. Frequent, submesic to subxeric woods, low to high elevations.
- * Carya glabra var. odorata (Marsh.) Little. Red hickory. Occasional, dry woods, mid- to high elevations. C. ovalis (Wang.) Sargent in R. It is difficult to discern this taxon from the previous one.
- * Carya ovata (Mill.) K. Koch. Shagbark hickory. Frequent, mesic woods to subxeric woods, low to high elevations.

Juglans L.

- * Juglans cinerea L. Butternut. Occasional, mesic woods, low to mid-elevations.

LAMIACEAE

Agastache Clayton

- * Agastache scrophulariaefolia (Willd.) Kuntze. Giant hyssop. Scarce, mesic woods and openings, mid- to high elevations.

Blephilia Raf.

- * Blephilia hirsuta (Pursh) Benth. Woodmint. Infrequent, submesic to subxeric woods, mid-elevations.

Collinsonia L.

Collinsonia canadensis L. Stoneroot. Frequent, mesic woods, low to high elevations.

Lycopus L.

Lycopus virginicus L. Virginia water-horehound. Infrequent, mesic woods and clearings, low to mid-elevations.

Monarda L.

- Monarda clinopodia L. Horse-mint. Frequent, moist woods, mid- to high elevations.
- * Monarda didyma L. Bee-balm. Frequent, moist woods, low to high elevations.
- * Monarda x media Willd. Purple bee-balm. Infrequent, mesic woods, mid- to high elevations. Evidently a hybrid of M. didyma and M. clinopodia. Not in R. This complex is difficult to understand, but has been clarified by Whitten (1979).

Mosla Hamilton

- * Mosla dianthera (Hamilton) Maxim. Very rare, only found at end of Rough Creek Road, 825 m, in a disturbed area. Possibly the second collection of this introduced taxon in the Blue Ridge Province, the other collection from South Carolina. Introduced from Asia (not in R).

Prunella L.

- * Prunella vulgaris L. Heal-all. Occasional, mesic woods, trailsides and clearings, low to high elevations. There is some controversy concerning whether this is native or introduced (White, 1982).

Pycnanthemum Michaux

- Pycnanthemum incanum (L.) Michaux. Mountain mint. Infrequent, dry woods and thickets, low to high elevation.
- Pycnanthemum montanum Michaux. Mountain mint. Infrequent, dry woods and thickets, low to high elevation.

Scutellaria L.

- Scutellaria elliptica var. hirsuta (Short) Fern. Hairy skullcap. Infrequent, subxeric to mesic woods and trailsides, low to mid-elevations (included in S. elliptica Muhl. in R).
- * Scutellaria saxatilis Riddell. Scarce, mesic to subxeric woods, low elevation. The specimens key to S. saxatilis and fit the descriptions, but they are not typical for the taxon. The plants are glabrous, with weak stems, which is typical, but the leaves are atypically very large.

Stachys L.

Nelson (1981) has solved many of the problems in this confusing genus. The identifications follow his work.

- * Stachys nuttallii Shuttleworth ex. Benth. Infrequent, mesic woods, low elevations.
- * Stachys tenuifolia var. latidens (Small) Nelson. Rough hedge-nettle. Infrequent, mesic woods, mid- to high elevations. Included in S. latidens Small in R.

LAURACEAE

Lindera Thunberg

Lindera benzoin (L.) Blume. Spicebush. Common, mesic woods, low to high elevations.

Sassafras Trew ex. Blackwell

Sassafras albidum (Nuttall) Nees. Sassafras. Frequent, woodland borders and roadsides, submesic to subxeric disturbed woods, low elevations.

LINACEAE

Linum L.

Linum striatum Walter. Yellow flax. Scarce, trailsides, mid-elevations.

LORANTHACEAE

Phoradendron Nuttall

- * Phoradendron serotinum (Raf.) M. C. Johnston. Mistletoe. Scarce, mesic to submesic woods, low elevations. Only on the north side of the BFM.

MAGNOLIACEAE

Liriodendron L.

Liriodendron tulipifera L. Yellow poplar. Common, mesic woods, low to high elevations.

Magnolia L.

Magnolia acuminata L. Cucumber tree. Frequent, mesic woods, low to mid-elevations.

Magnolia fraseri Walter. Fraser magnolia. Frequent, mesic woods to submesic ridges, low to high elevations.

Magnolia tripetala L. Umbrella magnolia. Frequent, mesic woods, low to mid-elevations.

MELASTOMATACEAE

Rhexia L.

Rhexia virginica L. Meadow beauty. Rare, only seen along Rough Creek Road, low elevations.

NYSSACEAE

Nyssa L.

Nyssa sylvatica Marshall. Blackgum. Common, submesic to subxeric woods and slopes, low to high elevations.

OLEACEAE

Fraxinus L.

- * Fraxinus americana L. White ash. Frequent, mesic coves and slopes, low to high elevations.

ONAGRACEAE

Ludwigia L.

- * Ludwigia alternifolia L. Alternate-leaved seedbox. Infrequent, mesic disturbed areas and trailsides, low elevations.

Oenothera L.

- * Oenothera fruticosa ssp. glauca (Michaux) Straley. Sundrops. Occasional, dry to submesic woods, mid- to high elevation. Difficulty was encountered in trying to identify these specimens, but a monograph by Straley (1977) seemed to clarify some of the confusion.

OROBANCHACEAE

Conopholis Wallroth

Conopholis americana (L.) Wallroth. Squaw root, cancer root. Occasional, mesic to xeric woods, under a variety of trees, mainly oak or hemlock, low to high elevations.

Epifagus Nuttall

Epifagus virginiana (L.) Barton. Beechdrops. Frequent, mesic woods under beech, low to high elevations.

Orobanche L.

- * Orobanche uniflora L. One-flowered cancer root. Scarce, mesic woods, one of the populations was on a rock along a stream, low to mid-elevations.

OXALIDACEAE

Oxalis L.

Oxalis dillenii Jacquin. Yellow sorrell. Scarce, clearings and roadsides, low elevations.

Oxalis grandis Small. Large wood-sorrell. Infrequent, mesic rocky slopes, mid- to high elevations.

PAPAVERACEAE

Sanguinaria L.

- * Sanguinaria canadensis L. Blood root. Frequent, mesic woods and coves, low to high elevations.

PHRYMACEAE

Phryma L.

- * Phryma leptostachya L. Lop-seed. Rare, only known locality at Horse Camp Flat, on Wolf Ridge, 1040 m, mesic woods.

PHYTOLACCACEAE

Phytolacca L.

- * Phytolacca americana L. Poke weed. Scarce, mesic clearings and roadsides, low to high elevations.

PLANTAGINACEAE

Plantago L.

Plantago rugellii Dcne. Broad-leaved plantain. Frequent, clearings and roads, low elevations.

- * Plantago virginica L. Virginia plantain. Occasional, clearings and roads, low elevations.

PLATANACEAE

Platanus L.

