

**FLORISTIC INVESTIGATIONS OF
THE FLORA OF OKLAHOMA**

By

BRUCE ALAN SMITH

**Bachelor of Science
Cameron University
Lawton, Oklahoma
1978**


**Masters of Education
Central State University
Edmond, Oklahoma
1981**

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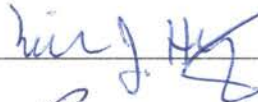
OKLAHOMA STATE UNIVERSITY

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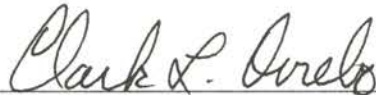
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Thesis Adviser









Dean of the Graduate Office

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CHAPTER I

ORGANIZATION OF DISSERTATION

This dissertation comprises three parts each of which encompasses one component of the doctoral research conducted between 1993 and the present. Chapter II describes the results of a floristic survey of the vascular plants in the McCurtain County Wilderness Area in extreme southeastern Oklahoma. It has been submitted for publication as a note in the Proceedings of the Oklahoma Academy of Science. Chapter III presents taxonomic treatments, including keys and descriptions of the Geraniaceae and Loasaceae in Oklahoma. These treatments will be incorporated in the Flora of Oklahoma and proceeding publications. Chapter IV offers three DELTA-based character list and derived taxonomic descriptions for the 17 Oklahoma families of pteridophytes. These descriptions also will be incorporated in the Flora of Oklahoma.

CHAPTER II

FLORISTIC INVENTORY OF THE MCCURTAIN COUNTY (OKLAHOMA) WILDERNESS AREA

INTRODUCTION

The 5,701 ha McCurtain County Wilderness Area (MCWA) is the largest representative tract of unlogged, old-growth oak-shortleaf pine habitat known to remain in the United States (Stahl et al. 1989). It has been owned by the Oklahoma Department of Wildlife Conservation (ODWC) since 1918 (Masters et al. 1989). The overstory of the upland communities is dominated by *Pinus echinata*, *Quercus stellata*, *Quercus marilandica*, *Quercus velutina*, and *Carya spp.* on the south slopes, while the more mesic north slopes are dominated by *Quercus alba*, *Quercus stellata*, *Carya tomentosa*, and to a lesser extent *Acer spp.* (Kreiter 1995). Common understory taxa are *Vaccinium spp.* and *Hypericum spp.* (Kreiter 1995, and Masters et al. 1989). The riparian forest along the Mountain Fork River in the MCWA was lost due to construction of Broken Bow Reservoir (Carter 1965). This community may have had several constituents, e.g., *Taxodium distichum*, *Quercus bicolor*, and *Carya glabra*, that are currently absent from the area.

The appearance of the Wilderness today is quite different from that prior to the arrival of European settlers. Historical evidence (e.g., Foti and Glenn 1991, Kreiter 1995, Little and Olmstead 1931, Masters et al. 1995) suggests that frequent anthropogenic and lightning-caused fires maintained a mosaic of open woodland

plant communities. The understory was likely dominated by grasses such as bluestems or by woody sprouts (Masters et al. 1995).

The ODWC is implementing an ecosystem-based management plan for the Wilderness. The primary goal is to restore the open, pine-grassland or open hardwood-woodland with a grass or shrub understory that existed before the advent of fire suppression in the mid 1920's. Restoration is important in order to increase understory forage and improve habitat quality for many species of wildlife, including the federally endangered red-cockaded woodpecker, *Picoides borealis*. Prescribed burning and limited midstory removal are principal tools for restoring open forest conditions.

Prior to this study, our knowledge of the plant species and understory communities in the Wilderness was limited. No formal inventory of the plants present had been made. Knowledge of the woody species was also incomplete, although Masters and coworkers conducted sampling of the woody species in ecological studies of the area (Kreiter 1995 and Masters et al. 1995). This lack of information is especially significant because of the high floristic diversity of the region. The Natural Heritage Inventory (1997) lists 84 species as rare in McCurtain County, many of which occur in the forests of the Wilderness. Knowledge of the plants present is needed to evaluate success in restoring presettlement forest conditions. As noted above, the absence of fire has resulted in dramatic shifts in the nature of the forest community. Baseline information is needed in order to make comparisons as fire regimes are developed. Thus the objective of my study was to inventory the vascular flora of the MCWA. Information on the understory

communities will be presented in a later publication.

THE WILDERNESS AREA

The MCWA is located at the north end of Broken Bow Reservoir (T3S, R25E & R26E), and located in the Kiamichi Mountain Range of the Ouachita Highlands (Figure 1). The area's topography consists of narrow strongly dissected ridges that are oriented generally east to west and range in elevation from 183 m to 415 m (Masters et al. 1995). The MCWA extends east to west 11.3 km and north to south 8.1 km, and is dissected by the Mountain Fork River and 5 major creeks (Reasoner 1974). Soil associations of the MCWA are part of the Goldston-Carnasaw-Sacul, steep (GsF) and Hector-Rock outcrop complex, 35-60% slopes (HkF). The former comprises moderate to deep and moderately to excessively-drained, loamy soils over sandstone and shale. The latter is found on the dissected ridgetops and escarpments, and consists of shallow, steep well-drained gravelly loams and exposures of sandstone bedrock (Reasoner 1974).

Climate of the area is warm, moist, and warm temperate (Reasoner 1974, National Climatic Center 1988). Summers are hot with high humidity levels. The winters are short but well-defined. Temperatures above 0.0 C average 228 days per year. The growing season averages 200 days and generally extends from 15 April to 22 October. The mean annual temperature is 23.3 C, July and August are typically the warmest months averaging 33.9 C, and January and February the coldest, averaging 12.2 C. Average annual precipitation is 122 cm; with April and May the wettest months. Days with snow cover of 1 inch or more is typically

only three days per year.

INVENTORY OF FLORA

A systematic collection of the vascular plants of the Wilderness was conducted during the growing seasons of 1993-1997. Several times each season, the area was traversed on foot by 2-6 individuals for a total of 24 trips (Table 1). Collecting focused on management compartments 1-3, 5, and 6 because of related studies examining the effects of prescribed fire on understory communities in those areas. Using standard taxonomic methods (Radford et al. 1974), each plant collected was identified to species, and subsequently inventoried. Specimens typically were collected in fertile condition. Nomenclature for families and species follows *Flora of North America* (1993) for the pteridophytes and gymnosperms; and Waterfall (1969), Cronquist (1981), Steyermark (1963), and Correll & Johnston (1979) for the flowering plants. Common names were taken from Taylor and Taylor (1994). Designations of rarity follow the Natural Heritage Inventory (1997). Vouchers are deposited in the OSU Herbarium (OKLA.).

FLORA OF THE MCWA

Three hundred and fifty-nine species in 236 genera and 95 families were encountered in this inventory (Table 2). A complete list of all taxa is shown in Appendices A and B. Native species composed 94.2% of the flora. Three families, Poaceae (55 taxa), Asteraceae (39 taxa), and the Fabaceae (32 taxa), composed 35.1% of the vascular flora of the Wilderness. Other large families were the Cyperaceae (20 taxa) and the Lamiaceae (12 taxa). Pteridophytes with 12 taxa, represented 3.34% of the flora. The largest genera present in the area were *Panicum*

with 15 taxa followed by *Carex* with 12.

Plant species designated by the U. S. Fish and Wildlife Service (1996) as endangered, threatened, or candidate (formerly category 1) were not encountered. Species designated as rare by the Oklahoma Natural Heritage Inventory (1997) and present were: *Ribes curvatum* (S1), *Phaseolus polystachios* (S1), *Streptanthus squamiformis* (S1), *Brachyelytrum erectum* (S1), *Amorpha ouachitensis* (S2), *Hamamelis virginiana* (S2), *Baptisia nuttalliana* (S2), *Carex latebracteata* (S2), *Carex oxylepis* (S2), *Iris cristata* (S2), *Chionanthus virginicus* (S2), *Ilex opaca* (S2S3), *Panicum brachyanthum* (S2S3), and *Mitchella repens* (S2S3).

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Table 1. Key to collection dates (dates include only those of B. A. Smith).

<u>Collection numbers</u>	<u>Date</u>	<u>Collection numbers</u>	<u>Date</u>
1816-1900	7-23-93	2581-2603	4-28-95
1901-1924	8-09-93	2604-2676	4-29-95
1925-1948	8-10-93	2677-2680	4-30-95
2059-2078	10-17-93	2703-2748	6-22-95
2079-2086	10-18-93	2749-2803	6-23-95
2087-2089	10-19-93	2809-2810	8-07-95
2090-2108	3-24-94	2811-2815	8-08-95
2109-2146	3-25-94	2816-2818	8-09-95
2147-2235	4-23-94	2819-2831	9-20-95
2236-2274	4-24-94	2832-2866	9-21-95
2281-2414	6-23-94	2867-2886	9-22-95
2415-2432	6-24-94	2887-2912	9-29-95
2433-2434	8-03-94	2991-3182	6-11-96
2435-2436	8-04-94	3183-3257	6-12-96
2437-2438	8-05-94	3275-3299	7-08-96
2439-2485	9-29-94	3300-3311	7-09-96
2486-2523	10-01-94	3312-3375	9-07-96
2524-2580	3-24-95	3381-3393	6-17-97

Table 2. Taxa constituting the flora of McCurtain County Wilderness Area

	Species and Intraspecific Taxa				
	Families	Genera	Native	Introduced	Total
Polypodiophyta	8	10	12	0	12
Coniferophyta	2	2	2	0	2
Magnoliophyta					
Magnoliopsida	75	175	239	13	252
Lillioopsida	10	49	85	8	93
Total Taxa	95	236	338	21	359

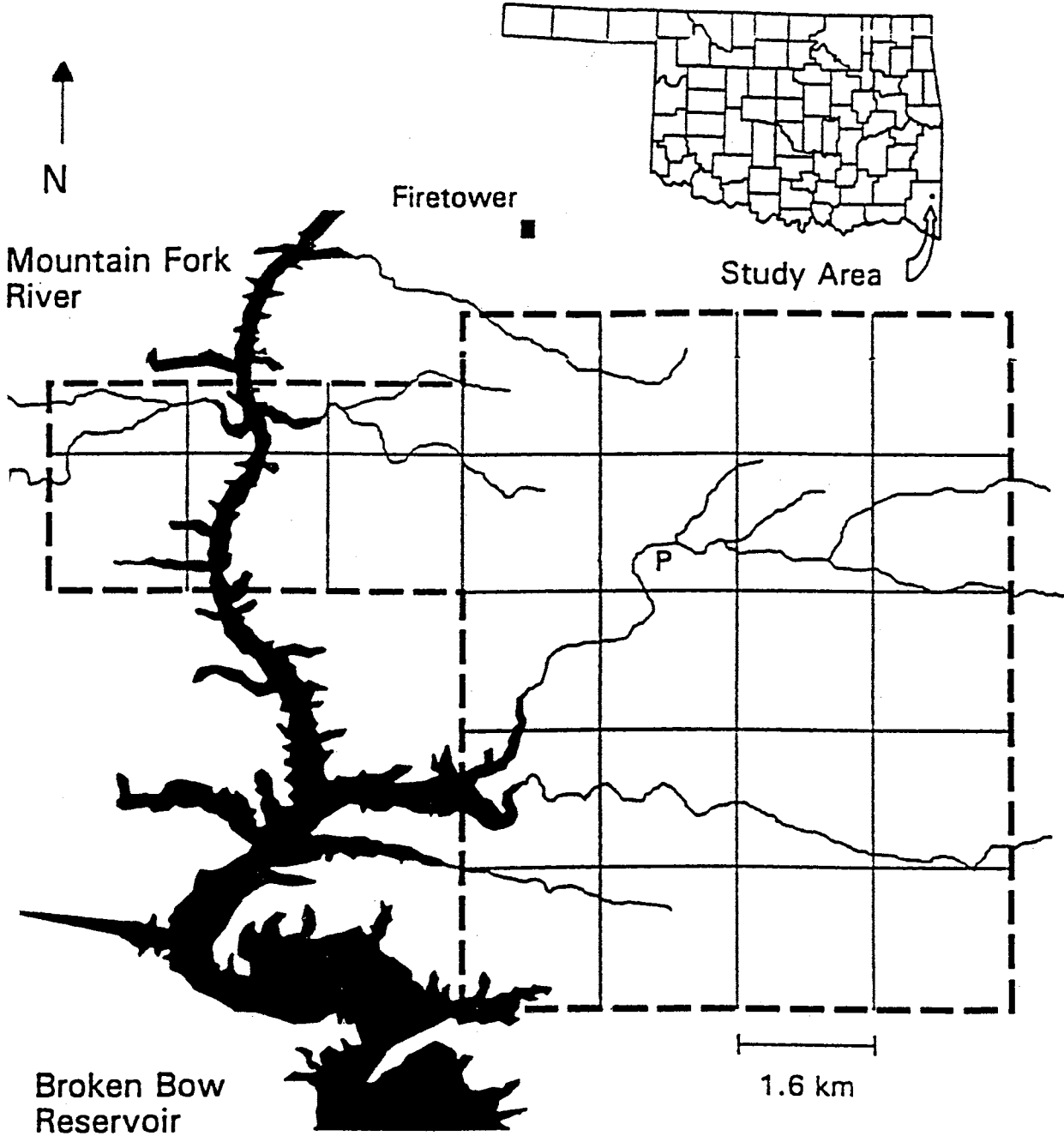


Figure 1. McCurtain County Wilderness Area.

Chapter III

A TAXONOMIC TREATMENT OF THE GERANIACEAE AND LOASACEAE OF OKLAHOMA

INTRODUCTION

Oklahoma is a state that is botanically rich. Geographically, it is at the crossroads where several phytogeographic regions meet, each contributing species to the flora. This diversity of plants is related to the state's environmental diversity in climate, geology, and topography. The vascular flora of Oklahoma comprises 2600 species, 850 genera, and 173 families (Tyrl et al., 1994). This diversity constitutes a major economic resource and thus is studied and manipulated by farmers, ranchers, agronomists, range managers, soil conservationists, ecologists, wildlife managers, foresters, recreationalists, and botanists (Tyrl et al., 1994). All require a means of identifying native and introduced plants. Unfortunately, a modern taxonomic treatment of Oklahoma's plants is not available. Currently, U.T. Waterfall's (1969) *Keys to the Flora of Oklahoma* is the most widely used key for identification. The keys unfortunately do not provide technical descriptions of the included taxa, thus botanists must rely on manuals from adjacent areas e.g., *Manual of the Vascular Plants of Texas* (Correll and Johnston, 1979), *Gray's Manual of Botany* (Fernald, 1950), or *Flora of Missouri* (Steyermark, 1963) in order to confirm identifications. In response to this need for a taxonomic manual of the state's plants, the Flora of Oklahoma Project was organized (Tyrl et al., 1994). A consortium of

state taxonomists have undertaken the writing and publishing of the modern and comprehensive flora (both descriptions and keys) of the vascular plants of Oklahoma. In the last five years, the editorial committee of the project has made significant progress toward its goal. Keys to all families have been developed and tested in both university and high school classrooms across the state. Using DELTA (Descriptive Language for Taxonomy; Dallwitz and Paine, 1986) which is an automated description/ identification program that provides a standardized format for taxonomic descriptions by using a coded list of characters, the committee also has completed the technical descriptions of the families. Upon completion of the family descriptions, work will begin on the construction of the keys to the genera and species in each family (R. J. Tyrl, personal communication).

The Geraniaceae and Loasaceae are two small families of the state's vascular flora that will be included in the forthcoming floristic treatment. Commonly known as the geranium family, the former comprises 11 genera and about 700 species widespread in temperate and warm-temperate regions of the world (Cronquist, 1981). In Oklahoma, it is represented by two genera and eight species (Taylor and Taylor, 1994). Of little economic importance, Oklahoma taxa of the family are typically encountered as lawn weeds. Comprising about 200 species in 14 genera distributed in temperate and tropical North and South America, the Loasaceae, or stick-leaf family, is represented in Oklahoma by two genera and seven species (Taylor and Taylor, 1994). Distributed primarily in the western half of the state, taxa of the family are noted for their conspicuous flowers that open early or

late in the day and their stinging hairs.

Because of my prior interest in the biology and taxonomy of these two families, I volunteered to prepare taxonomic treatments of the two families for the Flora of Oklahoma project. Specific objectives of the work summarized here were: (1) to compile a list of Oklahoma taxa of these two families, (2) to examine specimens deposited in state herbaria in order to describe the range of morphological variation of each taxon present in the state, (3) to write technical descriptions of each taxon, and (4) to construct keys permitting the rapid, accurate identification of all taxa. The descriptions and keys will be submitted to the editorial committee of the Flora of Oklahoma Project.

METHODOLOGY

PREPARATION OF THE TREATMENTS

Preparation of the treatments of the Geraniaceae and Loasaceae began with a review of the taxonomic literature. Floras and checklists of Oklahoma were examined, for example, *Keys to the Spring Flora of Central Oklahoma* (Goodman, 1958), *A Study of Flowering Plants* (McCoy, 1968), *Keys to the Flora of Oklahoma* (Waterfall, 1969), and *An Annotated List of the Ferns, Fern Allies, Gymnosperms, and Flowering Plants of Oklahoma* (Taylor and Taylor, 1994). In addition, information was gathered from floras of adjacent areas such as the *Flora of the Great Plains* (Great Plains Association, 1986), *Manual of the Vascular Plants of Texas* (Correll and Johnston, 1979), *Flora of Missouri* (Steyermark, 1963), and *Gray's Manual of Botany* (Fernald, 1950). A list of the taxa present in Oklahoma from the two families was compiled (Tables 3 and 4); it served as the basis for

subsequent development of the genera and species descriptions for each family.

As the literature was reviewed, specimens were borrowed from herbaria at the University of Oklahoma, University of Science & Arts of Oklahoma, Southeastern Oklahoma State University, Northeastern Oklahoma State University, Northwestern Oklahoma State University, Cameron University, Tulsa University, and McLoud High School. These specimens (Appendices C and D), as well as those deposited in the OSU Herbarium were identified, examined, and various morphological characters scored. At the end of the study, these herbarium specimens were annotated and returned.

Using the CHARS data set for DELTA (Descriptive Language for Taxonomy; Dallwitz and Paine, 1986) developed by the editorial board of the flora project, the morphological features of the plants on each herbarium sheet were scored or measured, and the information recorded on data sheets. After all specimens were scored, the data were interpreted, summarized, and entered into an ITEMS file for DELTA. Natural language descriptions of each species and genus were subsequently produced using a TONAT file for DELTA. Dichotomous keys to the genera and species of each family were then constructed. The descriptions of taxa and keys, presented below, were submitted to the editorial board of the Flora of Oklahoma project for review and editing.

RESULTS AND DISCUSSION

TAXONOMIC TREATMENTS OF THE GERANIACEAE AND LOASACEAE

In the following paragraphs, the descriptions of each taxon and the keys to

the genera and species of each family are presented. The descriptions reflect only the taxon's range of morphological variation found in Oklahoma. Contrary to traditional practice, the descriptions of genera and their included species overlap. This is deliberate. The project's editorial board will eventually determine the format for presentation of overlapping information in the manual.

Taxonomic Treatment of the Geraniaceae

Geraniaceae A.L. de Jussieu
Geranium Family

Plants herbs; annuals or biennials or perennials; multiple stemmed. **Root Systems** with a central taproot or fibrous from rhizomes. **Stems** prostrate or ascending to erect. **Leaves** cauline or basal or forming a basal rosette; simple or 1-pinnately compound; alternate or opposite; petiolate; venation pinnate or palmate; margins palmately lobed to palmatifid or pinnately lobed to pinnatifid; terminal leaflets of compound leaves present; stipules present. **Inflorescences** simple cymes; often umbelliform; terminal or axillary. **Flowers** perfect; perianths in 2-series. **Sepals** 5; free. **Corollas** radially symmetrical or slightly bilaterally symmetrical. **Petals** 5; free; red-violet or rose-purple or pale-pink to white. **Stamens** 5 or 10. **Pistils** 1; compound; stigmas 5, linear; styles 5, fused forming a styler column, but separating at maturity; ovaries superior; lobes 5; carpels 5; locules 5; placentation axile. **Fruits** schizocarps; abruptly dehiscent from a persistent central column. **Seeds** 5; brown; smooth, or finely reticulated.

The family is represented in Oklahoma by 2 genera and 8 species. *Geranium texanum* has been reported to occur in the state, but no herbarium collections of it were encountered. Several species were used medicinally by Native Americans, but members of the family are not economically important even as weeds.

1. Stamens 5. Mericarps fusiform. Style columns bristly bearded on inner surfaces. Styles twisting after separation. *Erodium*
1. Fertile stamens 10. Mericarps obovate to oblong. Style columns with soft pubescence on inner surfaces. Styles curving upward after separation, but not twisting. *Geranium*

Erodium* C. L.I. Heritier*Stork's-Bill**

Plants herbs; biennials or perennials or annuals. **Stems** prostrate to ascending; with leafy branches. **Leaves** forming a basal rosette; simple or 1-pinnately compound; ovate and palmately lobed or obovate to oblanceolate and pinnate to pinatifid; venation pinnate or palmate; stipules lanceolate to deltoid. **Inflorescences** umbelliform; axillary. **Flowers** slightly bilaterally symmetrical, upper 2 petals slightly larger than lower 3. **Sepals** elliptic; apiculate or with short awns. **Petals** elliptic to broadly obovate; venation palmate; apices bifid or not bifid. **Stamens** 5. **Schizocarps** with elongate style columns; mericarps oblanceolate; hispid; styler portion spirally twisting below the middle of style column; bristly bearded on inner surface. **Seeds** dark or light brown; smooth; ellipsoid or ellipsoid-conic.

1. Leaves 1-pinnately compound. Hairs of blades conspicuously flattened, translucent, and usually articulate. Petal apices not bifid *E. cicutarium*
1. Leaves simple, palmately lobed. Hairs of blades terete or slightly flattened, not articulate. Petal apices bifid. *E. texanum*

***Erodium cicutarium* (L.) C.L.I. Heriter**

Redstem Storksbill

Plants winter annuals. **Stems** branched at bases; prostrate to ascending; to 38 cm tall. **Leaves** forming a basal rosette; 1-pinnately compound, opposite; obovate to oblanceolate; leaflets opposite, sessile, terminal leaflet present, oblong to ovate; sparsely to densely villous; hairs flattened, translucent, articulate or not articulate, occasionally gland tipped; apices obtuse to acute. **Sepals** strongly 3-nerved; 3.3 to 4.5 mm long at anthesis and 4.3 to 6.5 mm in fruit; adaxial surfaces sparsely villous; abaxial surfaces densely pubescent below, apices awned. **Petals** elliptic to obovate; 4 to 5 mm long; roseate purple; elliptic to obovate; glabrous; apices obtuse without bifid tips. **Schizocarps** with style column 12-59 mm long; mericarps 4 to 5 mm long. **Seeds** 2.5 to 3 mm long; elliptic.

A native of Europe, this species is naturalized throughout the state in open disturbed sites especially in weedy lawns.

***Erodium texanum* A. Gray**

Texas Storksbill

Plants annuals. **Stems** branched; prostrate to ascending; to 27 cm tall. **Leaves** forming a basal rosette; simple; opposite; simple; ovate; densely hirsute, hairs retrorse; blades 0.7 to 2.7 cm wide, 1.0 to 2.8 cm long; margins palmately lobed with 3-5 rounded lobes, margins crenate; bases cordate. **Sepals** 5 to 7 mm long at anthesis and 7 to 11.5 mm long in fruit; adaxial surfaces retrorsely hirsute hairs; apices apiculate. **Petals** purplish red; broadly obovate; longer than the sepals; glabrous; apices with bifid tips. **Schizocarps** with style column 3.1 to 5.6 cm long. **Mericarps** 6.5 to 9 mm long. **Seeds** 4 to 4.8 mm long; elliptic conic.

This species is naturalized in open, rocky, sandy areas and prairies in southern Oklahoma.

***Geranium* Linnaeus**

Cranesbill

Plants herbs; annuals or biennials or rhizomatous perennials. **Stems** ascending to erect; with leafy branches. **Leaves** simple; alternate or opposite; suborbicular to reniform; palmately veined; margins palmatifid; stipules narrowly lanceolate to deltoid. **Inflorescences** cymes of 2 to 5 flowers; umbelliform; axillary. **Sepals** ovate to elliptic. **Corollas** radially symmetrical. **Petals** obovate to elliptic; apices bifid. **Stamens** 10; of 2 lengths; longer ones with glands at bases. **Schizocarps** with style columns elongate;

mericarps obovate to oblong; glabrous; transversely rugose; strigose or hirsute; tardily dehiscent, styles curving upward; style . columns with soft pubescence on the inner surface. **Seeds** smooth or finely reticulate; oblong to oval.

Geranium texanum has been reported to occur in the state, but no herbarium collections of it were encountered. It will not be described or part of the key to species of Geraniums. See Correll and Johnston for a description of the species.

1. Plants perennials; scapose. Rhizomes present. Leaf lobes serrate. Pedicels erect; gland-tipped hairs absent. Petals 12-20 mm long. *G. maculatum*
1. Plants annuals or biennials; not scapose. Rhizomes absent. Leaf lobes not serrated. Pedicels reflexed; gland-tipped hairs present. Petals 3-6 mm long.
 2. Petal apices deeply bifid. Mericarps glabrous; transversely rugose. Leaves cleft half way to midribs. *G. molle*
 2. Petal apices shallowly bifid. Mericarps indumented; not transversely rugose. Leaves cleft more than half way to midribs.
 3. Leaves 7-9 parted; reniform. Sepals awnless. Petals 3-3.8 mm long. Seeds 1.5-1.8 mm long. *G. pusillum*
 3. Leaves 5-parted, suborbicular. Sepals awned. Petals 4.5-6 mm long. Seeds 2 mm long.
 4. Petals reddish pink. Style branches purple..... *G. dissectum*
 4. Petals white to pale pink. Style branches yellowish..... *G. carolinianum*

***Geranium carolinianum* Linnaeus**

Carolina Cranesbill

Plants annuals or biennials. **Stems** much branched; erect to ascending; 6.5 to 29.0 cm long. **Internodes** with sparse retrorse hirsute hairs. **Leaves** suborbicular to reniform; 5-parted, cleft 4/5 of the way to the leaf midrib; blades 2.5 to 4.3 cm wide; indumentum retrorse hirsute; palmately lobed, lobes divided into 3 segments at the summits, which are further subdivided 2 to 3 times; summit apices obtuse to acute, margins entire.

Inflorescences umbelliform; with 2 flowers. **Sepals** broadly ovate to elliptic; sepal lobes 4 to 6 mm long; apices aristate. **Petals** white to pale pink; oblanceolate; 4.5 to 5.5 mm long; apices bifid. **Schizocarps** with style columns 5.5 to 12.3 mm long; mericarps 2.5 to 3 mm long; oval to oblong; indumentum hirsute. **Seeds** 1.0 mm wide; 2.0 mm long; minutely reticulate.

This the most commonly eocuntered species of the family. Plants are found throughout the body of the state in weedy lawns and other areas of disturbance.

Geranium dissectum* Linnaeus*Cranesbill**

Plants annuals or biennials. **Stems** much branched; ascending; up to 8 cm long. **Internodes** with dense retrorse hirsute hairs. **Leaves** suborbicular to orbicular; 5 parted, cleft 5/6 of the way to the leaf midrib; **blades** 2.0 to 7.0 cm wide; indumentum retrorse **hirsute**; palmately lobed, lobes divided into 3 segments at the summits, which are further subdivided 3 to 5 times; summit apices obtuse to acute, margins entire. **Inflorescences** umbels with 2 flowers. **Sepals** ovate to lanceolate; sepal lobes 7.0 to 9.0 mm long; apices aristate. **Petals** reddish pink; obovate; 5.0 to 6.0 mm long; apices bifid. **Schizocarps** with style columns 12 mm long; mericarps about 2.5 mm long; obovate; indumentum glandular hirsute. **Seeds** 2.0 mm wide; reticulate.

This species is infrequently encountered in counties of the southeastern corner of the state.

Geranium maculatum* Linnaeus*Wild Cranesbill**

Plants perennials from a stout rhizome. **Stems** erect with 1 pair of leaves; 23-49.5cm tall. **Leaves** simple; opposite; petiolate, with long petioled basal leaves and short petiolate leaves on the scapose stem; orbicular, 5 parted, sometimes 3 or 7 parted; blades 7.2-18.9 cm wide, 7.2-18.9 cm long; pubescence of sparsely flattened villous to hirsute hairs; apices acute; margins serrate, palmately lobed 4/5 of the way to the leaf midrib. **Inflorescences** corymbs; with each peduncle with 2 flowers or sometimes 3 or 5; peduncles up to 17 cm long. **Sepals** ovate to elliptic; sepal lobes 7 to 10 mm long at anthesis and up to 12 mm long in fruit; indumentum sparsely villous; apices aristate. **Petals** rose pink to light purple; obovate; 12 to 20 mm long; apices obtuse, without bifid tips. **Schizocarps** with style columns 14 to 26 mm long; mericarps 4 to 5 mm long; obovate. **Seeds** 1.25 to 1.5 mm wide; 2 to 3 mm long; finely reticulate; oblong.

This species is a naturalized taxon found in the wooded areas of northeastern Oklahoma.

Geranium molle* Linnaeus*Dovesfoot**

Plants annuals or biennials. **Stems** branched from the base; weak spreading to ascending; 22.5 to 35.5 cm long; **Internodes** with sparse to dense villous to hirsute hairs. **Leaves** reniform; 5 to 9 parted, cleft the middle of the lobe; **Blades** 2 to 5 cm wide; indumentum sparsely to densely villous to hirsute; palmately lobed, lobes divided into 3 segments at the summit; summit apices obtuse to acute, margins entire. **Inflorescences** umbels of 3 flowers. **Sepals** elliptic; sepal lobes 3.0 to 4.5 mm long; apices callus tipped. **Petals** red to violet; oblanceolate; 3.0 to 4.0 mm long; apices deeply bifid. **Schizocarps** with style columns 4 to 7 mm long; mericarps 2 mm long; oval to oblong; indumentum hirsute. **Seeds** 1 mm wide; 1.5 to 1.8 mm long; smooth.

A native of Europe and Asia, this species is naturalized in the eastern portion of the state. Plants are common in lawns, old fields, and waste places.

Geranium pusillum Linnaeus

Small Cranesbill

Plants annuals or biennials. **Stems** diffusely branched at the base; spreading or ascending; up to 33 cm long. **Internodes** with dense retrorse hirsute hairs. **Leaves** reniform; 7 to 9 parted, cleft 3/4 of the way to the leaf midrib; terminal blades 1.0 to 1.9 cm wide, basal leaves 2.5 to 6.0 cm wide with long petioles; indumentum sparsely villous to hirsute; palmately lobed, lobes divided into segments at the summit; summit apices acute, with entire margins. **Inflorescences** umbels with 2 flowers. **Sepals** elliptic; sepal lobes 3.0 to 4.0 mm long; apices callus tipped. **Petals** red to violet; elliptic to obovate; 3.0 to 3.75 mm long; apices bifid. **Schizocarps** with style columns 4.3 to 8.3 mm long; mericarps 2 mm long; oval to oblong indumentum strigose. **Seeds** 1 mm wide; 1.5 to 1.8 mm long; smooth.

This species is found throughout the eastern half of the state in a variety of habitats including weedy lawns and wooded areas.

Taxonomic Treatment of the Loasaceae

Loasaceae M.F. Dunal**Stick-Leaf Family**

Plants herbs or subshrubs; perennials armed with stinging hairs or not armed with stinging hairs, or hairs bristly, barbellate or hooked. **Stems** viscid; erect. **Leaves** simple; alternate or occasionally opposite; short petiolate or sessile; clasping or not clasping; venation pinnate or not apparent; margins entire or sinuate to pinnately lobed or pinnatifid; stipules absent. **Inflorescences** solitary flowers or simple cymes or heads; bracts present or absent. **Flowers** perfect; perianths in 2 series; sepals and petals different or alike. **Calyces** imbricate or convolute. **Sepals** 5; free; herbaceous or petaloid. **Corollas** radially symmetrical; valvate. **Petals** 5 or 10 or more; free; white to yellow or orange or white with a yellow inner surface. **Stamens** 5 or numerous; free; staminodia absent or present, petaloid. **Pistils** 1; compound; stigmas 1, 3-lobed; styles 1; ovaries inferior; carpels 3 to 5; locules 1, with 1 to 5 intruding placentae; placentation parietal. **Hypanthia** present; coroniform. **Nectaries** absent or present; 1 or 2; staminodal. **Fruit** capsules; with persistent calyx; dehiscent or indehiscent. **Seeds** 1 to 3 or numerous.

The family is represented in Oklahoma by 2 genera and 5 species. It is of little value economically.

1. Plants armed with stinging hairs. Perianth parts densely villous.
 Sepals petaloid. Stamens 5 *Cevallia*
1. Plants not armed with stinging hairs. Perianth parts glabrous.
 Sepals herbaceous. Stamens numerous *Mentzelia*

Cevallia M. Lagasca**Cevallia*****Cevallia sinuata* M. Lagasca****Stinging Cevallia**

Plants subshrubs; perennials, from a woody rootstock; armed with stinging hairs. **Stems** tomentose, with scattered bulbous-based stinging hairs, 2.1-2.5 mm long; branched; erect to ascending; to 40 cm tall. **Leaves** alternate; 3-8 mm long; ovate to elliptic; adaxial surfaces with barbellate hairs and scattered bulbous based stinging hairs 1.5-2 mm long; abaxial surfaces with tomentose hairs, lacking stinging hairs; apices obtuse to acute; margins sinuate to pinnatifid; bases cuneate to oblique. **Inflorescences** heads; globose to hemispheric; to 4.2 cm in diameter; peduncles 6 cm long, borne opposite the leaf petioles; bracts linear, densely villous, in more than 1 series, equal in length to perianth parts. **Sepals** petaloid, similar in shape and size. **Petals** 0.5-0.8 mm wide and 5-8.5 mm long; linear; adaxial surfaces glabrous, yellow; abaxial surfaces white, densely villous. **Stamens** 5; anthers linear, 2-2.3 mm long, connective hollow, 2.5-3 mm long; filaments 1-1.3 mm long, thick, fused to petals. **Pistils** with stigmas capitate, 0.5-0.8 mm wide; styles 0.8-1 mm long. **Capsules** indehiscent; about 3 mm long; densely villous. **Seeds** 1.

This species is the only member of the genus. It is typically found on gypsum in the extreme southwestern corner of the state in Harmon, Jackson, and Greer counties.

***Mentzelia* H.D. Harrington**

Stickleaf Family

Plants herbs; perennials; not armed with stinging hairs. **Leaves** alternate. **Inflorescences** solitary flowers or simple cymes; bracts present. **Sepals** 5; herbaceous. **Petals** 5 or more. **Stamens** numerous; of equal or unequal lengths; filaments filiform or dilated; staminoids absent or present. **Pistils** with styles filiform; ovaries with 3-5 placentae. **Capsules** dehiscent; sessile or short pedicellate. **Seeds** 2 or 3 or numerous; winged or not winged.

Two species of *Mentzelia* (*M. multiflora* and *M. reverchonii*) have been reported for the state, but due to lack of research specimens from Oklahoma herbariums the 2 species are not included in the keys and descriptions. Both species are treated in Correll and Johnston.

- 1. Petals 5. Capsules with 2 or 3 seeds. Seeds not winged..... *M. oligosperma*
- 1. Petals more than 5. Capsules with numerous seeds. Seeds with wings
 - 2. Petals 4.4 to 7.7 cm long. Stamens with equal lengths..... *M. decapetala*
 - 2. Petals 0.7 to 4.3 cm long. Stamens of unequal lengths
 - 3. Petals yellow. 0.7-0.9 cm long..... *M. albescens*
 - 3. Petals white. 1.5-4.3 mm long..... *M. nuda*

***Mentzelia albescens* (J. Gilg. & G. Arnott) A. Grisebach**

Wavyleaf Mentzelia

Plants herbs; perennials; from woody taproots. **Stems** branched; erect; to 1.0 meter tall; internodes white; epidermis exfoliating below. **Leaves** cauline, sessile; clasping; lanceolate or ovate to lanceolate or oblong; 6.0 to 8.0 cm wide; 1.9 to 3 cm long; apices acute or obtuse; margins entire or sinuate or coarsely dentate. **Inflorescences** with bracts linear to lanceolate; about 1/2 length of capsules. **Flowers** opening in late afternoon. **Sepals** linear; with barbed hairs; 3 to 5 mm long; apices truncate; margins entire. **Petals** 10; lanceolate or spatulate; yellow; apices acute; margins entire; 7 to 9 mm long. **Stamens** of unequal lengths; about 4 mm long; filaments dilated and petaloid; anthers 0.3 mm wide; 0.5 mm long. **Capsules** with barbed trichomes with brown bases, which appear uniform punctate; cylindrical; 7 to 8 mm wide; 1.9 to 2.1 cm long. **Seeds** numerous; winged; 2.5 to 3 mm long;

This species is limited in distribution to the extreme southwestern corner of the state in Harmon, Greer, Kiowa, and Commanche counties.

Mentzelia decapetala* (F. Pursh) I. Urban & E.F. Gilg. Ten-petal *Mentzelia

Plants herbs; perennials; from thickened root stocks **Stems** erect; up to 1.25 meters tall. **Leaves** forming a basal rosette and cauline; oblanceolate; blades 1.1 to 2.1 cm wide, 4.2 to 10.2 cm long; sessile; apices acute; margins with coarsely toothed cauline leaves and sinuate rosette leaves. **Inflorescences** terminal; bracts sessile; margins laciniate; subtending capsules. **Flowers** opening about one hour after sunset. **Sepals** broadly lanceolate; 2.6 to 4 cm long; apices acuminate. **Petals** 10; white; obovate to oblanceolate; 4.4 to 7.7 cm long; apices acuminate; margins entire. **Stamens** of equal lengths; 3.4 to 4.7 cm long; anthers oblong or oblanceolate; 0.6 to 0.8 mm wide; 1.8 to 2.0 mm long. **Pistils** with styles 5 to 6 cm long. **Capsules** cylindrical; 0.9 to 1.6 cm wide; 2.5 to 4.4 cm long. **Seeds** numerous; winged; 3 mm long.

This species is scattered throughout the western half of the state.

Mentzelia nuda* (F. Pursh) J. Torrey & A. Gray Bractless *Mentzelia

Plants herbs; perennials; from thickened root stocks **Stems** erect; to 0.9 meters tall. **Leaves** cauline; linear-lanceolate; blades 0.6 to 2.1 cm wide; 2.1 to 10.4 cm long; sessile; apices acute; margins sinuate or dentate, with acute or obtuse apices. **Inflorescences** terminal; bracts present; sessile; linear to lanceolate; margins laciniate; subtending capsules. **Flowers** opening in late afternoon. **Sepals** 1.2 to 2 cm long. **Petals** 10 to 13; white; obovate to oblanceolate; 1.5 to 4.3 cm long; apices acuminate; margins entire. **Stamens** of unequal lengths; 3.4 to 4.7 cm long; anthers oblong or oblanceolate; staminodia slightly dilated, up to 3.5 cm long; fertile stamens 0.5 to 3.1 cm long. **Styles** 1.0 to 2.0 cm long. **Capsules** cylindrical; 0.9 to 1.3 cm wide; 1.5 to 2.9 cm long. **Seeds** numerous; winged; 3.0 mm long.

The species is widespread in the western half of Oklahoma, including the Panhandle. Two varieties are presently recognized. *Var. stricta* is the more common variety and was long recognized as a distinct species, *M. stricta*.