- * Platanus occidentalis L. Sycamore. Rare, a few individuals on Big Creek at edge of study area, 450 m.

POLEMONIACEAE

Phlox L.

- * Phlox glaberrima L. Smooth phlox. Frequent, open mesic woods and trailsides, mid- to high elevations.
- * Phlox paniculata L. Summer phlox. Occasional, open mesic woods and trailsides, mid- to high elevation. This taxon and P. glaberrima posed considerable taxonomic difficulty which has not been solved to my satisfaction.

POLYGALACEAE

Polygala L.

- * Polygala pauciflora Willd. Fringed polygala. Scarce, xeric woods and old logging roads, low to mid-elevations.

POLYGONACEAE

Polygonum L.

- * Polygonum cespitosum var. longisetum (DeBruyn) Stewart. Smartweed. Occasional, clearings and roadsides, low elevations. Introduced from southeast Asia.
- * Polygonum persicaria L. Lady's thumb. Occasional, clearings and roadsides, low elevations. Introduced from Europe.
- Polygonum sagittatum L. Tearthumb. Infrequent, moist to wet clearings and roadsides, low elevations.
- * Polygonum scandens L. var. scandens. Climbing buckwheat. Infrequent, mesic woods and open woods, low to high elevations.
- * Polygonum scandens var. cristatum (Engelman. and Gray) Gleason. Climbing buckwheat. Infrequent, mesic woods and open woods, low to high elevations. It seems that the differentiating characters of size of calyx and wing keel are poor characters to use for separation at the varietal level of these two varieties of P. scandens.

Rumex L.

- Rumex acetosella L. Sheep sorrel. Occasional, clearings and roadsides, low elevations. Introduced from Europe.
- * Rumex obtusifolius L. Bitterdock. Occasional, clearings and roadsides, low elevations. Introduced from Europe.

Tovara Adamson

- Tovara virginiana (L.) Raf. Jumpseed, Virginia knotweed. Common, mesic woods and coves, low to high elevations.

PORTULACACEAE

Claytonia L.

Claytonia caroliniana Michaux. Spring beauty. Common, mesic woods and coves, low to high elevations.

PRIMULACEAE

Lysimachia L.

Lysimachia quadrifolia L. Whorled loosestrife. Frequent, xeric to mesic woods, openings, roadsides, low to high elevations.

RANUNCULACEAE

Aconitum L.

- * Aconitum uncinatum L. Monk's hood. Scarce, mesic woods, mid-elevations. Though Hardin (1964) separates this taxon into three subspecies, I was unable to identify the BFM material below the species level with any certainty.

Anemone L.

- * Anemone quinquefolia L. Wood anemone. Frequent, mesic woods and coves, low to high elevations.

Aquilegia L.

Aquilegia canadensis L. Columbine. Frequent, moist rocky woods and streamsides, low to high elevations.

Cimicifuga L.

- * Cimicifuga americana Michaux. Mountain bugbane. Frequent, mesic woods, mid- to high elevations.
Cimicifuga racemosa Nuttall. Black cohosh. Frequent, mesic woods, low to high elevations.

Clematis L.

Clematis viorna L. Leatherflower. Infrequent, rocky woods and ridges, mid- to high elevation.

Hepatica Miller

- ✓ Hepatica nobilis var. acuta (Pursh.) Steyermark.
Liverleaf. Frequent, mesic woods, low to high elevations.
H. acutiloba DC. in R.

Ranunculus L.

- * Ranunculus hispidus Michaux. Hairy buttercup. Frequent, woods, roadsides, low to high elevations.
- Ranunculus recurvatus Poiret. Hooked buttercup. Frequent, woods, roadsides and clearings, low to high elevations.

Thalictrum L.

- Thalictrum thalictroides (L.) Eames & Boivin. Rue-anemone. Common, mesic woods, low to high elevations.
- Thalictrum clavatum DC. Mountain meadowrue. Frequent, mesic woods, seepy areas and along streams, low to high elevations.
- Thalictrum dioicum L. Early meadowrue. Frequent, mesic woods and along streams, low to high elevations.

Trautvetteria Fisher & Meyer

- Trautvetteria carolinensis (Walter) Vail. False bugbane. Frequent, moist woods, seeps and streamsides, mid- to high elevations.

Xanthorhiza Marshall

- Xanthorhiza simplicissima Marshall. Yellowroot. Scarce, only found at lowest elevations along Big Creek and Peter Camp Branch.

ROSACEAE

Agrimonia L.

- * Agrimonia gryposepala Wallroth. Large-fruited agrimony. Infrequent, mesic woods, high elevations.
- * Agrimonia rostellata Wallroth. Beaked agrimony. Infrequent, mesic woods, low elevations.

Amelanchier Medicus

- Amelanchier arborea (Michaux f.) Fernald. Serviceberry, shadbush. Occasional, subxeric woods and ridges, mid- to high elevations.

Amelanchier arborea x A. sanguinea (Pursh) DC. An interesting taxonomic problem. This small shrub is found on Big Frog Trail in the gaps on each side of Chimneytop. This tentative identification is based upon the advice of W. Ann Robinson (pers. comm.). I am not yet satisfied with this determination. The rhizomatous shrub has slightly rounded leaves, fugacious hairs on the undersurface of the leaf, flexed sepals, and a reddish tinge to the leaves. These plants average less than 1.0 m in height, and there are ca. 200 flowering and fruiting individuals along the Bark Legging Lead ridgetop.

Aruncus Adanson

- * Aruncus dioicus (Walter) Fernald. Goat's beard. Occasional, mesic woods and rich slopes, mid- to high elevations.

Crataegus L.

- * Crataegus iracunda Beadle. Hawthorne. Common, mesic woods, rock woods and steep slopes, mid to high elevations. A difficult group taxonomically, but the taxon did not vary much on BFM. Placed in C. flagellata (Bosc.) K. Koch in R. Most of the collectings with three pyrenes, and the leaves have short appressed hairs when young.

Fragaria L.

Fragaria virginiana Duchesne. Wild strawberry. Frequent, clearings and roadsides, low elevations.

Geum L.

Geum virginianum L. Small flowered avens. Occasional, moist road banks and mesic woods, low elevations.

Gillenia Moench

Porteranthus trifoliatus (L.) Britt. Indian physic, Bowman's root. Occasional, submesic woods, trailsides and ridges, mid- to high elevations. Gillenia trifoliata (L.) Moench in R.

Potentilla L.

Potentilla canadensis L. Dwarf cinquefoil. Occasional, xeric woods and open trailsides, low to high elevations.

- * Potentilla simplex Michaux. Common cinquefoil. Frequent, xeric woods, clearings and trailsides, low to mid-elevations.

Prunus L.

Prunus persica (L.) Batsch. Peach. Rare, one plant at spring near summit. Introduced from Asia and cultivated in North America.

Prunus serotina Ehrhart. Black cherry. Common, mesic woods, low to high elevations.

Prunus virginiana L. Chokeberry. Rare, two known sites on rocky ridges and slopes; Wolf Ridge, 1125 m, and the headwaters of Silvermine Creek, 1090 m.

Rosa L.

- * Rosa carolina L. Carolina rose. Infrequent, dry woods, mid-elevations.

Rubus L.

- * Rubus allegheniensis Porter. Hairy blackberry. Occasional, mesic wood, in openings and disturbed areas, low to high elevations.
- * Rubus betulifolius Small. Blackberry. Occasional, mesic woods, in openings and disturbed areas, low to high elevations.
- * Rubus canadensis L. Smooth blackberry. Frequent, mesic woods, in openings and disturbed areas, mid- to high elevations.
- * Rubus flagellaris Willd. Dewberry. Infrequent, mesic woods and thickets, low elevations.
- Rubus odoratus L. Purple-flowered raspberry. Occasional, mesic roadsides and disturbed areas, low to mid-elevations.

RUBIACEAE

Galium L.

- * Galium circaezans Michaux. Wild licorice. Occasional, mesic woods and openings, low to mid-elevations.
- * Galium lanceolatum Torr. Yellow wild licorice. Occasional, mesic rocky woods, low to mid-elevations.
- Galium latifolium Michaux. Broad-leaved bedstraw. Occasional, mesic to submesic woods and openings, low to mid-elevations.
- * Galium triflorum Michaux. Fragrant bedstraw. Occasional, mesic rocky woods, low to high elevations.

Houstonia L.

Houstonia purpurea L. Woodland bluets. Common, mesic woods, trails and old logging roads, low to high elevations.

Mitchella L.

Mitchella repens L. Partridge berry. Common, mesic to subxeric woods, low to mid-elevations.

RUTACEAE

Ptelea L.

Ptelea trifoliata L. Wafer ash. Infrequent, rocky mesic woods and ridges, mid- to high elevations. There are two very large populations, one on Wolf Ridge (1030-1130 m) and one on Peavine Ridge (1050 m). Each population contains ca. 250 individuals.

SALICACEAE

Salix L.

- * Salix tristis Aiton. Dwarf willow. Rare, a few individuals near the summit in open areas, high elevations. This taxon is included in S. humilis Marsh. in R. Work by G. W. Argus (unpublished data) aided in identification of this plant.
Salix nigra Marshall. Black willow. Scarce, only found at the lowest elevations, along streams.

SANTALACEAE

Pyrularia Michaux

Pyrularia pubera Michaux. Buffalo nut, oil nut. Common, mesic woods, low to high elevations.

SAXIFRAGACEAE

Astilbe Hamilton

Astilbe biternata (Vent.) Britt. False goat's beard. Occasional, mesic woods, low to high elevations.

Boykinia Nuttall

Boykinia aconitifolia Nuttall. Brook saxifrage. Infrequent, on rocks on streamsides, low elevations.

Decumaria L.

Decumaria barbara L. Climbing hydrangea. Frequent, mesic woods, low to mid-elevations.

Heuchera L.

Heuchera villosa Michaux. Hairy alumroot. Frequent, subxeric rocky woods and rock outcrops, low to high elevations.

Hydrangea L.

Hydrangea arborescens L. Wild hydrangea. Common, mesic woods and openings, low to high elevations.

Ribes L.

- * Ribes cynosbati L. Gooseberry. Infrequent, mesic rocky woods, mid- to high elevations.

Tiareella L.

Tiareella cordifolia L. Foamflower. Common, mesic to subxeric woods, rock slopes, low to high elevations.

SCROPHULARIACEAE

Aureolaria Raf.

Aureolaria laevigata (Raf.) Raf. Smooth gerardia. Infrequent, mesic to subxeric woods, low to high elevations.

Gratiola L.

Gratiola virginiana L. Virginia hedge-hyssop. Very rare, only known location is Bear Wallow Bog on south side of BFM, 900 m.

Melampyrum L.

- * Melampyrum lineare Desr. Cow wheat. Common, mesic woods, trails, low to high elevations.

Mimulus L.

- * Mimulus ringens L. Monkey flower. Infrequent, clearings, woodland borders and streamsides, low to mid-elevations.

Pedicularis L.

- * Pedicularis canadensis L. Lousewort. Common, subxeric woods and along trails, low to high elevations.

Penstemon Mitchell

Penstemon canescens Britt. Hairy beard-tongue. Infrequent, xeric to subxeric woods and open rocky areas, mid- to high elevations.

SOLANACEAE

Physalis L.

- * Physalis heterophylla Nees. Very rare, a few individuals on Wolf Ridge, mid-elevations.

Solanum L.

Solanum carolinense L. Horse-nettle. Infrequent, clearings and roadsides, low elevations.

STYRACACEAE

Halesia Ellis ex. L.

Halesia carolina L. Silverbell. Occasional, mesic woods and coves, mid- to high elevations.

THEACEAE

Stewartia L.

- * Stewartia ovata (Cav.) Weatherby. Mountain camellia. Infrequent, mesic woods, low elevations.

TILIACEAE

Tilia L.

- * Tilia americana L. American basswood. Occasional, mesic woods, low to high elevations.
- * Tilia heterophylla Vent. White basswood. Frequent, mesic woods, low to high elevations. There seems to be continuous character variation between these two taxa making identification difficult.

ULMACEAE

Ulmus L.

- * Ulmus rubra Muhl. Slippery elm. Occasional, dry woods and slopes, low elevations.

URTICACEAE

Boehmeria Jacq.

Boehmeria cylindrica (L.) Swartz. False nettle. Infrequent, mesic woods, clearings and streamsides, low elevations.

Laportea Gaudin

- * Laportea canadensis (L.) Weddell. Wood-nettle. Common, mesic woods, low to high elevations.

Pilea Lindl.

- * Pilea pumila (L.) Gray. Clearweed. Frequent, mesic woods and streamsides, low to mid-elevations.

VIOLACEAE

Hybanthus Jacq.

Hybanthus concolor (Forster) Sprengel. Green violet. Infrequent, only seen on Big Creek, low elevations.

Viola L.

All Viola identifications follow Russell (1965).

- * Viola affinis LeConte. Infrequent, mesic woods, streamsides, low to high elevations.
Viola blanda Willd. Sweet white violet. Frequent, mesic woods, low to mid-elevations.
- * Viola canadensis L. Canada violet. Common, mesic woods, low to high elevations.
- * Viola cucullata Aiton. Marsh blue violet. Infrequent, streamsides and wet woods, low elevations.
Viola hastata Michaux. Halberd-leaf violet. Common, mesic to submesic woods, low to mid-elevations.
Viola hirsutula Brainerd. Southern wood violet. Infrequent, mesic to subxeric woods, low elevations.
- * Viola palmata L. Occasional, submesic to subxeric woods, low elevations.
Viola pedata L. Bird's foot violet. Occasional, dry rocky woods and ridges, mid- to high elevations.
Viola primulifolia L. Primrose-leaved violet. Infrequent, moist soil in open areas, low to mid-elevations.
- * Viola pubescens Aiton. var. pubescens. Infrequent, mesic woods, low elevations. Not in R.
- * Viola pubescens var. eriocarpa Schwein. Infrequent, mesic woods, low elevations. V. eriocarpa Schwein in R.