Petals 1.5 to 2.0 cm long. **var. *nuda***

Petals 2.2 to 4.3 cm long. **var. *stricta***

***Mentzelia oligosperma* J. Sims Stick-Leaf**

Plants herbs; perennials; from a thickened woody rootstock. **Stems** much branched; internodes whitish to straw colored; epidermis exfoliating below. **Leaves** sessile to short petiolate; ovate to lanceolate; blades to 2.7 cm wide, to 7.3 cm long; scabrous; with barbed trichomes; apices acute to obtuse; margins dentate or serrate or basally lobed; bases cuneate or oblique. **Flowers** opening in the early morning. **Sepals** lanceolate; 4 to 7 mm long. **Petals** 5; pale yellow to orange; ovate; 7 to 12 mm long; apices acute; margins entire. **Stamens** filamentous; inner stamens 3 to 6 mm long the outer stamens 6 to 9 mm long; 0.3 to 0.5 mm wide; 0.8 to 1 mm long; staminodia absent. **Styles** 6 to 9.5 mm long.

Capsules clavate; sessile; 2 to 3 mm wide at the apex; 8 to 14 mm long. **Seeds** 2 or 3 per capsule; ovoid; 1.3 mm wide; 3 to 4 mm long.

This species is common throughout the state and occurs in a variety of soil types. It is the only species of the family that is found in eastern counties as well as western counties. Barbed trichomes on the leaves and fruit readily adhere to clothing, fur, or skin, hence the common name.

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Table 3. Oklahoma species of the family Geraniaceae (Taylor & Taylor, 1994).

Species name	Common name
<i>Erodium cicutarium</i> (L.) L'Her.	Filaree
<i>Erodium texanum</i> Gray	Texas Storksbill
<i>Geranium carolinianum</i> L.	Carolina Cranesbill
<i>Geranium dissectum</i> L.	Cranesbill
<i>Geranium maculatum</i> L.	Wild Cranesbill
<i>Geranium molle</i> L.	Dovesfoot
<i>Geranium pusillum</i> L.	Small Cranesbill
<i>Geranium texanum</i> (Trel.) Heller	Texas Cranesbill

* *Geranium texanum* is not included in keys or described in the study, due to lack of Oklahoma herbarium specimens.

Table 4. Oklahoma species of the family Loasaceae (Taylor & Taylor, 1994)

Species name	Common name
<i>Cevallia sinuata</i> Lag.	Stinging Cevallia
<i>Mentzelia albescens</i> (J. Gilg & G. Arnott) A. Grisebach	Wavyleaf Mentzelia
<i>Mentzelia decapetala</i> (F. Pursh) L. Urban & Gilg	Tenpetal Mentzelia
<i>Mentzelia multiflora</i> (Nuttall) Gray	Desert Mentzelia
<i>Mentzelia nuda</i> (Pursh) Torrey & Gray	Bractless Mentzelia
<i>Mentzelia oligosperma</i> Nuttall ex Sims	Stickleaf Mentzelia
<i>Mentzelia reverchonii</i> (Urban & Gilg.) Thomas. & Zavortic	

* Neither *Mentzelia multiflora* or *M. reverchonii* were included in the keys or descriptions for the study, due to a lack of Oklahoma herbarium specimens.

CHAPTER IV
TAXONOMIC DESCRIPTIONS OF THE PTERIDOPHYTE
FAMILIES OF OKLAHOMA

INTRODUCTION

Oklahoma is a state characterized by a diverse vascular flora; approximately 2,600 species, 850 genera, and 173 families (Tyrl et al., 1994). Not appreciated by most individuals is that the pteridophytes (=ferns and their allies) constitute a sizable component of this flora. At present, 68 species, 30 genera, and 17 families in 3 divisions are recognized to occur in the state (Flora of North America Editorial Committee, 1993). Studies of the fern flora in Oklahoma essentially began in 1900 with the first attempt at a catalog of the plants of Oklahoma territory by E.E. Bogue (1900). He listed 13 species of ferns and fern allies. Interestingly, at the same time, accounts of ferns in surrounding states Arkansas, New Mexico, and Kansas were more complete (Bush, 1930). By 1913 the number totaled 25 (Bush, 1930). G.W. Stevens in 1916 in his *The Flora of Oklahoma* reported 41 species. In 1930 Bush (1930) and Jeff and Little (1930) respectively listed 50 and 41 species. Seven years later, Stemen and Meyer (1937) recognized 48 species in 6 families. By 1969, the number of pteridophytes had increased to 8 families, 23 genera, and 58 species according to Waterfall (1969).

As noted above, 17 families, 30 genera, and 68 species are believed to occur within the boundaries of the state (Appendix E). There are several reasons for this

increase in numbers from those given by Waterfall. One is the substantial number of changes in the classification and nomenclature of the pteridophytes. Large, familiar families have been divided into a number of smaller ones. For example, the Polypodiaceae used in Waterfall and other taxonomic treatments (Fernald, 1950; Correll and Johnston, 1979) has been divided into seven families by the editors of the *Flora of North America* (1993) or five families according to Taylor and Taylor (1994). Smaller families have likewise been divided, e.g., the Salviniaceae has been divided into the Azollaceae and Salviniaceae. These changes are due to increases in information about taxa, changes in classificatory practices, and changes in concepts of taxa. Concomitant with these changes in classification have been changes in nomenclature. Familiar genera and species have seemingly disappeared e.g., *Polypodium polypodioides* is now *Pleopeltis polypodioides* and *Notholaena dealbata* is now *Argyrochosma dealbata*. The increase in number of pteridophyte taxa reflects the discovery of additional species; *Lygodium japonicum*, *Azolla mexicana*, *Lycopodiella appressa*, and *Equisetum arvense*.

With these changes and additions in Oklahoma pteridophytes, the need for comprehensive taxonomic treatments for ferns and fern allies was recognized. U.T. Waterfall's (1969) *Keys to the Flora of Oklahoma* is the most recent treatment and is widely used. Unfortunately, his work does not provide technical descriptions of the taxa, and thus users must rely on manuals of other states, e.g. *Manual of the Vascular Plants of Texas* (Correll and Johnston, 1979) or *Gray's Manual of Botany* (Fernald, 1950), for them.

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In the last five years, the editorial committee of the Flora of Oklahoma Project has made significant progress. Keys to all families have been developed and tested in both university and high school classrooms across the state. Using DELTA (Descriptive Language for Taxonomy, Dallwitz and Paine, 1986), which is an automated description/identification program that provides a standardized format for taxonomic descriptions by using a coded list of characters, the committee also has completed the technical descriptions of the 156 families of gymnosperms and flowering plants. Upon completion of the family descriptions, work will begin on the construction of keys to genera and species of each family.

Family descriptions were needed for the 17 families of pteridophytes in Oklahoma, and work summarized in this section was conducted as one facet of the Flora of Oklahoma Project. Specific objectives of this work were: (1) to examine specimens deposited in state herbaria in order to compile a list of pteridophyte taxa present in Oklahoma, (2) to review the taxonomic literature to adopt or develop a classification encompassing Oklahoma pteridophytes, (3) to develop a DELTA-based character list for their vegetative and reproductive features, and (4) to produce descriptions of the families for inclusion in the *Flora of Oklahoma*.

METHODOLOGY PREPARATION OF THE TREATMENTS

Preparation of the treatments of pteridophyte families began with a review of the taxonomic literature. Keys to the Flora of Oklahoma (Waterfall, 1969), *Flora of North America* (Flora of North America Editorial Committee, 1993), and *Identification of Oklahoma Plants* (Tyril et al., 1994) were reviewed to determine

families, genera, species, and infraspecific taxa present within the state's boundaries. In addition, information was gathered from floras of adjacent areas such as the *Flora of the Great Plains* 1986 (Great Plains Association, 1986), *Manual of the Vascular Plants of Texas* (Correll and Johnston, 1979), and *Gray's Manual of Botany* (Fernald, 1950). As the literature was reviewed, specimens deposited in the OSU Herbarium (OKLA) were examined. The morphology and habitats of selected taxa also were examined in the field during several collecting trips throughout south-central and southeastern Oklahoma. A list of the taxa present in Oklahoma was compiled (Appendix E); it served as the basis for subsequent development of the family descriptions.

Because of the extreme diversity in morphology among the 17 families of pteridophytes, three lists of characters were compiled in the DELTA format for CHARS (Dallwitz and Paine, 1986) rather than one as originally planned. One was for the aquatic families Azollaceae, Marsileaceae, and Salviniaceae; one was for the families commonly known as the fern allies: Equisetaceae, Isoetaceae, Lycopodiaceae, and Selaginellaceae; and one was for the remaining 10 families of "true ferns" (Appendices F-H). Each list of characters and the number of states for each character were designed to encompass all of the variation exhibited by all Oklahoma members of the included families. Features exhibited by non-Oklahoma taxa of each family were not included. Concomitant with the development of CHARS was the development of SPECS (Appendices I-K) which provided specifications as to how each character was to be treated. Using the appropriate set

of CHARS, the morphological features of each of the 17 families were scored and entered in one of three ITEMS files (Appendices L-N). Natural language descriptions were subsequently produced using a TONAT file (Appendices O-Q). The family descriptions, presented below, were then submitted to the editorial board of the Flora of Oklahoma project for review and editing.

RESULTS AND DISCUSSION

TAXONOMIC TREATMENTS OF THE 17 FAMILIES OF PTERIDOPHYTES
IN OKLAHOMA

ASPLENIACEAE F.W. Newman

Spleenwort Family

Plants herbs; perennials; from rhizomes; evergreen; producing sporangia in sori on abaxial surfaces of fronds. **Rhizomes** branching or not branching; erect to horizontal; glabrous; scales present, clathrate. **Fronds** all alike or of 2 forms sterile and fertile different; vernation circinate; simple or 1-pinnately compound; stipitate; blades linear to lanceolate; apices rooting or not rooting; pinnae sessile, alternate or opposite; auricles present or absent; stipes grooved adaxially. **Sori** separate; borne on veins; scattered or in uniform rows; indusia attached at one side of sori. **Sporangia** all alike; annuli present; vertical. **Spores** all alike. **Gametophytes** all alike; green; cordate.

The family is represented in Oklahoma by 1 genus and 7 species. Our species are more common in the eastern part of the state, but occur statewide.

AZOLLACEAE R. Wettstein

Azolla Family

Plants small annuals or rarely perennials; herbs; free floating aquatics (often stranded on mud flats); reddish green or green; producing sporangia in pairs or quartets of sporocarps borne on submerged leaf lobes. **Roots** present; colorless; not branched. **Stems** prostrate to suberect; pinnately branched; concealed by imbricate leaves; internodes glabrous. **Leaves** small; alternate; sessile; 2-ranked; with 2 oval to suborbicular lobes, the upper lobe floating and the lower lobe submerged; adaxial surfaces papillate. **Sporocarps** of 2 types; not equal in size; borne in pairs or quartets on first leaf of lateral branches. **Sori** absent or rarely present. **Sporangia** of 2 types; microspores 32 or 64; megaspores 1. **Gametophytes** of 2 types.

The family in Oklahoma is represented by 1 genus and 2 species. Plants are often mistaken for leafy liverworts. The dense cover often formed from these plants over the surface of ponds, lagoons, and inlets provides shade and habitat for fish. The plants also serve as a food source for ducks and other water fowl.

BLECHNACEAE C. B. Presl

Chain Fern Family

Plants herbs; perennials; from rhizomes; producing sporangia in sori on abaxial surfaces of fronds. **Rhizomes** woody; long; scales present. **Fronds** of 2 forms, sterile and fertile different; vernation circinate; stipitate; sterile fronds green, proximally (at base) 1-pinnately compound, distally (above base) simple, blades ovate-lanceolate to oblong, margins pinnatisect, rachises olive green, curved; fertile fronds green (turning brown), 1-pinnately

compound, blades oblong, rachises yellow-green or reddish brown, straight to curved. **Sori** separate; positioned end to end; linear to oblong; indusia persistent, attached at one side of sori.; dehiscing toward midribs. **Sporangia** all alike. **Spores** all alike; reniform. **Gametophytes** all alike; green cordate.

The family is represented in Oklahoma by 1 species, *Woodwardia areolata*, chain fern. It is found in shaded moist soils of the pine, hardwood, and mixed forest of eastern Oklahoma.

DENNSTAEDTIACEAE R.C. Ching

Bracken Fern Family

Plants herbs; perennials; from rhizomes forming colonies; producing sporangia in sori on abaxial surfaces of fronds. **Roots** dark brown or black; branching; thick. **Rhizomes** black; woody; branching; scales absent. **Fronde**s all alike; vernation circinate; silver; claw-like; 1-pinnately to 4-pinnately compound; stipitate; erect to spreading; blades deltoid; veins not anastomosing; pinnae stalked, opposite or subopposite, proximally 2-pinnately compound and distally 1-pinnately compound; rachises yellow-brown, curved; stipes jointed, grooved adaxially. **Sori** present; rare; contiguous; borne on revolute margins; linear; false indusia formed by revolute margins, partially concealing sporangia. **Sporangia** all alike. **Spores** all alike; tetrahedral to globose. **Gametophytes** all alike; green; cordate.

The family is represented in Oklahoma by 1 species, *Pteridium aquilinum*, bracken fern.

DRYOPTERIDACEAE W.G.F. Herter

Wood Fern Family

Plants herbs; perennials; from rhizomes; without needle-like hairs; producing sporangia in sori on abaxial surfaces of fronds. **Rhizomes** branching or not branching; scales present. **Fronde**s all alike or of 2 forms, sterile and fertile different; vernation circinate; simple or 1-pinnately or 2-pinnately compound; stipitate; ascending to erect; blades lanceolate or deltoid; venation dichotomous, veins anastomosing or not anastomosing, areoles with veinlets absent; auricles present or absent; rachises with wings present or absent; stipes with scales present. **Sori** separate or contiguous; borne on veins; orbicular or oblong or u-shaped; indusia attached beneath sori and enclosing sporangia or at centers of sori or beneath sori at one side. **Sporangia** all alike; annuli present, vertical. **Spores** all alike; reniform or oblong. **Gametophytes** all alike; green; cordate.

The family is represented in Oklahoma by 6 genera and 12 species.

EQUISETACEAE A. Michaux. A.P. DeCondolle

Horsetail Family

Plants herbs; perennials; from creeping and branching rhizomes; terrestrial to emergent aquatics; producing sporangia on whorled, peltate sporophylls borne on terminal strobili. **Stems** all alike or of 2 forms, fertile and sterile; persisting for 1 or more growing seasons; jointed; longitudinally ribbed; branched or not branched; internodes hollow. **Leaves** small;

scale-like; chlorophyll absent; whorled; fused to form toothed sheaths at nodes; sheaths with 1 or 2 dark bands. **Strobili** terminal; sessile or peduncled; erect; elliptic to cylindrical; apices rounded or acute or apiculate. **Sporophylls** all alike; peltate; polygonal; with 5 to 10 sporangia. **Sporangia** borne on inner surfaces; pendulous. **Spores** all alike; greenish or white; with 4 elaters. **Gametophytes** all alike green.

The family in Oklahoma is represented by 1 genus, and 4 species. Typically forming dense stands in wet areas that are often shaded. *Equisetum* is sometimes described as a living fossil, little changed since the Devonian. Early settlers used the stems as abrasive materials, hence the common name, scouring rush.

ISOETACEAE C. L. Von Riechenbach

Quillwort Family

Plants herbs; from corms; terrestrial or emergent aquatics; producing sporangia in basal cavities of leaves (sporophylls). **Corms** brown; lobed. **Leaves** quill-like; simple; spirally arranged; blades linear; venation a single vein; apices acute; margins entire; bases dilated, sheathing; ligules present, attached above sporangia. **Sporangia** of 2 types; subtended by velums; microsporangia borne in bases of outermost leaves. **Spores** of 2 types; microspores minute; megaspores large. **Gametophytes** of 2 types.

The family is represented in Oklahoma by 1 genus and 2 species, *Isoetes butleri* and *Isoetes melanopoda*. Plants are typically encountered in vernal pools or wet areas, in the Wichita and Arbuckle Mountains, and in eastern Oklahoma.

LYCOPODIACEAE C.F.B. de Mirbel

Club Moss Family

Plants herbs; perennials; creeping; deciduous; sporangia on photosynthetic sporophylls borne in cylindrical, peduncled strobili. **Roots** emerging from lower sides of stems. **Stems** branched; erect or prostrate to arching. **Leaves** spirally arranged; appressed; linear to lanceolate; venation a single vein; margins entire or slightly toothed at bases; ligules present. **Strobili** conspicuous; solitary; peduncled; erect; cylindrical; peduncle leaves appressed, incurved, not imbricate, linear to lanceolate. **Sporophylls** all alike; resembling vegetative leaves in shape; generally longer than peduncle leaves; marginal teeth absent. **Sporangia** all alike; globose. **Spores** all alike. **Gametophytes** all alike; green; cordate.

The family in Oklahoma is represented by 1 species, *Lycopodiella appressa*, appressed bog club moss.

LYGODIACEAE C.B. Presl

Climbing Fern Family

Plants herbs; twining vines; perennials; from rhizomes; producing sporangia in 2-rowed aggregations at ends of pinnules. **Rhizomes** branching. **Fronds** all alike; with sterile and fertile portions; venation circinate; 2-pinnately to 4-pinnately compound; stipitate; pinnae stalked, alternate, proximally compound and distally simple; blades deltoid, ultimate

segments of fertile portions with radiating oblong lobes; rachises light brown; twining. **Sori** absent; indusia persistent, hood-like; dehiscing away from midrib. **Sporangia** all alike; obovate; annuli absent. **Spores** all alike; tetrahedral to globose. **Gametophytes** all alike; green; cordate.

The family is represented in Oklahoma by a single species, *Lygodium japonicum*, Japanese climbing fern. An introduced species of the southeastern U.S., it is known only from a single collection near Tom in McCurtain County. This species is not recognized to occur in Oklahoma according to the *Flora of North America*.

MARSILEACEAE C.F.B. de Mirbel

Water Clover Family

Plants perennials; herbs; from rhizomes; emergent aquatics or floating leaved aquatics (often partly submerged); from rhizomes; producing sporangia in hardened sporocarps borne on short axillary branches at bases of petioles. **Roots** arising from nodes. **Stems** slender; creeping; growing on or below soil surface; branched. **Leaves** all alike; aerial or floating or submerged; simple or palmately compound; alternate; long or short petiolate; vernation circinate; expanded blades absent or present; venation conspicuous, anastomosing, vein tips not free at margins, leaflets of compound leaves 4, obdeltoid, margins entire or toothed, bases cuneate. **Sporocarps** all alike; borne on short axillary stalks, borne above or below soil surface; attached laterally at apices, perpendicular or slightly nodding; brownish yellow; elliptic to nearly orbicular or reniform; with matted or coarse reddish hairs or glabrous; dehiscing into 2 or 4 parts. **Sori** 4-22 per sporocarp. **Sporangia** of 2 types; microspores 32-64; megaspores 1. **Gametophytes** of 2 types; developing within spores.

The family in Oklahoma is represented by 2 genera and 2 species, *Marsilea vestita*, water clover, and *Pilularia americana*, pillwort.

OPHIOGLOSSACEAE C.A. Agardh

Adder's-Tongue Family

Plant herbs; perennials; from fleshy erect subterranean stems; producing sporangia in aggregations at ends of elongated stalks. **Roots** fleshy. **Fronde**s all alike; divided into sterile and fertile portions; vernation erect; sterile portions simple or 1-pinnately to 3-pinnately compound; fertile portions simple or 1-pinnately to 2-pinnately compound; stipes with stipules at base, terete, stout, succulent, sheaths open or closed. **Sori** absent. **Sporangia** all alike; annuli absent. **Spores** all alike. **Gametophytes** all alike; not green mycotrophic; growing below soil surface; orbicular to ovate or linear.

The family is represented in Oklahoma by 2 genera and 7 species, all native.

OSMUNDACEAE B.W. von Berchtold & C.B. Presl**Royal Fern Family**

Plants herbs; perennials; from rhizomes; producing sporangia in aggregations on non-expanded pinnae. **Roots** black; wiry. **Rhizomes** woody; bearing persistent stipe bases and roots to form conspicuous crowns. **Fronde**s of 2 forms, sterile fronds and fertile different, or all alike, divided into sterile and fertile portions; vernation circinate; sterile fronds green, 1-pinnately compound stipitate; fertile fronds green becoming brown, 2-pinnately compound; sterile portions proximal, green, subtending fertile portion; fertile portions distal, brown; stipes yellow-green or green, grooved adaxially. **Sori** absent. **Sporangia** all alike; annuli present; poorly developed. **Spores** all alike; greenish. **Gametophytes** all alike; green; obcordate.

The family is represented in Oklahoma by 1 genus and 2 species. Plants are found in wet sites in the eastern 1/3 of Oklahoma.

POLYPODIACEAE B.W. von Berchtold and C.B. Presl**Polypody Family**

Plants epiphytic or terrestrial herbs; perennials; from rhizomes; producing sporangia in sori on abaxial surfaces of fronds. **Roots** dark brown. **Rhizomes** branching; scales present. **Fronde**s all alike; vernation circinate; simple; stipitate; arching; blades ovate to oblong; venation free or anastomosing; abaxial surfaces light gray-green, glabrous, scales with reddish brown centers and transparent margins, margins pinnatisect; segments not opposite. **Sori** separate; borne at ends of veins; embedded; indusia absent. **Sporangia** all alike; annuli present, vertical. **Spores** all alike; spherical. **Gametophytes** all alike; green; cordate or elliptic.

The family is represented in Oklahoma 1 species, *Pleopeltis polypodioides*, resurrection fern. It is a common epiphyte on older trees of forests in the southeastern part of the state. It also has been collected on mossy granite and sandstone in southcentral Oklahoma.

PTERIDACEAE C.L. von Reichenbach**Maidenhair Fern Family**

Plants herbs; perennials; from rhizomes; producing sporangia in sori on abaxial surfaces of fronds. **Rhizomes** branching or not branching; scales present. **Fronde**s all alike or of 2 forms sterile and fertile different; vernation circinate or erect; 1-pinnately to 5-pinnately compound; stipitate; abaxial surfaces green or white or yellow, mealy or not mealy. **Sori** contiguous; borne on revolute margins; false indusia formed by margins. **Sporangia** all alike; annuli present, vertical. **Spores** all alike; tetrahedral to globose. **Gametophytes** all alike; green; obcordate to reniform.

The family is represented in Oklahoma by 6 genera and 15 species. Many taxa exhibit adaptations for xeric habitats.

SALVINIACEAE C.L. von Reichenbach**Floating Fern Family**

Plants small; annuals; herbs; free floating aquatics (occasionally stranded on mud flats); producing sporangia in sporocarps borne at tips of submerged root-like leaves. **Roots** absent **Stems** branched; with many dark multicellular hairs. **Leaves** whorled; 2 leaves green, sessile or short petioled, flat, entire, floating and 1 leaf petioled, dissected, root-like, submerged; blades orbicular to elliptic; venation anastomosing; vein tips free at margins; adaxial surfaces with short multicellular stiff hairs separated into 4 segments at apex; adaxial surfaces glabrous; apices obtuse or retuse; bases rounded to cordate. **Sporocarps** of 2 types; equal in size; borne at tips of submerged root-like leaves; solitary. **Sporangia** of 2 types. **Spores** of 2 types; microspores 64; megaspores 1. **Gametophytes** of 2 types.

The family is represented in Oklahoma by 1 species, *Salvinia minima*.

SELAGINELLACEAE H. M.**Wilkomm Spikemoss Family**

Plants herbs; perennials; evergreen; typically saxicolous; producing sporangia on sporophylls borne in 4-sided or flattened strobili. **Roots** from rhizophores. **Stems** branched; prostrate to erect; nodes with wiry rhizophores borne on upper or lower sides of stems. **Leaves** all alike or of 2 forms; small; scale-like; spirally arranged; 4-or-8-ranked; imbricate; linear to lanceolate or falcate or narrowly triangular; ligules present, inconspicuous. **Strobili** solitary; terminal; sessile; erect or ascending or spreading; 4 sides or flattened; apices rounded. **Sporophylls** different from vegetative leaves; all alike or of 2 sizes; 4 ranked; microsporophylls distal; megasporophylls proximal; ligules present. **Sporangia** of 2 types. **Spores** of 2 types; microspores numerous, orange; megaspores large, yellowish white or white. **Gametophytes** of 2 types.

The family in Oklahoma is represented by 1 genus and 6 species.

THELYPTERIDACEAE R.C. Ching ex R.E.G. Pichi Sermolli Marsh Fern Family

Plants herbs; perennials; from rhizomes; with needle-like hairs; producing sporangia in sori on abaxial surfaces of fronds. **Roots** black or dark brown. **Rhizomes** black; branching; scales present. **Fronds** all alike; vernation circinate; 1-pinnately to 2-pinnately compound; stipitate; ascending to erect; blades lanceolate to deltoid; venation dichotomous; apices acuminate; pinnae sessile, alternate or opposite, bases truncate or oblique, auricles present or absent; rachises curved; stipes with scales only at bases. **Sori** separate; borne on veins; scattered; indusia absent or present, attached at on side of sori, reniform, ciliate. **Sporangia** all alike. **Spores** all alike; globose. **Gametophytes** all alike; green; cordate.

The family is represented in Oklahoma by 2 genera and 3 species. Our taxa occur in the eastern 1/3 of Oklahoma.

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APPENDIX A
ALPHABETICAL LIST OF SPECIES OF THE MCWA, THEIR COMMON
NAMES, AND HABIT

Key to Habit Information

N=Native

I=Introduced

P=Perennial

B=Biennial

A=Annual

S=Shrub

T=Tree

Species name	Common name	Habit
<i>Acalypha gracilens</i> Gray	Three Seeded Mercury	NA
<i>Acalypha virginica</i> L.	Three Seeded Mercury	NA
<i>Acer rubrum</i> L.	Red Maple	NT
<i>Acer saccharum</i> Marsh.	Sugar Maple	NT
<i>Aesculus glabra</i> Willd.	Texas Buckeye	NS
<i>Agrostis perennans</i> (Walt.) Tuckm.	Autumn Bentgrass	NP
<i>Alnus serrulata</i> (Ait.) Willd.	Hazel Alder	NP
<i>Ambrosia psilostachya</i> DC.	Western Ragweed	NP
<i>Amelanchier arborea</i> (Michx.) Fern.	Juneberry	NP
<i>Amorpha fruticosa</i> L.	False Indigo	NS
<i>Amorpha ouachitensis</i> Wilbur.	Ouachita Mt. Leadplant	NS
<i>Amphicarpa bracteata</i> L. Fern	Hog Peanut	NA
<i>Andropogon elliottii</i> Chapm.	Elliott's Bluestem	NP
<i>Andropogon gerardi</i> Vitman	Big Bluestem	NP
<i>Andropogon virginicus</i> L.	Broomsedge	NP
<i>Antennaria neglecta</i> Greene.	Field Pussytoes	NP
<i>Antennaria plantaginifolia</i> (L.) Richards	Plainleaf Pussytoes	NP
<i>Apios americana</i> Medic.	Ground Nuts	NP
<i>Arisaema dracontium</i> (L.) Schott.	Green Dragon	NP
<i>Aristida oligantha</i> Michx.	Three Awn	NA
<i>Aristida wrightii</i> Nash.	Three Awn	NP
<i>Aristolochia serpentaria</i> L.	Virginia Snakeroot	NP
<i>Arundinaria gigantea</i> (Walt.) Much.	Giant Cane	NP
<i>Asclepias quadrifolia</i> Jasq.	Four-leaved-a-node Milkweed	NP
<i>Asclepias tuberosa</i> L.	Butterfly Weed	NP
<i>Asclepias variegata</i> L.	White Milkweed	NP
<i>Asclepias verticillata</i> L.	Whorled Milkweed	NP
<i>Asimina triloba</i> (L.) Dunal	Pawpaw	NT
<i>Asplenium platyneuron</i> (L.) Oakes	Ebony Spleenwort	NP
<i>Asplenium trichomanes</i> L.	Maidenhair Spleenwort	NP
<i>Aster lateriflorus</i> (L.) Britt.	White Woodland Aster	NP

<i>Aster patens</i> Ait.	Skydrop Aster	NP
<i>Aster sagittatifolius</i> Wedemeyer	Arrow-leaf Aster	NP
<i>Astragalus distortus</i> T & G.	Bentpod Milkvetch	NP
<i>Astragalus racemosus</i> Pursh.	Loco Weed	NP
<i>Athyrium felix-femina</i> (L.) Roth	Lady Fern	NP
<i>Bacopa acuminata</i> (Walt.) Robinson	Water Hyssop	NP
<i>Baptisia leucophaea</i> Nutt.	Plains Wild Indigo	NP
<i>Baptisia nuttalliana</i> Small.	Small Indigo	NP
<i>Berchemia scandens</i> (Hill.) K. Koch.	Rattan Vine	NV
<i>Bidens polylepis</i> Blake	Tickseed	NA
<i>Boehmeria cylindrica</i> (L.) SW.	False Nettle	NP
<i>Botrychium virginianum</i> (L.) SW.	Virginiana Grape Fern	NP
<i>Brachyelytrum erectum</i> (Schreb.) Beauv.	Sharon's Straight Grass	NP
<i>Bromus pubescens</i> Muhl. ex Willd.	Canada Brome	NP
<i>Bumelia lanuginosa</i> (Michx.) Pers.	Chittamwood	NT
<i>Cacalia plantaginea</i> (Raf.) Shinnery	Indian Plantain	NP
<i>Callicarpa americana</i> L.	Beauty Bush	NS
<i>Callirhoe alcaeoides</i> Michx.	Plain's Poppy Mallow	NP
<i>Camassia scilloides</i> (Raf.) Cory.	Lavender Lilly	NP
<i>Campsis radicans</i> (L.) Seem.	Trumpet Vine	NV
<i>Cardamine parviflora</i> L.	Small Flower Bitter Cress	NA
<i>Carex festucacea</i> Willd.	Fescue Sedge	NP
<i>Carex frankii</i> Kunth.	Frank's Sedge	NP
<i>Carex intumescens</i> Rudge.	Bladder Sedge	NP
<i>Carex jorii</i> Bailey.	Bailey's Sedge	NP
<i>Carex latebracteata</i> Waterfall	Waterfall's Sedge	NP
<i>Carex lupulina</i> Willd.	Lupina Sedge	NP
<i>Carex meadii</i> Dewey	Mead's Sedge	NP
<i>Carex microrhyncha</i> Mack.	Little Snout Sedge	NP
<i>Carex muhlenbergii</i> Schkuhr. ex Willd.	Muhlenberg's Sedge	NP
<i>Carex oxylepis</i> Torr. and Hook.	Sharpscale Sedge	NP
<i>Carex squarrosa</i> L. Sedge.	Square Sedge	NP
<i>Carex tribuloides</i> Wahlenb.	Bristleback Sedge	NP
<i>Carpinus caroliniana</i> Walt.	American Hornbean	NT
<i>Carya texana</i> Buckl.	Black Hickory	NT
<i>Carya tomentosa</i> Poir.	Mockernut Hickory	NT
<i>Cassia marilandica</i> L.	Wild Senna	NA
<i>Cassia nictitans</i> L.	Sensitive Pea	NA
<i>Ceanothus herbaceus</i> Raf.	New Jersey Tea	NS
<i>Celtis laevigata</i> Willd.	Sugar Berry	NT
<i>Celtis occidentalis</i> Pursh. L.	Hackberry	NT
<i>Cephalanthus occidentalis</i> L.	Button Bush	NS
<i>Cercis canadensis</i> L.	Red Bud	NT
<i>Chasmanthium latifolium</i> (Michx.) Yates	Inland Seoats	NA
<i>Chasmanthium sessiliflorum</i> (Poir.) Yates	Spike Inland Seoats	NP

<i>Cheilanthes tomentosa</i> Link	Woolly Lipfern	NP
<i>Chenopodium ambrosioides</i> L.	Wormweed	IA
<i>Chionanthus virginicus</i> L.	Fringe Tree	NT
<i>Chrysopsis nervosa</i> (Willd.) Fern.	Golden Aster	NP
<i>Cirsium caroliniana</i> (Walt). Fern. & Schub.	Smallhead Thistle	NP
<i>Claytonia virginica</i> L.	Spring Beauty	NP
<i>Clitoria mariana</i> L.	Butterfly Pea	NP
<i>Conyza canadensis</i> (L.) Cronq.	Mare's Tail	NA
<i>Coreopsis grandiflora</i> Hogg. ex Sweet	Tickseed	NP
<i>Coreopsis tinctoria</i> Nutt.	Plain's Tickseed	NP
<i>Cornus florida</i> L.	Flowering Dogwood	NT
<i>Cornus obliqua</i> Raf.	Swamp Dogwood	NS
<i>Corydalis flavula</i> (Raf.) DC.	Yellow Harlequin	NA
<i>Crataegus crus-galli</i> L.	Cockspur Hawthorne	NS
<i>Crataegus marshalli</i> Egglest.	Parsley Hawthorne	NT
<i>Crataegus spathulata</i> Michx.	Little Hawthorne	NT
<i>Croton monanthogynus</i> Michx.	One-seeded Croton	NA
<i>Cunila organoides</i> (L.) Britt.	Stonemint	NP
<i>Cuscuta compacta</i> Juss. ex Choisy	Compact Dodder	NA
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda Grass	IP
<i>Cynoglossum amabile</i> Stapf. & Drummond	Hound's Tongue	NP
<i>Cynoglossum virginianum</i> L.	Hound's Tongue	NP
<i>Cyperus aristatus</i> Rottb.	Bearded Flatsedge	NA
<i>Cyperus globulosus</i> Aubl.	Flatsedge	NP
<i>Cyperus ovularis</i> (Michx.) Torr.	Flatsedge	NP
<i>Cyperus strigosus</i> L.	False Nutsedge	NP
<i>Danthonia spicata</i> (L.) Beauv. ex R. & S.	Poverty Grass	NP
<i>Daucus pusillus</i> Michx.	Southwestern Carrot	NA
<i>Delphinium virescens</i> Nutt.	Carolina Larkspur	NP
<i>Dentaria laciniata</i> Muhl.	Toothwort	NP
<i>Desmodium ciliare</i> (Muhl. ex Willd.) DC.	Beggar's Lice	NP
<i>Desmodium laevigatum</i> (Nutt.) DC.	Tick Trefoil	NP
<i>Desmodium marilandicum</i> (L.) DC.	Beggar's Lice	NP
<i>Desmodium nudiflorum</i> (L.) DC.	Tick Trefoil	NP
<i>Digitaria violascens</i> Link	Crabgrass	IA
<i>Diodia virginiana</i> L.	Virginia Buttonweed	NP
<i>Dioscorea quaternata</i> (Walt.) Gmel.	Wild Yam	NP
<i>Diospyros virginiana</i> L.	Persimmon	NT
<i>Dodecatheon meadia</i> L.	Shooting Star	NP
<i>Echinacea pallida</i> Nutt.	White Ray Coneflower	NP
<i>Echinochloa colonum</i> (L.) Link	Jungle Grass	IA
<i>Echinochloa crusgalli</i> (L.) Beauv.	Barnyard Grass	IV
<i>Eleocharis obtusa</i> (Willd.) Schultes	Blunt Spikerush	NA
<i>Elymus virginicus</i> L.	Virginia Wild Rye	NP
<i>Eragrostis hirsuta</i> (Michx.) Nees	Hairy Lovegrass	NP

<i>Eragrostis spectabilis</i> (Pursh) Steud.	Purple Lovegrass	NP
<i>Erectites hieracifolia</i> (L.) Raf. ex DC.	Fireweed	NA
<i>Erianthus alopecuroides</i> (L.) Ell.	Silver Plumegrass	NP
<i>Erigeron pulchellus</i> Michx.	Robbin's Plantain	NP
<i>Erigeron strigosus</i> Muhl.	Daisy Fleasbane	NP
<i>Eryngium prostratum</i> Nutt. ex DC.	Creeping Eryngo	NP
<i>Eryngium yuccifolium</i> Michx.	Snakeroot	NP
<i>Euonymus americanus</i> L.	Strawberry Bush	NS
<i>Eupatorium incarnatum</i> Walt.	Pink Boneset	NP
<i>Eupatorium serotinum</i> Michx.	Boneset	NP
<i>Euphorbia corollata</i> L.	Flowering Spurge	NP
<i>Euphorbia heterophylla</i> L.	Spurge	NA
<i>Euphorbia prostrata</i> Ait. Spurge	Flatspurge	NA
<i>Euphorbia tetraspora</i> Engelm.	Weak Spurge	NA
<i>Festuca obtusa</i> Biehler	Fescue	NP
<i>Festuca octoflora</i> Walt.	Six Week Fescue	NA
<i>Festuca paradoxa</i> Deav.	Cluster Fescue	NP
<i>Fraxinus americana</i> L.	White Ash	NT
<i>Galactia volubilis</i> (L.) Britt.	Downey Milkpea	NP
<i>Galium asparine</i> L.	Catchweed Bedstraw	NA
<i>Galium circaezans</i> L.	Weed Bedstraw	NP
<i>Gerardia grandiflora</i> Benth.	Big-flower Gerardia	NA
<i>Geranium carolinianum</i> L.	Carolina Cranbill	NA
<i>Gratiola brevifolia</i> Raf.	Stick Hedehyssop	NP
<i>Geum canadense</i> Jasq.	Red Root	NP
<i>Glyceria striata</i> (Lam.) Hitchx.	Fowl Mannagrass	NP
<i>Gnaphalium obtusifolium</i> L.	Fragrant Cudweed	NA
<i>Gymnopogon ambiguus</i> (Michx.) BSP.	Bearded Skeleton Grass	NP
<i>Hamamelis virginiana</i> L.	Common Witchhazel	NS
<i>Hedeoma hispidum</i> Pursh.	Rough Penneyroyal	NA
<i>Hedyotis crassifolia</i> Raf.	Tiny Bluet	NA
<i>Helenium amarum</i> (Raf.) H. Rock	Bitter Sneezeweed	NA
<i>Helianthus hirsutus</i> Raf.	Hairy Sunflower	NP
<i>Heliotropium indicum</i> L.	India Heliotrope	IA
<i>Hemicarpha micrantha</i> (Vah.) Pax.	Common Hemicarpha	NA
<i>Hibiscus lasiocarpus</i> Cav.	Woolly Rose Mallow	NP
<i>Hieracium gronovii</i> L.	Hawkweed	NP
<i>Hymenopappus scabiosaeus</i> L'Her.	Old Plainman	NP
<i>Hypericum densiflorum</i> Pursh.	St. John's Wort	NS
<i>Hypericum drummondii</i> (Grv. & H.) T. & G.	Nits-&-lice	NA
<i>Hypericum hypericoides</i> (L.) Grantz.	St. John's Wort	NP
<i>Hypericum mutilum</i> L.	Dwarf St. John's Wort	NP
<i>Hypericum punctatum</i> Lam.	Spotted St. John's Wort	NP
<i>Hypericum tubulosum</i> Walter.	Marsh St. John's Wort	NP
<i>Hypoxis hirsuta</i> (L.) Coville	Yellow Stargrass	NP