- Viola rostrata Pursh. Beaked violet. Infrequent, mesic woods, low to mid-elevations.
- * Viola rotundifolia Michaux. Early yellow violet. Frequent, mesic woods, low to mid-elevations.
- Viola triloba Schwein. var. triloba. Three-lobed violet. Very rare, a few individuals seen near Low Gap on Grassy Gap Trail, 700 m. V. palmata var. triloba (Schweinitz) Ging. ex DC. in R.
- Viola triloba var. dilatata (Ell.) Brainerd. Three lobed violet. Infrequent, mesic woods, low to mid-elevations. V. palmata var. triloba (Schweinitz) Ging. ex. DC. in R.

VITACEAE

Parthenocissus Planch.

- * Parthenocissus quinquefolia (L.) Planch. Virginia creeper. Occasional, mesic woods and disturbed woods, low to mid-elevations.

Vitis L.

The identifications for Vitis follow Duncan (1967). The determinations in this genus were difficult and unsatisfying.

- * Vitis aestivalis var. argentifolia (Munson) Fernald. Summer grape. Occasional, dry woods, roadsides and thickets, low to mid-elevations.
- * Vitis palmata Wahl. Cat grape. Infrequent, mesic disturbed woods, low elevations. Not in R.
- * Vitis vulpina L. Frost grape. Occasional, mesic woods and streamsides, low to mid-elevations.

APPENDIX B

STATUS REPORTS OF TAXA LISTED AS ENDANGERED,
THREATENED OR SPECIAL CONCERN IN TENNESSEE

STATUS REPORT

Taxon: Agastache scrophulariaefolia (Willd.) Ktze.

Common name: Purple Giant Hyssop

Family: Lamiaceae

Distribution: Vermont and eastern Massachusetts, to western Ontario, south to North Carolina, Kentucky, Missouri and Kansas.

Status: Special Concern in Tennessee.

Habitat: Rich woods, moist thickets, woodland and borders.

Habitat and distribution data from: Fernald, 1950; Radford et al., 1968.

Site #1: Horse Camp Flat.

Location: Wolf Ridge, 1.6 km WNW of the summit of BFM along the Wolf Ridge Trail at an elevation of 1040 m. Caney Creek Quad.

Description of the site: Horse Camp Flat is a mesic woods which has been disturbed in the past. A campsite and remains of a crude fence, along with the name of the site, indicate that the area was used as a campsite for horseback riders in the area. The site is open and parklike with large trees and dense herbaceous growth.

Population size and vigor: There are ca. 175 individuals clumped in an area 20 m in diameter. This population is approximately 20 m east of the Silene ovata population which is restricted to the western end of the flat site. The population is vigorous with almost all the individuals flowering and a high percentage of seed set observed over a two year period. Several individuals were scattered along the trail toward the summit of BFM, to an elevation of 1100 m.

Associates: Acer saccharum, Campanula americana, Carya cordiformis, Crataegus iracunda, Fraxinus americana, Helianthus decapetalus (abundant), Heracleum maximum, Hystrix patula (abundant), Impatiens pallida, Ostrya virginiana, Polymnia uvedalia, Prunus serotina, Ptelea trifoliata, Quercus rubra, Salvia lyrata, Tilia heterophylla, Tovara virginiana.

Threats: This population is approximately 10 m from the trail and 20 m from the campsite, so the only threats of trail maintenance and camping abuse are remote. Any trail maintenance may actually encourage expansion.

Site #2: BFM summit, near spring.

Location: A few meters below an intermittent spring, 275 m southeast of the summit of BFM, beside the Licklog Ridge Trail. Hemp Top Quad.

Description of the site: A small cove 275 m southeast of the summit of BFM. At the base of the cove, an intermittent spring flows onto the Licklog Ridge Trail for 10 m before flowing into the woods. Usually the flow of water is so little that the flowing water is absorbed before it leaves the trail. The site is open and disturbed. The surrounding forest is a submesic Oak-Hickory Forest. A single Prunus persica grows here, probably introduced by a hiker.

Population size and vigor: Approximately 70 individuals are in an area 7 m in diameter, within 4 m of the spring. Fifteen more individuals are scattered southward along the trail for 45 m. The population was observed in flower and fruit, and it had a high percentage seed set. During a two year period, this population expanded and continued to grow and reproduce vigorously.

Associates: Acer saccharum, Aster undulatus, Carya cordiformis, C. glabra, Crataegus iracunda, Hamamelis virginiana, Osmunda cinnamomea, O. regalis, Pilea pumila, Polygonum persicaria, Prunus persica, Quercus alba, Ranunculus hispidus, Rhododendron calendulaceum, Salix tristis.

Threats: The trail poses the greatest threat to the population, since any trail maintenance could adversely affect the population. Even though the population is along the trail, foot and horse travel in the vicinity have not adversely affected the population.

Site #3: Near saddle, BFM summit.

Location: One-half kilometer southeast of the summit of BFM, east of saddle. Approximately 150 m south of the Licklog Ridge Trail. Elevation 1250 m. Caney Creek Quad.

Description of the site: The mesic woods is dominated by large white oaks (Quercus alba) averaging 75 cm dbh producing a park-like appearance to the vegetation, with some openings in the canopy and very few small trees or shrubs present.

Population size and vigor: This population was the largest on BFM; there were ca. 500 individuals in an area 25 m in diameter. This is a vigorous population with a high percentage of seed set. The population increased in size the second year, as individuals were found scattered peripheral to the main population.

Associates: Carya cordiformis, C. glabra, Collinsonia canadensis, Thelypteris novaboracensis, Hystrix patula (abundant), Phlox paniculata, Quercus alba (abundant).

Threats: The population is vigorous and healthy. It is not threatened by the trail and will not be encountered by most hikers and campers.

Site #4: One-fourth kilometer south of BFM summit.

Location: South of summit of BFM 0.25 km, on a ridge which extends SSW from the summit. Elevation 1250 m. Caney Creek Quad.

Description of the site: A fairly large meadow or opening in the canopy approximately 30 m in diameter. The surrounding trees are predominately white oak (Quercus alba). The site is submesic and the soil is well-developed.

Population size and vigor: A fairly vigorous population of ca. 300 individuals. A high percentage of seed set was observed over a two year period. Expansion was observed in the population as several more individuals were found in the area during the second year. This population is dissected by an unmaintained trail which extends southward along the crest of the ridge.

Associates: Carya cordiformis, C. glabra, Collinsonia canadensis, Hystrix patula, Lactuca biennis, Phlox paniculata, Prunus serotina, Quercus alba, Rubus allegheniensis.

Threats: Any expansion of the crude unmaintained trail will adversely affect the population in the short term, but may be beneficial to expansion of this taxon.

STATUS REPORT

Taxon: Coreopsis latifolia Michaux

Common name: Broad-leaved tickseed

Family: Asteraceae

Distribution: Restricted to the Blue Ridge Province of North Carolina (Buncombe, Cherokee, Henderson and Polk Counties), South Carolina (Pickens and Greenville Counties), and Polk County, Tennessee.

Status: Endangered in Tennessee.
Category II - Federal listing.

Habitat: Mesic woods, usually associated with canopy openings.

Habitat and distribution data from: Massey et al., 1983; Radford et al., 1968.

Site #1: Big Creek, 670 m elevation.

Location: Big Creek, 2.5 km north of summit of BFM, in flat area above the intersection of two prongs of Big Creek, with a few plants extending up the ridge face along the trail for 300 m. Caney Creek Quad.

Description of the site: The Big Creek cove in this area is a submesic woods which was timbered 60-80 years ago. The area is fairly level.

Population size and vigor: The population was observed to be healthy and vigorous the first year, but the population decreased by ca. 25% during the second season. The plants were observed in flower and fruit and had a high percentage seed set. The centers of the population are associated with two treefalls in the vicinity, with approximately 30 individuals at the lower site and 50 individuals at the upper site during the second season. Upslope from these centers, spreading 150 m south, 20-30 individuals are scattered along the trail.

Associates: Acer rubrum, A. saccharum, Aster divaricatus, A. undulatus, Cornus florida, Dentaria laciniata, Erechtites hieracifolia, Helianthus microcephalus, H. strumosus, Liriodendron tulipifera, Prunus serotina, Solidago roanensis, Stellaria pubera, Thalictrum thalictroides, Viola hastata.

Threats: This population is along a trail, but there are no threats to the population. Any trail maintenance in the area would probably be beneficial to encourage expansion. Some herbivory was observed at this site, but it was not sufficient to harm the population.

Site #2: North of Horse Camp Flat.

Location: North facing slope, Wolf Ridge, 1.6 km WNW of summit of BFM. Just downslope from Wolf Ridge Trail at Horse Camp Flat, near head of Peter Camp Branch, 1006 m elevation. Caney Creek Quad.

Description of the site: The fairly open cove hardwood forest is submesic, just a few meters east of the mesic north face of the cove. The population is near an abrupt change in slope aspect, converting to a more xeric forest as the slope turns west facing. The plants are below a small outcrop which forms a ledge upon which the population was restricted. The soil in this location is deep and rich.

Population size and vigor: Plants are in two small clumps, each with five to six flowering stems. The population is small, but most of the stems were producing flowers. This population was not observed in fruit.

Associates: Acer rubrum, Aesculus octandra, Betula allegheniensis, Dryopteris goldiana, Fraxinus americana, Ostrya virginiana, Prunus serotina, Tilia heterophylla, Trillium vaseyi, Viola canadensis.

Threats: No threats were observed, but the small size of the population may limit its reproductive potential.

Site #3: West side of Bark Logging Lead, 1128 m.

Location: West of crest of Bark Logging Lead, 1.1 km due north of summit of BFM, at top of cove, 100 m west of ridge crest. Caney Creek Quad.

Description of the site: A submesic cove. The forest is in transition from an Oak-Hickory Forest to a Cove-Hardwood Forest at the site.

Population size and vigor: A very small population, only five individuals scattered in the top of the cove. They were all in flower. The population looked as though it were a recent adventive, possibly from the population 350 m lower in elevation in the same cove.

Associates: Acer rubrum, Athyrium asplenoides, Fraxinus americana, Hamamelis virginiana, Osmunda cinnamomea, Prunus serotina, Quercus rubra, Robinia pseudo-acacia.

Threats: No threats were perceived to this population.

Site #4: West side of Bark Logging Lead, 780 m.

Location: In mesic woods 10 m above the unnamed stream due west of Bark Logging Lead, 0.25 km south of Grassy Gap Trail, 780 m elevation. Caney Creek Quad.

Description of the site: A steep slope above a small stream which flows into Peter Camp Branch. The population was in an opening in the canopy caused by a fallen sugar maple. The site is mesic to submesic with rich, rocky soil.

Population size and vigor: A population of ca. 100 individuals seen in flower, restricted to a rather small area of 20 m². This population was the most vigorous Coreopsis latifolia station with no herbivory seen and almost all the individuals in flower.

Associates: Acer saccharum, Betula lenta, Calycanthus floridus, Cornus florida, Dryopteris marginalis, Magnolia fraseri, Polystichum acrostichoides, Stellaria pubera, Thelypteris noveboracensis, Tsuga canadensis.

Threats: No threats were perceived to this population.

Site #5: Ramp Cove.

Location: East facing slope of cove at the head of the west fork of Big Creek, 20 m upslope from Big Creek Trail, 1.4 km north of the summit of BFM, elevation 1040 m. Caney Creek Quad.

Description of the site: The site is almost on the ecotone between a mesic Cove Hardwood Forest and a dryer Oak-Hickory Forest. The canopy is somewhat open due to the trail, but the site is generally shaded.

Population size and vigor: This is a small population of 20 flowering individuals. The population was vigorous and healthy.

Associates: Acer rubrum, Allium tricoccum, Caulophyllum thalictroides, Cornus florida, Dennstaedtia punctilobula, Polygonatum biflorum, Quercus rubra, Viola canadensis.

Threats: None.

Site #6: Ridge south of BFM summit, 1080 m.

Location: An unnamed ridge 1.25 km WSW of the summit of BFM. The population is scattered over a 50 m² area on the west side of the ridge, just below the crest of the ridge. Hemp Top Quad.

Description of the site: The site is a mature Oak-Hickory Forest just below the crest of the ridge. The soil is deep and the slope is gentle. The site is submesic with several large white oaks nearby. This site also includes a population of Silene ovata.

Population size and vigor: A small population of 20 individuals, most in flower. The site is not open, but it is within three meters of an opening with Rubus allegheniensis. The population may expand into this opening.

Associates: Acer saccharum, Carya glabra, Cornus florida, Fraxinus americana, Quercus alba, Q. rubra, Rubus allegheniensis, Silene ovata.

Threats: No threats were observed for this population.

STATUS REPORT

Taxon: Diervilla lonicera Miller

Common name: Bush-honeysuckle

Family: Caprifoliaceae

Distribution: Newfoundland to Manitoba, south to Nova Scotia, New England, Delaware, inland Virginia, mountains of North Carolina, Tennessee, Ohio, Indiana, Illinois and Iowa. Mostly above 1220 m in the southern Appalachians and the eastern and western Highland Rims of Tennessee.

Status: Threatened in Tennessee.

Habitat: Dry woods, clearings and rocky places. Woodlands and rocky bluffs.

Habitat and distribution data from: Fernald, 1950; Hardin, 1968; Radford et al., 1968.