<i>Ilex decidua</i> Walt.	Deciduous Holly	NS
<i>Ilex opaca</i> Soland. Ait.	American Holly	NT
<i>Ilex vomitoria</i> Soland. in Ait.	Yaupon Holly	NS
<i>Iris cristata</i> Ait.	Wild Iris	NP
<i>Juncus coriaceous</i> Mackenzie	Leathery Rush	NP
<i>Juncus effusus</i> L. Bog Rush.	Rush	NP
<i>Juncus tenuis</i> Willd.	Slender Rush	NP
<i>Juniperus virginiana</i> L.	Red Cedar	NT
<i>Justicia americana</i> (L.) Vahl.	Water Willow	NP
<i>Jussiaea peploides</i> (HBK.) Raven	Water Primrose	NP
<i>Krigia occidentalis</i> Nutt.	Western Dwarf Dandelion	NA
<i>Lactuca canadensis</i> L.	Wild Lettuce	NA
<i>Lathyrus venosus</i> Muhl.	Bushy Vetch	NA
<i>Leersia oryzoides</i> (L.) SW.	Wild Rice	NP
<i>Lepidium virginicum</i> L.	Peppergrass	NA
<i>Lespedeza cuneata</i> (Dum-Cours.) G. Don	Sericea Lespedeza	IP
<i>Lespedeza hirta</i> (L.) Hornem.	Hairy Lespedeza	NP
<i>Lespedeza procumbens</i> Michx.	Trailing Lespedeza	NP
<i>Lespedeza repens</i> (L.) Bart.	Creeping Lespedeza	NP
<i>Lespedeza virginica</i> (L.) Britt.	Slender Lespedeza	NP
<i>Liatris squarrosa</i> (L.) Michx.	Blazing Star	NP
<i>Liquidambar styraciflua</i> L.	Sweetgum	NT
<i>Linum striatum</i> Walt.	Rigid Flax	NA
<i>Lobelia cardinalis</i> L.	Cardinal Flower	NP
<i>Lobelia spicata</i> Lam.	Palespike Lobelia	NP
<i>Lolium multiflorum</i> Lam.	Perennial Rye Grass	IP
<i>Lolium perenne</i> L.	Rye Grass	IP
<i>Lonicera sempervirens</i> L.	Coral Honeysuckle	NV
<i>Lotus americanus</i> (Nutt.) Bisch.	Deervetch	NA
<i>Luzula bulbosa</i> (Wood) Rydb.	Bulb Woodrush	NA
<i>Luzula echinata</i> (Small) F. J. Herm.	Bulb Woodrush	NA
<i>Lyonia liquistriana</i> (L.) DC.	Male Blueberry	NS
<i>Matelea decipiens</i> (Alex) Woodson	Climbing Milkvine	NV
<i>Melica mutica</i> Walt.	Two Flowered Melica	NP
<i>Mitchella repens</i> L.	Partridge Berry	NP
<i>Mollugo verticillata</i> L.	Carpet Weed	IA
<i>Monarda fistulosa</i> L.	Wild Bergamot	NP
<i>Monarda virgata</i> Raf.	Red Spotted Beebalm	NP
<i>Morus rubra</i> L.	Red Mulberry	NT
<i>Myosotis macrosperma</i> Engelm.	Spring Forget-me-not	NA
<i>Muhlenbergia sobolifera</i> (Muhl) Trin.	Rocky Muhly	NP
<i>Nothoscordum bivalve</i> (L.) Britt.	Crow Poison	NP
<i>Nyssa sylvatica</i> Marsh.	Black Gum	NT
<i>Osmunda cinnamomea</i> L.	Cinnamon Fern	NP
<i>Osmunda regalis</i> L.	Royal Fern	NP

<i>Ostrya virginiana</i> (Mill.) K. Koch.	Eastern Hop Hornbeam	NT
<i>Oxalis corniculata</i> L.	Yellow Wood Sorrel	NP
<i>Oxalis dillenii</i> Jasq.	Yellow Sorrel	NP
<i>Oxalis violacea</i> L.	Violet Wood Sorrel	NP
<i>Panicum agrostoides</i> Spreng.	Red Top Panicum	NA
<i>Panicum anceps</i> Michx.	Beaked Panicum	NP
<i>Panicum boscii</i> Poir.	Bosc Panicum	NP
<i>Panicum brachyanthum</i> Steud.	Pimple Panicum	NP
<i>Panicum capillare</i> L.	Witchgrass	NA
<i>Panicum dichotomum</i> L.	Forked Panicum	NA
<i>Panicum linearifolium</i> Scribn.	Slim Leaf Panicum	NA
<i>Panicum microcarpon</i> Muhl.	Forked Panicum	NA
<i>Panicum oligoanthes</i> Schult.	Small Panic Grass	NP
<i>Panicum polysanthes</i> Schult.	Philadelphia Witchgrass	NA
<i>Panicum praecocius</i> Hitchc. and Chase	Chase Woolly Panicum	NP
<i>Panicum revenelii</i> Scribn.	Panic Grass	NP
<i>Panicum scoparium</i> Lam.	Velvet Panic Grass	NP
<i>Panicum sphaerocarpon</i> Ell.	Leafy Panicum	NP
<i>Panicum villosissimum</i> Nash	Woolly Panicum	NP
<i>Parthenocissus quinquefolia</i> (L.) Planch.	Virginia Creeper	NV
<i>Paspalum dilatatum</i> Poir.	Dallis Grass	IP
<i>Paspalum floridanum</i> Michx.	Dallis Grass	NP
<i>Paspalum setaceum</i> Michx.	Thin Paspalum	NP
<i>Passiflora incarnata</i> May	May Pop Passion Flower	NP
<i>Passiflora lutea</i> L.	Passion Flower	NP
<i>Penstemon arkansanus</i> Pennell	Arkansas Beardtongue	NP
<i>Perilla frutescens</i> (L.) Britt.	Common Perilla	IA
<i>Phacelia hirsuta</i> Nutt.	Hairy Blue Curly	NA
<i>Phaseolus polystachios</i> L.	Thicket Bean	NP
<i>Phlox pilosa</i> L.	Prairie Phlox	NP
<i>Phryma leptostachya</i> L.	Lopseed	NP
<i>Physalis cordata</i> Miller	Ground Cherry	NA
<i>Physalis pubescens</i> L.	Ground Cherry	NA
<i>Physalis viscosa</i> L.	Field Ground Cherry	NP
<i>Phytolacca americana</i> L.	Pokeweed	NP
<i>Pinus echinata</i> Mill.	Shortleaf Pine	NT
<i>Plantago lanceolata</i> L.	Buckhorn Plantain	IP
<i>Platanus occidentalis</i> L.	Sycamore	NT
<i>Pleopeltis polypodioides</i> (L.) Walt.	Polypod Fern	NP
<i>Pluchea camphorata</i> (L.) DC.	Camphorweed	NP
<i>Poa annua</i> L.	Bluegrass	IA
<i>Podophyllum peltatum</i> L.	Mayapple	NP
<i>Polygala verticillata</i> L.	Whorled Milkwort	NA
<i>Polygonatum canaliculatum</i> (Muhl.) Prsh.	Soloman's Seal	NP
<i>Polygonum hydropiperoides</i> Michx.	Wild Water Pepper	NP

<i>Polygonum persicaria</i> L.	Smartweed	NA
<i>Polygonum punctatum</i> Ell.	Spotted Smartweed	NA
<i>Polystichum acrostichoides</i> (Michx.) Scht.	Christmas Fern	NP
<i>Populus deltoides</i> Marsh.	Cottonwood	NT
<i>Potamogeton pulcher</i> Tuckerm.	Spotted Pondweed	NP
<i>Potentilla simplex</i> Michx.	Old Field Cinquefoil	NP
<i>Prunella vulgaris</i> L.	Heal-All	NP
<i>Prunus munsoniana</i> Wight & Hedrick	Wildgoose Plum	NT
<i>Ptelea trifoliata</i> L.	Hop Tree	NT
<i>Pteridium aquilinum</i> (L.) Kuhn	Bracken Fern	NP
<i>Pyrrhopappus carolinianum</i> (Walt.) DC.	False Dandelion	NA
<i>Pyrrhopappus scaposus</i> DC.	False Dandelion	NP
<i>Quercus alba</i> L.	White Oak	NT
<i>Quercus falcata</i> Michx.	Southern Red Oak	NT
<i>Quercus marilandica</i> Muench.	Black Jack Oak	NT
<i>Quercus muehlenbergii</i> Engelm.	Chinquipin Oak	NT
<i>Quercus nigra</i> L.	Water Oak	NT
<i>Quercus rubra</i> L.	Red Oak	NT
<i>Quercus stellata</i> Wang.	Post Oak	NT
<i>Ranunculus fascicularis</i> Muhl.	Tufted Buttercup	NP
<i>Rhus aromatica</i> Ait.	Lemon Sumac	NS
<i>Rhus copallina</i> L.	Winged Sumac	NS
<i>Rhynchosia latifolia</i> Nutt. ex T.&G.	Broadleaf Snoutbean	NP
<i>Ribes curvatum</i> Small	Granite Gooseberry	NS
<i>Robinia pseudoacacia</i> L.	Black Locust	NT
<i>Rosa</i> sp. L.	Wild Rose	NS
<i>Rubus trivialis</i> Michx.	Blackberry	NV
<i>Rudbeckia grandiflora</i> (Sweet) DC.	Mexican Hat	NP
<i>Rudbeckia hirta</i> L.	Brown Eyed Susan	NP
<i>Ruellia humilis</i> Nutt.	Low Ruellia	NP
<i>Rumex crispus</i> L.	Curly Dock	IP
<i>Sabatia angularis</i> (L.) Pursh.	Squarestem Rose	NA
<i>Salix caroliniana</i> Michx.	Carolina Willow	NT
<i>Salvia azurea</i> Lam.	Blue Sage	NP
<i>Salvia lyrata</i> L.	Lyre Leaf Sage	NP
<i>Sambucus canadensis</i> L.	Elderberry	NS
<i>Sanguinaria canadensis</i> L.	Bloodroot	NP
<i>Sanicula canadensis</i> L.	Canada Snakeroot	NP
<i>Sassafras albidum</i> (Nutt.) Nees	Sassafras	NS
<i>Schizachyrium scoparium</i> (Michx.) Nash	Little Bluestem	NP
<i>Scleria ciliata</i> Michx.	Fringed Nutrush	NP
<i>Scleria oligantha</i> Michx.	Littlehead Nutrush	NP
<i>Scutellaria ovata</i> Hill.	Eggleaf Skullcap	NP
<i>Scutellaria parvula</i> Michx.	Small Skullcap	NP
<i>Senecio obovatus</i> Muhl. ex Willd.	Squaweed	NP

<i>Setaria geniculata</i> (Lam.)	Knotweed	NP
<i>Silene stellata</i> (L.) Ait.	Starry Campion	NP
<i>Silene virginica</i> L.	Fire Pink	NP
<i>Sisyrinchium angustifolium</i> Miller	Blue-eyed grass	NP
<i>Smilax bona-nox</i> L.	Greenbriar	NP
<i>Solanum carolinense</i> L.	Horse Nettle	NP
<i>Solidago hispida</i> Muhl. ex Willd.	Hispid Goldenrod	NP
<i>Solidago nemoralis</i> Ait.	Old Field Goldenrod	NP
<i>Solidago odora</i> Ait.	Sweet Goldenrod	NP
<i>Solidago speciosa</i> Nutt.	Prairie Goldenrod	NP
<i>Solidago ulmifolia</i> Muhl. ex Willd.	Elmleaf Goldenrod	NP
<i>Sorghastrum nutans</i> (L.) Nash	Indian Grass	NP
<i>Specularia biflora</i> (R. & P.) Fisch. & Mey.	Venus Looking Glass	NA
<i>Sphenopholis obtusata</i> (Michx.) Scribn.	Prairie Wedgescale	NP
<i>Spiranthes gracilis</i> (Bigel.) Beck.	Spiralled Spiranthes	NP
<i>Stellaria media</i> (L.) Cyr.	Common Chickweed	IA
<i>Stipa avenacea</i> L.	Porcupine Grass	NP
<i>Streptanthus squamiformis</i> Goodman	Jewellweed	NA
<i>Strophostyles leiosperma</i> (T.&G.) Piper.	Wild Bean	NP
<i>Strophostyles umbellata</i> (Muhl.) Britt.	Wild Bean	NP
<i>Stylosanthes biflora</i> L. B.S.P.	Pencil Flower	NP
<i>Symphoricarpos orbiculatus</i> Moench.	Coralberry	NS
<i>Taenidia integerrima</i> (L.) Drude	Yellow Pimpernel	NP
<i>Tephrosia virginiana</i> (L.) Pers.	Goat's Rue	NP
<i>Teucrium canadense</i> L.	American Germander	NP
<i>Tilia neglecta</i> Spach.	American Basswood	NT
<i>Toxicodendron radicans</i> (L.) O. Ktze.	Poison Ivy/Oak	NV
<i>Tradescantia hirsuticaulis</i> Bush.	Spiderwort	NP
<i>Tradescantia ohiensis</i> Raf.	Ohio Spiderwort	NP
<i>Trepocarpus aethusae</i> Nutt.	Knotty Hedge Parsley	NA
<i>Trichostema dichotomum</i> L.	Forked Bluecurls	NA
<i>Tridens flavus</i> (L.) Michx.	Purple Top	NP
<i>Trifolium dubium</i> Sibth.	Small Hop Clover	IP
<i>Trifolium repens</i> L.	White Clover	IP
<i>Ulmus alata</i> Michx.	Winged Elm	NT
<i>Ulmus americana</i> L.	American Elm	NT
<i>Ulmus serotina</i> Sarg.	September Elm	NT
<i>Vaccinium arboreum</i> Marsh.	Farkleberry	NT
<i>Vaccinium vacillans</i> Torr.	Lowbush Blueberry	NS
<i>Valerinella radiata</i> L. Dufr.	Beaked Corn Salad	NA
<i>Verbascum blattaria</i> L.	Moth Mullein	IB
<i>Verbascum thapsus</i> L.	Common Mullein	IB
<i>Verbena canadensis</i> (L.) Britt.	Rose Vervain	NP
<i>Verbena urticifolia</i> L.	White Vervain	NA

<i>Verbescina helianthoides</i> Michx.	Yellow Crownbeard	NP
<i>Veronica perigrina</i> L.	Purslane Speedwell	NA
<i>Viburnum rufidulum</i> Raf.	Rusty Blackhaw	NS
<i>Vicia dasycarpa</i> Roth.	Hairy Vetch	IA
<i>Vicia minutiflora</i> Dietri.	Small Flowered Vetch	NA
<i>Viola pedata</i> L.	Bird's Foot Violet	NA
<i>Viola pubescens</i> Ait.	Yellow Violet	NP
<i>Viola rafinesquii</i> Greene	Field Pansy	NA
<i>Viola sagittata</i> Ait.	Arrow-leaved Violet	NP
<i>Vitis palmata</i> Vahl.	Missouri Grape	NV
<i>Vitis rotundiflora</i> Michx.	Muscadine Grape	NV
<i>Woodwardia areolata</i> (L.) Moore	Chain Fern	NP
<i>Woodsia obtusa</i> Spreng. Torr.	Wood Fern	NP
<i>Yucca glauca</i> Nutt.	Bear Grass	NP

The checklist is far from complete. The search for new plants in the Wilderness must continue. It is my hope that the list will continue to grow.

APPENDIX B
A LIST OF DIVISIONS, FAMILIES, GENERA, AND SPECIES OF TAXA
COMPRISING THE MCWA. IN ADDITION THE GENERAL HABITAT
AND THE AUTHORS COLLECTION NUMBERS

Relative abundance for species of the McCurtain County Wilderness Area. Density refers to density of colonies rather than individual stems. The abundance scale is modified from Palmer (1995).

Density	Description
Abundant	Dominant or codominant in one or more common habitats.
Frequent	Easily seen or found in one or more common habitats but not dominant in any common habitat.
Occasional	Widely scattered but not difficult to find.
Infrequent	Difficult to find with few individuals but found in several locations.
Rare	Very difficult to find and limited to one or very few locations or uncommon habitats.

Polypodiophyta

Aspleniaceae
Spleenwort family

Asplenium platyneuron (L.) Oakes. Ebony Spleenwort. Hardwood-pine, hardwood, pine, and pine-hardwood forest; frequent. 1832, 1839, 2179, 2250, 2369, 2380, 2408, 2599, 2621, 2719, 2726, 2760, 3384.

Asplenium trichomanes L. Maidenhair Spleenwort. Drain on a north facing slope; plants imbedded in the rock underneath a canopy of a dense to low-medium pine-hardwood forest; infrequent. 2587-2589, 3307, 3311.

Blechnaceae
Chain Fern family

Woodwardia areolata (L.) Moore. Chain Fern. Shaded marshy area near Hee Creek; underneath a hardwood-pine forest; rare. 2887, 2888, 2892-2894, 3205, 3235.

Dennstaedtiaceae
Bracken Fern Family

Pteridium aquilinum (L.) Kuhn. Bracken Fern. Hardwood-pine, hardwood,

pine-hardwood (high, medium, or low density), and pine forest; in addition roadside disturbed areas; frequent. 1824, 1875, 2164, 2165, 2166, 2720, 2769, 2868, 3202, 3385

Dryopteridaceae
Wood Fern family

Athyrium felix-femina (L.) Roth. Lady Fern. Roadside disturbance underneath a canopy of hardwood-pine forest and marshy area near Hee Creek; infrequent. 2433-2436, 2601, 2889, 2891, 2897, 2905, 3203.

Polystichum acrostichoides (Michx.) Schott. Christmas Fern. Hardwood-pine, pine hardwood, and hardwood forest, also found in low-woods forest along North Linson Creek. The ferns are common in holes formed from large fallen pine trees); frequent (it is by far the most abundant fern in the 5 compartments surveyed); 1848, 1850, 1893, 1900, 1913, 2250, 2380, 2461, 2463, 2469, 2490, 2491, 2708, 2709, 3309.

Woodsia obtusa Spreng Torr. Wood Fern. Pine-hardwood, pine, hardwood-pine, hardwood forest, and roadside disturbed areas; occasional. 2180, 2362, 2589, 2727, 2728, 2766.

Ophioglossaceae
Adders Tongue Family

Botrychium virginianum (L.) SW. Virginia Grape Fern. Low-woods hardwood forest along North Linson Creek; infrequent. 2636.

Osmundaceae
Royal Fern Family

Osmunda cinnamomea L. Cinnamon Fern. Marshy area along Hee Creek under the canopy of a hardwood-pine forest (cinnamon ferns and the chain fern formed large populations in this compartment 5 area, it was the only place in which they were seen during the study); rare. 2890, 2895, 3256.

Osmunda regalis L. Royal Fern. Seep area along the margin of Hee Creek; rare. 3199.

Polypodiaceae
Polypod Family

Pleopeltis polypodioides (L.) Watt. Polypod Fern. Found on mossy rocks and trees in hardwood-pine, hardwood, and pine-hardwood (low to high density) forest;

occasional. 1914, 2590, 2828, 3390.

Pteridaceae
Maidenhair Fern Family

Cheilanthes tomentosa Link Woolly Lipfern. Imbedded in shale rock in pine-hardwood (low to high density) and hard-wood forest; infrequent. 2473, 2591.

Coniferophyta

Cupressaceae
Cypress Family

Juniperus virginiana L. Red Cedar. Floodplain along North Linson Creek; infrequent. 3022, 3032, 3037.

Pinaceae
Pine Family

Pinus echinata Mill. Shortleaf Pine. Half way up the MCWA wilderness trail in a hardwood-pine forest; abundant. 1932, 3153, 3285, 3329, 3362, 3391.

Magnoliophyta: Magnoliopsida

Acanthaceae
Acanthus Family

Justicia americana (L.) Vahl. Water Willow. Mud flat area along the Mountain Fork River; infrequent. 3351, 3353.

Ruellia humilis Nutt. Low Ruellia. Pine-hardwood forest (low to high density); infrequent. 2404, 2405.

Aceraceae
Maple Family

Acer rubrum L. Red Maple. Low-woods forest along North Linson Creek; occasional. 2832, 3025, 3026, 3028, 3177.

Acer saccharum Marsh. Sugar Maple. Low-woods forest along North Linson Creek and rocky floodplain along Panther Creek; frequent. 2994, 2995, 3079, 3183, 3245.

Aizoaceae
Carpetweed Family

Mollugo verticillata L. Carpetweed. Roadside disturbed area near a hardwood-pine forest; occasional. 1943.

Anacardiaceae
Cashew Family

Rhus aromatica Ait. Lemon Sumac. Half way up the MCWA hiking trail in a hardwood-pine forest; infrequent. 3115, 3287.

Rhus copallina L. Winged Sumac. Overlooking a rocky steep hillside, the area locally known as the "view", it was also collected on a hardwood-pine ridgetop; rare. 3215, 3243, 3381.

Toxicodendron radicans (L.) O. Ktze. Poison Ivy/ Oak. Roadside areas with disturbance in both hardwood and pine-hardwood forest (low to high density) and rocky area along a branch of Panther Creek growing as a understory tree; occasional. 2593, 3333.

Annonaceae
Custard Apple Family

Asimina triloba (L.) Dunal. Pawpaw. Creek bottom on a branch of Panther Creek; infrequent. 3303.

Apiaceae
Carrot Family

Daucus pusillus Michx. Southwestern Carrot. Area of disturbance along the roadside (across the road from the caretaker's house) and weedy bank overlooking the boatlanding area on the east side of the Mountain Fork River; infrequent. 2430-2432.

Eryngium prostratum Nutt. ex DC. Creeping Eryngo. Mudflat on the east side of the Mountain Fork River, below a hardwood-pine forest; occasional. 1904.

Eryngium yuccifolium Michx. Button Snakeroot. Creek bottom; in a pine-hardwood forest; infrequent. 1873.

Sanicula canadensis L. Canada Snakeroot. Hardwood and pine-hardwood forest; occasional. 1887, 2371, 2372.

Taenidia integerrima (L.) Drude. Yellow Pimpernel. Low-woods along North Linson Creek; infrequent. 2269, 2637.

Trepocarpus aethusae Nutt. Knotty Hedge Parsley. Weedy area along the upper bank of the Mountain Fork River below a hardwood-pine forest; infrequent. 2419-2422.

Aristolochiaceae

Aristolochia serpentaria L. Virginia Snakeroot. Moist soils along North Linson Creek; infrequent. 3011.

Asclepiadaceae Milkweed Family

Asclepias quadrifolia Jasq. Four-leaved-a-node Milkweed. Low to medium pine-hardwood hardwood forest; occasional. 2242, 2611.

Asclepias tuberosa L. Butterfly Milkweed. Roadside area near public trail; infrequent. 3213, 3231.

Asclepias variegata L. White Milkweed. Pine-hardwood forest and along roadside; infrequent. 1877, 3386, 3387.

Asclepias verticillata L. Whorled Milkweed. Pine-hardwood (low to high density), hardwood, and hardwood-pine forest; also collected in a low-woods forest along North Linson Creek; occasional. 2384, 2393, 2394, 2777, 2784.

Matelea decipens (Alex.) Woodson. Climbing Milkvine. Public trail area on a Creek bottom along a branch of Panther Creek; infrequent. 3278.

Aquifoliaceae Holly Family

Ilex decidua Walt. Deciduous Holly. Low-woods forest along North Linson Creek; infrequent. 3036, 3042, 3046, 3048, 3074.

Ilex opaca Soland. Ait. American Holly. Ridgetop along roadside and in hardwood-pine forest; occasional. 2991, 3083, 3296.

Ilex vomitoria Soland. in Ait. Yaupon Holly. Collected by Dr. Ron Masters.

Asteraceae Sunflower Family

Ambrosia psilostachya DC. Western Ragweed. Roadside disturbed area adjacent to a pine-hardwood forest; occasional. 2495, 2865, 3321.

Antennaria neglecta Greene. Field Pussytoes. Pine-hardwood forest; occasional. 2241.

Antennaria plantaginifolia (L.) Richards. Plainleaf Pussy-toes. Hardwood-pine, hardwood, and pine-hardwood forest; frequent 2067, 2096, 2097, 2098, 2099, 2298, 2554.

Aster lateriflorus (L.) Britt. White Woodland Aster. Disturbance area near the assistant biologist cabin within a hardwood-pine and hardwood forest; occasional. 2061, 2071.

Aster patens Ait. Skydrop Aster. Roadside disturbed area in low to medium density pine-hardwood forest; occasional. 2444.

Aster sagittatifolius Wedemeyer. Arrow leaf Aster. Low-woods forest along North Linson Creek; occasional. 2402.

Bidens polylepis Blake. Weedy area on west side of the Mountain Fork River near the boat landing area; infrequent. 3315.

Cacalia plantaginea (Raf.) Shinnery. Collected on the creek bottom of a branch of Panther Creek; infrequent. 3229.

Chrysopsis nervosa (Willd.) Fern. Golden Aster. Roadside disturbed areas, low to medium density pine-hardwood forest and open woodpecker colony sites with large shortleaf pines for nesting; infrequent. 2445, 2475, 2810, 2867.

Cirsium caroliniana (Walt.) Fern. & Schub. Smallhead Thistle. Weedy area in a hardwood-pine forest; infrequent. 2410, 3227, 3393.

Conyza canadensis (L.) Cronq. Mare's Tail. Roadside disturbed area adjacent to a pine and pine-hardwood forest and a low to medium density pine-hardwood forest; occasional. 2516, 2864.

Coreopsis grandiflora Hogg ex Sweet. Tickseed. Roadside disturbance and low-woods forest along North Linson Creek and in a pine-hardwood forest; occasional. 2369, 2378, 2390, 2391, 2392, 2712, 2790, 3213.

Coreopsis tinctoria Nutt. Plains Coreopsis. Roadside disturbance area adjacent to a hardwood-pine forest; occasional. 2475.

Echinacea pallida Nutt. White Ray Coneflower. Roadside disturbance area along a gravel road near public hiking trail; infrequent. 3230.

Erechtites hieracifolia (L.) Raf. ex DC. Fireweed. Open area where fire has

definitely occurred; the plants are common near fallen trees; occasional. 2902, 2858, 2859, 2860.

Erigeron pulchellus Michx. Robbin's plantain. Low-woods forest along North Linson Creek; infrequent. 2628, 2629.

Erigeron strigosus Muhl. ex Willd. Daisy Fleabane. Roadside disturbance area, pine and pine-hardwood forest; frequent. 1923, 2077, 2078, 2181-2183, 2288, 2289, 2294, 2355, 2704, 3382.

Eupatorium incarnatum Walt. Pink Eupatorium. Weedy slope overlooking the Mountain Fork River.; occasional. 3322.

Eupatorium serotinum Michx. Late Boneset. Roadside disturbance area underneath a hardwood-pine and hardwood forest; infrequent. 2078.

Gnaphalium obtusifolium L. Fragrant Cudweed. Hardwood-pine, pine-hardwood and hardwood forest; occasional. 2066, 2497, 2498.

Helenium amarum (Raf.) H. Rock Bitter Sneezeweed. Roadside disturbance along side a hardwood-pine, hardwood, and low to medium hardwood-pine forest; frequent. 1922, 2074, 2586, 2856, 2857, 2739, 2515, 2368, 2345.

Helianthus hirsutus Raf. Hairy Sunflower. Area of disturbance in a pine-hardwood, hardwood-pine forest, and low-woods forest along North Linson Creek in a hardwood forest; occasional. 1867, 2334, 2783.

Hieracium gronovii L. Longbeard Hawkweed. Hardwood-pine, hardwood, and pine-hardwood forest; occasional. 1818, 2763, 3302.

Hymenopappus scabiosaesus L'Her. Old Plainsman. Disturbance area near North Linson Creek; infrequent. 3110, 3111, 3113.

Krigia occidentalis Nutt. Western Dwarf Dandelion. Roadside disturbed area adjacent to a pine-hardwood forest; infrequent. 2253.

Lactuca canadensis L. Wild Lettuce. Roadside disturbance area near MCWA public hiking trail; infrequent. 3289, 3300.

Liatris squarrosa (L.) Michx. Gayfeather. Hardwood-pine, pine-hardwood, and hardwood forest; frequent. 1827, 1861, 1876, 1912, 1927, 2751, 2869, 2907.

Pluchea camphorata (L.) DC. Camphorweed. Weedy area on the bank of the Mountain Fork River beneath a hardwood-pine forest and a low to medium density pine-hardwood forest; infrequent. 1903, 2862, 2872.

Pyrrhopappus carolinianum (Walt.) DC. False Dandelion. Weedy upper bank overlooking the Mountain Fork River, beneath a hardwood-pine forest; occasional. 2517, 2518.

Pyrrhopappus scaposus DC. False Dandelion. Low-woods forest along North Linson Creek, ridgetop in a pine-hardwood, and low-medium density pine-hardwood forest; frequent. 2254-2256, 2635.

Rudbeckia grandiflora (Sweet) DC. Sampling collection; occasional. 2520.

Rudbeckia hirta L. Blackeyed Susan. Roadside disturbed areas and pine-hardwood, and pine forest; frequent. 1816, 1834, 2299, 2332, 2334, 2717, 2732, 2299.

Senecio obovatus Muhl. ex Willd. Squaweed. Low-woods hard-wood forest along North Linson Creek and a hardwood-pine and hardwood forest; infrequent. 2122, 2124, 2126, 2214, 2215, 2249, 2529, 2533, 2535, 2631.

Solidago hispida Muhl. ex Willd. Hispid Goldenrod. Roadside disturbed sites alongside hardwood and hardwood-pine forest; infrequent. 2073.

Solidago nemoralis Ait. Old Field Goldenrod. Roadside disturbed area alongside a hardwood forest; infrequent. 2236, 2450, 2451.

Solidago odora Ait. Sweet Goldenrod. Moist sandy soils near creek; infrequent. 3342, 3371.

Solidago speciosa Nutt. Prairie Goldenrod. South facing hillside; infrequent. 1834.

Solidago ulmifolia Muhl. ex Willd. Elmleaf Goldenrod. Low-woods forest along North Linson Creek and hardwood-pine and pine-hardwood forest; occasional. 1858, 1885, 2833, 2873, 2874.

Verbescina helianthoides Michx. Yellow Crownbeard. Disturbance area along the roadside; infrequent. 3319.

Berberidaceae
Barberry Family

Podophyllum peltatum L. Mayapple. Low-woods along North Linson Creek underneath the canopy of a hardwood forest; frequent. 2645.

Betulaceae
Birch Family

Alnus serrulata (Ait.) Willd. Hazel Alder. Margin of North Linson Creek; infrequent. 2850, 3156, 3157, 3349.

Carpinus caroliniana Walt. American Hornbeam. Pine-hardwood forest and a low-woods forest along North Linson Creek; occasional. 1847, 3004, 3095, 3187.

Ostrya virginiana (Mill.) K. Koch. Eastern Hop Hornbeam. Floodplain along North Linson Creek; infrequent. 3016-3018.

Bignoniaceae
Bignonia Family

Campsis radicans (L.) Seem. Trumpet Creeper. Dry rocky creek bottom of Panther Creek; infrequent. 3302.

Boraginaceae
Borage Family

Cynoglossum amabile Stapf. & Drummond. Houndstongue. Roadside disturbed areas where trees had fallen and pine-hardwood and pine forest; frequent. 2304-2306, 2723.

Cynoglossum virginianum L. Blue Houndstongue. Low to medium density pine-hardwood forest and low-woods along North Linson Creek; occasional. 2161-2163, 2632.

Heliotropium indicum L. India Heliotrope. Weedy bank along the road and near the boat landing area on the west side of the Mountain Fork River; frequent. 1892, 2472.

Myosotis macrosperma Engelm. Spring Forget-me-not. Pine-hardwood, hardwood, and hardwood-pine forest; occasional. 2257-2259, 2663.

Brassicaceae
Mustard Family

Cardamine parviflora L. Smallflower Bitter Cress. Assistant biologist's cabin area and inside a hardwood and hardwood-pine forest; occasional. 2121, 2141, 2577.

Dentaria laciniata Muhl. Toothwort. Low-woods forest along North Linson Creek and drain sites inside hardwood and hardwood-pine forest; occasional. 2068, 2140, 2537.

Lepidium virginicum L. Virginia Peppergrass. Hardwood-pine and hardwood forest, and roadside disturbance areas; infrequent. 2387.

Streptanthus squamiformis Goodman. Jewellweed. Pine-hardwood, hardwood, hardwood-pine forest and low-medium density pine-hardwood forest; also collected in low-woods forest along North Linson Creek; occasional. 2228-2230, 2360, 2750, 2772, 3250.

Caesalpinaceae
Cassia Family

Cassia marilandica L. Wild Senna. Weedy area below the assistant biologist's cabin; rare. 2437, 3358.

Cassia nictitans L. Sensitive Pea. Weedy area in an open region of a pine-hardwood forest; occasional. 2487.

Cercis canadensis L. Red Bud. Low woods forest along North Linson Creek; occasional. 3001, 3002, 3159, 3160.

Campanulaceae
Bell Flower Family

Specularia biflora (R. & P.) Fisch. & Mey. Venus Looking-glass. Pine-hardwood (low, medium, and high density), hardwood-pine, and hardwood forest; infrequent. 2236, 2366, 2390, 2771.

Caprifoliaceae
Honeysuckle Family

Lonicera sempervirens L. Coral Honeysuckle. Care-takers garden; the vines have also been seen on east side of the mountain Fork River within the compartments by Ron Masters; rare. 3221.

Sambucus canadensis L. Elderberry. Mixed forest overlooking the Mountain Fork River; rare. 3179, 3180.

Symphoricarpos orbiculatus Moench. Coralberry. Understory shrub in a low woods forest along North Linson Creek; abundant. 2960, 2996, 2997, 3038.

Viburnum rufidulum Raf. Rusty Blackhaw. Low-woods forest along North Linson Creek; frequent. 3122, 3123.

Caryophyllaceae
Pink Family

Silene stellata (L.) Ait. Starry Champion. Low-woods forest along North Linson Creek and a upland hardwood-pine forest; occasional. 2395-2397, 2778.

Silene virginica L. Fire Pink. Low-woods forest along North Linson Creek and pine forest; occasional. 2190-2192, 2617, 2624-2626.

Stellaria media (L.) Cyr. Common Chickweed. Disturbance area near the assistant biologist's cabin and in a hardwood-pine forest; infrequent. 2576.

Veronica perigrina L. Purslane Speedwell. Roadside disturbance area on the ridge top of a pine-hardwood forest; infrequent. 2680.

Chenopodiaceae
Goosefoot Family

Chenopodium ambrosioides L. Wormweed. Weedy area along the upper bank of the boat landing area near a hardwood-pine forest; infrequent. 2882.

Convolvulaceae
Morning Glory Family

Cuscuta compacta Juss. ex Choisy. Compact Dodder. The specimens were found parasitizing on *Rubus* in a disturbed area near the boat ramp and on *Alnus* growing on the margin of North Linson Creek; infrequent. 2847, 2876.

Cornaceae
Dogwood Family

Cornus florida L. Flowering Dogwood. Ridgetop area in a hardwood-pine forest; frequent. 3136.

Cornus obliqua Raf. Swamp Dogwood. Rocky creek bank of North Linson Creek; infrequent. 2851, 2852, 3119, 3120, 3164.

Celastraceae
Staff Tree Family

Euonymus americanus L. Strawberry Bush. Small shrubby plant growing on the embankment of Hee creek; infrequent. 2899.

Dioscoreaceae
Yam Family

Dioscorea quaternata (Walt.) Gmel. Wild Yam. Low-woods forest alongside North Linson Creek; infrequent. 3201.

Ebenaceae
Ebony Family

Diospyros virginiana L. Persimmon. Creek bottom area along North Linson Creek and along the margin of the Mountain Fork River near boat landing area; infrequent. 2799, 3029, 3031, 3041, 3316.

Ericaceae
Heath family

Lyonia liquistriana (L.) DC. Male Blueberry. Ridgetop hardwood-pine forest and along the floodplain of North Linson Creek; occasional. 3138, 3167.

Vaccinium arboreum Marsh. L. Farkleberry. Ridgetop community of hardwood and pines and weedy area near bank of the Mountain Fork River; frequent. 3069, 3070, 3292, 3194.

Vaccinium vacillans Torr. Lowbush Blueberry. Weedy area near a woodpecker colony site with large pines, hardwood clearing, and southfacing pine-hardwood forest; abundant. 1840, 2132-2134, 3063, 3088, 3091, 3282-3284

Euphorbiaceae
Spurge Family

Acalypha gracilens Gray. Three-seeded Mercury. Roadside disturbance area and hardwood forest; occasional. 2454.

Acalypha virginica L. Three Seeded Mercury. Sampling collection; occasional 2911.

Croton monanthogynus Michx. One-seeded Croton. Parking area near the cabin beneath a hardwood-pine forest; occasional. 2829.

Euphorbia corollata L. Flowering Spurge. Creek bank at the base of a hardwood-pine forest; occasional. 2863.

Euphorbia heterophylla L. Spurge. Parking area near the assistant biologist's cabin; occasional. 2878.

Euphorbia prostrata Ait. Spurge. Roadside disturbance area adjacent to a hardwood-pine forest; infrequent. 1942.

Euphorbia tetraspora Engelm. Weak Euphorbia. Hardwood-pine and hardwood forest and a low-woods forest along North Linson Creek; frequent. 2103-2105, 2613, 2658.

Fabaceae
Bean Family

Amorpha fruticosa L. False Indigo. Seepy area along Hee Creek; occasional. 3106.

Amorpha ouachitensis Wilbur. Ouachita Mountain Lead Plant. Collected by Dr. Ron Masters on a north facing slope in compartment number 2, August 23, 1993.

Amphicarpa bracteata (L.) Fern. Hog Peanut. Sampling collection; occasional. 2523.

Apios americana Medic. Ground Nut. Seep area near Hee Creek; infrequent. 3197, 3198, 3286.

Astragalus distortus T.& G. Bentpod Milkvetch. Weedy area near the assistant biologist's cabin and a hardwood-pine forest; infrequent. 2144-2146, 2558.

Astragalus racemosus Pursh. Loco Weed. Low-woods forest near North Linson Creek; infrequent. 2803, 3155, 3245.

Baptisia leucophaea Nutt. Plains Wild Indigo. Hardwood-pine, pine-hardwood, and low to medium density pine-hardwood forest; infrequent. 1828, 1868, 2155-2157, 2607.

Baptisia nuttalliana Small. Wild Indigo. Roadside disturbance area under the canopy of a hardwood-pine forest; infrequent. 3304.

Clitoria mariana L. Butterfly Pea. Hardwood-pine, hardwood, and pine-hardwood forest, and a low-woods forest along North Linson Creek; frequent. 1830, 2341, 2761, 2762, 2774.

Desmodium ciliare (Muhl. ex Willd.) DC. Beggars Lice. Sampling collection; occasional. 2522.

Desmodium laevigatum (Nutt.) DC. Tick Trefoil. Roadside disturbed area, and hardwood-pine, and hardwood-pine forest; occasional. 2453, 2465.

Desmodium marilandicum (L.) DC. Beggar Lice. Sampling collection; occasional. 2521.

Desmodium nudiflorum (L.) DC. Tick Trefoil. Pine-hardwood and hardwood-pine

forest; occasional. 1928, 2336.

Galactia volubilis (L.) Britt. Downey Milkpea. Hardwood-pine, hardwood, and pine-hardwood forest; infrequent. 1946, 2320.

Lathyrus venosus Muhl. Bushy Vetch. Low-woods forest along North Linson Creek; infrequent. 2605.

Lespedeza cuneata (Dum.-Cours.) G. Don. Sericea Lespedeza. Weedy area along the roadside near boat landing area near a hardwood-pine forest; occasional. 2087, 2466.

Lespedeza hirta (L.) Hornem. Hairy Lespedeza. Roadside disturbance area adjacent to a hardwood pine and hardwood forest; infrequent. 2439.

Lespedeza procumbens Michx. Trailing Lespedeza. Pine-hardwood forest; infrequent. 2499, 2500, 3363.

Lespedeza repens (L.) Bart. Creeping Lespedeza. Sampling collection; occasional. 2912.

Lespedeza virginica (L.) Britt. Slender Lespedeza. Hardwood and hardwood-pine forest; occasional. 2387, 2491b, 2861.

Lotus americanus (Nutt.) Bisch. Deervetch. Hardwood-pine and hardwood forest; infrequent. 2385.

Phaseolus polystachios L. Thicket Bean. Hardwood-pine forest along the MCWA public trail; infrequent. 2731, 3331, 3332, 3366.

Robinia pseudoacacia L. Black Locust. Ridgetop community of a hardwood-pine forest; infrequent. 3065, 3086, 3087.

Rhynchosia latifolia Nutt. ex T. & G. Broadleaf Snoutbean. Grassy area in a hardwood-pine and pine-hardwood forest; frequent. 1838, 2310, 2749.

Strophostyles leiosperma (T. & G.) Piper. Wild Bean. Hardwood-pine forest; infrequent. 3359.

Strophostyles umbellata (Muhl.) Britt. Wild Bean. Trail side on a southfacing slope under a pine-hardwood forest; infrequent. 3345.

Stylosanthes biflora L. B.S.P. Pencil-Flower. Hardwood-pine, hardwood, and pine-hardwood forest; frequent. 1874, 1930, 2377, 2409.

Tephrosia virginiana (L.) Pers. Goat's Rue. Collected along a hardwood-pine forest trail; infrequent. 3277.

Trifolium dubium Sibth. Small Hop-clover. Assistant biologist's cabin lawn; occasional. 2672.