Site #1: Big Frog Trail, 1160 m elevation.

Location: A dry rocky ridge, 0.25 km south of intersection of Big Creek Trail and Big Frog Trail. One and one-fourth kilometers NNE of the summit of BFM. Elevation 1160 m. Caney Creek Quad.

Description of site: The site is a subxeric, rocky, narrow ridge. The plants grow in the rock crevices along the top of the ridge.

Population size and vigor: The knife-edged ridge has 40 individuals growing in the rocky area which the trail runs beside. The population was seen in flower and in fruit, but usually very few flowers per plant. The plants were restricted to the rocky area and were not seen anywhere else.

Associates: Agrostis perennans, Campanula divaricata, Carya glabra, Castanea dentata, Clematis viorna, Corylus cornuta, Dioscorea villosa, Eupatorium rugosum, Hamamelis virginiana, Lonicera dioica, Penstemon canescens, Polygonum scandens var. cristatum, Quercus montana, Q. rubra, Smilax glauca, S. herbacea, Taenidia integerrima, Vaccinium erythrocarpum.

Threats: Even though the trail is adjacent to this population, it is not really a threat since the individuals grow in the rock outcrop which protects them from foot and horse travel along with potential trail maintenance procedures.

STATUS REPORT

Taxon: Euonymus obovatus Nuttall

Common name: Running strawberry-bush

Family: Celastraceae

Distribution: Western New York and southern Ontario to Michigan and Illinois, south to Tennessee and Missouri.

Habitat: Dry to damp woods, moist rocky woods in association with cove hemlock and hardwoods.

Status: Special Concern in Tennessee.

Habitat and distribution data from: Fernald, 1950; Radford et al., 1968; White, 1982.

Site #1: East Fork Rough Creek, 1040 m elevation.

Location: In block field on east side of East Fork Rough Creek, 0.9 km NE of summit of BFM. Elevation 1040 m. Caney Creek Quad.

Description of the site: The location is in a block field on a northwest facing slope in a mesic cove hardwood forest. Much of the block field is covered in mosses and leaf litter, but in some areas the rocks are exposed.

Population size and vigor: The population is large, forming the dominant ground cover for a 2500 m² area with a few individuals scattered along the stream to an elevation of 975 m. None of the plants were observed to flower or fruit. The population was reproducing vegetatively rather vigorously.

Associates: Acer saccharum, A. spicatum, Aesculus octandra, Arisaema atrorubens, Betula allegheniensis, Cimicifuga americana, Dennstaedtia punctilobula, Ribes cynosbati, Sambucus pubens, Thelypteris noveboracensis, Tilia heterophylla.

Threats: Even though the population was not reproducing sexually, it was vigorously reproducing vegetatively. No threats were identified.

STATUS REPORT

Taxon: Heracleum maximum Bartram

Common name: Cow parsnip or Masterwort

Family: Apiaceae

Distribution: Labrador to Alaska, south to Newfoundland, Nova Scotia, New England, to mountains of Georgia, Ohio, Indiana, Illinois, Missouri, Kansas, New Mexico, and California where it ascends to subalpine regions.

Status: Special Concern in Tennessee.

Habitat: Stream bank, meadows and roadsides, rich or low ground in the southern Appalachian Mountains.

Habitat and distribution data from: Fernald, 1950; Radford et al., 1968.

Site #1: Wolf Ridge Trail, 1020-1040 m elevation.

Location: Wolf Ridge, 1.7 km WNW of summit of BFM. Scattered along the Wolf Ridge Trail and surrounding woods from 1020 to 1040 m. Caney Creek Quad.

Description of the site: The population is centered on a west facing slope just below Horse Camp Flat, with scattered individuals in Horse Camp Flat and extending for 0.4 km to the east. The area is a mesic to submesic woods with deep soils.

Population size and vigor: Approximately 100 individuals widely scattered over a 0.2 ha area. The population was vigorous with almost 100 percent of the individuals flowering and fruiting. The plants are large and vigorous, producing hundreds of seeds per plant, each with several flowering stalks. The population seemed to be associated with small openings in the canopy, but not in actual full sunlight. A few individuals were found in association with the Agastache scrophulariaefolia and Silene ovata populations.

Associates: Acer rubrum, Aesculus octandra, Agastache
scrophulariofaelia, Carya cordiformis, C. glabra, Cornus florida,
Fraxinus americana, Hybanthus concolor, Hystrix patula, Impatiens
pallidum, Ostrya virginiana, Parthenocissus quinquefolius, Prunus
serotina, Ptelea trifoliata, Silene ovata.

Threats: No threats were observed.

STATUS REPORT

Taxon: Lonicera dioica L.

Common name: Honeysuckle

Family: Caprifoliaceae

Distribution: Southwest Maine and southwest Quebec to Manitoba, south to Georgia and Missouri.

Habitat: Rocky banks, dry woods, woodlands, and thickets.

Status: Special Concern in Tennessee.

Habitat and distribution data from: Fernald, 1950; Radford et al., 1968.

Site #1: BFM, above 945 m elevation.

Location: Lonicera dioica is found in several populations on BFM. These populations are usually in patches 5 m in diameter with 10 to 50 individuals together in a tangled patch. The plants usually are self-supported. There are three areas where the taxon is frequently found: on a ridgetop south of Chimneytop, which extends from Chimneytop to Bark Logging Lead; Wolf Ridge; and the south face of BFM between the elevations of 1040 and 1160 m. On the ridgetop south of Chimneytop, there are 11 patches of Lonicera dioica along the Big Frog Trail extending from the Diervilla lonicera population 1.25 km NNE of the summit at 1160 m elevation north to Chimneytop. On Wolf Ridge there are five populations between the elevations of 1130 and 1220 m. Twelve populations were found on the south side of BFM, from Groundhog Ridge to Bear Wallow Bog, 1.5 km SSW of the summit. A large population is located 0.6 km east of the summit on Licklog Ridge, along Licklog Ridge Trail. A few individuals were found on East Fork Rough Creek, on a northwest facing rocky slope. This population of a few individuals is at 950 m and is the lowest elevation for Lonicera dioica on BFM. Caney Creek Quad. and Hemp Top Quad.

Description of the site: Almost all of the sites were submesic to subxeric rocky ridges and slopes, usually in open areas. There seemed to be some tolerance for variation in aspect and moisture of the site. The population on East Fork Rough Creek was very mesic, atypically in a Cove Hardwood Forest, but was not very vigorous in that site.

Population size and vigor: This taxon is vigorous and healthy at BFM. Almost all of the populations were observed in fruit or flower, and seed set was observed in most of the populations.

Associates: Acer rubrum, Carya ovata, Fraxinus americana, Galax urceolata, Hamamelis virginiana, Ilex ambigua, Oxydendrum arboreum, Phlox paniculata, Pinus strobus, Quercus montana, Q. rubra, Rhododendron calendulaceum, Robinia pseudo-acacia, Rubus allegheniensis, Silene stellata, Smilax rotundifolia.

Threats: No threats were seen for this taxon. It seems to thrive on disturbances.

STATUS REPORT

Taxon: Panax quinquefolius L.

Common name: Ginseng

Family: Araliaceae

Distribution: Quebec and Manitoba south to north Florida, Alabama, Louisiana and Oklahoma.

Habitat: Rich and cool woods, mesic coves.

Status: Threatened in Tennessee.

Habitat and distribution data from: Fernald, 1950; Massey et al., 1983; Radford et al., 1968.

Site #1: BFM, low to high elevations.

Location: Panax quinquefolius is present in most of the mesic coves on the mountain. Caney Creek Quad. and Hemp Top Quad.

Description of the site: The mesic coves which are suitable for ginseng are typically cove hardwood forests with rich soil. Usually, there is good soil development where ginseng is found.

Population size and vigor: Although the plant is found in most of the mesic coves on BFM, it is nowhere abundant. Probably most abundant in the lower portions of Big Creek and throughout Rough Creek. Plants were seen to flower and fruit. No indications of ginseng digging were observed in the area, but diggers probably do collect in the area from time to time.

Associates: Acer rubrum, Aesculus octandra, Cladrastis kentukea, Cornus florida, Cystopteris protrusa, Dentaria laciniata, Dryopteris marginalis, Fraxinus americana, Hydrophyllum canadense, Tilia heterophylla.

Threats: Ginseng is collected for the commercial value of the roots. This commercial value threatens the plant throughout its range.

STATUS REPORT

Taxon: Prenanthes roanensis (Chickering) Chickering

Common name: Roan's rattlesnake root

Family: Fabaceae

Distribution: This taxon is restricted to the Blue Ridge Province of the southern Appalachians. It occurs in Virginia, North Carolina and Tennessee.

Habitat: Prenanthes roanensis is restricted to mountainous areas, above 1220 m. It is usually found in open or disturbed areas which are mesic to submesic. The habitats include, grass and heath balds, roadside clearings, woodland margins, and oak-hickory forests.

Status: Threatened in Tennessee.
Category II - Federal list.

Habitat and distribution data from: Radford et al., 1968; Massey et al., 1983; Wofford, (unpublished data); Conquist, 1980; Fusiak, 1983.

Site #1: Summit, BFM, above 1128 m.

Location: The taxon is scattered over the top of the mountain, mostly above 1190 m, but a few individuals are scattered down to 1128 m. Caney Creek Quad. and Hemp Top Quad.

Description of the site: The plant occurs in submesic to mesic woods and openings on BFM. It occurs on rocky ridges, deep soiled meadows on the summit and in cove hardwood forests.

Population size and vigor: Approximately 100 individuals were observed on the summit of BFM. They usually occur singly or 2 to 3 together, but are widely scattered. In the mesic coves the associates are Acer saccharum, Aesculus octandra, Allium tricoccum, Athyrium asplenoides, Betula allegheniensis, Dryopteris intermedia, Hamamelis virginiana, Laportea canadensis, Sambucus pubens, Tiarella cordifolia, Trautvetteria carolinensis, Trillium erectum, Veratrum parviflorum and Viola canadensis. In the open meadows, the canopy surrounding the openings includes Acer saccharum, Carya cordiformis, Fraxinus americana, Prunus serotina and Quercus alba. The herbaceous

growth associated with these areas includes Agrostis perennans, Aster sagittifolius, A. undulatus, Gentiana decora, Lactuca biennis, Rudbeckia laciniata, Solidago curtisii and S. flaccidifolia. In the dry, rocky habitats on Wolf Ridge, Prenanthes roanensis is found with Campanula americana, C. divaricata, Carya glabra, Crataegus iracunda, Hamamelis virginiana, Heuchera americana, Hydrangea arborescens, Lonicera dioica, Ostrya americana, Polygonatum biflorum, Quercus alba and Vaccinium vacillans.

Threats: No threats were observed or expected for this taxon. It seems to be thriving on BFM, at its southernmost station and lowest elevations in its range.

STATUS REPORT

Taxon: Prunus virginiana L.

Common name: Chokeberry

Family: Rosaceae

Distribution: Newfoundland to Saskatchewan, south to Nova Scotia, New England, upland of North Carolina, Tennessee, Missouri and Kansas (Fernald, 1950). The distribution is generally funnel-shaped with a wide distribution in the northeast, and the range narrows as it extends southward through the Appalachian Mountains. BFM is the southernmost station for this taxon.

Status: Special Concern in Tennessee.

Habitat: Thickets, shores, borders of woods, and rocky woods. In the Southeast this taxon is usually in rocky submesic areas, forming colonial stands of small trees.

Habitat and distribution data from: Fernald, 1950; Little, 1970; Robertson, 1974.

Site #1: Wolf Ridge Trail, 1160 m.

Location: North side of Wolf Ridge Trail, just off the trail along Wolf Ridge, 0.8 km WNW of summit of BFM, elevation 1160 m. Caney Creek Quad.

Description of the site: A rocky ridge, fairly open, submesic to subxeric.

Population size and vigor: The plants are in a colony ca. 6 m in diameter with 30-40 stems. The tallest individuals are 3-4 m tall. Approximately 30% of the individuals were bearing fruit. The population seemed to be healthy but there was little evidence of expansion. Very few young individuals were seen.

Associates: Acer rubrum, Aster curtisii, A. sagittifolius, Carya ovata, Crataegus iracunda, Fraxinus americana, Ostrya americana, Polygonum scandens, Prunus serotina, Quercus montana, Robinia pseudo-acacia, Viburnum dentatum.

Threats: This population is beside the Wolf Ridge Trail and could be adversely affected by trail clearing and trail improvements.

Site #2: Silvermine Creek drainage, 1100 m elevation.

Location: In the upper portion of the Silvermine Creek drainage, 0.25 km southeast of Licklog Ridge and 1.0 km ESE of the summit of BFM. The population is 0.25 km east of the Hemp Top Trail. Hemp Top Quad.

Description of the site: A rocky submesic cove, in a mature forest.

Population size and vigor: The population is colonial, measuring 20 m by 10 m with ca. 200 stems. Many of the individual stems were not erect but leaning at a 45° angle as if a strong wind had damaged the population. This did not seem to affect the growth of the individuals. Very few of these individuals were seen in fruit, but the colony looked vigorous and healthy.

Associates: Acer saccharum, Cornus florida, Fraxinus americana, Lindera benzoin, Polystichum acrostichoides, Prunus serotina, Quercus rubra, Stellaria pubera, Thelypteris hexagonoptera, Tilia americana.

Threats: Unless the leaning of the stems affects growth and reproduction, which does not seem to be the case, there were no threats seen to the population.

STATUS REPORT

Taxon: Scutellaria saxatilis Riddell

Common name: Rock skullcap

Family: Lamiaceae

Distribution: North Delaware and southwest Pennsylvania, southwest to southern Indiana, and south to western South Carolina and Tennessee.