Trifolium repens L. Persian Clover. Assistant biologist's cabin lawn; occasional. 2647, 2673.

Vicia dasycarpa Roth. Hairy Vetch. Low-woods forest along North Linson Creek; occasional. 2547, 2548, 2612.

Vicia minutiflora Dietri. Small Flowered Vetch. Disturbance area near the assistant biologist's cabin and pine-hardwood and hardwood-pine forest; occasional. 2246-2248, 2550, 2579, 2580.

Fagaceae
Oak Family

Quercus alba L. White Oak. Creek bottom area along North Linson Creek; occasional. 3023, 3158, 3161, 3361.

Quercus falcata Michx. Roadside trees along a ridgetop near John's house (caretaker's property); occasional. 3280, 3281.

Quercus marilandica Muench. Blackjack Oak. Ridgetop in a hardwood-pine forest; frequent. 3121, 3181.

Quercus muehlenbergii Engelm. Chinquapin Oak. Low-woods forest alongside North Linson Creek; infrequent. 2837, 3014, 3026, 3027.

Quercus nigra L. Water Oak. Floodplain along North Linson Creek; infrequent. 3119, 3142, 3223.

Quercus rubra L. Red Oak. MCWA public trail on a southfacing hillside; occasional. 3019, 3085.

Quercus stellata Wang. Post Oak. Ridgetop site above Linson Creek; abundant. 3012, 3084, 3096, 3099.

Fumariaceae
Fumitory Family

Corydalis flavula (Raf.) DC. Yellow Harlequin. Low-woods forest along North Linson Creek; occasional. 2525, 2526.

Gentianaceae
Gentian Family

Sabatia angularis (L.) Pursh. Squarestem Rose. Roadside disturbance area under the canopy of a pine-hardwood forest; infrequent. 3306.

Geraniaceae
Geranium Family

Geranium carolinianum L. Carolina Cranebill. Roadside disturbance area on the northside of compartment one, near the west gate; occasional. 2677-2679.

Hamamelidaceae
Witchhazel Family

Hamamelis virginiana L. Common Witchhazel. Edge of North Linson Creek; occasional. 3046, 3049, 3050, 3051, 3139, 3176.

Liquidambar styraciflua L. Sweetgum. Upland site ; infrequent. 3107.

Hippocastanaceae
Buckeye Family

Aesculus glabra Willd. Floodplain area along North Linson Creek; occasional. 3053, 3058.

Hydrophyllaceae
Waterleaf Family

Phacelia hirsuta Nutt. Hairy Blue Curls. Low-woods forest along North Linson Creek; occasional. 2265, 2266, 2627.

Hypericaceae
Saint John's Wort Family

Hypericum densiflorum Pursh. Saint John's Wort. Pine-hardwood and hardwood-pine forest; frequent. 1833, 1884, 1890, 1935, 3056.

Hypericum drummondii (Grev. & Hook.) Nits-&-lice. Roadside area adjacent to a hardwood-pine forest; occasional. 2853.

Hypericum punctatum Lam. Spotted Saint John's Wort. Pine-hardwood forest; occasional. 1878, 1881, 2486.

Hypericum hypericoides (L.) Grantz. Saint John's Wort. Pine-hardwood forest; infrequent. 1937.

Hypericum mutilum L. Dwarf Saint John's Wort. Hardwood-pine and hardwood forest; infrequent. 2765, 2781, 2779.

Hypericum tubulosum Walter. Marsh St John's Wort. Marshy area near the assistant biologist's cabin near a hardwood-pine forest; infrequent. 2821, 2825, 2827.

Juglandaceae
Walnut Family

Carya texana Buckl. Black Hickory. Hillside overlooking North Linson Creek and a southfacing pine-hardwood forest overlooking a branch of Panther Creek; frequent. 3147, 3214, 3343.

Carya tomentosa Poir. Mockernut Hickory. Southfacing slope with predominantly shortleaf pine and oaks, and low woods forest along North Linson Creek; occasional. 2835, 3348, 3365, 3380, 3388.

Lamiaceae
Mint Family

Cunila origanoides (L.) Britt. Stone Mint. Hardwood-pine, hardwood, and pine-hardwood forest, in addition roadside disturbance areas ; frequent. 2059, 2446, 2488, 2489.

Hedeoma hispidum Pursh. Rough Pennyroyal. Hardwood-pine and hardwood forest; infrequent. 2412, 2770.

Monarda fistulosa L. Wild Bergamot. Shortleaf pine forest both low to medium density and high density, also found in a disturbance area near N. Linson Creek; infrequent. 2406, 3112.

Monarda virgata. Raf. Red Spotted Beebalm. Hardwood-pine, hardwood, pine-hardwood (low to medium density), and pine forest, also in a low-woods forest along North Linson Creek; frequent. 1825, 2125, 2150, 2152, 2171, 2174, 2232, 2233, 2234, 2244, 2351, 2651, 2654, 2731, 2735, 2748.

Perilla frutescens (L.) Britt. Common Perilla. Marshy area near the assistant biologist's cabin and a disturbance area in a pine-hard-wood forest; infrequent. 2501, 2819.

Prunella vulgaris L. Heal-all. Hardwood-pine forest and a low-woods forest along North Linson Creek; occasional. 2401, 2782.

Salvia azurea Lam. Azure Blue Sage. Hardwood-pine and hardwood forest; infrequent. 2082, 2802.

Salvia lyrata L. Lyreleaf Sage. Low-woods forest along North Linson Creek, hardwood-pine, and low to medium density pine-hardwood forest. The pine-hardwood forest is a woodpecker colony site; infrequent. 2201-2203, 2643, 2644.

Scutellaria ovata Hill. Eggleaf Skullcap. Pine-hardwood, hardwood, hardwood-pine, and pine forest; frequent. 1823, 1869, 2303, 2352, 2377, 2724, 2744.

Scutellaria parvula Michx. Small Skullcap. Hardwood-pine, hardwood, and low-medium density pine-hardwood forest. In addition a low-woods forest of hardwoods along North Linson Creek; occasional. 2262, 2263, 2262.

Teucrium canadense L. American Germander. Disturbance area above the river bank near a hardwood-pine forest; infrequent. 1899.

Trichostema dichotomum L. Bastard Pennyroyal. Roadside disturbance area near the assistant biologist's cabin; infrequent. 2901.

Lauraceae
Laurel Family

Sassafras albidum (Nutt.) Nees. Sassafras. Ridgetop area of hardwoods and shortleaf pine; occasional. 3116.

Linaceae
Flax Family

Linum striatum Walt. Rigid Flax. Hardwood-pine forest; occasional. 1944.

Lobeliaceae
Lobelia Family

Lobelia cardinalis L. Cardinal Flower. Creek bank at the base of a hardwood-pine forest; rare. 2886.

Lobelia spicata Lam. Palespike Lobelia. Hardwood-pine forest and low-woods forest along North Linson Creek; occasional. 1906, 2314, 2327.

Malvaceae
Mallow family

Callirhoe alcaeoides (Michx.) Gray Plains Poppy Mallow. Low-woods forest along North Linson Creek under the canopy of a hardwood forest, also found in hardwood-pine and pine hardwood forest; occasional. 2389, 2413, 2776, 2793.

Hibiscus lasiocarpus Cav. Woolly Rose Mallow. Collected on the bank of the Mountain Fork River; rare. 3091, 3288, 3291, 3293.

Moraceae
Mulberry Family

Morus rubra L. Red Mulberry. Floodplain area along North Linson Creek; occasional. 3025, 3098.

Nyssaceae
Tupelo Family

Nyssa sylvatica Marsh. Black Gum. Floodplain along North Linson Creek and a ridgetop forest; occasional. 3039, 3200.

Oleaceae
Olive Family

Chionanthus virginicus L. Fringe Tree. Floodplain along North Linson Creek; infrequent. 3020.

Fraxinus americana L. White Ash. Upland site just above North Linson Creek; frequent. 3174, 3130, 3219.

Onagraceae
Evening Primrose Family

Jussiaea peploides (HBK.) Raven. Water Primrose. Shallow pool in a seep area near Hee Creek; rare. 3189.

Oxalidaceae
Wood Sorrel Family

Oxalis corniculata L. Yellow Wood Sorrel. Hardwood-pine forest.; occasional. 2365.

Oxalis dillenii Jasq. Yellow Sorrel. Hardwood, hardwood-pine and pine-hardwood forest; occasional. 2069, 2196, 2667-2669.

Oxalis violacea L. Violet Wood Sorrel. Hardwood-pine forest and a low to high density pine-hardwood forest; occasional. 2110, 2111, 2116.

Passifloraceae
Passion Flower Family

Passiflora incarnata L. May Pop Passion Flower. Roadside disturbance adjacent to a hardwood-pine forest; infrequent. 1902.

Passiflora lutea L. Passion Flower Vine. Hardwood-pine forest; infrequent. 1945.

Papaveraceae
Poppy Family

Sanguinaria canadensis L. Bloodroot. Low-woods forest along North Linson Creek; rare. 2528, 2549.

Phytolacaceae
Poke Family

Phytolacca americana L. Poke Weedy area above a pine-hardwood and hardwood-pine forest; infrequent. 2506, 2754.

Phrymaceae
Lopseed Family

Phryma leptostachya L. Lopseed. Floodplain along North Linson Creek; infrequent. 3117.

Plantaginaceae
Plantain Family

Plantago lanceolata L. Buckhorn Plantain. Assistant biologist's cabin lawn; infrequent. 2646.

Platanaceae
Sycamore Family

Platanus occidentalis L. Sycamore. Bottomland area along North Linson Creek; rare. 3032, 3163.

Polemoniaceae
Phlox Family

Phlox pilosa L. Prairie Phlox. Hardwood and hardwood-pine forest, and a low to medium density pine-hardwood forest. Also in a low-woods forest along North Linson Creek; frequent. 2158-2160, 2194, 2195, 2614, 2654.

Polygalaceae
Milkwort Family

Polygala verticillata L. Whorled Milkwort. Hardwood-pine forest and a low-woods forest along North Linson Creek; infrequent. 2764.

Polygonaceae
Smartweed Family

Polygonum hydropiperoides Michx. Wild Water Pepper. Marshy area in a hardwood-pine forest; occasional. 1908, 2363, 2364

Polygonum persicaria L. Pink Smartweed. Bank of a Mountain Fork River inlet, at the base of a hardwood forest to the south and pine-hardwood forest to the north; occasional. 2467, 2468.

Polygonum punctatum Ell. Spotted Smartweed. Mountain Fork River inlet at the base of a pine-hardwood and hardwood forest; occasional. 2470, 2471, 2860b.

Rumex crispus L. Curly Dock. Abandoned flower bed on the caretaker's property; infrequent. 3217, 3222.

Portulacaceae
Purslane Family

Claytonia virginica L. Spring Beauty. Along roadsides of Hardwood and hardwood-pine forest, and low-woods forest along North Linson Creek; occasional. 2120.

Primulaceae
Shooting Star

Dodecatheon meadia L. Shooting Star. Roadside area adjacent to pine-hardwood and hardwood-pine forest; occasional. 2193, 2600.

Ranunculaceae
Buttercup Family

Delphinium virescens Nutt. Carolina Larkspur. Hardwood and hardwood-pine forest, and low-woods forest along North Linson Creek; infrequent. 2386, 2642, 3172.

Ranunculus fascicularis Muhl. Tufted Buttercup. Ravine in a hardwood and pine-hardwood forest; occasional. 2115, 2127, 2128, 2184, 2185, 2570, 2571.

Rhamnaceae
Buckthorn Family

Berchemia scandens (Hill.) K. Koch. Rattau Vine. Pine-hardwood forest; occasional. 2812.

Ceanothus herbaceus Raf. Buckthorn. Hardwood-pine forest; occasional. 2594.

Rosaceae
Rose Family

Amelanchier arborea (Michx.) Fern. Juneberry. Ridgetop overlooking North Linson Creek; rare. 3092.

Crataegus crus-galli L. Cockspur Hawthorne. Upland site; (880 feet above sea level) occasional. Collected by Dr. Ron Masters in compartment 3, August 23, 1993.

Crataegus marshalli Egglest. Parsley Hawthorne. Ridgetop site overlooking North Linson Creek and bottomland area underneath a canopy of hardwoods and pines; infrequent. 1917, 3169.

Crataegus spathulata Michx. Littlehip Hawthorn. Floodplain along North Linson Creek; occasional. 3015, 3030.

Geum canadense Jasq. Red Root. Low-wood forest along North Linson Creek; occasional. 2787.

Potentilla simplex Michx. Old Field Cinquefoil. Hardwood and pine-hardwood forest; occasional. 2116, 2209, 2210, 2618, 2619.

Prunus munsoniana Wight & Hedrick. Wild Goose Plum. Ridgetop Forest; infrequent. 3044.

Rosa sp. L. Wild Rose. Ridgetop forest adjacent to "the view"; infrequent. 3216.

Rubus trivialis Michx. Southern Blackberry. Weedy area in a pine-hardwood forest; occasional. 2213, 2218, 2219, 3229.

Rubiaceae
Madder Family

Cephalanthus occidentalis L. Buttonbush. East facing bank of the Mountain Fork River; occasional. 3290, 3295.

Diodia virginiana L. Buttonweed. Weedy embankment overlooking the Mountain Fork River; infrequent. 1941.

Galium asparine L. Catchweed Bedstraw. Low-woods forest along North Linson Creek; infrequent. 2640.

Galium circaezans Michx. Weed Bedstraw. South facing hillside; infrequent. 1817, 2347.

Hedyotis crassifolia Raf. Tiny Bluet. Weedy area near North Linson Creek; infrequent. 2093-2094.

Mitchella repens L. Partridge Berry. Mossy bank of Hee Creek; occasional. 3212.

Rutaceae
Hop Tree Family

Ptelea Trifoliata L. Hop Tree. Collected by Dr. Ron Masters along a unnamed branch of the Mountain Fork River, June 11, 1997; infrequent.

Salicaceae
Willow Family

Populus deltoides Marsh. Cottonwood. Growing along the margin of Hee Creek; rare. 3206.

Salix caroliniana Michx. Carolina Willow. Rocky creek bottom along North Linson Creek; infrequent. 3118, 3126, 3127, 3128, 3130.

Sapotaceae
Sapodilla Family

Bumelia lanuginosa (Michx.) Pers. Chittamwood. Mixed forest overlooking North Linson Creek; occasional. 3000, 3103.

Saxifragaceae
Saxifage Family

Ribes curvatum Small. Granite Gooseberry. Understory shrub underneath the canopy of the hardwood forest of North Linson Creek; occasional. 3218.

Scrophulariaceae
Figwort Family

Bacopa acuminata (Walt.) Robins. Water Hyssop. Hardwood-pine forest; infrequent. 1905.

Gerardia grandiflora Benth. Big Flower Gerardia. Roadside above the public walking trail north of a branch of Panther Creek; infrequent. 3318, 3373, 3374.

Gratiola brevifolia Raf. Stick Hedgehyssop Mudflat area along a branch of Panther Creek; infrequent. 3326.

Penstemon arkansanus Pennell. Arkansas Beardtongue. Low-woods forest along North Linson Creek and low to medium density pine-hardwood forest; infrequent. 2270-2272, 2609.

Verbascum blattaria L. Moth Mullein. Low-woods forest along North Linson Creek and in moist area near the assistant biologist's cabin; infrequent 1920, 2773, 2831.

Verbascum thapsus L. Common Mullein. Roadside disturbance area under the sparse canopy of a pine-hardwood forest; infrequent. 3055.

Solanaceae
Nightshade Family

Physalis cordata Miller. Ground Cherry. Weedy area near the assistant biologist's cabin; occasional. 2504, 2505.

Physalis pubescens L. Weedy area near the assistant biologist's cabin; occasional. 1919, 2879.

Physalis viscosa L. Field Ground Cherry. Woodpecker colony site hardwood clearing and large pines; infrequent. 2740.

Solanum carolinense L. Horse Nettle. Weedy area near the assistant biologist's cabin; occasional. 2877.

Tiliaceae
Basswood Family

Tilia neglecta Ashe. American Basswood. Ridgetop area in a hardwood-pine forest; infrequent. 3061, 3062, 3090.

Ulmaceae
Elm Family

Celtis occidentalis Pursh. L. Hackberry. Near margin along North Linson Creek; occasional. 3007.

Celtis laevigata Willd. Sugarberry. Near margin along North Linson Creek; occasional. 3006, 3008, 3009.

Ulmus alata Michx. Winged Elm. Floodplain along North Linson Creek; occasional. 3035, 3082, 3168.

Ulmus americana L. American Elm. Creek bottom area along North Linson Creek; occasional. 3033.

Ulmus serotina Sarg. September Elm. Collected in a drain site; occasional. Collected by Dr. Ron Masters August-24-93, compartment 2.

Urticaceae
Nettle Family

Boehmeria cylindrica (L.) Sw. False Nettle. Marshy area near the assistant biologist's cabin, on a creek bank underneath a hardwood-pine forest, and on a west facing mudflat along the Mountain Fork River; occasional. 1894, 1901, 2822, 2711.

Valerinaceae
Corn Salad Family

Valerinella radiata Dufur. Common Beaked Corn Salad. Ridgetop within a pine-hardwood forest, low to medium density hardwood-pine forest, and low-woods forest along North Linson Creek; infrequent. 2260, 2639.

Verbenaceae
Vervain Family

Callicarpa americana L. Beauty Bush. Hardwood-pine forest above the Mountain Fork River, pine forest, and pine-hardwood forest; occasional. 1898, 2285-2287, 3125.

Verbena canadensis (L.) Britt. Rose Vervain. Pine-hardwood forest of low to medium density and hardwood-pine and hardwood forest. In addition a low-woods forest along North Linson Creek; frequent. 2100-2102, 2235, 2530, 2531, 2540, 2259, 3337.

Verbena urticifolia L. White Vervain. Pine-hardwood forest; occasional. 1882.

Violaceae.
Violet Family

Viola pedata L. Bird's Foot Violet. Hardwood-pine forest, weedy area near the boat area above the assistant biologist's cabin, and a low to medium density pine-hardwood forest; occasional; 2114, 2142, 2143, 2552, 2562, 2563, 2606.

Viola pubescens Ait. Yellow Violet. Low-woods forest along North Linson Creek; infrequent. 2527.

Viola rafinesquii Greene. Field Pansy. Roadside area adjacent to a hardwood-pine forest; frequent. 2550, 2551.

Viola sagittata Ait. Arrow-leaved Violet. Hardwood-pine forest; occasional. 2109, 2114, 2524.

Vitaceae

Grape Family

Parthenocissus quinquefolia (L.) Planch. Floodplain along North Linson Creek; occasional. 3010.

Vitis palmata Vahl. Missouri Grape. Ridgetop road adjacent to "the view"; infrequent. 3195.

Vitis rotundiflora Michx. Muscadine Grape. Pine-hardwood and pine forest and low-woods forest along North Linson Creek; occasional. 2718, 3232.

Magnoliophyta:Lilliopsida

Amarylidaceae

Amarylis Family

Hypoxis hirsuta (L.) Coville. Yellow Star Grass. Flat moist area of a hardwood-pine forest near the cabin; infrequent. 2674.

Araceae

Arum Family

Arisaema dracontium (L.) Schott. Green Dragon. Floodplain area along North Linson Creek; infrequent. 3077.

Commelinaceae

Day Flower Family

Tradescantia hirsuticaulis Bush. Spiderwort. Low-woods forest along North Linson Creek; infrequent. 2273, 2615, 2616.

Tradescantia ohioensis Raf. Ohio Spiderwort. Pine-hardwood forest with disturbance; occasional. 2596.

Cyperaceae
Sedge Family

Carex festucacea Willd. Fescue Sedge. Pine-hardwood forest; occasional. 2170.

Carex frankii Kunth. Franks Sedge. Hardwood and pine-hardwood forest; occasional. 1925, 2343.

Carex intumescens Rudge. Bladder Sedge. Hardwood-pine forest; occasional. 2582, 2583.

Carex jorii Bailey. Emergent marshy area formed by an inlet of the Mountain Fork River; occasional. 2602, 2603, 2660, 2870

Carex latebracteata Waterfall. Wide Bracted Sedge or Waterfall's Sedge. Pine-hardwood and hardwood-pine forest; occasional. 2147, 2237-2239, 2297, 2584-2586.

Carex lupulina Willd. Weedy area on the bank of the Mountain Fork River beneath a hardwood-pine forest and a seep area; occasional. 2428, 2429, 3239, 3240.

Carex meadii Dewey. Mead's Sedge. Low-woods forest along North Linson Creek and a pine-hardwood forest; occasional. 2123, 2187-2189, 2441, 2534, 2536, 2539, 2541.

Carex microrhyncha Mack. Little Snout Sedge. Pine-hardwood, hardwood-pine, and hardwood-pine forest; occasional. 2106-2109, 2113, 2563-2565.

Carex muhlenbergii Schkuhr ex Willd. Muhlenberg's Sedge. Moist hardwood-pine forest; occasional. 2153, 2154.

Carex oxylepis Torr. and Hook. Sharpscale Sedge. Pine-hardwood forest; infrequent. 2670, 2671.

Carex squarrosa L. Sedge. Weedy area on the upper bank of the Mountain Fork River; infrequent. 2427.

Carex tribuloides Wahlenb. Bristlebract Sedge. Weedy area on the upper bank of the Mountain Fork River; occasional. 2423-2426.

Cyperus aristatus Rottb. Bearded Flatsedge. Hardwood-pine forest along a creek bank; occasional. 1909.

Cyperus globulosus Aubl. Disturbance area near the assistant biologist's cabin underneath a hardwood-pine forest; occasional. 1921, 2881.

Cyperus ovularis (Michx.) Torr. Globe Flatsedge. Roadside disturbance area adjacent to a pine-hardwood forest; infrequent. 2344.

Cyperus strigosus L. False Nut Grass. Weedy area overlooking the Mountain Fork River; infrequent. 3294.

Eleocharis obtusa (Willd.) Schultes. Blunt Spikerush. Dried creek bank under a hardwood-pine and hardwood forest; occasional. 2768.

Hemicarpha micrantha (Vahl) Pax. Common Hemicarpha. Emergent marshy area created by an inlet of the Mountain Fork River; occasional. 2603.

Scleria ciliata Michx. Fringed Nutrush. Hardwood-pine forest; frequent. 2337-2339.

Scleria oligantha Michx. Littlehead Nutrush. Pine-hardwood and pine forest; frequent. 1835, 2302, 2350, 2411, 2550b, 2656, 2707, 2716.

Iridaceae

Iris family

Camassia scilloides (Raf.) Cory. Lavender Lilly. Low-medium density pine-hardwood forest; rare. 2232.

Iris cristata Ait. Dwarf Wild Iris. Low-woods forest along North Linson Creek; infrequent. 2268, 2630.

Sisyrinchium angustifolium Miller. Blue-eyed Grass. Hardwood-pine, pine hardwood, and hardwood forest, and a low to medium density pine-hardwood forest; infrequent. 2068, 2173, 2198-2200, 2212, 2622, 2623.

Juncaceae

Rush Family

Juncus coriaceous Mackenzie. Leathery Rush. Low-woods forest along North Linson Creek, a mudflat area near the boat landing area, and high to low density pine-hardwood forest; occasional. 1889, 1939, 2319, 2796, 2798, 2800.

Juncus effusus L. Bog Rush. Low-woods forest along North Linson Creek; occasional. 2802.

Juncus tenuis Willd. Slender Rush. Roadside disturbance area under a pine-hardwood forest; occasional. 2307-2310.

Luzula bulbosa (Wood) Rydb. Bulb Rush. Hardwood-pine and pine-hardwood forest; infrequent. 2112, 2175.

Luzula echinata (Small) F.J. Herm. Bulb Rush. Low-medium density pine-hardwood forest; infrequent. 2125, 2136-2238, 2544, 2545.

Liliaceae
Lilly Family

Nothoscordum bivalve (L.) Britt. Crow Poison. Low to high density pine-hardwood forest; occasional. 2116, 2197, 2211.

Polygonatum canaliculatum (Muhl.) Pursh. Solomon's Seal. Seepy area along Hee Creek; infrequent. 3141.

Smilax bona-nox L. Greenbriar. Ridgetop hardwood-pine forest and seep area near Hee Creek; occasional. 2249, 2993, 2994, 3249, 3196.

Yucca glauca Nutt. Bear Grass. Pine-hardwood and hardwood-pine forest (most common along the roadside); infrequent. 1851, 2620.

Orchidaceae
Orchid Family

Spiranthes gracilis (Bigel.) Beck. Spiralled Spiranthes. Pine-hardwood forest along the MCWA public trail; rare. 3324.

Poaceae
Grass Family

Agrostis perennans (Walt.) Tuckerman. Autumn Bentgrass. Roadside area in a hardwood-pine and hardwood forest; infrequent. 2063, 2076.

Andropogon elliotii Chapm. Elliott Bluestem. Low density pine-hardwood forest, woodpecker colony site with large pines and hardwood clearing; infrequent. 2443, 2494.

Andropogon gerardi Vitman. Big Bluestem. Hardwood-pine and pine hardwood forest; frequent. 2085, 2493.

Andropogon virginicus L. Broomsedge. Roadside disturbance area adjacent to hardwood-pine and pine-hardwood forest; occasional. 2440.

Aristida oligantha Michx. Three Awn. Disturbance area at the base of a hardwood-pine forest; infrequent. 2883.

Aristida wrightii Nash. Three Awn. Roadside disturbance area at the ridgetop of a pine-hardwood and hardwood-pine forest; infrequent. 2855.

Arundinaria gigantea (Walt.) Much. Giant Cane. Creek bottom of a branch Panther Creek (east of the fork); infrequent. 3275, 3276.

Brachyelytrum erectum (Schreb.) Beauv. Pine-hardwood and hardwood forest. In addition low-woods forest along North Linson Creek; occasional. 2311-2313, 2374, 2403, 2785, 2786, 2793, 2809.

Bromus pubescens Muhl. ex Willd. Canada Brome. Hardwood-pine, hardwood, and pine-hardwood forest. In addition low-woods forest along North Linson Creek; frequent. 2060, 2281, 2282, 2283, 2353, 2358, 2399, 2410, 2775.

Chasmanthium latifolium (Michx.) Yates Inland Seoats. *Uniola latifolium* Michx. Pine-hardwood forest; infrequent. 1829, 1938.

Chasmanthium sessiliflorum (Poir.) Yates Spike Inland Seoats. *Uniola sessiliflora* Poir. Pine-hardwood and hardwood forest; frequent. 1872, 1933, 1938, 2291-2294, 2348, 2349.

Cynodon dactylon (L.) Pers. Bermuda grass. Assistant biologist's cabin lawn; rare. 2866.

Danthonia spicata (L.) Beauv. ex R. & S. Poverty Grass. Hardwood, hardwood-pine, and pine-hardwood forest; abundant. 1948, 2129, 2130, 2131, 2251, 2295, 2388, 2767.

Digitaria violacens Link. Crabgrass. Weedy area near the assistant biologist's cabin and along roadside adjacent to a pine-hardwood forest; occasional. 2502, 2813, 2814, 2816.

Echinochloa colonum (L.) Link. Junglegrass. Weedy upper bank of the Mountain Fork River and a water inlet of the Mountain Fork; infrequent. 2482-2485.

Echinochloa crusgalli (L.) Beauv. Barnyard Grass. Weedy area near boat landing area; infrequent. 2867.

Elymus virginicus L. Virginia Wild Rye. Pine-hardwood forest in areas of disturbance; occasional. 1826, 1855, 1859, 1863, 2300, 2325, 2326, 2375.

Eragrostis hirsuta (Michx.) Nees Hairy Lovegrass. Weedy area near the assistant biologist's cabin; infrequent. 2514.

Erianthus alopecuroides (L.) Ell. Silver Plumegrass. Weedy area near boatlanding area and ridgetop hardwood-pine forest; infrequent. 2086, 2884.

Eragrostis spectabilis (Pursh) Steud. Purple Lovegrass. Roadside disturbance area and weedy area on the upper bank of the Mountain Fork River; infrequent. 2062, 2088.

Festuca paradoxa Desv. Cluster Fescue. Hardwood-pine and low to medium density pine-hardwood forest; infrequent. 2204-2206.

Festuca obtusa Biehler. Fescue. Hardwood-pine, hardwood, and pine-hardwood forest; infrequent. 2598.

Festuca octoflora Walt. Six Week Fescue. Hardwood, hardwood-pine and pine-hardwood forest; frequent. 2383, 2597, 2662, 2663.

Glyceria striata (Lam.) Hitchc. Fowl Mannagrass. Low-woods forest along North Linson Creek; infrequent. 2792, 2794, 2795.

Gymnopogon ambiguus (Michx.) BSP. Bearded Skeletongrass. Hardwood-pine and hardwood forest; infrequent. 2442, 2452.

Leersia oryzoides (L.) Sw. Marshy emergent area near the assistant biologist's cabin; infrequent. 2824.

Lolium multiflorum Lam. Perennial Ryegrass. Hardwood-pine forest; infrequent. 2710.

Lolium perenne L. Ryegrass. Hardwood-pine forest; infrequent; 3233.

Melica mutica Walt. Two Flowered Melica. Pine-hardwood forest; abundant. 2176, 2177, 2178, 2240.

Muhlenbergia sobolifera (Muhl.) Trin. Rocky Muhly. Hardwood-pine and hardwood forest; infrequent. 2077.

Panicum agrostoides Spreng. Redtop Panicum. Hardwood-pine and hardwood forest; occasional. 1893, 1910, 2075, 2080.

Panicum anceps Michx. Beaked Panicum. Roadside disturbance area and weedy area near the assistant biologist's cabin; infrequent. 2830, 2908.

Panicum boscii Poir. Bosc Panicum. Pine, pine-hardwood, and hardwood-pine forest; frequent. 2324, 2354, 2722, 2737, 2738, 2746.

Panicum brachyanthum Steud. Pimple Panicum. Pine-hardwood and hardwood-pine forest; infrequent. 2481, 2910.

Panicum capillare L. Witchgrass. Pine-hardwood forest; infrequent. 2447, 2449.

Panicum dichotomum L. Forked Panicum. Low to medium density pine-hardwood and hardwood forest; frequent; 1822, 1837, 1852, 1857, 1860, 2065, 2352, 2359, 2412.

Panicum linearifolium Scribn. Slim Leaf Panicum. Low-woods forest along North Linson Creek; occasional. 2651, 2653.

Panicum microcarpon Muhl. Forked Panicum. Hardwood-pine and pine-hardwood forest (both high and low-medium density); frequent. 2714, 2167, 2168, 2169.

Panicum oligoanthes Schult. Small Panic Grass. Hardwood and hardwood-pine forest; occasional. 2756, 2758.

Panicum polyanthes Schult. Philadelphia Witchgrass. Hardwood-pine, pine-hardwood, and low to medium density pine-hardwood forest; frequent. 1870, 1891, 1897, 2321, 2415-2418, 2608, 2708, 2759, 2789, 2799.

Panicum praecocius Hitchc. & Chase Woolly Panicum. Hardwood-pine and hardwood forest; infrequent. 2083.

Panicum ravenelii Scribn. Panicum. Hardwood and hardwood-pine forest; infrequent. 2064.

Panicum scoparium Lam. Velvet Panic Grass. Pine-hardwood forest; occasional. 2284, 2331, 2346.

Panicum sphaerocarpon Ell. Leafy Panicum. Hardwood-pine forest; infrequent. 1888.

Panicum villosissimum Nash. Woolly Panicum. Pine-hardwood forest; infrequent. 1871.

Paspalum dilatatum Poiret. Dallis Grass. Weedy area near the assistant biologist's cabin; infrequent. 1924.

Paspalum floridanum Michx. Dallis Grass. Weedy area near boat area; infrequent; 3312, 3375.

Paspalum setaceum Michx. Thin Paspalum. Disturbance area near North Linson Creek; infrequent. 3093.

Poa annua L. Annual Bluegrass. Assistant biologist's cabin lawn underneath the canopy of a hardwood-pine forest; infrequent. 2572-2574.

Schizachyrium scoparium (Michx.) Nash. Little Bluestem. *Andropogon scoparius* Michx. Pine-hardwood, hardwood-pine, and hardwood forest; abundant. 1849, 1866, 1947, 2070, 2081, 2492.

Setaria geniculata (Lam.) Beauv. Knotroot. Roadside disturbance area underneath a hardwood-pine forest; occasional. 1907, 2519, 3224.

Sorghastrum nutans (L.) Nash. Indian Grass. Roadside area near the caretaker's house; infrequent. 2496.

Sphenopholis obtusata (Michx.) Scribn. Prairie Wedgescale. Hardwood-pine and pine-hardwood forest; infrequent. 2245, 2252.

Stipa avenacea L. Porcupine Grass. Hardwood-pine, low to medium density pine-hardwood, hardwood, and pine-hardwood forest; abundant. 2208, 2226, 2227, 2664, 2665, 2666, 2767.

Tridens flavus (L.) Michx. Purple Top. Roadside area underneath a hardwood-pine, and pine-hardwood forest and forest edge near the cabin; occasional. 1865, 1918, 2072, 2511, 2512.

Zosteraceae **Pondweed Family**

Potamogeton pulcher Tuckerm. Spotted Pondweed. Floating leaf aquatic collected by Dr. Ron Masters on South Linson Creek; infrequent. June 11, 1997.

APPENDIX C
SPECIMENS EXAMINED DURING PREPARATION OF DESCRIPTIONS
OF THE FAMILY GERANIACEAE

Erodium cicutarium (L.) L'Her. BRYAN CO: J. D. Loyd, 106 (OKLA); J. Taylor, 74 (SEOSU); C. Taylor, 4792 (OKL); CHEROKEE CO: C. Wallis, 643 (OKLA); CLEVELAND CO: N. Hintze, s.n. (OKLA); COMMANCHE CO: J. Ault, 4 (CUOKL); C. Huysseen, 4 (CUOKL); C. Lepine, 39 (CUOKL); C. Mauck, 12 (CUOKL); K. Patterson, 212 (CUOKL); M. Ringer, 7 (CUOKL); R. Rudman, s.n. (OKL); E. Seneca, s.n. (OKL); COTTON CO: T. Stokes, 66 (CUOKL); U.T. Waterfall, 25816a (OKLA); KAY CO: E. B. Byler, 241 (OKLA); GRADY CO: K. Bowers, 51 (OCLA); G. Heebing, 39 (OCLA); L. Magrath, 10242 (OCLA); R. Pearce, 1078 (OKLA); C. Soos, s.n. (OCLA); GREER CO: S. Barber, 635 (OKLA); P. Buck, s.n. (TULS); HARMON CO: U.T. Waterfall, 9421 (OKLA); JACKSON CO: S. Barber, 635 (OKL); B. Harkins, 24 (OKLA); KINGFISHER CO: E. Byers, 123 (OKLA); LINCOLN CO: P. Buck, 3129 (OKLA & TULS); McCURTAIN CO: L. Magrath, 10242 (OCLA); MURRAY CO: G. J. Goodman, 7667 (OKLA); OKLAHOMA CO: U.T. Waterfall, 4339 (OKLA); PAYNE CO: W. B. Gernett, s.n. (OKLA); Stemen, 299 (OKL); PITTSBURG CO: A. Brown, 8 (OKL); K. Kitchens, 29 (OCLA); ROGERS CO: B. Davis, s.n. (TULS); WOODS CO: J. McCracken, 12 (NWOSU); P. Nighswonger, 801 (NWOSU)

Erodium texanum Gray BRYAN CO: J. Taylor, 1575 (OKL); HARMON CO: U.T. Waterfall, 8722, 8995, 9402, 9420 (OKLA); JACKSON CO: S. Barber, 733 (OKLA); C. Taylor, 2176, 8362 (OKL); U.T. Waterfall, 8354 (OKL); JEFFERSON CO: J. Taylor, 3635 (OKL); U.T. Waterfall, 11978 (OKLA)

Geranium carolinianum L. ADAIR CO: C. Wallis, 6917 (OKLA); BLAINE CO: G. Goodman, 4175 (OKLA); BRYAN CO: G. Goodman, 6886 (OKLA); CANADIAN CO: G. Dunn, 20 (OKLA); CADDO CO: D. Pettijohn, 44, 117 (OCLA); CHEROKEE CO: M. Dodson, 37 (NEOSU); L. Thierry, 24 (NEOSU); C. Wallis, 441 (OKLA); CHOCTAW CO: D. Trott, s.n. (OKLA); M. Hopkins, 1564 (OKLA); CLEVELAND CO: V. Harden, 88 (OKLA); COMMANCHE CO: R. Erwin, 70 (OKLA); C. Huysseen, 89 (CUOKL); L. Magrath, 15227 (OCLA); DELAWARE CO: R. Shendel, 214 (OKLA); C. Wallis, 6562 (OKLA); GRADY CO: K. Bowers, 127, 187, 281 (OCLA); J. Davis, 58 (OCLA); J. Elliott, 15 (OCLA); D. Pettijohn, 30 (OCLA); M. Rempe, 6 (OCLA); C. Southerland, 16 (OCLA); GREER CO: S. Barber, 816 (OKLA); JACKSON CO: S. Barber, 704 (OKLA); KAY CO: LATIMER CO: E. Byler, 456 (OKLA); F. H. Means, 1217 (OKLA); J. Standish s.n. (OKLA); LEFLORE CO: J. H. Means, 1370 (OKLA); MAYES CO: P. Knight, 41 (OKLA); C. Stutte, 96 (OKLA); G. Thompson, 61 (NEOSU); C. Wallis, 2971 (OKLA); McCURTAIN CO: U.T. Waterfall, 13035 (OKLA); MURRAY CO: H. Barclay, 445 (TULS); R. Stratton, 17 (OKLA); MUSKOGEE CO: H. Barclay, s.n. (TULS); C. Wallis, 6633 (OKLA); NOBLE CO: P. Harding, 3 (OKLA); OSAGE CO: C. H. Derdeyn, s.n. (OKLA); H. Sizemore, 180 (OKLA);

PAYNE CO: E. Byler, s.n. (OKLA); R. Dahms, 119 (OKLA); R. Estes, 35 (OKLA); K. Kramer, 62 (OKLA); P. Lewis, 213 (OKLA); D. Mueller, 1722, 1811 (OKLA); C. Smith, s.n. (CUOKL); C. Wallis, 3754 (OKLA); PITTSBURG CO: Kitchens, 45 (OCLA); PONTOTOC CO: D. McCoy, 2639, 2665, 2899 (OKLA); PUSHMATAHA CO: H. Barclay, s.n. (TULS); C. Mathers, s.n. (OCLA); F. H. Means, 1219, 2469, 3326 (OKLA); ROGERS CO: P. Buck, 997 (TULS); C. Bush, s.n. (TULS); J. Clark, s.n. (TULS); R. Gomez, s.n. (TULS); R. Govett, s.n. (TULS); K. Kawata, s.n. (NEOSU); SEQUOUYAH CO: K. Flourney, s.n. (TULS); C. Wallis, 8120 (OKLA); TULSA CO: M. Clark, 19 (TULS); D. Howard, s.n. (TULS); M. Kimita, s.n. (TULS); A. Long, 138 (TULS); J. Wakefield, s.n. (TULS); WAGONER CO: J. Geis, s.n. (TULS); T. Hymowitz, 99 (OKLA); WOODS CO: 576, 3094 (NWOSU); C. Buckley, 66 (NWOSU); E. Long, s.n. (NWOSU); P. Nighswonger, 975, 1148, 1627 (NWOSU)

Geranium dissectum L. BRYAN CO: B. Smith, 3362-3365 (MHS); McCURTAIN CO: C. Taylor, 18413 (SEOSU)

Geranium molle L. ADAIR CO: M. Huft, 1131 (OKL); CHEROKEE CO: L. Magrath, 16851(OCLA); U.T. Waterfall, 5751 (OKL); McCURTAIN CO: G. Goodman, 8336 (OKL);

Geranium maculatum L. ADAIR CO: G. Goodman, 5250(OKLA); C. Perino, 184, 169 (OKL); M. Stillwagen, s.n. (NEOSU); CHEROKEE CO: L. Bentley, s.n. (NEOSU); D. Hougardy, s.n. (NEOSU); M. Ishmael, 46 (NEOSU); A. McBeath, 17 (NEOSU); P. Nighswonger, 612 (NWOSU); B. Phillips, 10 (NEOSU); C. W. Prier, s.n. (OKLA); P. Sanders, s.n. (NEOSU); P. Sanders, 90 (NEOSU); B. Simmons, 37 (NEOSU); Z. Turley, 41 (OKLA); C. Wallis, 280, 397, 3822, 6873 (OKLA); DELAWARE CO: M. Hopkins, 3281 (OKL); C. Wallis, 2902, 2960, 6569 (OKLA); OTTAWA CO: C. Wallis, 2884, 3743 (OKLA); McCURTAIN CO: L. Magrath, 11355, 12819 (OCLA); SEQUOYAH CO: J. Schoonover, s.n. (OKLA); WOODS CO: J. Burris, s.n (TULS)

Geranium pusillum L. ADAIR CO: C. Wallis, 2384, 6916 (OKLA); CHEROKEE CO: C. Wallis, 1998, 2169, 2168, 3526, 3829, 3942, (OKLA); DELAWARE CO: C. Wallis, 2043 (OKLA); MAYES CO: C. Wallis, 6742 (OKLA); POTTAWOTOMIE CO: B. Smith, 1001-1048, (MHS); SEQUOYAH CO: G. Goodman, 6060 (OKL); C. Wallis, 2079 (OKLA); U.T. Waterfall, 12353 (OKLA)

APPENDIX D
SPECIMENS EXAMINED DURING PREPARATION OF DESCRIPTIONS
OF THE FAMILY LOASACEAE

Cevallia sinuata Lag. GREER CO: B. Smith, 1332, 1333 (MHS); HARMON CO : U. T. Waterfall, 7717, 8294 (OKLA); JACKSON CO: S. Allen, 39 (MHS); U.T. Waterfall, 7218, 7705 (OKLA); B. Smith, 1092-1098, 1114, 1115 (MHS); T. Wahpekeche, 2 (MHS)

Mentzelia albescens (Gill.) Griesbie. COMMANCHE CO: L. Magrath, 15826 (OCLA); GREER CO: B. Smith, 1334-1340 (MHS)

Mentzelia decapetala (Pursh.) Urban & Gilg. CIMMARON CO: U.T. Waterfall, 3169, 9249 (OKLA); GRADY CO: L. Magrath, 10774 (OCLA); U.T. Waterfall (OKLA); GRANT CO: S. Smith, 10 (OKLA); HARPER CO: G. Goodman, 5307 (OKLA); S. Fossey, s.n. (OKLA); JACKSON CO: S. Barber, 1100 (OKLA); KINGFISHER CO: G. Couch, s.n. (OKLA); K. Langdon, 274 (OKLA); MAJOR CO: L. Magrath, 9955, 16701 (OCLA); WOODS CO: S. Bellah, (TULS); P. Nighswonger, 1742 (OKLA); WOODWARD CO: L. Magrath, 16412 (OCLA)

Mentzelia nuda (Osterh.) Stevens BLAINE CO: U.T. Waterfall, 2383 (OKLA); CANADIAN CO: U.T. Waterfall, 743 (OKLA); CIMMARON CO: B. Barclay, s.n. (OKL); U.T. Waterfall, 8665 (OKL); 8667 (OKLA); COTTON CO: F. McMurray, 1051 (OKL); CUSTER CO: O. King, s.n. (OKL); U.T. Waterfall, 7336, 8261 (OKL); ELLIS CO: F. Erteeb, 1145 (OKLA); G.W. Stevens, 2921 (OKLA); GREER CO: S. Allen, 31 (MHS); S. Barber, 1009 (OKLA); T. Cunningham, 135 (OKLA); B. Smith, 861, 1087-1089, 1091, 1120, 1121, 1337 (MHS); L. R. Wilson, 635 (OKL); U.T. Waterfall, 7692 (OKLA); HARMON CO: S. Barber, 1001 (OKLA); U.T. Waterfall, 7190 (OKL & OKLA); HARPER CO: L. Hoch, 57 (OKLA); JACKSON CO: S. Barber, 1009 (OKL); R. J. Tyr1, 908 (OKLA); T. A. Zanoni, 3470 (OKL); JEFFERSON CO: G. Goodman, 4065, 7205 (OKL); ROGER MILLS CO: G. Goodman, 5347 (OKL); P. Nighswonger, 409 (OKL); C. Smith, 519 (OKL); TEXAS CO: G. Goodman, 5606 (OKL); J. Lamb, 109 (TULS); U.T. Waterfall, 8629 (OKL & OKLA); TILLMAN CO: C. Beckwith, 528 (OKL); WASHITA CO: L. Mericle, 1607 (OKL); WOODS CO: L. Magrath, 11789a (OCLA); P. Nighswonger, 1078 (NWOSU); G. W. Stevens, 1714, 1765 (OKLA); (U.T. Waterfall, 7384, 7844 (OKL); J. Sullivan, 1061 (OKLA); WOODWARD CO: T. Springer, 197 (OKL & NWOSU); R. Taylor, 32 (OKLA)

Mentzelia oligosperma Nutt. BLAINE CO: G. Goodman, 5326, 7373 (OKL); L. Magrath, 14888 (OCLA); U.T. Waterfall, 8126, 8677 (OKL); CADDO CO: D. Demaree, 12539 (OKL); CHEROKEE CO: I. Roberts, 61 (NEOSU); E. Waugh, 23 (NEOSU); J. L. Weaver, 42 (NEOSU); CIMMARON COUNTY CO: L. Magrath, 15811 (OCLA); J. Sullivan, 1117 (OKL); J. Taylor, 4755, 16834 (OKL); COMMANCHE CO: J. Prince, 78 (CUOKL); L. Magrath, 335 (OCLA); L. McGee,

s.n. (CUOKL); CUSTER CO: L. Mericle, 1554 (OKL); HARMON CO: U.T. Waterfall, 8295, 8731 (OKL); GARVIN CO: V. Wiedeman, 268 (OKL); GREER CO: JACKSON CO: B. Smith, 1118 (MHS); R. Bull, 281 (OKL); JOHNSTON CO: J. Taylor, s.n. (OKL); KINGFISHER CO: R. Bollenbach, 80 (OKL); J. Engelman, 106-108 (OKL); E. Rice, s.n. (OKL); MAJOR CO: A. Long, 556 (TULS); T. Springer, 465 (NWOSU); MARSHALL CO: G. Goodman, 5913, 6495 (OKL); M. Hall, s.n. (OKL); H.F. Massey, 1421 (OKL); MAYES CO: J. First, 52 (OKL); MURRAY CO: M. Hopkins, 1950, 5262, 5946 (OKL); K. Starks, s.n. (OKL); T. Zanoni, 3737 (OKL); MUSKOGEE CO: E. Little, s.n. (OKL); IOWA CO: J. Geiger, 49 (CUOKL); OKLAHOMA CO: U.T. Waterfall, 1436, 2215 (OKL); PAYNE CO: L. Cockrell, 81 (OKL); W. Ray, 48 (TULS); PONTOTOC CO: L. Magrath, 11189 (OCLA); G. Robbins (OKL); R. Scott, 46 (OKL); J. Williams, 492 (OKL); TULSA CO: H. Barclay, s.n. (TULS); M. Clark, 334 (TULS); SEQUOYAH CO: C. Wallis, 8308, (OKL); WOODS CO: P. Nighswonger, 1094 (NWOSU); U.T. Waterfall, 7109 (OKL); WOODWARD CO: T. Springer, 202 (NWOSU); J. Graber, 79 (OKL)

APPENDIX E
PTERIDOPHYTE FAMILIES AND SPECIES IN OKLAHOMA. IN
ADDITION THEIR COMMON NAMES AND HABIT.

Key to Habit information

NP=Native perennial to Oklahoma

IP= Introduced perennial to Oklahoma

NV=Native vine to Oklahoma

IP=Introduced vine to Oklahoma

Species name	Common name	Habit
True Ferns		
ASPENIACEAE		
<i>Asplenium bradleyi</i> D.C. Eaton	Bradley's Spleenwort	NP
<i>Asplenium pinnatifidum</i> Nuttall	Lobed Spleenwort	NP
<i>Asplenium platyneuron</i> (L.) Oakes	Ebony Spleenwort	NP
<i>Asplenium rhizophyllum</i> L.	Walking Fern	NP
<i>Asplenium resiliens</i> Kunze	Blackstemmed Spleenwort	NP
<i>Asplenium septentrionale</i> (L.) Hoffman	Forked Spleenwort	NP
<i>Asplenium trichomanes</i> L.	Maidenhair Spleenwort	NP
BLECHNACEAE		
<i>Woodwardia areolata</i> (L.) T. Moore	Chain Fern	NP
DENNSTAEDTIACEAE		
<i>Pteridium aquilinum</i> L.	Bracken Fern	NP
DRYOPTERIDACEAE		
<i>Athyrium felix-femina</i> (L.) Roth	Lady Fern	NP
<i>Cystopteris protrusa</i> (Weatherby) Blasdl.	Lowland Brittle Fern	NP
<i>Cystopteris tennesseensis</i> Shaver	Tennessee Fragile Fern	NP
<i>Cystopteris tenuis</i> (Michx.) Desvaux	Fragile Fern	NP
<i>Dryopteris felix-mas</i> (L.) Schott.	Male Fern	NP
<i>Dryopteris marginalis</i> (L.) Gray	Marginal Shield Fern	NP
<i>Onoclea sensibilis</i> L.	Sensitive Fern	NP
<i>Polystichum acrostichoides</i> (Michx.) Sht.	Christmas Fern	NP
<i>Woodsia neomexicana</i> Windham	Cliff Fern	NP
<i>Woodsia plummerae</i> Lemmon	Cliff Fern	NP
<i>Woodsia obtusa</i> (Sprengel) Torrey	Blunt Lobed Cliff Fern	NP
<i>Woodsia oregana</i> D.C. Eaton	Western Cliff Fern	NP

LYGODIACEAE

Lygodium japonicum (Thunb. ex Mur.) Sw. Climbing Fern IV

OPHIOGLOSSACEAE

Botrychium biternatum (Savigny) Underw. Southern Grape Fern NP
Botrychium virginianum (L.) Sw. Virginiana Grape Fern NP
Ophioglossum crotalophoroides Walter Bulbous Adder's Tongue NP
Ophioglossum engelmannii Prantl Engelmann Adder's Tongue NP
Ophioglossum nudicaule L. Slender Adder's Tongue NP
Ophioglossum petiolatum Hook. Stalked Adder's Tongue NP
Ophioglossum vulgatum L. Adder's Tongue NP

OSMUNDACEAE

Osmunda cinnamomea L. Cinnamon Fern NP
Osmunda regalis L. Royal Fern NP

PTERIDACEAE

Adiantum capillus-veneris L. Southern Maidenhair Fern NP
Adiantum pedatum L. Northern Maidenhair Fern NP
Argyrochosma dealbata (Pursh) Windham Powdery Cloak Fern NP
Astrolepis integerrima (Hook.) D. Benham Cloak Fern NP
Cheilanthes alabamensis (Buckley) Kunze Alabama Lip Fern NP
Cheilanthes eatonii Baker Eaton's Lip Fern NP
Cheilanthes feei T. Moore Slender Lip Fern NP
Cheilanthes horridula Maxon Hispid Lip Fern NP
Cheilanthes lanosa (Michx.) D.C. Eaton Hairy Lip Fern NP
Cheilanthes tomentosa Link Woolly Lip Fern NP
Cheilanthes wootonii Maxon Beaded Lip Fern NP
Notholaena standleyi Maxon Star Cloak Fern NP
Pellaea atropurpurea (L.) Link Purple Cliff Brake NP
Pellaea glabella Mettenius ex Kuhn Smooth Cliff Brake NP
Pellaea wrightiana Hook. Wright's Cliff Brake NP

POLYPODIACEAE

Pleopeltis polypodioides (L.) E. Andrews Resurrection Fern NP

THELYPTERIDACEAE

Phegopteris hexagonoptera (Michx.) Fee Broad Beech Fern NP
Thelypteris noveboracensis (L.) Nieuwland Marsh Fern NP
Thelypteris palustris Schott Marsh Fern NP

Aquatic Ferns

AZOLLACEAE

Azolla caroliniana Wildenow Mosquito Fern NP

<i>Azolla mexicana</i> Pres.	Mexican Mosquito Fern	NP
SALVINIACEAE		
<i>Salvinia natans</i> (L.) All.	Water Spangles	IP
MARSILEACEAE		
<i>Marsilea vestita</i> Hook. & Greville	Water Clover	NP
<i>Pilularia americana</i> A. Braun	American Pillwort	NP
Fern Allies		
EQUISETACEAE		
<i>Equisetum lavigatum</i> A. Braun	Smooth Scouring Rush	NP
<i>Equisetum hyemale</i> L.	Winter Scouring Rush	NP
<i>Equisetum arvense</i> L.	Field Horstail	NP
<i>Equisetum * ferrissii</i> Clute	Winter Scouring Rush	NP
ISOETACEAE		
<i>Isoetes butleri</i> Engelm.	Limestone Quillwort	NP
<i>Isoetes melanopoda</i> Gay & Dur.	Blackfooted Quillwort	NP
LYCOPODIACEAE		
<i>Lycopodiella appressa</i> (Chapm.) Cranfill	Clubmoss	NP
SELLAGINELLACEAE		
<i>Selaginella apoda</i> (L.) Spr. in Martius	Meadow Spikerush	NP
<i>Selaginella arenicola</i> L. Underw.	Sand Spikerush	NP
<i>Selaginella eclipses</i> W.R. Buck	Hidden Spikerush	NP
<i>Selaginella peruviana</i> (J. Mild.) Hier.	Spikemoss	NP
<i>Selaginella rupestris</i> (L.) Spr.	Rock Spikerush	NP
<i>Selaginella Underwoodii</i> Hier.	Underwood's Spikerush	NP

APPENDIX F
DELTA-CHARS FOR FERN FAMILIES OF OKLAHOMA

*SHOW: Fern Families of Oklahoma - character list. Revised 11 April 1997.

*CHARACTER LIST

- | | |
|---|--|
| <p>#1. plants <habit> <MANDATORY>/
 1. herbs/
 2. herbaceous twining vines/
 3. herbaceous epiphytes/
 4. terrestrial or epiphytic herbs/
 5. terrestrial herbs/</p> | <p>1. fleshy/
 2. dry/</p> |
| <p>#2. plants <habit> <MANDATORY>/
 1. perennials/
 2. annuals/</p> | <p>#15. roots <thickness>/
 1. thick/
 2. slender/</p> |
| <p>#3. plants <distinctive, general descriptors that serve to characterize the taxon>/</p> | <p>#16. roots <whether scaled>/
 1. scales present/
 2. scales absent/</p> |
| <p>#4. plants <perenniating organs>/
 1. with perenniating organs absent/
 2. from rhizomes/
 3. from stolons/
 4. from fleshy erect subterranean stems/</p> | <p>#17. stems <distinctive, general descriptors that serve to characterize the taxon>/</p> |
| <p>#5. plants <habit>/
 1. deciduous/
 2. evergreen/</p> | <p>#18. stems <branching>/
 1. not branched/
 2. branched/</p> |
| <p>#6. plants <whether cespitose>/
 1. cespitose/
 2. not cespitose/</p> | <p>#19. stems <aspect>/
 1. erect/
 2. ascending/
 3. creeping/
 4. prostrate/</p> |
| <p>#7. plants <if needlelike hairs present>/
 1. with needle-like hairs/
 2. without needle-like hairs <implicit>/</p> | <p>#20. stems <if fleshy and cormlike>/
 1. fleshy and cormlike/
 2. fleshy/
 3. not fleshy/</p> |
| <p>#8. plants <description of conspicuous indumentation of entire plant>/</p> | <p>#21. stems <if having scales>/
 1. scales present/
 2. scales absent/</p> |
| <p>#9. plants <reproductive habit>/
 1. producing sporangia in sori on abaxial surfaces of fronds/
 2. producing sporangia in 2-rowed aggregations at ends of pinnules <Lygodium>/
 3. producing sporangia in aggregations at ends of elongated stalks/</p> | <p>#22. rhizomes <distinctive general descriptors that serve to characterize the taxon>/</p> |
| <p>#10. root systems <distinctive, general descriptors that serve to characterize the taxon>/</p> | <p>#23. rhizomes <color>/
 1. brown/
 2. black/</p> |
| <p>#11. roots <color>/
 1. white/
 2. brown/
 3. black/
 4. dark brown/</p> | <p>#24. rhizomes <texture>/
 1. woody/
 2. fleshy/</p> |
| <p>#12. roots <if branching>/
 1. branching/
 2. not branching/</p> | <p>#25. rhizomes <if having persistent stipes bases, wiry roots and prominent mounds>/
 1. bearing deciduous stipe bases and wiry roots, but not forming conspicuous crowns/
 2. bearing persistent stipe bases and wiry roots to form conspicuous crowns <Osmunda>/</p> |
| <p>#13. roots <if wiry>/
 1. wiry/
 2. not wiry/</p> | <p>#26. rhizomes <if branching>/
 1. branching/
 2. not branching/</p> |
| <p>#14. roots <if fleshy>/</p> | <p>#27. rhizomes <habit and aspect>/
 1. horizontal <implicit>/
 2. erect/
 3. ascending/</p> |
| | <p>#28. rhizomes <length>/</p> |

1. short/
 2. long/
- #29. rhizomes <depth>/
1. shallow/
 2. deep/
- #30. rhizomes <thickness>/
1. thread-like/
 2. thick/
 3. slender/
- #31. rhizomes <shape in cross-section>/
1. 3-angled/
 2. lanceolate in cross-section/
 3. ovate in cross-section/
 4. elliptic in cross-section/
- #32. rhizomes <indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. with dark dense hairs/
- #33. scales <scales whether present>/
1. present/
 2. absent/
- #34. <rhizomes> scales <arrangement>/
1. in 2 or more series/
 2. in 1 series/
- #35. <rhizomes> scales <color>/
1. of 2 colors, with dark centers and transparent margins/
 2. of 2 color/
 3. of 1 colors/
- #36. scales <specific color or colors that serve to distinguish the taxon>/
- #37. <rhizomes> scales/
1. clathrate/
 2. not clathrate/
- #38. <rhizomes> scales <shape>/
1. triangular/
 2. lanceolate/
3. ovate/
 4. elliptic/
 5. linear/
 6. broadly lanceolate/
 7. subulate/
 8. linear-subulate/
- #39. <rhizomes> scales <attachment>/
1. basally attached/
 2. peltate/
- #40. <rhizomes> scales <margins>/
1. margins denticulate/
 2. margins denticulate-ciliate/
- #41. fronds <distinctive, general characters that serve to distinguish the taxon>/
- #42. fronds <monomorphic or dimorphic>/
1. all alike/
 2. all alike; each divided into sterile and fertile portions/
 3. of 2 forms, fertile and sterile different/
- #43. fronds <vernation>/
1. vernation circinate/
 2. vernation erect/
- #44. fronds <color>/
1. croziers cinnamon brown/
 2. croziers silver/
 3. croziers pale red/
 4. croziers dark purple red/
 5. croziers green/
 6. croziers wine colored/
 7. croziers silver and clawlike/
- #45. fronds <whether climbing>/
1. climbing by twining rachises/
 2. not climbing <implicit>/
- #46. fronds <length>/
1. less than 1 m long/
 2. more than 1 m long/
- #47. fronds <color>/
1. green/
 2. yellow green/
- #48. fronds <number of fronds per erect stem>/
1. 1 per erect stem/
 2. 2 per erect stem/
- #49. fronds <number per rhizome>/
1. 1 per rhizome/
 2. 2 to 11 per rhizome/
 3. 12 or more per rhizome/
- #50. fronds <distribution>/
1. basal/
 2. forming basal rosettes/
 3. cauline/
- #51. fronds <complexity> <MANDATORY IF APPLICABLE>/
1. simple/
 2. 1-pinnately compound/
 3. 2-pinnately compound/
 4. 3-pinnately compound/
 5. 4-pinnately compound/
 6. palmately compound/

- #52. fronds <whether stipitate or not>/
 1. stipitate/
 2. subsessile/
 3. sessile/
- #53. fronds <attachment to rhizome or stem>/
 1. clasping/
 2. not clasping/
- #54. fronds <aspect>/
 1. ascending/
 2. spreading/
 3. reflexed/
 4. curled/
 5. erect/
 6. lax-arching/
 7. pendent/
- #55. fronds <spacing>/
 1. imbricate/
 2. not imbricate/
- #56. blades <distinctive, general characters that serve to distinguish the taxon>/
- #57. blades <shape>/
 1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #58. blades <thickness>/
 1. thick/
 2. thin/
- #59. venation/
 1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #60. venation/
 1. veins conspicuous/
 2. veins not conspicuous/
- #61. venation <anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #62. venation/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #63. adaxial surfaces <of fronds; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #64. adaxial surfaces <of fronds; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #65. adaxial surfaces <of frond blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #66. scales <adaxial surfaces of frond blades; presence of scales>/
 1. present/
 2. absent/
- #67. scales <adaxial surfaces of frond blades; scales>/
 1. abundant/
 2. sparse/
- #68. abaxial surfaces <of frond blades; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #69. abaxial surfaces <of fronds; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #70. abaxial surfaces <of frond blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/

6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
- #71. scales <of abaxial surfaces of frond blades; scales>/
1. present/
 2. absent/
- #72. scales <of abaxial surfaces of frond blades; scales>/
1. abundant/
 2. sparse/
- #73. scales <abaxial surfaces of frond blades; scales>/
1. with reddish brown centers and transparent margins/
 2. with reddish brown centers and yellow margins/
- #74. apices <of frond blades>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #75. apices <of frond blades; whether rooting>/
1. rooting at tips/
 2. not rooting at tips/
- #76. margins <of frond blades>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
- #77. bases <of frond blades>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
9. attenuate/
10. cuneate/
- #78. bases <of frond blades>/
1. with adaxial tuft of tomentum/
 2. without adaxial tuft of tomentum/
- #79. pinnae <morphological forms>/
1. all alike/
 2. of 2 forms/
- #80. pinnae <number>/
- #81. pinnae <distinctive, general characters that serve to distinguish the taxon>/
- #82. pinnae <sessile>/
1. sessile/
 2. stalked/
- #83. pinnae <articulation>/
1. articulate with rachises/
 2. not articulate with rachises/
- #84. pinnae <arrangement>/
1. alternate/
 2. opposite/
 3. subopposite/
- #85. pinnae <aspect>/
1. perpendicular to rachises/
 2. stiffly ascending along rachises/
- #86. pinnae <complexity>/
1. simple/
 2. 1-pinnately compound/
 3. proximally compound and distally simple/
- #87. blades <of pinnae; distinctive, general characters that serve to distinguish the taxon>/
- #88. blades <of pinnae; shape>/
1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #89. blades <of pinnae; thickness>/
1. thick/
 2. thin/
- #90. venation <of pinnae>/
1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #91. venation <of pinnae>/
1. veins conspicuous/
 2. veins not conspicuous/
- #92. venation <of pinnae; anastomosing>/
1. veins anastomosing/

2. veins not anastomosing/
- #93. venation <of pinnae>/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #94. adaxial surfaces <of pinnae; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #95. adaxial surfaces <of pinnae; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #96. adaxial surfaces <of pinnae blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #97. scales <adaxial surfaces of pinnae blades; presence of scales>/
 1. present/
 2. absent/
- #98. scales <adaxial surfaces of pinnae blades; scales>/
 1. abundant/
 2. sparse/
- #99. abaxial surfaces <of pinnae blades; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #100. abaxial surfaces <of pinnae blades; farina>/
 1. farina present <Argyrochosma, Notholaena>/
 2. farina absent/
- #101. abaxial surfaces <of pinnae blades; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #102. abaxial surfaces <of pinnae blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #103. scales <of abaxial surfaces of pinnae blades; scales>/
 1. present/
 2. absent/
- #104. scales <of abaxial surfaces of pinnae blades; scales>/
 1. abundant/
 2. sparse/
- #105. scales <abaxial surfaces of pinnae blades; scales>/
 1. with reddish brown centers and transparent margins/
 2. with reddish brown centers and yellow margins/
- #106. apices <of pinnae blades>/
 1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/

- #107. margins <of pinnae blades>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #108. bases <of pinnae>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #109. bases <of pinnae blades>/
1. auricles present/
 2. auricles absent/
- #110. bases <of pinnae blades>/
1. auricles acroscopic/
 2. auricles basioscopic/
- #111. pinnules <number>/
- #112. pinnules <distinctive, general characters that serve to distinguish the taxon>/
- #113. pinnules <sessile>/
1. sessile/
 2. stalked/
- #114. pinnules <articulation>/
1. articulate with costae/
 2. not articulate with costae/
- #115. pinnules <arrangement>/
1. alternate/
 2. opposite/
 3. subopposite/
- #116. pinnules <aspect>/
1. perpendicular to costae/
 2. stiffly ascending along costae/
- #117. pinnules <complexity>/
1. simple/
 2. 1-pinnately compound/
 3. proximally compound and distally simple/
- #118. blades <of pinnules; distinctive, general characters that serve to distinguish the taxon>/
- #119. blades <of pinnules; shape>/
1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #120. venation <of pinnules>/
1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #121. venation <of pinnules>/
1. veins conspicuous/
 2. veins not conspicuous/
- #122. venation <of pinnules; anastomosing>/
1. veins anastomosing/
 2. veins not anastomosing/
- #123. venation <of pinnules>/
1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #124. adaxial surfaces <of pinnules; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #125. adaxial surfaces <of pinnules; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #126. adaxial surfaces <of pinnule blades; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/

19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #127. scales <adaxial surfaces of pinnule blades; presence of scales>/
1. present/
2. absent/
- #128. scales <adaxial surfaces of pinnule blades; scales>/
1. abundant/
2. sparse/
- #129. abaxial surfaces <of pinnule blades; color>/
1. green <implicit>/
2. white/
3. yellow/
4. light gray green/
- #130. abaxial surfaces <of pinnule blades; farina>/
1. farina present <Argyrochosma, Notholaena>/
2. farina absent/
- #131. abaxial surfaces <of pinnule blades; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #132. abaxial surfaces <of pinnule blades; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #133. scales <of abaxial surfaces of pinnule blades; scales>/
1. present/
2. absent/
- #134. scales <of abaxial surfaces of pinnule blades; scales>/
1. abundant/
2. sparse/
- #135. scales <abaxial surfaces of pinnule blades; scales>/
1. with reddish brown centers and transparent margins/
2. with reddish brown centers and yellow margins/
- #136. apices <of pinnule blades>/
1. acute/
2. rounded/
3. attenuate/
4. acuminate/
5. obtuse/
6. caudate/
7. subulate/
8. mucronate/
9. long attenuate/
- #137. margins <of pinnules>/
1. dentate/
2. crenate/
3. serrulate/
4. entire/
5. undulate/
6. lacerate/
7. pinnatifid/
8. pinnatisect/
9. pectinate/
10. denticulate/
- #138. bases <of pinnules>/
1. hastate/
2. auriculate/
3. sagittate/
4. rounded/
5. cordate/
6. truncate/
7. obtuse/
8. oblique/
9. attenuate/
10. cuneate/
11. truncate/
12. acute/
- #139. ultimate segments <number per simple frond blade>/
per blade/
- #140. ultimate segments <number per pinnules>/
per pinnule/
- #141. ultimate segments <distinctive, general characters that serve to distinguish the taxon>/
- #142. ultimate segments <articulation>/
1. articulate with costules/
2. not articulate with costules/
- #143. ultimate segments <aspect>/
1. perpendicular to costules/
2. stiffly ascending along costules/
- #144. blades <of ultimate segments; distinctive, general characters that serve to distinguish the taxon>/
- #145. blades <of ultimate segments; shape>/
1. lanceolate/
2. ovate/
3. rhomboid/
4. flabellate/
5. linear/

6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #146. venation <of ultimate segments>/
 1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #147. venation <of ultimate segments>/
 1. veins conspicuous/
 2. veins not conspicuous/
- #148. venation <of ultimate segments; anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #149. venation <of ultimate segments>/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #150. adaxial surfaces <of ultimate segments; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #151. adaxial surfaces <of ultimate segments; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #152. adaxial surfaces <of ultimate segment blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #153. scales <adaxial surfaces of ultimate segments; presence of scales>/
 1. present/
 2. absent/
- #154. scales <adaxial surfaces of ultimate segments blades; scales>/
 1. abundant/
 2. sparse/
- #155. abaxial surfaces <of ultimate segments blades; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #156. abaxial surfaces <of ultimate segments blades; farina>/
 1. farina present <Argyrochosma, Notholaena>/
 2. farina absent/
- #157. abaxial surfaces <of ultimate segments blades; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #158. abaxial surfaces <of ultimate segments blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/

- #159. scales <of abaxial surfaces of ultimate segments blades; scales>/
 1. present/
 2. absent/
- #160. scales <of abaxial surfaces of ultimate segments blades; scales>/
 1. abundant/
 2. sparse/
- #161. scales <abaxial surfaces of ultimate segments; scales>/
 1. with reddish brown centers and transparent margins/
 2. with reddish brown centers and yellow margins/
- #162. apices <of ultimate segments>/
 1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #163. margins <of ultimate segments>/
 1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #164. bases <of ultimate segments>/
 1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #165. sterile fronds <distinctive, general characters that serve to distinguish the taxon>/
- #166. sterile fronds <monomorphic or dimorphic>/
 1. all alike/
 2. of 2 forms/
- #167. sterile fronds <vernation>/
 1. vernation circinate/
 2. vernation erect/
- #168. sterile fronds <color>/
 1. croziers cinnamon brown/
 2. croziers silver/
 3. croziers pale red/
 4. croziers dark purple red/
 5. croziers green/
 6. croziers wine colored/
 7. croziers silver and clawlike/
- #169. sterile fronds <whether climbing>/
 1. climbing by twining rachises/
 2. not climbing <implicit>/
- #170. sterile fronds <length>/
 1. less than 1 m long/
 2. more than 1 m long/
- #171. sterile fronds <color>/
 1. green/
 2. yellow green/
- #172. sterile fronds <number of sterile fronds per erect stem>/
 1. 1 per erect stem/
 2. 2 per erect stem/
- #173. sterile fronds <number per rhizome>/
 1. 1 per rhizome/
 2. 2 to 11 per rhizome/
 3. 12 or more per rhizome/
- #174. sterile fronds <distribution>/
 1. basal/
 2. forming basal rosettes/
 3. cauline/
- #175. sterile fronds <complexity> <MANDATORY IF APPLICABLE>/
 1. simple/
 2. 1-pinnately compound/
 3. 2-pinnately compound/
 4. 3-pinnately compound/
 5. 4-pinnately compound/
 6. palmately compound/
- #176. sterile fronds <whether stipitate or not>/
 1. stipitate/
 2. subsessile/
 3. sessile/
- #177. sterile fronds <attachment to rhizome or stem>/
 1. clasping/
 2. not clasping/
- #178. sterile fronds <aspect>/
 1. ascending/
 2. spreading/
 3. reflexed/
 4. curled/
 5. erect/
 6. lax-arching/
 7. pendent/
- #179. sterile fronds <spacing>/
 1. imbricate/
 2. not imbricate/
- #180. blades <distinctive, general characters that serve to distinguish the taxon>/
- #181. blades <shape>/
 1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/

10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #182. blades <thickness>/
 1. thick/
 2. thin/
- #183. venation/
 1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #184. venation/
 1. veins conspicuous/
 2. veins not conspicuous/
- #185. venation <anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #186. venation/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #187. adaxial surfaces <of sterile fronds; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #188. adaxial surfaces <of sterile fronds; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #189. adaxial surfaces <of sterile frond blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #190. scales <adaxial surfaces of sterile frond blades; presence of scales>/
 1. present/
 2. absent/
- #191. scales <adaxial surfaces of sterile frond blades; scales>/
 1. abundant/
 2. sparse/
- #192. abaxial surfaces <of sterile frond; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #193. abaxial surfaces <of sterile fronds; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #194. abaxial surfaces <of sterile frond; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #195. scales <of abaxial surfaces of sterile frond blades; scales>/
 1. present/
 2. absent/
- #196. scales <of abaxial surfaces of sterile frond blades; scales>/
 1. abundant/
 2. sparse/
- #197. scales <abaxial surfaces of sterile frond blades; scales>/

1. with reddish brown centers and transparent margins/
2. with reddish brown centers and yellow margins/
- #198. apices <of sterile frond blades>/
1. acute/
2. rounded/
3. attenuate/
4. acuminate/
5. obtuse/
6. caudate/
7. subulate/
8. mucronate/
9. long attenuate/
- #199. margins <of sterile frond blades>/
1. dentate/
2. crenate/
3. serrulate/
4. entire/
5. undulate/
6. lacerate/
7. pinnatifid/
8. pinnatisect/
9. pectinate/
- #200. bases <of sterile frond blades>/
1. hastate/
2. auriculate/
3. sagittate/
4. rounded/
5. cordate/
6. truncate/
7. obtuse/
8. oblique/
9. attenuate/
10. cuneate/
- #201. bases <of sterile frond blades>/
1. with adaxial tuft of tomentum/
2. without adaxial tuft of tomentum/
- #202. segments of simple sterile fronds <number of pairs>/
pairs/
- #203. segments of simple sterile fronds <distinctive, general characters that serve to distinguish the taxon>/
- #204. segments of simple sterile fronds <arrangement>/
1. alternate/
2. opposite/
3. subopposite/
- #205. segments of simple sterile fronds <aspect>/
1. perpendicular to rachises/
2. stiffly ascending along rachises/
- #206. blades <of segments of simple sterile fronds; distinctive, general characters that serve to distinguish the taxon>/
- #207. blades <of segments of simple sterile fronds; shape>/
1. lanceolate/
2. ovate/
3. rhomboid/
4. flabellate/
5. linear/
6. deltoid/
7. elliptic/
8. oblong/
9. pentagonal/
10. oblanceolate/
11. obdeltoid/
12. reniform/
- #208. venation <of segments of simple sterile fronds>/
1. parallel/
2. pinnate/
3. palmate/
4. dichotomous/
- #209. venation <of segments of simple sterile fronds>/
1. veins conspicuous/
2. veins not conspicuous/
- #210. venation <midveins>/
1. protuding on abaxial surfaces/
2. not protuding on abaxial surfaces/
- #211. venation <secondary veins>/
1. secondary veins parallel to segments forming sori/
2. secondary veins not parallel to segments forming sori/
- #212. venation <of segments of simple sterile fronds; anastomosing>/
1. veins anastomosing/
2. veins not anastomosing/
- #213. venation <of segments of simple sterile fronds>/
1. areoles with veinlets present/
2. areoles with veinlets absent/
- #214. adaxial surfaces <of segments of simple sterile fronds; color>/
1. green <implicit>/
2. white/
3. yellow/
4. dark green/
- #215. adaxial surfaces <of segments of simple sterile fronds; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #216. adaxial surfaces <of segments of simple sterile frond blades; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/

14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
- #217. scales <adaxial surfaces of segments of simple sterile frond blades; presence of scales>/
1. present/
 2. absent/
- #218. scales <adaxial surfaces of segments of simple sterile frond blades; scales>/
1. abundant/
 2. sparse/
- #219. abaxial surfaces <of segments of simple sterile frond blades; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #220. abaxial surfaces <of segments of simple sterile frond blades; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #221. abaxial surfaces <of segments of simple sterile frond blades; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #222. scales <of abaxial surfaces of segments of simple sterile frond blades; scales>/
1. present/
 2. absent/
- #223. scales <of abaxial surfaces of segments of simple sterile frond blades; scales>/
1. abundant/
 2. sparse/
- #224. apices <of segments of simple sterile fronds blades>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #225. margins <of segments of simple sterile fronds>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
 11. serrate/
- #226. margins <of segments of simple sterile fronds>/
1. lowest pair of lobes longest/
 2. second pair of lobes longest/
 3. third pair of lobes longest/
- #227. bases <of segments of simple sterile fronds>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #228. pinnae of sterile fronds <number>/
- #229. pinnae of sterile fronds <pinnae distinctive characters that serve distinguish the taxon>/
- #230. pinnae of sterile fronds <sessile>/
1. sessile/
 2. stalked/
- #231. pinnae of sterile fronds <articulation>/
1. articulate with rachises/
 2. not articulate with rachises/
- #232. pinnae of sterile fronds <arrangement>/
1. alternate/
 2. opposite/
 3. subopposite/

- #233. pinnae of sterile fronds <aspect>/
 1. perpendicular to rachises/
 2. stiffly ascending along rachises/
- #234. pinnae of sterile fronds <complexity>/
 1. simple/
 2. 1-pinnately compound/
 3. proximally compound and distally simple/
- #235. blades <of sterile pinnae; distinctive, general characters that serve to distinguish the taxon>/
- #236. blades <of sterile pinnae; shape>/
 1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #237. blades <of sterile pinnae; thickness>/
 1. thick/
 2. thin/
- #238. venation <of sterile pinnae>/
 1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #239. venation <of sterile pinnae>/
 1. veins conspicuous/
 2. veins not conspicuous/
- #240. venation <of sterile pinnae; anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #241. venation <of sterile pinnae>/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #242. adaxial surfaces <of sterile pinnae; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #243. adaxial surfaces <of sterile pinnae; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #244. adaxial surfaces <of pinnae of sterile fronds blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #245. scales <adaxial surfaces of pinnae of sterile fronds blades; presence of scales>/
 1. present/
 2. absent/
- #246. scales <adaxial surfaces of pinnae of sterile fronds blades; scales>/
 1. abundant/
 2. sparse/
- #247. abaxial surfaces <of pinnae of sterile fronds blades; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #248. abaxial surfaces <of pinnae of sterile fronds blades; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #249. abaxial surfaces <of pinnae of sterile fronds blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/

10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #250. scales <of abaxial surfaces of pinnae of sterile fronds blades; scales>/
1. present/
 2. absent/
- #251. scales <of abaxial surfaces of pinnae of sterile fronds blades; scales>/
1. abundant/
 2. sparse/
- #252. apices <of pinnae of sterile fronds blades>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #253. margins <of pinnae of sterile fronds blades>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #254. bases <of sterile pinnae>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #255. bases <of pinnae of sterile fronds blades>/
1. auricles present/
 2. auricles absent/
- #256. bases <of pinnae of sterile fronds blades>/
1. auricles acroscopic/
 2. auricles basioscopic/
- #257. bases <of sterile pinnae, whether tapered>/
1. tapered to axes/
 2. not tapered to axes/
- #258. pinnules of sterile fronds <number>/
- #259. pinnules of sterile fronds <pinnae distinctive characters that serve to distinguish the taxon>/
- #260. pinnules of sterile fronds <sessile>/
1. sessile/
 2. stalked/
- #261. pinnules of sterile fronds <articulation>/
1. articulate with rachises/
 2. not articulate with rachises/
- #262. pinnules of sterile fronds <arrangement>/
1. alternate/
 2. opposite/
 3. subopposite/
- #263. pinnules of sterile fronds <aspect>/
1. perpendicular to rachises/
 2. stiffly ascending along rachises/
- #264. pinnules of sterile fronds <complexity>/
1. simple/
 2. 1-pinnately compound/
 3. proximally compound and distally simple/
- #265. blades <of sterile pinnules; distinctive, general characters that serve to distinguish the taxon>/
- #266. blades <of sterile pinnules; shape>/
1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #267. blades <of sterile pinnules; thickness>/
1. thick/
 2. thin/
- #268. venation <of sterile pinnules>/
1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #269. venation <of sterile pinnules>/
1. veins conspicuous/
 2. veins not conspicuous/
- #270. venation <of sterile pinnules; anastomosing>/
1. veins anastomosing/
 2. veins not anastomosing/
- #271. venation <of sterile pinnules>/