Status: Threatened in Tennessee.

Habitat: Low woodlands, rocky woods, talus slopes and bluffs.

Habitat and distribution data from: Epling, 1942; Fernald, 1950; Radford et al., 1968.

Site #1: Big Creek, 520 m.

Location: In rocky area along Big Creek, 520 m.

Description of the site: Rocky mesic woods along the stream, in a second growth mixed mesophytic cove forest in which tulip poplar is the dominant canopy tree. Caney Creek Quad.

Population size and vigor: Approximated 20 individuals were present, scattered in the rocky area. The plants were observed in flower and in fruit.

Associates: Acer rubrum, A. saccharum, Cornus florida, Dentaria laciniata, Liriodendron tulipifera, Prunus serotina, Stellaria pubera, Thalictrum thalictroides, Viola hastata.

Threats: The only observed threat to this population is the small number of individuals present.

Site #2: East Fork Rough Creek, 900 m.

Location: A rocky east facing slope above East Fork Rough Creek, elevation 900 m.

Description of the site: A very rocky, mesic slope near the East Fork Rough Creek, in a mixed mesophytic second growth forest. Caney Creek Quad.

Population size and vigor: Approximately 15 individuals were present at this site. The plants were observed in flower and fruit. The population was very small, but the individuals seemed vigorous.

Associates: Acer saccharum, Aesculus octandra, Betula allegheniensis, Calycanthus floridus, Dentaria laciniata, Liriodendron tulipifera, Stellaria pubera, Tsuga canadensis.

Threats: The small size of the population is a threat to the persistence of the taxon at this site. No other threats were seen.

STATUS REPORT

Taxon: Silene ovata Pursh

Common name: Rough-leaved campion

Family: Caryophyllaceae

Distribution: Western North Carolina and southeast Kentucky to upland Georgia, Alabama, and Arkansas.

Status: Threatened in Tennessee.

Habitat: Mesic to submesic woods at mid- to high elevations.

Habitat and distribution data from: Fernald, 1950.

Site #1: Horse Camp Flat.

Location: Horse Camp Flat on Wolf Ridge, 1.8 km WNW of the summit of BFM, elevation 1040 m. Caney Creek Quad.

Description of site: The site is a mesic woods adjacent to an old campsite. The area has been disturbed in the past. Evidence of a crude fence, along with the site's name, belies the former use of the area by horseback riders as a campsite. The broad, flat site is also the location for Heracleum maximum and Agastache scrophulariaefolia.

Population size and vigor: Plants robust and vigorous, clumped with two to 30 flowering shoots per clump. In the second season, this population seemed to expand. The plants were observed in flower and fruit. Although some herbivory was observed, this did not seem to affect the reproductive potential of the population.

Associates: Agastache scrophulariaefolia, Anisostichus capreolata, Aster curtisii, A. sagittifolius, Cornus florida, Cryptotaenia canadensis, Eupatorium sessilifolium, Fraxinus americana, Heracleum maximum, Phryma leptostachya, Polymnia uvedalia, Prunus serotina, Pycnanthemum incanum, Quercus rubra, Silene stellata.

Threats: This site is heavily used as a campsite, but this disturbance may keep the area open enough for these plants to persist.

Site #2: Ridge south of summit of BFM.

Location: An unnamed ridge 1.25 km WSW of the summit of BFM. On the west side of the ridge, 10 m below the ridge crest, elevation 1050 m. Hemp Top Quad.

Description of the site: The site is a mature Oak-Hickory Forest just below the crest of the ridge. The soil is deep and the slope is gentle. The site is submesic with several large white oaks nearby. The site is also the location for a population of Coreopsis latifolia.

Population size and vigor: This is a small population of only six individuals, which were not very robust in stature. Some evidence of herbivory was seen, but this did not fully explain the lack of vigor in this small population. Only two of the individuals were in flower.

Associates: Acer saccharum, Carya glabra, Coreopsis latifolia, Cornus florida, Fraxinus americana, Quercus alba, Q. rubra, Rubus allegheniensis.

Threats: The population did not seem healthy, possibly due to herbivory. It is improbable that this population will be able to persist.

STATUS REPORT

Taxon: Thermopsis fraxinifolia M.A. Curtis

Common name: Bush-pea

Family: Fabaceae

Distribution: Georgia, North Carolina, South Carolina and Tennessee.

Status: Endangered in Tennessee.

Habitat: Dry ridges and clearings, mountains of the southern Appalachians.

Habitat and distribution data from: Radford et al., 1968.

Site #1: Dry ridges, 700 to 1160 m elevation.

Location: This taxon is scattered in dry woods and ridges, low to high elevations.

Description of the site: The plant is usually found in subxeric woods and trailsides. Usually in Pine or Oak-Hickory Forests. Usually in openings along trails. Rarely, it is found in closed canopy forests. Caney Creek Quad. and Hemp Top Quad.

Population size and vigor: On Wolf Ridge the taxon was seen along the Wolf Ridge Trail and in the surrounding forests. Between 730 m northeast of Bear Pen Hill in a Quercus montana woods and 1160 m on Wolf Ridge in an Oak-Hickory Forest, the plant was seen at nine stations with from two to 10 plants at each station. On Grassy Gap Trail, 3 stations were located with two to four plants per station. Approximately 30 plants are within 200 m of Low Gap at the intersection of Big Frog and Grassy Gap Trail, in the surrounding woods and along the trail. On the south side of the mountain, 10 plants were seen, most along the Hemp Top Trail, with a few scattered in the surrounding forest. Almost all of the plants were observed in flower with an average of 50 percent seed set. Some herbivory by unknown causes was observed, but this did not affect the reproductive capabilities of the plants.

Associates: Carya glabra, Crataegus iracunda, Danthonia sericea, Kalmia latifolia, Lyonia ligustrina, Lysimachia quadrifolia, Pinus strobus, P. virginiana, Quercus montana, Rhododendron calendulaceum, Smilax glauca, Taenidia integerrima,

Threats: This taxon seems to be vigorous on BFM. Any trail maintenance will increase the size of this population, which seems to invade disturbed areas, trailsides, and roadsides.

VITA

Zack Ernest Murrell was born to M. Vann and Ina Gresham Murrell in Edinburgh, Scotland on January 15, 1956. He received his primary education in Buies Creek, North Carolina and Boiling Springs, North Carolina. He received his secondary education in Shelby, North Carolina, graduating from Shelby High School in May 1974. In September 1974 he entered Davidson College in Davidson, North Carolina and received a Bachelor of Science degree in Biology in May 1980.

In September 1980 he began work as a park ranger at Duke Power State Park in North Carolina and was promoted to Park Chief Ranger in 1982.

He was admitted to the Graduate School of the University of Tennessee, Knoxville in the Botany Department in the fall of 1982 and was awarded a Graduate Teaching Assistantship in the fall of 1983. After completion of a Master of Science degree in Botany, he plans to pursue a doctoral degree at Duke University.