1. areoles with veinlets present/
2. areoles with veinlets absent/
- #272. adaxial surfaces <of sterile pinnules; color>/
1. green <implicit>/
2. white/
3. yellow/
4. dark green/
- #273. adaxial surfaces <of sterile pinnules; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #274. adaxial surfaces <of pinnules of sterile frond blades; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #275. scales <adaxial surfaces of pinnules of sterile frond blades; presence of scales>/
1. present/
2. absent/
- #276. scales <adaxial surfaces of pinnules of sterile frond blades; scales>/
1. abundant/
2. sparse/
- #277. abaxial surfaces <of pinnules of sterile fronds blades; color>/
1. green <implicit>/
2. white/
3. yellow/
4. light gray green/
- #278. abaxial surfaces <of pinnules of sterile frond blades; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #279. abaxial surfaces <of pinnules of sterile fronds blades; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #280. scales <of abaxial surfaces of pinnules of sterile frond blades; scales>/
1. present/
2. absent/
- #281. scales <of abaxial surfaces of pinnules of sterile frond blades; scales>/
1. abundant/
2. sparse/
- #282. apices <of pinnules of sterile frond blades>/
1. acute/
2. rounded/
3. attenuate/
4. acuminate/
5. obtuse/
6. caudate/
7. subulate/
8. mucronate/
9. long attenuate/
- #283. margins <of pinnules of sterile frond blades>/
1. dentate/
2. crenate/
3. serrulate/

4. entire/
5. undulate/
6. lacerate/
7. pinnatifid/
8. pinnatisect/
9. pectinate/
10. denticulate/
- #284. bases <of sterile pinnae>/
1. hastate/
2. auriculate/
3. sagittate/
4. rounded/
5. cordate/
6. truncate/
7. obtuse/
8. oblique/
9. attenuate/
10. cuneate/
11. truncate/
12. acute/
- #285. bases <of pinnules of sterile frond blades>/
1. auricles present/
2. auricles absent/
- #286. bases <of pinnules of sterile frond blades>/
1. auricles acroscopic/
2. auricles basioscopic/
- #287. bases <of pinnules of sterile frond blades, whether tapered>/
1. tapered to axes/
2. not tapered to axes/
- #288. ultimate segments <number per pinnule of sterile fronds>/ per pinnule/
- #289. ultimate segments <of sterile fronds; distinctive, general characters that serve to distinguish the taxon>/
- #290. ultimate segments <of sterile fronds; darticulation>/
1. articulate with costules/
2. not articulate with costules/
- #291. ultimate segments <of sterile fronds; aspect>/
1. perpendicular to costules/
2. stiffly ascending along costules/
- #292. blades <of ultimate segments of sterile fronds; distinctive, general characters that serve to distinguish the taxon>/
- #293. blades <of ultimate segments of sterile fronds; shape>/
1. lanceolate/
2. ovate/
3. rhomboid/
4. flabellate/
5. linear/
6. deltoid/
7. elliptic/
8. oblong/
9. pentagonal/
10. oblanceolate/
11. obdeltoid/
12. reniform/
- #294. venation <of ultimate segments of sterile fronds>/
1. parallel/
2. pinnate/
3. palmate/
4. dichotomous/
- #295. venation <of ultimate segments of sterile fronds>/
1. veins conspicuous/
2. veins not conspicuous/
- #296. venation <of ultimate segments of sterile fronds; anastomosing>/
1. veins anastomosing/
2. veins not anastomosing/
- #297. venation <of ultimate segments of sterile fronds>/
1. areoles with veinlets present/
2. areoles with veinlets absent/
- #298. adaxial surfaces <of ultimate segments of sterile fronds; color>/
1. green <implicit>/
2. white/
3. yellow/
4. dark green/
- #299. adaxial surfaces <of ultimate segments of sterile fronds; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #300. adaxial surfaces < of ultimate segment blades of sterile fronds; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #301. scales <adaxial surfaces of ultimate segments of sterile fronds; presence of scales>/
1. present/

2. absent/
- #302. scales <adaxial surfaces of ultimate segments of sterile fronds; scales>/
1. abundant/
 2. sparse/
- #303. abaxial surfaces <of ultimate segments of sterile fronds; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #304. abaxial surfaces <of ultimate segments of sterile fronds; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #305. abaxial surfaces <of ultimate segments of sterile fronds; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #306. scales <of abaxial surfaces of ultimate segments of sterile fronds; scales>/
1. present/
 2. absent/
- #307. scales <of abaxial surfaces of ultimate segments of sterile fronds; scales>/
1. abundant/
 2. sparse/
- #308. apices <of ultimate segments of sterile fronds>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #309. margins <of ultimate segments of sterile fronds>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #310. bases <of ultimate segments of sterile fronds>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #311. fertile fronds <distinctive, general characters that serve to distinguish the taxon>/
- #312. fertile fronds <monomorphic or dimorphic>/
1. all alike/
 2. of 2 forms/
- #313. fertile fronds <vernation>/
1. vernation circinate/
 2. vernation erect/
- #314. fertile fronds <color>/
1. croziers cinnamon brown/
 2. croziers silver/
 3. croziers pale red/
 4. croziers dark purple red/
 5. croziers green/
 6. croziers wine colored/
 7. croziers silver and clawlike/
- #315. fertile fronds <whether climbing>/
1. climbing by twining rachises/
 2. not climbing <implicit>/
- #316. fertile fronds <length>/
1. less than 1 m long/
 2. more than 1 m long/
- #317. fertile fronds <color>/
1. green/
 2. yellow green/
- #318. fertile fronds <number of fertile fronds per erect stem>/
1. 1 per erect stem/
 2. 2 per erect stem/

- #319. fertile fronds <number per rhizome>/
 1. 1 per rhizome/
 2. 2 to 11 per rhizome/
 3. 12 or more per rhizome/
- #320. fertile fronds <distribution>/
 1. basal/
 2. forming basal rosettes/
 3. cauline/
- #321. fertile fronds <complexity> <MANDATORY IF APPLICABLE>/
 1. simple/
 2. 1-pinnately compound/
 3. 2-pinnately compound/
 4. 3-pinnately compound/
 5. 4-pinnately compound/
 6. palmately compound/
- #322. fertile fronds <whether stipitate or not>/
 1. stipitate/
 2. subsessile/
 3. sessile/
- #323. fertile fronds <attachment to rhizome or stem>/
 1. clasping/
 2. not clasping/
- #324. fertile fronds <aspect>/
 1. ascending/
 2. spreading/
 3. reflexed/
 4. curled/
 5. erect/
 6. lax-arching/
 7. pendent/
- #325. fertile fronds <spacing>/
 1. imbricate/
 2. not imbricate/
- #326. blades <distinctive, general characters that serve to distinguish the taxon>/
- #327. blades <shape>/
 1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #328. blades <thickness>/
 1. thick/
 2. thin/
- #329. venation/
 1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #330. venation/
 1. veins conspicuous/
 2. veins not conspicuous/
- #331. venation <anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #332. venation/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #333. adaxial surfaces <of fertile fronds; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #334. adaxial surfaces <of fertile fronds; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #335. adaxial surfaces <of fertile frond blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #336. scales <adaxial surfaces of fertile frond blades; presence of scales>/
 1. present/
 2. absent/
- #337. scales <adaxial surfaces of fertile frond blades; scales>/
 1. abundant/
 2. sparse/
- #338. abaxial surfaces <of fertile frond; color>/
 1. green <implicit>/
 2. white/
 3. yellow/

4. light gray green/
- #339. abaxial surfaces <of fertile fronds; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #340. abaxial surfaces <of fertile frond; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #341. scales <of abaxial surfaces of fertile frond blades; scales>/
1. present/
 2. absent/
- #342. scales <of abaxial surfaces of fertile frond blades; scales>/
1. abundant/
 2. sparse/
- #343. scales <abaxial surfaces of fertile frond blades; scales>/
1. with reddish brown centers and transparent margins/
 2. with reddish brown centers and yellow margins/
- #344. apices <of fertile frond blades>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #345. margins <of fertile frond blades>/
1. dentate/
2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
- #346. bases <of fertile frond blades>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
- #347. bases <of fertile frond blades>/
1. with adaxial tuft of tomentum/
 2. without adaxial tuft of tomentum/
- #348. segments of simple fertile fronds <number of pairs>/
- pairs/
- #349. segments of simple fertile fronds <distinctive, general characters that serve to distinguish the taxon>/
- #350. segments of simple fertile fronds <arrangement>/
1. alternate/
 2. opposite/
 3. subopposite/
- #351. segments of simple fertile fronds <aspect>/
1. perpendicular to rachises/
 2. stiffly ascending along rachises/
- #352. blades <of segments of simple fertile fronds; distinctive, general characters that serve to distinguish the taxon>/
- #353. blades <of segments of simple fertile fronds; shape>/
1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #354. venation <of segments of simple fertile fronds>/
1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #355. venation <of segments of simple fertile fronds>/
1. veins conspicuous/
 2. veins not conspicuous/
- #356. venation <midveins>/
1. protruding on abaxial surfaces/
 2. not protruding on abaxial surfaces/

- #357. venation <secondary veins>/
 1. secondary veins parallel to segments forming sori/
 2. secondary veins not parallel to segments forming sori/
- #358. venation <of segments of simple fertile fronds; anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #359. venation <of segments of simple fertile fronds>/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #360. adaxial surfaces <of segments of simple fertile fronds; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #361. adaxial surfaces <of segments of simple fertile fronds; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #362. adaxial surfaces <of segments of simple fertile frond blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #363. scales <adaxial surfaces of segments of simple fertile frond blades; presence of scales>/
 1. present/
 2. absent/
- #364. scales <adaxial surfaces of segments of simple fertile frond blades; scales>/
 1. abundant/
 2. sparse/
- #365. abaxial surfaces <of segments of simple fertile frond blades; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #366. abaxial surfaces <of segments of simple fertile frond blades; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #367. abaxial surfaces <of segments of simple fertile frond blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #368. scales <of abaxial surfaces of segments of simple fertile frond blades; scales>/
 1. present/
 2. absent/
- #369. scales <of abaxial surfaces of segments of simple fertile frond blades; scales>/
 1. abundant/
 2. sparse/
- #370. apices <of segments of simple fertile fronds blades>/
 1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/

5. obtuse/
6. caudate/
7. subulate/
8. mucronate/
9. long attenuate/
- #371. margins <of segments of simple fertile fronds>/
1. dentate/
2. crenate/
3. serrulate/
4. entire/
5. undulate/
6. lacerate/
7. pinnatifid/
8. pinnatisect/
9. pectinate/
10. denticulate/
11. serrate/
- #372. margins <of segments of simple fertile fronds>/
1. lowest pair of lobes longest/
2. second pair of lobes longest/
3. third pair of lobes longest/
- #373. bases <of segments of simple fertile fronds>/
1. hastate/
2. auriculate/
3. sagittate/
4. rounded/
5. cordate/
6. truncate/
7. obtuse/
8. oblique/
9. attenuate/
10. cuneate/
11. truncate/
12. acute/
- #374. pinnae of fertile fronds <number>/
- #375. pinnae of fertile fronds <pinnae distinctive characters that serve distinguish the taxon>/
- #376. pinnae of fertile fronds <sessile>/
1. sessile/
2. stalked/
- #377. pinnae of fertile fronds <articulation>/
1. articulate with rachises/
2. not articulate with rachises/
- #378. pinnae of fertile fronds <arrangement>/
1. alternate/
2. opposite/
3. subopposite/
- #379. pinnae of fertile fronds <aspect>/
1. perpendicular to rachises/
2. stiffly ascending along rachises/
- #380. pinnae of fertile fronds <complexity>/
1. simple/
2. 1-pinnately compound/
3. proximally compound and distally simple/
- #381. blades <of fertile pinnae; distinctive, general characters that serve to distinguish the taxon>/
- #382. blades <of fertile pinnae; shape>/
1. lanceolate/
2. ovate/
3. rhomboid/
4. flabellate/
5. linear/
6. deltoid/
7. elliptic/
8. oblong/
9. pentagonal/
10. oblanceolate/
11. obdeltoid/
12. reniform/
- #383. blades <of fertile pinnae; thickness>/
1. thick/
2. thin/
- #384. venation <of fertile pinnae>/
1. parallel/
2. pinnate/
3. palmate/
4. dichotomous/
- #385. venation <of fertile pinnae>/
1. veins conspicuous/
2. veins not conspicuous/
- #386. venation <of fertile pinnae; anastomosing>/
1. veins anastomosing/
2. veins not anastomosing/
- #387. venation <of fertile pinnae>/
1. areoles with veinlets present/
2. areoles with veinlets absent/
- #388. adaxial surfaces <of fertile pinnae; color>/
1. green <implicit>/
2. white/
3. yellow/
4. dark green/
- #389. adaxial surfaces <of fertile pinnae; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #390. adaxial surfaces <of pinnae of fertile fronds blades; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/

13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #391. scales <adaxial surfaces of pinnae of fertile fronds blades; presence of scales>/
1. present/
 2. absent/
- #392. scales <adaxial surfaces of pinnae of fertile fronds blades; scales>/
1. abundant/
 2. sparse/
- #393. abaxial surfaces <of pinnae of fertile fronds blades; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #394. abaxial surfaces <of pinnae of fertile fronds blades; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #395. abaxial surfaces <of pinnae of fertile fronds blades; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight tri-
chomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled tri-
chomes; cobwebby>/

13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #396. scales <of abaxial surfaces of pinnae of fertile fronds blades; scales>/
1. present/
 2. absent/
- #397. scales <of abaxial surfaces of pinnae of fertile fronds blades; scales>/
1. abundant/
 2. sparse/
- #398. apices <of pinnae of fertile fronds blades>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #399. margins <of pinnae of fertile fronds blades>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #400. bases <of fertile pinnae>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #401. bases <of pinnae of fertile fronds blades>/
1. auricles present/
 2. auricles absent/
- #402. bases <of pinnae of fertile fronds blades>/
1. auricles acroscopic/

2. auricles basioscopic/
- #403. bases <of fertile pinnae, whether tapered>/
 1. tapered to axes/
 2. not tapered to axes/
- #404. pinnules of fertile fronds <number>/
- #405. pinnules of fertile fronds <pinnae distinctive characters that serve to distinguish the taxon>/
- #406. pinnules of fertile fronds <sessile>/
 1. sessile/
 2. stalked/
- #407. pinnules of fertile fronds <articulation>/
 1. articulate with rachises/
 2. not articulate with rachises/
- #408. pinnules of fertile fronds <arrangement>/
 1. alternate/
 2. opposite/
 3. subopposite/
- #409. pinnules of fertile fronds <aspect>/
 1. perpendicular to rachises/
 2. stiffly ascending along rachises/
- #410. pinnules of fertile fronds <complexity>/
 1. simple/
 2. 1-pinnately compound/
 3. proximally compound and distally simple/
- #411. blades <of fertile pinnules; distinctive, general characters that serve to distinguish the taxon>/
- #412. blades <of fertile pinnules; shape>/
 1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #413. blades <of fertile pinnules; thickness>/
 1. thick/
 2. thin/
- #414. venation <of fertile pinnules>/
 1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #415. venation <of fertile pinnules>/
 1. veins conspicuous/
 2. veins not conspicuous/
- #416. venation <of fertile pinnules; anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #417. venation <of fertile pinnules>/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #418. adaxial surfaces <of fertile pinnules; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #419. adaxial surfaces <of fertile pinnules; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #420. adaxial surfaces <of pinnules of fertile frond blades; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #421. scales <adaxial surfaces of pinnules of fertile frond blades; presence of scales>/
 1. present/
 2. absent/
- #422. scales <adaxial surfaces of pinnules of fertile frond blades; scales>/
 1. abundant/
 2. sparse/
- #423. abaxial surfaces <of pinnules of fertile fronds blades; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #424. abaxial surfaces <of pinnules of fertile frond blades; nature>/

1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #425. abaxial surfaces <of pinnules of fertile fronds blades; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #426. scales <of abaxial surfaces of pinnules of fertile frond blades; scales>/
1. present/
 2. absent/
- #427. scales <of abaxial surfaces of pinnules of fertile frond blades; scales>/
1. abundant/
 2. sparse/
- #428. apices <of pinnules of fertile frond blades>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #429. margins <of pinnules of fertile frond blades>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #430. bases <of fertile pinnae>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #431. bases <of pinnules of fertile frond blades>/
1. auricles present/
 2. auricles absent/
- #432. bases <of pinnules of fertile frond blades>/
1. auricles acroscopic/
 2. auricles basioscopic/
- #433. bases <of pinnules of fertile frond blades, whether tapered>/
1. tapered to axes/
 2. not tapered to axes/
- #434. ultimate segments <number per pinnule of fertile fronds >/per pinnule/
- #435. ultimate segments <of fertile fronds; distinctive, general characters that serve to distinguish the taxon>/
- #436. ultimate segments <of fertile fronds; darticulation>/
1. articulate with costules/
 2. not articulate with costules/
- #437. ultimate segments <of fertile fronds; aspect>/
1. perpendicular to costules/
 2. stiffly ascending along costules/
- #438. blades <of ultimate segments of fertile fronds; distinctive, general characters that serve to distinguish the taxon>/
- #439. blades <of ultimate segments of fertile fronds; shape>/
1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #440. venation <of ultimate segments of fertile fronds>/
1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/

- #441. venation <of ultimate segments of fertile fronds>/
 1. veins conspicuous/
 2. veins not conspicuous/
- #442. venation <of ultimate segments of fertile fronds; anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #443. venation <of ultimate segments of fertile fronds>/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #444. adaxial surfaces <of ultimate segments of fertile fronds; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #445. adaxial surfaces <of ultimate segments of fertile fronds; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #446. adaxial surfaces <of ultimate segment blades of fertile fronds; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #447. scales <adaxial surfaces of ultimate segments of fertile fronds; presence of scales>/
 1. present/
 2. absent/
- #448. scales <adaxial surfaces of ultimate segments of fertile fronds; scales>/
 1. abundant/
 2. sparse/
- #449. abaxial surfaces <of ultimate segments of fertile fronds; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #450. abaxial surfaces <of ultimate segments of fertile fronds; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #451. abaxial surfaces <of ultimate segments of fertile fronds; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #452. scales <of abaxial surfaces of ultimate segments of fertile fronds; scales>/
 1. present/
 2. absent/
- #453. scales <of abaxial surfaces of ultimate segments of fertile fronds; scales>/
 1. abundant/
 2. sparse/
- #454. apices <of ultimate segments of fertile fronds>/
 1. acute/
 2. rounded/

3. attenuate/
4. acuminate/
5. obtuse/
6. caudate/
7. subulate/
8. mucronate/
9. long attenuate/
- #455. margins <of ultimate segments of fertile fronds>/
1. dentate/
2. crenate/
3. serrulate/
4. entire/
5. undulate/
6. lacerate/
7. pinnatifid/
8. pinnatisect/
9. pectinate/
10. denticulate/
- #456. bases <of ultimate segments of fertile fronds>/
1. hastate/
2. auriculate/
3. sagittate/
4. rounded/
5. cordate/
6. truncate/
7. obtuse/
8. oblique/
9. attenuate/
10. cuneate/
11. truncate/
12. acute/
- #457. sterile portions <distinctive, general characters that serve to distinguish the taxon>/
- #458. sterile portions <monomorphic or dimorphic>/
1. all alike/
2. of 2 forms/
- #459. sterile portions <vernation>/
1. vernation circinate/
2. vernation erect/
- #460. sterile portions <color>/
1. croziers cinnamon brown/
2. croziers silver/
3. croziers pale red/
4. croziers dark purple red/
5. croziers green/
6. croziers wine colored/
7. croziers silver and clawlike/
- #461. sterile portions <whether climbing>/
1. climbing by twining rachises/
2. not climbing <implicit>/
- #462. sterile portions <length>/
1. less than 1 m long/
2. more than 1 m long/
- #463. sterile portions <color>/
1. green/
2. yellow green/
- #464. sterile portions <number of sterile portions per erect stem>/
1. 1 per frond/
2. 2 per frond/
- #465. sterile portions <number per rhizome>/
1. 1 per rhizome/
2. 2 to 11 per rhizome/
3. 12 or more per rhizome/
- #466. sterile portions <distribution>/
1. basal/
2. forming basal rosettes/
3. cauline/
- #467. sterile portions <complexity> <MANDATORY IF APPLICABLE>/
1. simple/
2. 1-pinnately compound/
3. 2-pinnately compound/
4. 3-pinnately compound/
5. 4-pinnately compound/
6. palmately compound/
- #468. sterile portions <whether stalked or not, stalked and origin in relation to common stipe>/
1. stalked/
2. subsessile/
3. sessile/
- #469. sterile portions <attachment to rhizome or stem>/
1. clasping/
2. not clasping/
- #470. sterile portions <aspect>/
1. ascending/
2. prostrate/
3. reflexed/
4. curled/
5. erect/
6. lax-arching/
7. pendent/
- #471. sterile portions <imbricate>/
1. imbricated/
2. not imbricated/
- #472. blades <distinctive, general characters that serve to distinguish the taxon>/
- #473. blades <shape>/
1. lanceolate/
2. ovate/
3. rhomboid/
4. flabellate/
5. linear/
6. deltoid/
7. elliptic/
8. oblong/
9. pentagonal/
10. oblanceolate/
11. obdeltoid/
12. reniform/
- #474. blades <thickness>/
1. thick/
2. thin/
- #475. venation/
1. parallel/
2. pinnate/
3. palmate/
4. dichotomous/
- #476. venation/
1. veins conspicuous/

2. veins not conspicuous/
- #477. venation <anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #478. venation/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #479. adaxial surfaces <of sterile portions; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #480. adaxial surfaces <of sterile portions; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #481. adaxial surfaces <of sterile portions; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #482. scales <adaxial surfaces of sterile portions; presence of scales>/
 1. present/
 2. absent/
- #483. scales <adaxial surfaces of sterile portions; scales>/
 1. abundant/
 2. sparse/
- #484. abaxial surfaces <of sterile portions; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
4. light gray green/
- #485. abaxial surfaces <of sterile portions; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #486. abaxial surfaces <of sterile portions; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #487. scales <of abaxial surfaces of sterile portions; scales>/
 1. present/
 2. absent/
- #488. scales <of abaxial surfaces of sterile portions; scales>/
 1. abundant/
 2. sparse/
- #489. scales <abaxial surfaces of sterile portions; scales>/
 1. clathrate/
 2. not clathrate/
- #490. apices <of sterile portions>/
 1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #491. margins <of sterile portions>/
 1. dentate/
 2. crenate/
 3. serrulate/

4. entire/
5. undulate/
6. lacerate/
7. pinnatifid/
8. pinnatisect/
9. pectinate/
- #492. bases <of sterile portions>/
1. hastate/
2. auriculate/
3. sagittate/
4. rounded/
5. cordate/
6. truncate/
7. obtuse/
8. oblique/
9. attenuate/
10. cuneate/
- #493. bases <of sterile portions>/
1. with adaxial tuft of tomentum/
2. without adaxial tuft of tomentum/
- #494. segments of simple sterile portions <number of pairs>/
pairs/
- #495. segments of simple sterile portions <distinctive, general characters that serve to distinguish the taxon>/
- #496. segments of simple sterile portions <arrangement>/
1. alternate/
2. opposite/
3. subopposite/
- #497. segments of simple sterile portions <aspect>/
1. perpendicular to rachises/
2. stiffly ascending along rachises/
- #498. blades <of segments of simple sterile portions; distinctive, general characters that serve to distinguish the taxon>/
- #499. blades <of segments of simple sterile portions; shape>/
1. lanceolate/
2. ovate/
3. rhomboid/
4. flabellate/
5. linear/
6. deltoid/
7. elliptic/
8. oblong/
9. pentagonal/
10. oblanceolate/
11. obdeltoid/
12. reniform/
- #500. venation <of segments of simple sterile portions>/
1. parallel/
2. pinnate/
3. palmate/
4. dichotomous/
- #501. venation <of segments of simple sterile portions>/
1. veins conspicuous/
2. veins not conspicuous/
- #502. venation <midveins>/
1. protuding on abaxial surfaces/
2. not protuding on abaxial surfaces/
- #503. venation <secondary veins>/
1. secondary veins parallel to segments forming sori/
2. secondary veins not parallel to segments forming sori/
- #504. venation <of segments of simple sterile portions; anastomosing>/
1. veins anastomosing/
2. veins not anastomosing/
- #505. venation <of segments of simple sterile portions>/
1. areoles with veinlets present/
2. areoles with veinlets absent/
- #506. adaxial surfaces <of segments of simple sterile portions; color>/
1. green <implicit>/
2. white/
3. yellow/
4. dark green/
- #507. adaxial surfaces <of segments of simple sterile portions; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #508. adaxial surfaces <of segments of simple sterile portions; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvet>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
- #509. scales <adaxial surfaces of segments of simple sterile portions; presence of scales>/
1. present/
2. absent/
- #510. scales <adaxial surfaces of segments of simple sterile portions; scales>/
1. abundant/

2. sparse/
- #511. abaxial surfaces <of segments of simple sterile portions; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #512. abaxial surfaces <of segments of simple sterile portions; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #513. abaxial surfaces <of segments of simple sterile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #514. scales <of abaxial surfaces of segments of simple sterile portions; scales>/
1. present/
 2. absent/
- #515. scales <of abaxial surfaces of segments of simple sterile portions; scales>/
1. abundant/
 2. sparse/
- #516. apices <of segments of simple sterile portions >/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
8. mucronate/
9. long attenuate/
- #517. margins <of segments of simple sterile portions>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
 11. serrate/
- #518. margins <of segments of simple sterile portions>/
1. lowest pair of lobes longest/
 2. second pair of lobes longest/
 3. third pair of lobes longest/
- #519. bases <of segments of simple sterile portions>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #520. pinnae of sterile portions <number>/
- #521. pinnae of sterile portions <pinnae distinctive characters that serve to distinguish the taxon>/
- #522. pinnae of sterile portions <sessile>/
1. sessile/
 2. stalked/
- #523. pinnae of sterile portions <articulation>/
1. articulate with rachises/
 2. not articulate with rachises/
- #524. pinnae of sterile portions <arrangement>/
1. alternate/
 2. opposite/
 3. subopposite/
- #525. pinnae of sterile portions <aspect>/
1. perpendicular to rachises/
 2. stiffly ascending along rachises/
- #526. pinnae of sterile portions <complexity>/
1. simple/
 2. 1-pinnately compound/
 3. proximally compound and distally simple/
- #527. blades <of sterile pinnae portions; distinctive, general characters that serve to distinguish the taxon>/
- #528. blades <of sterile pinnae portions; shape>/
1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/

6. deltoid/
7. elliptic/
8. oblong/
9. pentagonal/
10. oblanceolate/
11. obdeltoid/
12. reniform/
- #529. blades <of sterile pinnae portions; thickness>/
1. thick/
2. thin/
- #530. venation <of sterile pinnae portions>/
1. parallel/
2. pinnate/
3. palmate/
4. dichotomous/
- #531. venation <of sterile pinnae portions>/
1. veins conspicuous/
2. veins not conspicuous/
- #532. venation <of sterile pinnae portions; anastomosing>/
1. veins anastomosing/
2. veins not anastomosing/
- #533. venation <of sterile pinnae portions>/
1. areoles with veinlets present/
2. areoles with veinlets absent/
- #534. adaxial surfaces <of sterile pinnae portions; color>/
1. green <implicit>/
2. white/
3. yellow/
4. dark green/
- #535. adaxial surfaces <of sterile pinnae portions; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #536. adaxial surfaces <of pinnae of sterile portions ;
indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid
trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes;
velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight
trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly
trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight
trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely
entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending,
straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or
ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or
sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base
or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #537. scales <adaxial surfaces of pinnae of sterile portions ;
presence of scales>/
1. present/
2. absent/
- #538. scales <adaxial surfaces of pinnae of sterile portions;
scales>/
1. abundant/
2. sparse/
- #539. abaxial surfaces <of pinnae of sterile portions; color>/
1. green <implicit>/
2. white/
3. yellow/
4. light gray green/
- #540. abaxial surfaces <of pinnae of sterile portions ; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #541. abaxial surfaces <of pinnae of sterile portions;
indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid
trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes;
velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight
trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly
trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight
trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely
entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending,
straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or
ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or
sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base
or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/

- #542. scales <of abaxial surfaces of pinnae of sterile portions; scales>/
 1. present/
 2. absent/
- #543. scales <of abaxial surfaces of pinnae of sterile portions; scales>/
 1. abundant/
 2. sparse/
- #544. apices <of pinnae of sterile portions>/
 1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #545. margins <of pinnae of sterile portions >/
 1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #546. bases <of sterile pinnae portions>/
 1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #547. bases <of pinnae of sterile portions >/
 1. auricles present/
 2. auricles absent/
- #548. bases <of pinnae of sterile portions blades>/
 1. auricles acroscopic/
 2. auricles basioscopic/
- #549. bases <of pinnae of sterile portions, whether tapered>/
 1. tapered to axes/
 2. not tapered to axes/
- #550. pinnules of sterile portions <number>/
- #551. pinnules of sterile portions <pinnae distinctive characters that serve distinguish the taxon>/
- #552. pinnules of sterile portions <sessile>/
 1. sessile/
 2. stalked/
- #553. pinnules of sterile portions <articulation>/
 1. articulate with rachises/
 2. not articulate with rachises/
- #554. pinnules of sterile portions <arrangement>/
 1. alternate/
 2. opposite/
 3. subopposite/
- #555. pinnules of sterile portions <aspect>/
 1. perpendicular to rachises/
 2. stiffly ascending along rachises/
- #556. pinnules of sterile portions <complexity>/
 1. simple/
 2. 1-pinnately compound/
 3. proximally compound and distally simple/
- #557. blades <of pinnules of sterile portions; distinctive, general characters that serve to distinguish the taxon>/
- #558. blades <of pinnules of sterile portions; shape>/
 1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #559. blades <of pinnules of sterile portions; thickness>/
 1. thick/
 2. thin/
- #560. venation <of pinnules of sterile portions>/
 1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #561. venation <of pinnules of sterile portions>/
 1. veins conspicuous/
 2. veins not conspicuous/
- #562. venation <of pinnules of sterile portions; anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #563. venation <of pinnules sterile portions>/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #564. adaxial surfaces <of pinnules sterile portions; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #565. adaxial surfaces <of pinnules of sterile portions; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/

- #566. adaxial surfaces <of pinnules of sterile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #567. scales <adaxial surfaces of pinnules of sterile portions; presence of scales>/
1. present/
 2. absent/
- #568. scales <adaxial surfaces of pinnules of sterile portions; scales>/
1. abundant/
 2. sparse/
- #569. abaxial surfaces <of pinnules of sterile portions ; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #570. abaxial surfaces <of pinnules of sterile portions; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #571. abaxial surfaces <of pinnules of sterile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #572. scales <of abaxial surfaces of pinnules of sterile portions; scales>/
1. present/
 2. absent/
- #573. scales <of abaxial surfaces of pinnules of sterile portions; scales>/
1. abundant/
 2. sparse/
- #574. apices <of pinnules of sterile portions>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #575. margins <of pinnules of sterile portions>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #576. bases <of pinnae of sterile portions >/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/

- #577. bases <of pinnules of sterile portions>/
 1. auricles present/
 2. auricles absent/
- #578. bases <of pinnules of sterile portions>/
 1. auricles acroscopic/
 2. auricles basioscopic/
- #579. bases <of pinnules of sterile portions, whether tapered>/
 1. tapered to axes/
 2. not tapered to axes/
- #580. ultimate segments <number per pinnule of sterile portions >/ per pinnule/
- #581. ultimate segments <of sterile portions; distinctive, general characters that serve to distinguish the taxon>/
- #582. ultimate segments <of sterile portions; articulation>/
 1. articulate with costules/
 2. not articulate with costules/
- #583. ultimate segments <of sterile portions; aspect>/
 1. perpendicular to costules/
 2. stiffly ascending along costules/
- #584. blades <of ultimate segments of sterile portions; distinctive, general characters that serve to distinguish the taxon>/
- #585. blades <of ultimate segments of sterile portions; shape>/
 1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #586. venation <of ultimate segments of sterile portions>/
 1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
- #587. venation <of ultimate segments of sterile portions>/
 1. veins conspicuous/
 2. veins not conspicuous/
- #588. venation <of ultimate segments of sterile portions; anastomosing>/
 1. veins anastomosing/
 2. veins not anastomosing/
- #589. venation <of ultimate segments of sterile portions>/
 1. areoles with veinlets present/
 2. areoles with veinlets absent/
- #590. adaxial surfaces <of ultimate segments of sterile portions; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #591. adaxial surfaces <of ultimate segments of sterile portions; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #592. adaxial surfaces <of ultimate segment blades of sterile portions; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #593. scales <adaxial surfaces of ultimate segments of sterile portions; presence of scales>/
 1. present/
 2. absent/
- #594. scales <adaxial surfaces of ultimate segments of sterile portions; scales>/
 1. abundant/
 2. sparse/
- #595. abaxial surfaces <of ultimate segments of sterile portions; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #596. abaxial surfaces <of ultimate segments of sterile portions; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/

7. pustulate/
8. ribbed/
9. sulcate/
- #597. abaxial surfaces <of ultimate segments of sterile portions; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #598. scales <of abaxial surfaces of ultimate segments of sterile portions; scales>/
1. present/
2. absent/
- #599. scales <of abaxial surfaces of ultimate segments of sterile portions; scales>/
1. abundant/
2. sparse/
- #600. apices <of ultimate segments of sterile portions>/
1. acute/
2. rounded/
3. attenuate/
4. acuminate/
5. obtuse/
6. caudate/
7. subulate/
8. mucronate/
9. long attenuate/
- #601. margins <of ultimate segments of sterile portions>/
1. dentate/
2. crenate/
3. serrulate/
4. entire/
5. undulate/
6. lacerate/
7. pinnatifid/
8. pinnatisect/
9. pectinate/
10. denticulate/
- #602. bases <of ultimate segments of sterile portions>/
1. hastate/
2. auriculate/
3. sagittate/
4. rounded/
5. cordate/
6. truncate/
7. obtuse/
8. oblique/
9. attenuate/
10. cuneate/
11. truncate/
12. acute/
- #603. fertile portions <distinctive, general characters that serve to distinguish the taxon>/
- #604. fertile portions <whether laminate>/
1. laminate/
2. non laminate/
- #605. fertile portions <vernation>/
1. vernation circinate/
2. vernation erect/
- #606. fertile portions <color>/
1. croziers cinnamon brown/
2. croziers silver/
3. croziers pale red/
4. croziers dark purple red/
5. croziers green/
6. croziers wine colored/
7. croziers silver and clawlike/
- #607. fertile portions <whether climbing>/
1. climbing by twining rachises/
2. not climbing <implicit>/
- #608. fertile portions <length>/
1. less than 1 m long/
2. more than 1 m long/
- #609. fertile portions <color>/
1. green/
2. yellow green/
3. brown/
- #610. fertile portions <number of fertile portions per frond>/
1. 1 per frond/
2. 2 per frond/
- #611. fertile portions <complexity> <MANDATORY IF APPLICABLE>/
1. simple/
2. 1-pinnately compound/
3. 2-pinnately compound/
4. 3-pinnately compound/
5. 4-pinnately compound/
6. palmately compound/
- #612. fertile portions <whether stalked or not and origin in relation to common stipe>/
1. stalked/
2. sessile/
3. sessile/
- #613. fertile portions <aspect>/
1. ascending/
2. spreading/
3. reflexed/
4. curled/

5. erect/
6. lax-arching/
7. pendent/
8. prostrate/
- #614. fertile portions <spacing>/
1. imbricate/
2. not imbricate/
- #615. blades <distinctive, general characters that serve to distinguish the taxon>/
- #616. blades <shape>/
1. lanceolate/
2. ovate/
3. rhomboid/
4. flabellate/
5. linear/
6. deltoid/
7. elliptic/
8. oblong/
9. pentagonal/
10. oblanceolate/
11. obdeltoid/
12. reniform/
- #617. blades <thickness>/
1. thick/
2. thin/
- #618. venation/
1. parallel/
2. pinnate/
3. palmate/
4. dichotomous/
- #619. venation/
1. veins conspicuous/
2. veins not conspicuous/
- #620. venation <anastomosing>/
1. veins anastomosing/
2. veins not anastomosing/
- #621. venation/
1. areoles with veinlets present/
2. areoles with veinlets absent/
- #622. adaxial surfaces <of fertile portions; color>/
1. green <implicit>/
2. white/
3. yellow/
4. dark green/
- #623. adaxial surfaces <of fertile portions; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #624. adaxial surfaces <of fertile portions; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled tri-chomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
- #625. scales <adaxial surfaces of fertile portions; presence of scales>/
1. present/
2. absent/
- #626. scales <adaxial surfaces of fertile portions; scales>/
1. abundant/
2. sparse/
- #627. abaxial surfaces <of fertile portions; color>/
1. green <implicit>/
2. white/
3. yellow/
4. light gray green/
- #628. abaxial surfaces <of fertile portions; nature>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #629. abaxial surfaces <of fertile portions; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/

13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
- #630. scales <of abaxial surfaces of fertile portions; scales>/
1. present/
 2. absent/
- #631. scales <of abaxial surfaces of fertile portions; scales>/
1. abundant/
 2. sparse/
- #632. scales <abaxial surfaces of fertile portions; scales>/
1. clathrate/
 2. not clathrate/
- #633. apices <of fertile portions>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #634. margins <of fertile portions>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
- #635. bases <of fertile portions>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
- #636. bases <of fertile portions>/
1. with adaxial tuft of tomentum/
 2. without adaxial tuft of tomentum/
- #637. segments of simple fertile portions <number of pairs>/ pairs/
- #638. segments of simple fertile portions <distinctive, general characters that serve to distinguish the taxon>/
- #639. segments of simple fertile portions <arrangement>/
1. alternate/
 2. opposite/
3. subopposite/
- #640. segments of simple fertile portions <aspect>/
1. perpendicular to rachises/
 2. stiffly ascending along rachises/
- #641. blades <of segments of simple fertile portions; distinctive, general characters that serve to distinguish the taxon>/
- #642. blades <of segments of simple fertile portions; shape>/
1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #643. adaxial surfaces <of segments of simple fertile portions; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #644. adaxial surfaces <of segments of simple fertile portions; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #645. adaxial surfaces <of segments of simple fertile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/

17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
- #646. scales <adaxial surfaces of segments of simple fertile portions; presence of scales>/
1. present/
 2. absent/
- #647. scales <adaxial surfaces of segments of simple fertile portions; scales>/
1. abundant/
 2. sparse/
- #648. abaxial surfaces <of segments of simple fertile portions; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #649. abaxial surfaces <of segments of simple fertile portions; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #650. abaxial surfaces <of segments of simple fertile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
- #651. scales <of abaxial surfaces of segments of simple fertile portions; scales>/
1. present/
 2. absent/
- #652. scales <of abaxial surfaces of segments of simple fertile frond blades; scales>/
1. abundant/
 2. sparse/
- #653. apices <of segments of simple fertile portions blades>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #654. margins <of segments of simple fertile portions>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
 11. serrate/
- #655. margins <of segments of simple fertile portions>/
1. lowest pair of lobes longest/
 2. second pair of lobes longest/
 3. third pair of lobes longest/
- #656. bases <of segments of simple fertile portions>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #657. pinnae of fertile portions <number>/
- #658. pinnae of fertile portions <pinnae distinctive characters that serve distinguish the taxon>/
- #659. pinnae of fertile portions <sessile>/
1. sessile/
 2. stalked/
- #660. pinnae of fertile portions <articulation>/
1. articulate with rachises/
 2. not articulate with rachises/
- #661. pinnae of fertile portions <arrangement>/
1. alternate/
 2. opposite/
 3. subopposite/
- #662. pinnae of fertile portions <aspect>/
1. perpendicular to rachises/
 2. stiffly ascending along rachises/

- #663. pinnae of fertile portions <complexity>/
 1. simple/
 2. 1-pinnately compound/
 3. proximally compound and distally simple/
- #664. blades <of fertile pinnae; distinctive, general characters that serve to distinguish the taxon>/
- #665. blades <of fertile pinnae; shape>/
 1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #666. blades <of fertile pinnae; thickness>/
 1. thick/
 2. thin/
- #667. adaxial surfaces <of pinnae fertile portions; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #668. adaxial surfaces <of pinnae of fertile portions; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #669. adaxial surfaces <of pinnae of fertile portions ; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #670. scales <adaxial surfaces of pinnae of fertile portions; presence of scales>/
 1. present/
 2. absent/
- #671. scales <adaxial surfaces of pinnae of fertile portions ; scales>/
 1. abundant/
 2. sparse/
- #672. abaxial surfaces <of pinnae of fertile portions ; color>/
 1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #673. abaxial surfaces <of pinnae of fertile portions ; nature>/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #674. abaxial surfaces <of pinnae of fertile portions ; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #675. scales <of abaxial surfaces of pinnae of fertile portions blades; scales>/
 1. present/

2. absent/
- #676. scales <of abaxial surfaces of pinnae of fertile portions blades; scales>/
1. abundant/
 2. sparse/
- #677. apices <of pinnae of fertile portions blades>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #678. margins <of pinnae of fertile portions blades>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #679. bases <of pinnae of fertile portions>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #680. bases <of pinnae of fertile portions blades>/
1. auricles present/
 2. auricles absent/
- #681. bases <of pinnae of fertile portions blades>/
1. auricles acroscopic/
 2. auricles basioscopic/
- #682. bases <of pinnae of fertile portions, whether tapered>/
1. tapered to axes/
 2. not tapered to axes/
- #683. pinnules of fertile portions <number>/
- #684. pinnules of fertile portions <pinnae distinctive characters that serve distinguish the taxon>/
- #685. pinnules of fertile portions <sessile>/
1. sessile/
 2. stalked/
- #686. pinnules of fertile portions <articulation>/
1. articulate with rachises/
 2. not articulate with rachises/
- #687. pinnules of fertile portions <arrangement>/
1. alternate/
 2. opposite/
 3. subopposite/
- #688. pinnules of fertile portions <aspect>/
1. perpendicular to rachises/
 2. stiffly ascending along rachises/
- #689. pinnules of fertile portions <complexity>/
1. simple/
 2. 1-pinnately compound/
 3. proximally compound and distally simple/
- #690. blades <of pinnules of fertile portions; distinctive, general characters that serve to distinguish the taxon>/
- #691. blades <of pinnules of fertile portions; shape>/
1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #692. blades <of pinnules fertile portions; thickness>/
1. thick/
 2. thin/
- #693. adaxial surfaces <of pinnules of fertile portions; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #694. adaxial surfaces <of pinnules of fertile portions; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #695. adaxial surfaces <of pinnules of fertile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/

13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #696. scales <adaxial surfaces of pinnules of fertile portions; presence of scales>/
1. present/
 2. absent/
- #697. scales <adaxial surfaces of pinnules of fertile portions; scales>/
1. abundant/
 2. sparse/
- #698. abaxial surfaces <of pinnules of fertile portions ; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #699. abaxial surfaces <of pinnules of fertile portions; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #700. abaxial surfaces <of pinnules of fertile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #701. scales <of abaxial surfaces of pinnules of fertile portions; scales>/
1. present/
 2. absent/
- #702. scales <of abaxial surfaces of pinnules of fertile portions; scales>/
1. abundant/
 2. sparse/
- #703. apices <of pinnules of fertile portions>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #704. margins <of pinnules of fertile portions>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #705. bases <of pinnae of fertile portions>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #706. bases <of pinnules of fertile portions>/
1. auricles present/
 2. auricles absent/
- #707. bases <of pinnules of fertile portions>/
1. auricles acroscopic/
 2. auricles basioscopic/
- #708. bases <of pinnules of fertile portions, whether tapered>/
1. tapered to axes/
 2. not tapered to axes/
- #709. ultimate segments <number per pinnule of fertile portions >/per pinnule/
- #710. ultimate segments <of fertile portions; distinctive, general characters that serve to distinguish the taxon>/
- #711. ultimate segments <of fertile portions; disarticulation>/
1. articulate with costules/

2. not articulate with costules/
- #712. ultimate segments <of fertile portions; aspect>/
1. perpendicular to costules/
 2. stiffly ascending along costules/
- #713. blades <of ultimate segments of fertile portions; distinctive, general characters that serve to distinguish the taxon>/
- #714. blades <of ultimate segments of fertile portions; shape>/
1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. obdeltoid/
 12. reniform/
- #715. adaxial surfaces <of ultimate segments of fertile portions; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. dark green/
- #716. adaxial surfaces <of ultimate segments of fertile portions; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #717. adaxial surfaces <of ultimate segments of fertile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #718. scales <adaxial surfaces of ultimate segments of fertile portions; presence>/
1. present/
 2. absent/
- #719. scales <adaxial surfaces of ultimate segments of fertile portions>/
1. abundant/
 2. sparse/
- #720. abaxial surfaces <of ultimate segments of fertile portions; color>/
1. green <implicit>/
 2. white/
 3. yellow/
 4. light gray green/
- #721. abaxial surfaces <of ultimate segments of fertile portions; nature>/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #722. abaxial surfaces <of ultimate segments of fertile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/

- #723. scales <of abaxial surfaces of ultimate segments of fertile portions; scales>/
1. present/
 2. absent/
- #724. scales <of abaxial surfaces of ultimate segments of fertile portions; scales>/
1. abundant/
 2. sparse/
- #725. apices <of ultimate segments of fertile portions>/
1. acute/
 2. rounded/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. long attenuate/
- #726. margins <of ultimate segments of fertile portions>/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
 10. denticulate/
- #727. bases <of ultimate segments of fertile portions>/
1. hastate/
 2. auriculate/
 3. sagittate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
 11. truncate/
 12. acute/
- #728. rachises <of sterile portions; distinctive general characters that serve to distinguish the taxon>/
- #729. rachises <color of sterile portions>/
1. dark brown/
 2. reddish brown/
 3. dark purplish brown/
 4. green/
 5. pale yellow/
 6. pale green/
 7. chestnut brown/
 8. brown/
 9. black/
 10. olive green/
 11. straw color/
 12. pale brown/
 13. reddish/
 14. purplish/
 15. yellow brown-brown/
 16. yellow/
 17. yellow green/
- #730. rachises <sterile portions, shiny or not shiny>/
1. shiny/
 2. not shiny/
- #731. rachises <sterile portions, aspect>/
1. flexuous/
 2. straight/
 3. twining/
 4. curved/
- #732. rachises <sterile portions, thickness>/
1. stout/
 2. slender/
- #733. adaxial surfaces <rachises of sterile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #734. adaxial surfaces <rachises of sterile portions; presence of scales>/
1. scales present/
 2. scales absent/
- #735. abaxial surfaces <rachises of sterile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/

13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #736. abaxial surfaces <rachises of sterile portions; presence of scales>/
1. scales present/
 2. scales absent/
- #737. costae <sterile portions, distinctive general characters that serve to distinguish the taxon>/
- #738. costae <sterile portions, color>/
1. dark brown/
 2. reddish brown/
 3. dark purplish brown/
 4. green/
 5. pale yellow/
 6. pale green/
 7. chestnut brown/
 8. brown/
 9. black/
 10. olive green/
 11. straw color/
 12. pale brown/
 13. reddish/
 14. purplish/
 15. yellow brown-brown/
 16. yellow/
 17. yellow green/
- #739. costae <sterile portions, shiny or not shiny>/
1. shiny/
 2. not shiny/
- #740. costae <sterile portions, aspect>/
1. flexuous/
 2. straight/
 3. twining/
 4. curved/
- #741. costae <sterile portions, thickness>/
1. stout/
 2. slender/
- #742. adaxial surfaces <costae of sterile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #743. adaxial surfaces <costae of sterile portions; presence of scales>/
1. scales present/
 2. scales absent/
- #744. abaxial surfaces <costae of sterile portions; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #745. abaxial surfaces <costae of sterile portions; presence of scales>/
1. scales present/
 2. scales absent/
- #746. rachises <of fertile portions; distinctive general characters that serve to distinguish the taxon>/
- #747. rachises <color of fertile portions>/
1. dark brown/
 2. reddish brown/
 3. dark purplish brown/
 4. green/
 5. pale yellow/

6. pale green/
 7. chestnut brown/
 8. brown/
 9. black/
 10. olive green/
 11. straw color/
 12. pale brown/
 13. reddish/
 14. purplish/
 15. yellow brown-brown/
 16. yellow/
 17. yellow green/
- #748. rachises <sterile portions, shiny or not shiny>/
 1. shiny/
 2. not shiny/
- #749. rachises <sterile portions, aspect>/
 1. flexuous/
 2. straight/
 3. twining/
 4. curved/
- #750. rachises <sterile portions, thickness>/
 1. stout/
 2. slender/
- #751. adaxial surfaces <rachises of fertile portions; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #752. adaxial surfaces <rachises of fertile portions; presence of scales>/
 1. scales present/
 2. scales absent/
- #753. abaxial surfaces <rachises of fertile portions; indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #754. abaxial surfaces <rachises of fertile portions; presence of scales>/
 1. scales present/
 2. scales absent/
- #755. costae <fertile portions, distinctive general characters that serve to distinguish the taxon>/
- #756. costae <fertile portions, color>/
 1. dark brown/
 2. reddish brown/
 3. dark purplish brown/
 4. green/
 5. pale yellow/
 6. pale green/
 7. chestnut brown/
 8. brown/
 9. black/
 10. olive green/
 11. straw color/
 12. pale brown/
 13. reddish/
 14. purplish/
 15. yellow brown-brown/
 16. yellow/
 17. yellow green/
- #757. costae <fertile portions, shiny or not shiny>/
 1. shiny/
 2. not shiny/
- #758. costae <fertile portions, aspect>/
 1. flexuous/
 2. straight/
 3. twining/
 4. curved/
- #759. costae <fertile portions, thickness>/
 1. stout/
 2. slender/

#760. adaxial surfaces <costae of fertile portions; indumentum>/

1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/

#761. adaxial surfaces <costae of fertile portions; presence of scales>/

1. scales present/
2. scales absent/

#762. abaxial surfaces <costae of fertile portions; indumentum>/

1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/

21. without needle-like hairs/

#763. abaxial surfaces <costae of fertile portions; presence of scales>/

1. scales present/
2. scales absent/

#764. rachises <of sterile fronds; distinctive, general characters that serve to distinguish the taxon>/

#765. rachises <color of sterile fronds >/

1. dark brown/
2. reddish brown/
3. dark purplish brown/
4. green/
5. pale yellow/
6. pale green/
7. chestnut brown/
8. brown/
9. black/
10. olive green/
11. straw color/
12. pale brown/
13. reddish/
14. purplish/
15. yellow brown-brown/
16. yellow/
17. yellow green/

#766. rachises <of sterile fronds, shiny or not shiny>/

1. shiny/
2. not shiny/

#767. rachises <of sterile fronds, aspect>/

1. flexuous/
2. straight/
3. twining/
4. curved/

#768. rachises <of sterile fronds, thickness>/

1. stout/
2. slender/

#769. rachises <of sterile fronds, whether distal portions winged>/

1. with wings at distal and proximal ends/
2. with wings at proximal ends only/

#770. rachises <of sterile fronds, presence of bulblets>/

1. bulblets present/
2. bulblets absent/

#771. rachises <of sterile fronds, presence of grooves>/

1. grooved adaxially/
2. grooved abaxially/
3. not grooved/

#772. adaxial surfaces <rachises of sterile fronds; indumentum>/

1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/

10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #773. adaxial surfaces <rachises of sterile fronds; presence of scales>/
1. scales present/
2. scales absent/
- #774. abaxial surfaces <rachises of sterile fronds; indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #775. abaxial surfaces <rachises of sterile fronds; presence of scales>/
1. scales present/
2. scales absent/
- #776. costae <of sterile fronds; distinctive general characters that serve to distinguish the taxon>/
- #777. costae <of sterile fronds, color>/
1. dark brown/
2. reddish brown/
3. dark purplish brown/
4. green/
5. pale yellow/
6. pale green/
7. chestnut brown/
8. brown/
9. black/
10. olive green/
11. straw color/
12. pale brown/
13. reddish/
14. purplish/
15. yellow brown-brown/
16. yellow/
17. yellow green/
- #778. costae <of sterile fronds, shiny or not shiny>/
1. shiny/
2. not shiny/
- #779. costae <of sterile fronds, aspect>/
1. flexuous/
2. straight/
3. twining/
4. curved/
- #780. costae <of sterile fronds, thickness>/
1. stout/
2. slender/
- #781. costae <of sterile fronds, whether distal portions winged>/
1. with wings at distal and proximal ends/
2. with wings at proximal ends only/
- #782. costae <of sterile fronds, presence of grooves>/
1. grooved adaxially/
2. grooved abaxially/
3. not grooved/
- #783. adaxial surfaces <of sterile fronds, indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/

- #784. adaxial surfaces <costae of sterile fronds, presence of scales>/
1. scales present/
 2. scales absent/
- #785. abaxial surfaces <costae of sterile fronds, indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #786. abaxial surfaces <costae of sterile fronds, presence of scales>/
1. scales present/
 2. scales absent/
- #787. rachises <of fertile fronds; distinctive, general characters that serve to distinguish the taxon>/
- #788. rachises <color of fertile fronds>/
1. dark brown/
 2. reddish brown/
 3. dark purplish brown/
 4. green/
 5. pale yellow/
 6. pale green/
 7. chestnut brown/
 8. brown/
 9. black/
 10. olive green/
 11. straw color/
 12. pale brown/
 13. reddish/
 14. purplish/
 15. yellow brown-brown/
 16. yellow/
 17. yellow green/
- #789. rachises <of fertile fronds, shiny or not shiny>/
1. shiny/
 2. not shiny/
- #790. rachises <of fertile fronds, aspect>/
1. flexous/
 2. straight/
 3. twining/
 4. curved/
- #791. rachises <of fertile fronds, thickness>/
1. stout/
 2. slender/
- #792. rachises <of fertile fronds, whether distal portions winged>/
1. with wings at distal and proximal ends/
 2. with wings at proximal ends only/
- #793. rachises <of fertile fronds, presence of bulblets>/
1. bulblets present/
 2. bulblets absent/
- #794. rachises <of fertile fronds, presence of grooves>/
1. grooved adaxially/
 2. grooved abaxially/
 3. not grooved/
- #795. adaxial surfaces <rachises of fertile fronds; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #796. adaxial surfaces <rachises of fertile fronds; presence of scales>/
1. scales present/
 2. scales absent/
- #797. abaxial surfaces <rachises of fertile fronds; indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/

7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #798. abaxial surfaces <rachises of fertile fronds; presence of scales>/
 1. scales present/
 2. scales absent/
- #799. costae <of fertile fronds; distinctive general characters that serve to distinguish the taxon>/
- #800. costae <of fertile fronds, color>/
 1. dark brown/
 2. reddish brown/
 3. dark purplish brown/
 4. green/
 5. pale yellow/
 6. pale green/
 7. chestnut brown/
 8. brown/
 9. black/
 10. olive green/
 11. straw color/
 12. pale brown/
 13. reddish/
 14. purplish/
 15. yellow brown-brown/
 16. yellow/
 17. yellow green/
- #801. costae <of fertile fronds, shiny or not shiny>/
 1. shiny/
 2. not shiny/
- #802. costae <of fertile fronds, aspect>/
 1. flexuous/
 2. straight/
 3. twining/
 4. curved/
- #803. costae <of fertile fronds, thickness>/
 1. stout/
 2. slender/
- #804. costae <of fertile fronds, whether distal portions winged>/
 1. with wings at distal and proximal ends/
 2. with wings at proximal ends only/
- #805. costae <of fertile fronds, presence of grooves>/
1. grooved adaxially/
 2. grooved abaxially/
 3. not grooved/
- #806. adaxial surfaces <of fertile fronds, indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #807. adaxial surfaces <costae of fertile fronds, presence of scales>/
 1. scales present/
 2. scales absent/
- #808. abaxial surfaces <costae of fertile fronds, indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/

19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #809. abaxial surfaces <costae of fertile fronds, presence of scales>/
 1. scales present/
 2. scales absent/
- #810. stipes <distinctive, general characters that serve to distinguish the taxon>/
- #811. stipes <color>/
- #812. stipes <dull or lustrous>/
 1. shiny/
 2. not shiny/
- #813. stipes <colors>/
 1. distally green/
 2. black throughout/
 3. yellow green distally and light brown proximally/
- #814. stipes <aspect>/
 1. flexuous/
 2. curved/
 3. twining/
 4. straight/
- #815. stipes <length>/
- #816. stipes <shape in crosssection>/
 1. terete/
 2. triangular/
- #817. stipes <thickness firmness>/
 1. stout/
 2. slender/
- #818. stipes <succulent>/
 1. succulent/
 2. firm/
- #819. stipes <whether wiry>/
 1. wiry/
 2. not wiry/
- #820. stipes <whether jointed>/
 1. jointed (epipetiolar)/
 2. not jointed/
- #821. stipes <whether winged>/
 1. winged/
 2. not winged/
- #822. stipes <presence of grooves>/
 1. grooved/
 2. not grooved/
 3. grooved adaxially/
 4. grooved abaxially/
 5. grooved on both sides/
- #823. stipes <indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. sparsely pubescent or glabrous/
 19. glabrous except for veins/
 20. with needle-like hairs/
 21. without needle-like hairs/
- #824. stipes <sheathed>/
 1. sheaths open/
 2. sheaths closed/
- #825. stipes <sterile fronds, distinctive, general characters that serve to distinguish the taxon>/
- #826. stipes <sterile fronds, color>/
- #827. stipes <sterile fronds, dull or lustrous>/
 1. shiny/
 2. not shiny/
- #828. stipes <sterile fronds, colors>/
 1. distally green/
 2. black throughout/
 3. yellow green distally and light brown proximally/
- #829. stipes <sterile fronds, aspect>/
 1. flexuous/
 2. curved/
 3. twining/
 4. straight/
- #830. stipes <sterile fronds, length>/
- #831. stipes <sterile fronds, shape in crosssection>/
 1. terete/
 2. triangular/
- #832. stipes <sterile fronds, thickness firmness>/
 1. stout/
 2. slender/
- #833. stipes <sterile fronds, succulent>/
 1. succulent/
 2. firm/
- #834. stipes <sterile fronds, whether wiry>/
 1. wiry/
 2. not wiry/
- #835. stipes <sterile fronds, whether jointed>/
 1. jointed (epipetiolar)/
 2. not jointed/
- #836. stipes <sterile fronds, whether winged>/

1. winged/
2. not winged/
- #837. stipes <sterile fronds, presence of grooves>/
1. grooved/
2. not grooved/
3. grooved adaxially/
4. grooved abaxially/
5. grooved on both sides/
- #838. stipes <sterile fronds, ndumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #839. stipes <sterile fronds, sheathed>/
1. sheaths open/
2. sheaths closed/
- #840. stipes <fertile fronds, distinctive, general characters that serve to distinguish the taxon>/
- #841. stipes <fertile fronds, color>/
- #842. stipes <fertile fronds, dull or lustrous>/
1. shiny/
2. not shiny/
- #843. stipes <fertile fronds, colors>/
1. distally green/
2. black throughout/
3. yellow green distally and light brown proximally/
- #844. stipes <fertile fronds, aspect>/
1. flexuous/
2. curved/
3. twining/
4. straight/
- #845. stipes <fertile fronds, length>/
- #846. stipes <fertile fronds, shape in crosssection>/
1. terete/
2. triangular/
- #847. stipes <fertile fronds, thickness firmness>/
1. stout/
2. slender/
- #848. stipes <fertile fronds, succulent>/
1. succulent/
2. firm/
- #849. stipes <fertile fronds, whether wiry>/
1. wiry/
2. not wiry/
- #850. stipes <fertile fronds, whether jointed>/
1. jointed (epipetioilar)/
2. not jointed/
- #851. stipes <fertile fronds, whether, winged>/
1. winged/
2. not winged/
- #852. stipes <fertile fronds, presence of grooves>/
1. grooved/
2. not grooved/
3. grooved adaxially/
4. grooved abaxially/
5. grooved on both sides/
- #853. stipes <fertile fronds, ndumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. sparsely pubescent or glabrous/
19. glabrous except for veins/
20. with needle-like hairs/
21. without needle-like hairs/
- #854. stipes <fertile fronds, sheathed>/
1. sheaths open/
2. sheaths closed/
- #855. sori <whether present>/
1. present/
2. absent/

- #856. sori <distinctive, general characters that serve to distinguish the taxon>/
- #857. sori <whether confluent or distinct>/
 1. separate/
 2. contiguous/
 3. separate when young, contiguous at maturity/
- #858. sori <position on plant>/
 1. borne on margins/
 2. borne on veins/
 3. borne on revolute margins/
 4. borne between midvein and margins/
 5. borne at ends of veins/
 6. borne on veins near margins/
- #859. sori <if embedded>/
 1. embedded/
 2. not embedded/
- #860. sori <acroscopic or basioscopic>/
 1. acroscopic/
 2. basioscopic/
- #861. sori <relation to veins>/
 1. oriented parallel to veins/
 2. oriented obliquely to veins/
- #862. sori <distribution>/
 1. scattered/
 2. in uniform rows/
- #863. sori <shape>/
 1. orbicular/
 2. oblong/
 3. elliptic/
 4. linear/
 5. reniform/
 6. lunate/
 7. u-shaped/
- #864. sori <presence of "true" indusia>/
 1. indusia present/
 2. indusia absent/
 3. indusia and false indusia present <Dennstediaceae>/
- #865. sori <>false indusia>/
 1. false indusia formed by revolute margins and concealing sporangia/
 2. false indusia formed by revolute margins and partially concealing sporangia/
 3. false indusia formed by revolute margins/
- #866. indusia <distinctive, general characters that serve to distinguish the taxon>/
- #867. indusia <persistence>/
 1. persistent/
 2. deciduous/
- #868. indusia <origin>/
 1. arising from veins/
 2. not arising from veins/
- #869. indusia <attachment>/
 1. attached at centers of sori/
 2. attached at one side of sori/
 3. attached beneath sori and enclosing sporangia/
 4. attached beneath sori at one side/
- #870. indusia <shape>/
1. orbicular/
 2. reniform/
 3. lunate/
 4. linear/
 5. cup-like/
 6. funnel-form/
 7. U-shaped/
 8. hood-like/
 9. deltoid/
- #871. indusia <surface glands>/
 1. surfaces glandular/
 2. surfaces not glandular/
- #872. indusia <margins>/
 1. crenulate/
 2. dentate/
 3. entire/
 4. ciliate/
 5. glandular/
- #873. indusia <dehiscence>/
 1. dehiscing outward/
 2. dehiscing inward/
- #874. indusia <segments after dehiscence>/
 1. segments filamentous/
 2. segments cuneate/
 3. segments lanceolate/
- #875. sporangia <distinctive, general characters that serve to distinguish the taxon>/
- #876. sporangia <morphological form>/
 1. all alike/
 2. of 2 types/
- #877. sporangia <type>/
 1. eusporangiate/
 2. leptosporangiate/
- #878. sporangia <shape>/
 1. reniform/
 2. globose/
 3. obovate/
- #879. sporangia <dehiscence>/
 1. dehiscing by distal slits/
 2. indehiscent/
 3. dehiscing longitudinally/
 4. dehiscing transversely/
- #880. sporangia <length of stalk>/
 1. short stalked/
 2. long stalked/
 3. sessile/
- #881. annuli <whether present>/
 1. present/
 2. absent/
- #882. annuli <distinctive, general characters that serve to distinguish the taxon>/
- #883. annuli <whether complete>/
 1. complete/
 2. incomplete/
- #884. annuli <habit>/
 1. vertical/
 2. horizontal/

- #885. spores <distinctive, general characters that serve to distinguish the taxon>/
- #886. spores <number of kinds>/
 1. all alike/
 2. of 2 types/
- #887. spores <color>/
 1. colorless/
 2. yellowish/
 3. greenish/
 4. not greenish/
 5. black/
 6. brown/
 7. gray/
 8. white/
 9. green/
- #888. spores <shape>/
 1. tetrahedral/
 2. globose/
 3. reniform/
 4. oblong/
- #889. spores <surface>/
 1. warty/
 2. rugose/
 3. tuberculate/
 4. spiny/
 5. reticulate/
 6. winged/
 7. perforate/
 8. smooth/
 9. verrucose/
 10. granulate/
- #890. spores <laesura>/
 1. trilete/
 2. monolete/
- #891. spores <number of spores per sporangia>/
 per sporangium/
- #892. gametophytes <distinctive, distinguishing characters that distinguish the taxon>/
- #893. gametophytes <reproductive habit>/
 1. all alike/
 2. of 2 types/
- #894. gametophytes <whether green>/
 1. green/
 2. not green/
- #895. gametophytes <habit>/
 1. growing on the soil surface/
 2. growing below the soil surface/
- #896. gametophytes <shape>/
 1. cordate/
 2. round/
 3. linear/
 4. obcordate/
 5. reniform/
 6. elliptic/
 7. elongate/
 8. obcordate-elongate/
 9. obcordate-reniform/
 10. obovoid/
- #897. gametophytes <indumentation>/
- #898. archegonia and antheridia <gametophyte>/
 1. borne on lower surface/
 2. borne on upper surface/
- #899. <complete sentences giving numbers of genera and species present in Oklahoma> <MANDATORY>/
- #900. <complete sentences describing important taxonomic aspects such as problems in identification, classification, and/or nomenclature>/
- #901. <complete sentences describing important or characteristic aspects of family such as ecological and/or geographical distribution; economic significance; region of origin if adventive, introduced or naturalized; reproductive biology>/

APPENDIX G

DELTA-CHARS FOR AQUATIC FERN FAMILIES OF OKLAHOMA

*SHOW: Aquatic Ferns of Oklahoma - character list. Revised 17 March 1997.

*CHARACTER LIST

- | | |
|--|---|
| <p>#1. plants <habit> <MANDATORY>/
 1. perennials/
 2. annuals/
 3. minute annuals/</p> <p>#2. plants <habit> <MANDATORY>/
 1. herbs/
 2. woody/</p> <p>#3. plants <distinctive, general descriptors that serve to characterize the taxon>/</p> <p>#4. plants <habit>/
 1. terrestrial/
 2. emergent aquatics/
 3. floating-leaved aquatics/
 4. free-floating aquatics/</p> <p>#5. plants <color>/
 1. reddish green/
 2. green <implicit>/</p> <p>#6. plants <perenniating organs>/
 1. with perenniating organs not apparent/
 2. from rhizomes/
 3. from stolons/
 4. from fleshy erect subterranean stems/</p> <p>#7. plants <habit>/
 1. deciduous/
 2. evergreen/</p> <p>#8. plants <whether caespitose>/
 1. caespitose/
 2. not caespitose/</p> <p>#9. plants <reproductive habit>/
 1. producing sporangia in hardened sporocarps borne on short axillary stalks at bases of petioles <Marsilea>/
 2. producing solitary sporangia in pairs or quartets of sporocarps borne on submerged leaves <Azolla>/
 3. producing solitary sporangia in sporocarps borne at tips of submerged root-like leaves <Salvinia>/</p> <p>#10. plants <whether caulescent>/
 1. acaulescent/
 2. caulescent/</p> <p>#11. roots <whether present>/
 1. present/
 2. not present/</p> <p>#12. roots <distinctive, general descriptors that serve to characterize the taxon>/</p> <p>#13. roots <color>/
 1. colorless, translucent/
 2. brown/
 3. tan/
 4. black/</p> | <p>#14. roots <whether branching>/
 1. branching/
 2. not branching/</p> <p>#15. roots <emergence>/
 1. arising from nodes/
 2. arising from internodes/
 3. arising from nodes and internodes/
 4. arising at stem branch points/</p> <p>#16. roots <whether root hairs present>/
 1. root hairs present/
 2. root hairs not present/</p> <p>#17. stems <distinctive, general descriptors that serve to characterize the taxon>/</p> <p>#18. stems <diameter>/
 1. slender/
 2. stout/</p> <p>#19. stems <aspect>/
 1. erect/
 2. ascending/
 3. creeping/
 4. short creeping/
 5. long creeping/
 6. free floating/
 7. suberect/
 8. prostrate/</p> <p>#20. stems <location>/
 1. growing on soil surface/
 2. growing below soil surface/</p> <p>#21. stems <branching>/
 1. profusely branched/
 2. sparsely branched/
 3. pinnately branched/
 4. branched/</p> <p>#22. stems <whether concealed by roots and imbricating leaves>/
 1. concealed by imbricate leaves/
 2. not concealed imbricate leaves/</p> <p>#23. nodes <whether having distinct nodes>/
 1. distinct/
 2. not distinct/</p> <p>#24. nodes <distinctive general descriptors that serve to characterize the taxon>/</p> <p>#25. nodes <constriction>/
 1. constricted/
 2. swollen/
 3. equal in diameter to internode/</p> <p>#26. internodes <distinctive general descriptors that serve to characterize the taxon>/</p> |
|--|---|

- #27. internodes <anatomy>/
 1. solid <includes spongy>/
 2. hollow/
- #28. internodes <shape in cross-section>/
 1. terete/
 2. terete but flattened on one side/
- #29. internodes <indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #30. leaves <presence>/
 1. present/
 2. absent/
- #31. leaves <distinctive, general characters that serve to distinguish the taxon>/
- #32. leaves <morphology>/
 1. all alike/
 2. of 2 forms/
- #33. leaves <appearance>/
 1. scale-like/
 2. not scale-like/
- #34. leaves <color>/
 1. dull green to gray/
 2. yellow green/
 3. bright green/
- #35. leaves <size>/
 1. minute/
 2. small/
 3. large/
- #36. leaves <habit>/
 1. aerial/
 2. floating/
 3. submerged/
- #37. leaves <appearance>/
 1. filiform <Pilularia>/
 2. not filiform/
- #38. leaves <distribution>/
 1. basal/
 2. forming rosettes/
 3. cauline/
- #39. leaves <complexity> <MANDATORY IF APPLICABLE>/
 1. simple/
 2. palmately compound/
- #40. leaves <arrangement>/
 1. alternate/
 2. opposite/
 3. whorled, 2 leaves green, sessile or short-petioled, flat, entire, floating and 1 leaf petioled, dissected, root-like, submerged/
- #41. leaves <whether sessile>/
 1. sessile/
 2. petiolate/
 3. long petiolate/
 4. short petiolate/
- #42. leaves <ranking>/
 1. 2-ranked/
 2. not 2-ranked/
 3. 2-ranked along upper sides of stems/
- #43. leaves <aspect>/
 1. appressed/
 2. ascending/
 3. spreading/
 4. reflexed/
 5. erect/
- #44. leaves <spacing>/
 1. imbricate/
 2. not imbricate/
- #45. leaves <vernation type>/
 1. vernation circinate/
 2. vernation erect/
- #46. blades <presence>/
 1. present/
 2. absent/
- #47. blades <distinctive, general characters that serve to distinguish the taxon>/
- #48. blades <shape>/
 1. lanceolate/
 2. ovate/
 3. rhomboid/
 4. flabellate/
 5. linear/
 6. deltoid/
 7. elliptic/
 8. oblong/
 9. pentagonal/
 10. oblanceolate/
 11. quadrate/
 12. obdeltoid/
 13. orbicular/
- #49. venation <appearance>/
 1. conspicuous/
 2. not conspicuous/
- #50. venation <anastomosing>/
 1. anastomosing/

2. not anastomosing/
- #51. venation <vein tips>/
1. vein tips free at margins/
 2. vein tips not free at margins/
- #52. adaxial surfaces <of blades>/
1. smooth <implicit>/
 2. dotted with papillae/
 3. not dotted with papillae/
- #53. adaxial surfaces <indumentum of blades>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. with short multicellular stiff hairs, separated into 4 segments at apex/
- #54. adaxial surfaces <of blades>/
1. smooth <implicit>/
 2. dotted with papillae/
 3. not dotted with papillae/
- #55. <blades> abaxial surfaces <indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #56. <blades> apices/
1. acute/
 2. round/
 3. attenuate/
 4. acuminate/
 5. obtuse/
 6. caudate/
 7. subulate/
 8. mucronate/
 9. cuneate/
- #57. <blades> margins/
1. dentate/
 2. crenate/
 3. serrulate/
 4. entire/
 5. undulate/
 6. lacerate/
 7. pinnatifid/
 8. pinnatisect/
 9. pectinate/
- #58. <blades> bases/
1. hastate/
 2. auriculate/
 3. sagitate/
 4. rounded/
 5. cordate/
 6. truncate/
 7. obtuse/
 8. oblique/
 9. attenuate/
 10. cuneate/
- #59. leaflets <distinctive, general characters that serve to distinguish the taxon>/
- #60. leaflets <shape>/
1. obdeltoid/
 2. suborbicular/
- #61. venation <appearance of leaflets>/
1. conspicuous/
 2. not conspicuous/
- #62. venation <anastomosing in leaflets>/
1. anastomosing/
 2. not anastomosing/
- #63. venation <vein tips of leaflets>/
1. vein tips free at margins/
 2. vein tips not free at margins/
- #64. adaxial surfaces <indumentum of leaflet blades>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/

9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
18. with short multicellular stiff hairs, separated into 4 segments at apex/
- #65. abaxial surfaces <indumentum of leaflets>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #66. apices <of leaflet blades>/
1. acute/
2. round/
3. attenuate/
4. acuminate/
5. obtuse/
6. caudate/
7. subulate/
8. mucronate/
9. cuneate/
- #67. margins <of leaflet blades>/
1. dentate/
2. crenate/
3. serrulate/
4. entire/
5. undulate/
6. lacerate/
7. pinnatifid/
8. pinnatisect/
9. pectinate/
- #68. bases <of leaflet blades>/
1. hastate/
2. auriculate/
3. sagitate/
4. rounded/
5. cordate/
6. truncate/
7. obtuse/
8. oblique/
9. attenuate/
10. cuneate/
- #69. petioles <presence>/
1. present/
2. absent/
- #70. petioles <length>/
- mm long/
- #71. petioles <color>/
1. brown/
2. brownish yellow/
3. pale yellow/
- #72. petioles <indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #73. sporocarps <distinctive, general characters that serve to distinguish the taxon>/
- #74. sporocarps <number of kinds>/
1. all alike/
2. of 2 types/
- #75. sporocarps <size>/
1. equal in size/
2. not equal in size/
- #76. sporocarps <where borne on plant>/
1. borne at tips of submerged, root-like leaves; solitary <Salvinia>/
2. borne on first leaf of lateral branches; in pairs or quartets <Azolla>/
3. borne on short axillary stalks <Marsileaceae>/

- #77. sporocarps <whether paired>/
 1. in pairs/
 2. solitary/
- #78. sporocarps <habit>/
 1. perpendicular/
 2. slightly nodding/
- #79. sporocarps <habit>/
 1. above soil surface/
 2. below soil surface/
- #80. sporocarps <color>/
 1. brownish yellow/
 2. brown/
 3. dark brown/
- #81. sporocarps <shape>/
 1. elliptic/
 2. suborbicular/
 3. globose/
 4. reniform/
- #82. sporocarps <indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight tri- chomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled tri- chomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. with course reddish hairs becoming glabrate <Marsilea>/
 19. trichomes scars leaving purple or brown specks <Marsilea>/
 20. with matted hairs becoming glabrate <Pilularia>/
 21. with matted or course reddish hairs/
- #83. sporocarps <trichome scars>/
 1. trichome scars present, purple or brown/
 2. trichome scars absent/
- #84. sporocarps <dehiscence>/
 1. dehiscing into 2 parts/
 2. dehiscing into 4 parts/
- #85. sporocarps <attachment>/
 1. attached laterally at stalk apices/
 2. attached terminally at stalk apices/
- #86. sporocarps <whether stalks toothed>/
 1. stalks toothed at apices/
 2. stalks not toothed at apices/
- #87. sporocarps <orientation of stalkst>/
 1. stalks erect/
 2. stalks prostrate/
- #88. <sporocarp> stalks <whether branched>/
 1. branched/
 2. not branched/
- #89. microsporocarps <shape>/
 1. globose/
 2. oval/
- #90. microsporocarps <apex>/
 1. apically umbonate/
 2. obtuse/
- #91. megasporocarps <shape>/
 1. oval/
 2. oblong/
- #92. megasporocarps <number of megasporangia>/
 1. containing 1 megasporangium/
 2. containing more than 1 megasporangium/
- #93. sori <presence>/
 1. present <implicit>/
 2. absent or rarely present/
- #94. sori <distinctive, general charcters that serve to distinguish the taxon>/
- #95. sori <number per sporocarp>/
 1. 4 per sporocarp/
 2. 4-22 per sporocarp/
- #96. sori <attachment>/
 1. basally attached/
 2. apically attached/
- #97. sori <presence of both microsporangia and megasporangia>/
 1. containing both microsporangia and megasporangia/
 2. containing either microsporangia or megasporangia/
- #98. sporangia <distinctive, general characters that serve to distinguish the taxon>/
- #99. sporangia <morphological form>/
 1. all alike <implicit>/
 2. of 2 types/
- #100. sporangia <type>/
 1. eusporangiate/
 2. leptosporangiate/
- #101. sporangia <shape>/
 1. reniform/
 2. globose/
- #102. sporangia <dehiscence>/
 1. dehiscing by distal slits/
 2. indehiscent/
 3. dehiscing longitudinally/
 4. dehiscing transversely/
- #103. sporangia <length of stalk>/
 1. short stalked/
 2. long stalked/

3. sessile/
- #104. microsporangia <distinctive, general characters that serve to distinguish the taxon>/
- #105. microsporangia <shape>/
1. reniform/
 2. globose/
 3. spheric/
- #106. microsporangia <whether opening>/
1. dehiscent transversely/
 2. dehiscent longitudinally/
- #107. microsporangia <number of microspores>/
1. producing 20-64 microspores/
 2. producing 2 microspores/
 3. producing 64 microspores/
- #108. megasporangia <distinctive, general characters that serves to distinguish the taxon>/
- #109. megasporangia <shape>/
1. reniform/
 2. globose/
- #110. megasporangia <whether opening>/
1. dehiscent transversely/
 2. dehiscent longitudinally/
- #111. megasporangia <number of megaspores>/
1. producing 1 megaspore/
 2. producing 2-32 megaspores <do not use>/
- #112. spores <distinctive, general characters that serve to distinguish the taxon>/
- #113. spores <number of kinds>/
1. all alike/
 2. of 2 types/
- #114. spores <color>/
1. colorless/
 2. yellowish/
 3. greenish/
 4. not greenish/
 5. black/
 6. brown/
 7. gray/
 8. white/
 9. green/
- #115. spores <shape>/
1. tetrahedral/
 2. globose/
 3. reniform/
 4. oblong/
- #116. spores <surface>/
1. warty/
 2. rugose/
 3. tuberculate/
 4. spiny/
 5. reticulate/
 6. winged/
 7. perforate/
 8. smooth/
 9. verrucose/
 10. granulate/
- #117. spores <laesura>/
1. trilete/
 2. monolete/
- #118. spores <number of spores per sporangia>/ per sporangium/
- #119. microspores <distinctive, general characters that serve to distinguish the taxon>/
- #120. microspores <size>/
1. large/
 2. small/
 3. minute/
- #121. microspores <color>/
1. transparent/
 2. yellowish/
 3. greenish/
 4. not greenish/
 5. black/
 6. brown/
 7. gray/
- #122. microspores <shape>/
1. tetrahedral/
 2. globose/
 3. reniform/
 4. oblong/
- #123. microspores <surface>/
1. warty/
 2. rugose/
 3. tuberculate/
 4. spiny/
 5. reticulate/
 6. winged/
 7. perforate/
 8. smooth/
 9. verrucose/
 10. granulate/
 11. with raised angular bumps or pits/
 12. without raised angular bumps or pits/
 13. densely and uniformly covered with tangled filaments/
 14. with pits/
 15. sparsely covered with a few long filaments/
 16. with or without raised angular bumps or pits/
- #124. microspores <laesura>/
1. trilete/
 2. monolete/
- #125. microspores <number of microspores per microsporangia>/ per microsporangium/
- #126. megaspores <distinctive, general characters that serve to distinguish the taxon>/
- #127. megaspores <size>/
1. large/
 2. small/
 3. minute/
- #128. megaspores <color>/
1. colorless/
 2. yellowish/
 3. greenish/
 4. not greenish/
 5. black/
 6. brown/
 7. gray/

- #129. megaspores <shape>/
 1. tetrahedral/
 2. globose/
 3. reniform/
 4. oblong/
 5. spheric/
- #130. megaspores <surface>/
 1. warty/
 2. rugose/
 3. tuberculate/
 4. spiny/
 5. reticulatae/
 6. winged/
 7. perforate/
 8. smooth/
 9. verrucose/
 10. granulate/
 11. with raised angular bumps or pits/
 12. without raised angular bumps or pits/
 13. densely and uniformly covered with tangled filaments/
 14. with pits/
 15. sparsely covered with a few long filaments/
 16. with or without raised angular bumps or pits/
- #131. megaspores <scars on surface, laesura>/
 1. trilete/
 2. monolete/
- #132. megaspores <number per megasporangium>/
 per megasporangium/
- #133. gametophytes <distinctive, distinguishing characters that distinguish the taxon>/
- #134. gametophytes <reproductive habit>/
 1. all alike/
 2. of 2 types/
- #135. microgametophytes <distinctive, general descriptors that serve to characterize the taxon>/
- #136. microgametophytes <habit>/
 1. growing on soil surfaces/
 2. growing below soil surfaces/
- #137. microgametophytes <whether gametophytes remain within spores>/
 1. developing within spores/
 2. developing outside spores/
- #138. microgametophytes/
 1. bearing antheridia on lower surfaces/
 2. bearing antheridia on upper surfaces/
- #139. microgametophytes <whether green>/
 1. green/
 2. white/
 3. colorless/
- #140. microgametophytes <shape>/
 1. cordate/
 2. round/
 3. linear/
 4. obcordate/
 5. reniform/
 6. elliptic/
- #141. microgametophytes <indumentation>/
- #142. microgametophytes <number of antheridia>/
 1. antheridia 1/
 2. antheridia 2 or more/
- #143. megagametophytes <distinctive, general descriptors that serve to characterize the taxon>/
- #144. megagametophytes <habit>/
 1. growing on soil surface/
 2. growing below soil surface/
 3. floating on water surface/
- #145. megagametophytes <whether endospori>/
 1. developing within spores/
 2. developing outside spores/
- #146. megagametophytes <whether green>/
 1. green/
 2. not green/
 3. white/
 4. dark green/
 5. yellow/
- #147. megagametophytes <shape>/
 1. cordate/
 2. round/
 3. linear/
 4. obcordate/
 5. reniform/
 6. elliptic/
- #148. megagametophytes <indumentation>/
- #149. megagametophytes/
 1. with 1 archegonia/
 2. with 2 or more archegonia/
- #150. <complete sentences giving numbers of genera and species present in Oklahoma> <MANDATORY>/
- #151. <complete sentences describing important taxonomic aspects such as problems in identification, classification, and/or nomenclature>/
- #152. <complete sentences describing important or characteristic aspects of family such as ecological and/or geographical distribution; economic significance; region of origin if adventive, introduced or naturalized; reproductive biology>/

APPENDIX H

DELTA-CHARS FOR FERN ALLY FAMILIES OF OKLAHOMA

*SHOW: Equisetaceae, Isoetaceae, Lycopodiaceae, Selaginellaceae of Oklahoma - character list. Revised 17 March 1997.

*CHARACTER LIST

- | | |
|---|---|
| <p>#1. plants <habit> <MANDATORY>/
 1. herbs/
 2. herbaceous vines/
 3. herbaceous epiphytes/</p> <p>#2. plants <habit> <MANDATORY>/
 1. perennials/
 2. annuals/</p> <p>#3. plants <distinctive, general descriptors that serve to characterize the taxon>/</p> <p>#4. plants <perenniating organs>/
 1. with perenniating organs absent/
 2. from rhizomes/
 3. from creeping and branching rhizomes/
 4. from stolons/
 5. from fleshy erect subterranean stems/
 6. from corms/</p> <p>#5. plants <habit>/
 1. deciduous/
 2. evergreen/</p> <p>#6. plants <habit>/
 1. terrestrial/
 2. emergent aquatics/
 3. floating-leaved aquatics/
 4. free-floating aquatics/
 5. saxicolous/</p> <p>#7. plants <reproductive habit>/
 1. producing sporangia in basal cavities of leaves <Isoetes>/
 2. producing sporangia on sporophylls borne in 4-sided or flattened strobili <Selaginella>/
 3. producing sporangia on non-photosynthetic sporophylls borne in cylindrical, peduncled strobili <Lycopodiella>/
 4. producing sporangia on whorled, peltate sporophylls borne in terminal strobili <Equisetum>/</p> <p>#8. roots <distinctive, general descriptors that serve to characterize the taxon>/</p> <p>#9. roots <color>/
 1. translucent/
 2. black/
 3. brown/
 4. purplish/</p> <p>#10. roots <whether branched>/
 1. branching/
 2. not branching/</p> <p>#11. roots <whether felted>/
 1. felted/
 2. not felted/</p> <p>#12. roots <whether numerous>/
 1. numerous/
 2. not numerous/</p> | <p>#13. roots <emergence>/
 1. emerging from lower sides of stems/
 2. not emerging from lower sides of stems/</p> <p>#14. roots <whether root hairs present>/
 1. with root hairs present/
 2. with root hairs absent/</p> <p>#15. corms <presence>/
 1. present/
 2. absent/</p> <p>#16. corms <distinctive, general descriptors that serve to characterize the taxon>/</p> <p>#17. corms <color>/
 1. white/
 2. brown/
 3. black/</p> <p>#18. corms <shape>/
 1. globose/
 2. lanceolate/
 3. ovate/</p> <p>#19. corms <number of lobes>/
 1. 2-lobed/
 2. 3-lobed/
 3. 4-lobed/
 4. 5-lobed/</p> <p>#20. stems <distinctive, general descriptors that serve to characterize the taxon>/</p> <p>#21. stems <whether stems jointed and longitudinally ribbed>/
 1. jointed and longitudinally ribbed/
 2. not jointed and longitudinally ribbed/</p> <p>#22. stems <whether leafy>/
 1. leafy/
 2. not leafy/</p> <p>#23. stems <aspect>/
 1. erect/
 2. ascending/
 3. creeping/
 4. short creeping/
 5. long creeping/
 6. free floating/
 7. suberect/
 8. prostrate/
 9. growing on the soil surface/
 10. growing below the soil surface/
 11. prostrate to short creeping/
 12. long to moderately short creeping to decumbent/
 13. pendent/
 14. decumbent/</p> <p>#24. stems <tip aspect>/
 1. tips upturned/</p> |
|---|---|

2. tips straight/
- #25. stems <monomorphic or dimorphic>/
1. of 2 types, having both horizontal and upright shoots/
2. all alike/
- #26. stems <branching and forking>/
1. profusely branched and irregularly forked/
2. profusely branched and regularly forked/
3. sparsely branched and mostly simple or 1-forked/
4. pinnately branched/
5. sparsely to profusely branching/
- #27. <stems> horizontal shoots <habit>/
1. prostrate/
2. not prostrate/
- #28. <stems> upright shoots <whether forming peduncles>/
1. forming leafy peduncles/
2. not forming leafy peduncles/
- #29. <stems> upright shoots <whether branched>/
1. branching/
2. not branching/
- #30. aerial stems <distinctive, general descriptors that serve to characterize the taxon>/
- #31. aerial stems <size of aerial stems in cross section>/
1. stout/
2. slender/
- #32. aerial stems <habit>/
1. annuals, persisting for 1 year or less/
2. perennials, persisting more than a year/
- #33. aerial stems <whether aerial stems jointed>/
1. jointed/
2. not jointed/
- #34. aerial stems <presence of grooves, ridges, and flutation>/
1. fluted with grooves and ridges/
2. without flutation, grooves, and ridges/
- #35. aerial stems <presence of whorled branching from solid nodes>/
1. with whorled branches from solid nodes/
2. without whorled branches from solid nodes/
3. with or without whorled branches from solid nodes/
- #36. aerial stems <surfaces>/
1. surfaces slightly scabrous/
2. surfaces sparsely scabrous to scabrous/
3. surfaces scabrous/
4. surfaces smooth/
- #37. aerial stems <presence of silica particles>/
1. with gritty rosettes, rows, rings, or bands of silica particles/
2. without gritty rosettes, rows, rings, or bands of silica particles/
- #38. aerial stems <whether stomata present>/
1. stomata present/
2. stomata absent/
- #39. aerial stems <number of stomatal lines position>/
1. stomata in single rows and raised above surface/
2. stomata in single rows and below surface/
3. stomata in double rows and raised above surface/
4. stomata in single or double rows raised or below surface/
- #40. aerial stems <presence of aerenchyma tissue>/
1. aerenchyma tissue present/
2. aerenchyma tissue absent/
- #41. aerial stems <whether dimorphic>/
1. all alike, with fertile and sterile stems alike/
2. of 2 types, with separate fertile and sterile stems/
- #42. <aerial stems> fertile stems (from separate fertile and sterile stems)
<color and presence of chlorophyll>/
1. brown, lacking chlorophyll/
2. white, lacking chlorophyll/
- #43. <dimorphic aerial stems> fertile stems (from separate fertile and sterile stems)
<comparison of size with sterile stems>/
1. shorter than the sterile stems and with larger leaf sheaths/
2. larger than the sterile stems and with smaller leaf sheaths/
- #44. <dimorphic aerial stems> fertile stems (from separate fertile and sterile stems)
<presence of whorled branches>/
1. with regular ascending whorls of solid branches/
2. without regular whorls of branches/
- #45. <dimorphic aerial stems> fertile stems (from separate fertile and sterile stems)
<presence of stomates>/
1. stomates present/
2. stomates absent/
- #46. <dimorphic aerial stems> sterile stems (from separate fertile stems)
<color>/
1. green/
2. white/
- #47. <dimorphic aerial stems> sterile stems (from dimorphic aerial stems)
<presence of whorled branches>/
1. with regular ascending whorls of branches/
2. without regular whorls of branches/
3. with or without regular ascending whorls of branches/
- #48. <dimorphic aerial stems> sterile stems (from dimorphic aerial stems)
<presence of stomates>/
1. with stomates/
2. without stomates/
- #49. <dimorphic aerial stems> sterile stems (from dimorphic aerial stems)
<attachment>/
1. branches borne at nodes emerging from bases of leaf sheaths/
2. branches not borne at nodes/
- #50. monomorphic aerial stems <distinctive descriptors that serve to characterize the taxon>/
- #51. nodes <whether having distinct nodes>/
1. distinct/
2. not distinct/
- #52. nodes <distinctive, general descriptors that serve to characterize the taxon>/

- #53. nodes <rhizophores>/
 1. with wiry rhizophores/
 2. without wiry rhizophores/
- #54. <nodes> rhizophores <side of stem borne>/
 1. borne on upper sides of stems/
 2. borne on lower sides of stems/
 3. borne on upper or lower sides of stems/
- #55. internodes <distinctive, general descriptors that serve to characterize the taxon>/
- #56. internodes <anatomy>/
 1. solid/
 2. hollow/
- #57. internodes <shape in cross section>/
 1. terete/
 2. terete but flattened on one side/
 3. triangular/
- #58. internodes <indumentum>/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #59. leaves <presence>/
 1. present <implicit>/
 2. absent/
- #60. leaves <distinctive, general characters that serve to distinguish the taxon>/
- #61. leaves <nature >/
 1. scale-like/
 2. not scale-like/
- #62. leaves <size>/
 1. large/
 2. small/
 3. minute/
- #63. leaves <color>/
 1. dull green to gray/
 2. yellow green/
 3. bright green/
- #64. leaves <color of leaf bases>/
 1. pale toward bases/
 2. lustrous black toward bases/
- #65. leaves <presence of chlorophyll>/
 1. chlorophyll present/
 2. chlorophyll absent/
- #66. leaves <whether tips are leaves free and toothlike>/
 1. tips free, toothed, and persistent/
 2. tips not free, toothed, and persistent/
 3. tips free, toothed, and deciduous/
 4. tips free, toothed, and persistent or deciduous/
- #67. leaves <color of margins>/
 1. margins white/
 2. margins not white/
- #68. leaves <number of types>/
 1. all alike/
 2. of 2 forms/
- #69. leaves <distribution>/
 1. basal/
 2. forming a basal rosette/
 3. cauline/
- #70. leaves <complexity>/
 1. simple/
 2. 1-pinnately compound/
 3. palmately compound/
- #71. leaves <arrangement>/
 1. alternate/
 2. opposite/
 3. whorled/
 4. spirally arranged and arising from short underground corms/
 5. spirally arranged/
- #72. leaves <whether petiole present>/
 1. petiolate/
 2. sessile/
 3. with basal sheaths/
- #73. leaves <attachment to stem>/
 1. clasping/
 2. sheathing/
 3. not sheathing/
 4. with basal sheaths/
- #74. leaves <if opposite>/
 1. four ranked, 2 medial and 2 lateral/
 2. in two planes/
 3. 4-ranked/
 4. 8-ranked/
- #75. leaves <if whorled, number of leaves>/
 1. three per node/
 2. four per node/
 3. five per node/
- #76. leaves <aspect>/
 1. appressed in both horizontal and upright/
 2. ascending/
 3. spreading/
 4. curled/
 5. reflexed/
 6. appressed/
- #77. leaves <spacing>/
 1. imbricated/

2. non-overlapping/
3. spirally arranged/
4. approximate to widely imbricated/
- #78. blades of aerial stems <distinctive, general characters that serve to distinguish the taxon>/
- #79. blades of aerial stems <Selaginella; shape>/
1. linear/
2. lanceolate/
3. falcate/
4. narrowly triangular-ovate/
5. rhomboid/
6. linear-lanceolate/
- #80. blades of rhizomatous stems <Selaginella; whether scalelike>/
1. scale-like/
2. not scale-like/
- #81. blades <distinctive, general characters that serve to distinguish the taxon>/
- #82. blades <shape>/
1. lanceolate/
2. ovate/
3. rhomboid/
4. flabellate/
5. linear/
6. deltate/
7. narrowly lanceolate/
8. elliptic/
9. oblong/
10. pentagonal/
11. broadly ovate/
12. oblanceolate/
13. broadly deltoid/
14. ovate triangular/
15. quadrate/
16. obdeltoid/
17. filiform/
18. linear-lanceolate to ovate/
19. linear-lanceolate to lanceolate/
- #83. blades <surface>/
1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/
- #84. blades <venation>/
1. venation parallel/
2. venation pinnate/
3. venation a single vein/
4. venation not apparent/
- #85. blades <indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes; velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight tri-chomes; silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled tri-chomes; cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #86. blades <apices>/
1. apices acute/
2. apices rounded/
3. apices attenuate/
4. apices acuminate/
5. apices obtuse/
6. apices caudate/
7. apices subulate/
8. apices mucronate/
- #87. blades <margins>/
1. margins dentate/
2. margins crenate/
3. margins serrulate/
4. margins entire/
5. margins undulate/
6. margins lacerate/
7. margins pinnatifid/
8. margins pinnatisect/
9. margins pectinate/
- #88. blades <bases>/
1. bases hastate/
2. bases auriculate/
3. bases sagitate/
4. bases rounded/
5. bases cordate/
6. bases truncate/
7. bases obtuse/
8. bases oblique/
9. bases attenuate/
10. bases cuneate/
- #89. <blades> ligules <whether ligulate>/
1. present/
2. absent/
- #90. ligules <distinctive, general characters that serve to distinguish the taxon>/
- #91. ligules <apices>/
- #92. sheaths <presence>/
1. present/
2. absent/
- #93. sheaths <distinctive, general characters that serve to distinguish the taxon>/
- #94. sheaths <color>/
1. green/
2. brown-gray/

- #95. sheaths <shape of top>/
 1. dilated distally/
 2. cylindrical/
- #96. sheaths <girdles>/
 1. with 2 dark bands at summit and base/
 2. with 1 dark band at summit/
- #97. strobili <presence>/
 1. present/
 2. absent/
- #98. strobili <conspicuousness>/
 1. conspicuous/
 2. inconspicuous/
- #99. strobili <number & arrangement>/
 1. solitary/
 2. paired/
 3. occasionally paired/
- #100. strobili <position>/
 1. terminal/
 2. lateral/
- #101. strobili <position>/
 1. sessile/
 2. peduncled/
- #102. strobili <orientation>/
 1. erect/
 2. ascending/
 3. spreading/
- #103. strobili <appearance>/
 1. straight/
 2. curved/
- #104. strobili <shape>/
 1. flattened/
 2. cylindrical/
 3. 4-sided/
- #105. strobili <apices>/
 1. apices acute/
 2. apices rounded/
 3. apices blunt/
- #106. peduncle leaves <distinctive, general characters that serve to distinguish the taxon>/
- #107. peduncle leaves <resemblance to vegetative leaves>/
 1. resembling vegetative leaves/
 2. slightly different from vegetative leaves/
 3. conspicuously different from vegetative leaves/
 4. resembling vegetative leaves in shape, but lacking marginal teeth/
 5. not resembling vegetative leaves/
- #108. peduncle leaves <ranking>/
 1. 2-ranked/
 2. 3-ranked/
 3. 4-ranked/
- #109. peduncle leaves <orientation>/
 1. spreading/
 2. appressed/
 3. appressed and incurved/
- #110. peduncle leaves <aspect>/
 1. imbricated/
 2. not imbricated/
- #111. peduncle leaves <shape>/
 1. lanceolate/
 2. linear/
- #112. peduncle leaves <whether keeled>/
 1. keeled/
 2. not keeled/
- #113. peduncle leaves <apices>/
 1. apices acute/
 2. apices rounded/
 3. apices attenuate/
 4. apices acuminate/
 5. apices obtuse/
 6. apices caudate/
 7. apices subulate/
 8. apices mucronate/
- #114. peduncle leaves <margins>/
 1. margins dentate/
 2. margins crenate/
 3. margins serrulate/
 4. margins entire/
 5. margins undulate/
 6. margins lacerate/
 7. margins pinnatifid/
 8. margins pinnatisect/
 9. margins pectinate/
- #115. peduncle leaves <bases>/
 1. bases hastate/
 2. bases auriculate/
 3. bases sagitate/
 4. bases rounded/
 5. bases cordate/
 6. bases truncate/
 7. bases obtuse/
 8. bases oblique/
 9. bases attenuate/
 10. bases cuneate/
- #116. sporophylls <distinctive, general characters that serve to distinguish the taxon>/
- #117. sporophylls <resemblance to vegetative leaves>/
 1. resembling vegetative leaves/
 2. slightly different from vegetative leaves/
 3. conspicuously different from vegetative leaves/
 4. resembling vegetative leaves in shape, but lacking marginal teeth/
 5. not resembling vegetative leaves/
- #118. sporophylls <morphological types>/
 1. all alike/
 2. of 2 forms (micro- and mega-) <Isoetes>/
- #119. sporophylls <size relationship of megasporophylls and microsporophylls>/
 1. microsporophylls wider and larger than megasporophylls/
 2. megasporophylls wider and larger than microsporophylls/
 3. megasporophylls and microsporophylls same size/
- #120. sporophylls <ranking>/
 1. 2-ranked/
 2. 3-ranked/
 3. 4-ranked/

- #121. sporophylls <arrangement>/
 1. borne in alternating whorls/
 2. not borne in alternating whorls/
- #122. sporophylls <aspect>/
 1. spreading/
 2. appressed/
 3. appressed and incurved/
- #123. sporophylls <comparison to peduncle leaves>/
 1. generally longer than peduncle leaves/
 2. as long as peduncle leaves/
 3. slightly shorter than peduncle leaves/
- #124. sporophylls <shape>/
 1. ovate-lanceolate to lanceolate/
 2. ovate-deltate to ovate/
 3. deltate-ovate to ovate-lanceolate/
 4. ovate to ovate-deltate/
 5. lanceolate to ovate-lanceolate/
 6. lanceolate/
 7. ovate/
 8. rhomboid/
 9. flabellate/
 10. linear/
 11. deltate/
 12. narrowly lanceolate/
 13. elliptic/
 14. oblong/
 15. pentagonal/
 16. broadly ovate/
 17. oblanceolate/
 18. broadly deltoid/
 19. ovate triangular/
 20. quadrate/
 21. obdeltoid/
 22. filiform/
 23. linear lanceolate to ovate/
- #125. sporophylls <whether keeled>/
 1. strongly keeled/
 2. not keeled/
- #126. sporophylls <apices>/
 1. apices acute/
 2. apices rounded/
 3. apices attenuate/
 4. apices acuminate/
 5. apices obtuse/
 6. apices caudate/
 7. apices subulate/
 8. apices mucronate/
- #127. sporophylls <margins>/
 1. margins dentate/
 2. margins crenate/
 3. margins serrulate/
 4. margins entire/
 5. margins undulate/
 6. margins lacerate/
 7. margins pinnatifid/
 8. margins pinnatisect/
 9. margins pectinate/
 10. margins bilobed with ventral lobe submerged/
 11. margins toothed/
- #128. sporophylls <bases>/
 1. bases hastate/
 2. bases auriculate/
 3. bases sagitate/
 4. bases rounded/
 5. bases cordate/
 6. bases truncate/
 7. bases obtuse/
 8. bases oblique/
 9. bases attenuate/
 10. bases cuneate/
 11. bases gradually tapered/
 12. bases obliquely obtuse/
- #129. sporophylls <number of sporangia per sporophyll>/
 1. with 1 sporangium/
 2. with 2 sporangia/
 3. with 3 sporangia/
 4. with 4 sporangia/
 5. with 5 sporangia/
 6. with 6 sporangia/
 7. with 7 sporangia/
 8. with 8 sporangia/
 9. with 9 sporangia/
 10. with 10 sporangia/
- #130. <sporophylls> ligules <whether ligulate>/
 1. present/
 2. absent/
- #131. <sporophylls> ligules <distinctive, general characters that serve to distinguish the taxon>/
- #132. <sporophylls> ligules <position in relationship to sporangia>/
 1. attached below sporangia/
 2. attached above sporangia/
- #133. sporangia <distinctive, general characters that serve to distinguish the taxon>/
- #134. sporangia <morphological form>/
 1. all alike <implicit>/
 2. of 2 types/
- #135. sporangia <type>/
 1. eusporangiate/
 2. leptosporangiate/
- #136. sporangia <size>/
 1. minute/
 2. large/
- #137. sporangia <aspect>/
 1. erect/
 2. pendulous <Equisetum>/
- #138. sporangia <shape>/
 1. elongate/
 2. reniform/
 3. globose/
- #139. sporangia <dehiscence>/
 1. dehiscing by distal slits/
 2. indehiscent/
 3. dehiscing longitudinally/
- #140. sporangia <length of stalk>/
 1. stalked/
 2. sessile/
- #141. sporangia <stalk>/
 1. stalk cells in 1-row/
 2. stalk cells in 2-rows/
 3. stalk cells in 3-rows/
 4. stalk cells in 4-rows/

5. stalk cells in 5-rows/
6. stalk cells in 6-rows/
- #142. sporangia <velum presence>/
1. subtended by velum/
2. not subtended by velum/
- #143. <sporangia> velum <length>/
1. velum covering less than 3/4 of sporangium/
2. velum covering less than 1/4 of sporangium/
3. velum covering entire sporangium/
- #144. spores <distinctive,general characters that serve to distinguish the taxon>/
- #145. spores <whether homosporous or heterosporous>/
1. all alike/ /
2. of 2 types/
- #146. spores <size>/
1. large/
2. minute/
- #147. spores <color>/
1. colorless/
2. yellowish/
3. greenish/
4. black/
5. brown/
6. gray/
7. white/
8. green/
9. orange/
10. light brown/
- #148. spores <shape>/
1. tetrahedral/
2. globose/
3. reniform/
4. oblong/
- #149. spores <surface>/
1. warty/
2. rugose/
3. tuberculate/
4. spiny/
5. reticulate/
6. winged/
7. perforate/
8. smooth/
9. verrucose/
10. granulate/
- #150. spores <elaters>/
1. with 4 elaters/
2. without elaters/
- #151. spores <scars>/
1. trilete/
2. monolete/
- #152. spores <number of spores per sporangia>/
per sporangium/
- #153. microspores <distinctive,general characters that serve to distinguish the taxon>/
- #154. microspores <color>/
1. colorless/
2. yellowish/
3. greenish/
4. black/
5. brown/
6. gray/
7. white/
8. green/
9. orange/
10. light brown/
- #155. microspores <size>/
1. large/
2. minute/
- #156. microspores <shape>/
1. tetrahedral/
2. globose/
3. reniform/
4. oblong/
- #157. microspores <surface>/
1. warty/
2. rugose/
3. tuberculate/
4. spiny/
5. reticulate/
6. winged/
7. perforate/
8. smooth/
9. verrucose/
10. granulate/
- #158. microspores <scars>/
1. trilete/
2. monolete/
- #159. microspores <number of microspores per microsporangia>/ per microsporangium/
- #160. megaspores <distinctive,general characters that serve to distinguish the taxon>/
- #161. megaspores <color>/
1. colorless/
2. yellowish/
3. greenish/
4. black/
5. brown/
6. gray/
7. white/
8. green/
9. orange/
10. light brown/
- #162. megaspores <size>/
1. large/
2. minute/
- #163. megaspores <shape>/
1. tetrahedral/
2. globose/
3. reniform/
4. oblong/
- #164. megaspores <surface>/
1. warty/
2. rugose/
3. tuberculate/
4. spiny/
5. reticulate/
6. winged/
7. perforate/
8. smooth/

- 9. verrucose/
- 10. granulate/

- #165. megaspores <scars>/
 - 1. trilete/
 - 2. monolete/

- #166. megaspores <number of megasporangium>/
per megasporangium/

- #167. gametophytes <distinctive, distinguishing characters
that distinguish the taxon>/

- #168. gametophytes <reproductive habit>/
 - 1. of 2 types (micro- and mega-)/
 - 2. all alike/

- #169. gametophytes <habit>/
 - 1. growing on soil surface/
 - 2. growing below soil surface/

- #170. gametophytes <whether remaining inside spore>/
 - 1. developing within spores/
 - 2. developing outside spores/

- #171. gametophytes <location of gametangia>/
 - 1. producing both antheridia and archegonia on upper
surfaces/
 - 2. producing either antheridia or archegonia on upper
surfaces/

- #172. gametophytes <color>/
 - 1. green/
 - 2. white/
 - 3. colorless/

- #173. gametophytes <shape>/
 - 1. cordate/
 - 2. round/
 - 3. linear/
 - 4. reniform/
 - 5. elliptic/

- #174. gametophytes <indumentation>/

- #175. <complete sentences giving numbers of genera and
species present in Oklahoma> <MANDATORY>/

- #176. <complete sentences describing important taxonomic
aspects such as problems in identification, classification,
and/or nomenclature>/

- #177. <complete sentences describing important or
characteristic aspects of family such as ecological
and/or geographical distribution; economic significance
region of origin if adventive, introduced or naturalized;
reproductive biology>/

APPENDIX I
DELTA-SPECS FOR FERN FAMILIES OF OKLAHOMA

*SHOW: Fern Families of Oklahoma - specifications. Revised 11 April 1997.

*NUMBER OF CHARACTERS 901

*MAXIMUM NUMBER OF STATES 28

*MAXIMUM NUMBER OF ITEMS 202

*CHARACTER TYPES 3,TE 8,TE 10,TE 17,TE 22,TE 36,TE 41,TE 56,TE 80,IN 81,TE 87,TE 111,IN 112,TE 118,TE 139-140,IN 141,TE 144,TE 165,TE 180,TE 202,IN 203,TE 206,TE 228,IN 229,TE 235,TE 258,IN 259,TE 265,TE 288,IN 289,TE 292,TE 311,TE 326,TE 348,IN 349,TE 352,TE 374,IN 375,TE 381,TE 404,IN 405,TE 411,TE 434,IN 435,TE 438,TE 457,TE 472,TE 494,IN 495,TE 498,TE 520,IN 521,TE 527,TE 550,IN 551,TE 557,TE 580,IN 581,TE 584,TE 603,TE 615,TE 637,IN 638,TE 641,TE 657,IN 658,TE 664,TE 683,IN 684,TE 690,TE 709,IN 710,TE 713,TE 728,TE 737,TE 746,TE 755,TE 764,TE 776,TE 787,TE 799,TE 810-811,TE 815,IN 825-826,TE 830,IN 840-841,TE 845,IN 856,TE 866,TE 875,TE 882,TE 885,TE 891,IN 892,TE 897,TE 899-901,TE

*NUMBERS OF STATES 1,5 4,4 9,3 11,4 19,4 20,3 27,3 30,3 31,4 32,18 35,3 38,8 42,3 44,7 49-50,3 51,6 52,3 54,7 57,12 59,4 63,4 64,9 65,19 68,4 69,9 70,19 74,9 76,9 77,10 84,3 86,3 88,12 90,4 94,4 95,9 96,21 99,4 101,9 102,21 106,9 107,10 108,12 115,3 117,3 119,12 120,4 124,4 125,9 126,21 129,4 131,9 132,21 136,9 137,10 138,12 145,12 146,4 150,4 151,9 152,21 155,4 157,9 158,21 162,9 163,10 164,12 168,7 173-174,3 175,6 176,3 178,7 181,12 183,4 187,4 188,9 189,19 192,4 193,9 194,19 198-199,9 200,10 204,3 207,12 208,4 214,4 215,9 216,19 219,4 220,9 221,19 224,9 225,11 226,3 227,12 232,3 234,3 236,12 238,4 242,4 243,9 244,21 247,4 248,9 249,21 252,9 253,10 254,12 262,3 264,3 266,12 268,4 272,4 273,9 274,21 277,4 278,9 279,21 282,9 283,10 284,12 293,12 294,4 298,4 299,9 300,21 303,4 304,9 305,21 308,9 309,10 310,12 314,7 319-320,3 321,6 322,3 324,7 327,12 329,4 333,4 334,9 335,19 338,4 339,9 340,19 344-345,9 346,10 350,3 353,12 354,4 360,4 361,9 362,19 365,4 366,9 367,19 370,9 371,11 372,3 373,12 378,3 380,3 382,12 384,4 388,4 389,9 390,21 393,4 394,9 395,21 398,9 399,10 400,12 408,3 410,3 412,12 414,4 418,4 419,9 420,21 423,4 424,9 425,21 428,9 429,10 430,12 439,12 440,4 444,4 445,9 446,21 449,4 450,9 451,21 454,9 455,10 456,12 460,7 465-466,3 467,6 468,3 470,7 473,12 475,4 479,4 480,9 481,19 484,4 485,9 486,19 490-491,9 492,10 496,3 499,12 500,4 506,4 507,9 508,19 511,4 512,9 513,19 516,9 517,11 518,3 519,12 524,3 526,3 528,12 530,4 534,4 535,9 536,21 539,4 540,9 541,21 544,9 545,10 546,12 554,3 556,3 558,12 560,4 564,4 565,9 566,21 569,4 570,9 571,21 574,9 575,10 576,12 585,12 586,4 590,4 591,9 592,21 595,4 596,9 597,21 600,9 601,10 602,12 606,7 609,3 611,6 612,3 613,8 616,12 618,4 622,4 623,9 624,19 627,4 628,9 629,19 633-634,9 635,10 639,3 642,12 643,4 644,9 645,19 648,4 649,9 650,19 653,9 654,11 655,3 656,12 661,3 663,3 665,12 667,4 668,9

669,21 672,4 673,9 674,21 677,9 678,10 679,12 687,3 689,3 691,12 693,4 694,9
695,21 698,4 699,9 700,21 703,9 704,10 705,12 714,12 715,4 716,9 717,21 720,4
721,9 722,21 725,9 726,10 727,12 729,17 731,4 733,21 735,21 738,17 740,4 742,21
744,21 747,17 749,4 751,21 753,21 756,17 758,4 760,21 762,21 765,17 767,4 771,3
772,21 774,21 777,17 779,4 782,3 783,21 785,21 788,17 790,4 794,3 795,21 797,21
800,17 802,4 805,3 806,21 808,21 813,3 814,4 822,5 823,21 828,3 829,4 837,5
838,21 843,3 844,4 852,5 853,21 857,3 858,6 863,7 864-865,3 869,4 870,9 872,5
874,3 878,3 879,4 880,3 887,9 888,4 889,10 896,10

*IMPLICIT VALUES

*DEPENDENT CHARACTERS

*MANDATORY CHARACTERS

APPENDIX J**DELTA-SPECS FOR AQUATIC FERN FAMILIES OF OKLAHOMA**

*SHOW: Aquatic Ferns of Oklahoma - specifications. Revised 17 March 1997.

*NUMBER OF CHARACTERS 152

*MAXIMUM NUMBER OF STATES 22

*MAXIMUM NUMBER OF ITEMS 200

*CHARACTER TYPES 3,TE 12,TE 17,TE 24,TE 26,TE 31,TE 47,TE 59,TE 70,RN
73,TE 94,TE 98,TE 104,TE 108,TE 112,TE 118,IN 119,TE 125,IN 126,TE 132,IN
133,TE 135,TE 141,TE 143,TE 148,TE 150-152,TE

*NUMBERS OF STATES 1,3 4,4 6,4 9,3 13,4 15,4 19,8 21,4 25,3 29,17 34-36,3 38,3
40,3 41,4 42,3 43,5 48,13 52,3 53,18 54,3 55,17 56-57,9 58,10 64,18 65,17 66-67,9 68,10
71,3 72,17 76,3 80,3 81,4 82,21 102,4 103,3 105,3 107,3 114,9 115,4 116,10 120,3 121,7
122,4 123,16 127,3 128,7 129,5 130,16 139,3 140,6 144,3 146,5 147,6

*IMPLICIT VALUES

*DEPENDENT CHARACTERS

*MANDATORY CHARACTERS

APPENDIX K**DELTA-SPECS FOR FERN ALLY FAMILIES OF OKLAHOMA**

*SHOW: Equisetaceae, Isoetaceae, Lycopodiaceae, Selaginellaceae of Oklahoma - specifications. Revised 17 March 1997.

*NUMBER OF CHARACTERS 177

*MAXIMUM NUMBER OF STATES 23

*MAXIMUM NUMBER OF ITEMS 200

*CHARACTER TYPES 3,TE 8,TE 16,TE 20,TE 30,TE 50,TE 52,TE 55,TE 60,TE 78,TE 81,TE 90-91,TE 93,TE 106,TE 116,TE 131,TE 133,TE 144,TE 152,IN 153,TE 159,IN 160,TE 166,IN 167,TE 174-177,TE

*NUMBERS OF STATES 1,3 4,6 6,5 7,4 9,4 17-18,3 19,4 23,14 26,5 35,3 36,4 39,4 47,3 54,3 57,3 58,17 62-63,3 66,4 69-70,3 71,5 72,3 73-74,4 75,3 76,6 77,4 79,6 82,19 83,9 84,4 85,17 86,8 87,9 88,10 99,3 102,3 104-105,3 107,5 108-109,3 113,8 114,9 115,10 117,5 119-120,3 122-123,3 124,23 126,8 127,11 128,12 129,10 138-139,3 141,6 143,3 147,10 148,4 149,10 154,10 156,4 157,10 161,10 163,4 164,10 172,3 173,5

*IMPLICIT VALUES

*DEPENDENT CHARACTERS

*MANDATORY CHARACTERS

APPENDIX L
DELTA-ITEMS FOR FERN FAMILIES OF OKLAHOMA

*SHOW: Ferns of Oklahoma - Items. Revised 12-Apr-97.

*ITEMS DESCRIPTIONS/

#1. Aspleniaceae/

1,1 2,1 4,2 5,2 9,1 15,2 26,1/2 27,2-1 32,1 38,2/5/6 42,1 43,1
 51,1/2 52,1 57,5-1 75,1/2 82,1 84,1/2 109,1/2 110,1 822,3 857,1 858,2
 862,1/2 869,2 886,1 890,2 893,1 896,1 899<In Oklahoma the family is
 represented by one genus and seven species>

#2. Blechnaceae/

1,1 2,1 4,1 9,1 12,1 15,2 24,1 28,2 31,2 33,1 42,3 43,1 171,1 173,2
 175,1 176,1 181,7-1 185,1 186,2 189,16 190,1 198,1 199,8 200,6
 204,1 225,5&6 226,3 317,3 321,1 322,1 327,7-1 345,8 350,1 353,5/5-1
 356,1 370,1 765,10 767,4 769,1 771,1 788,17&2
 790,2-4 857,1<lined up end to end> 863,4-2 867,1 869,2 873,2 876,1
 877,2 888,3 890,2 894,1 896,1 898,1 899<A family in Oklahoma that is
 represented by one species Woodwardia areolata>

#3. Dennstaedtiaceae/

1,1 2,1 4,2 9,1 11,4/3 12,1 15,1 23,2 24,1 26,1 33,2 42,1 43,1 44,7
 51,2-5 52,1 54,5-2 57,6 61,2 65,1 70,11 74,2 82,2 84,2-3 86,4
 788,15 790,4 774,1 820,1 822,3 855,1<rare> 857,2 858,3 863,4
 865,2 877,2 886,1 888,1-2 890,1 894,1 898,1 899<In Oklahoma the family
 is represented by one species and 2 varieties> 901<This species
 is a common weed of southeastern Oklahoma pine-hardwood forest>

#4. Dryopteridaceae/

1,1 2,1 4,2 7,2 9,1 26,1/2 33,1 42,1/3 43,1 51,1/2/3 52,1 54,1-5
 57,1/6 59,4 61,1/2 62,2 109,1/2 110,2 787<wings present or
 wings absent> 840<scales present> 857,1/2/3 858,2 863,1/2/7 869,3/1/4
 876,1 877,2 886,1 894,1 896,1 888,3/4 890,2 899<The family in Oklahoma
 is represented by six genera and 12 species>

#5. Lygodiaceae/

1,2 2,1 4,2 9,2 26,1 42,1 51,3-5 52,1 82,2 84,1 86,3 88,6<ultimate
 segments of fertile portions fringed with radiating oblong lobes>
 96,1<except on veins> 788,12 790,3 855,2 867,1 870,8 873,1 877,2
 878,3 881,2 886,1 888,1-2 890,1 899<A family in Oklahoma represented
 by one species, Lygodium japonicum> 901<The species is neither reported
 by Flora of North America or the Taylors. The plant has been reported
 to occur near Tom Oklahoma by Dr. Magrath of USAO in Chickasha>

#6. Ophioglossaceae/

1,4 2,1 4,4 8<indumentum absent> 9,3 12,1/2 14,1 20,1/3 42,2 43,2
 467,1/2-4 611,1/2-3 810<with stipules at base> 824,1/2 881,2
 816,1 817,1 818,1 855,2 876,1 877,1 886,1 890,1 894,2 895,2
 899<the family in Oklahoma is represented by two genera and six
 species> 901<The family is considered the most primitive of the 17
 families with their eusporangia>

#7. Osmundaceae/

1,1 2,1 4,2 9,4 11,3 13,1 21,2 24,1 25,2 42,2/4 43,1 46,1/2
 51,2-4 171,1 175,2 176,1 181,1/7-1 311<green becoming brown>
 457<laminate portions subtending the distal fertile portions>
 463,1 604,2 609,3 610,1 613,5 811<yellow green or green> 822,3 855,2
 877,2 881,2 887,3 894,1 899<The family in Oklahoma is represented
 by one genus and two species> 901<These ferns are considered to be
 intermediates between the higher leptosporangiates and the
 eusporangiates>

#8. Polypodiaceae/

1,4 2,1 4,2 9,1 11,4 26,1 38,8 40,2 42,1 43,1 51,1 52,1 54,6 57,2-8
 59,4 68,4 70,1 73,1 76,8 144<subopposite> 857,1 858,5 859,1 864,2 145,5-8
 877,2 886,1 888,2 890,1 893,1 899<A family in Oklahoma represented
 by one species, Pleopeltis polypodioides> 901< Pleopeltis is a common
 epiphyte on older trees of southeastern Oklahoma forest, the species
 has also been collected on precambrian granite rock in Johnston
 County>

#9. Pteridaceae/

1,1 2,1 4,2 9,1 12,1 26,1/2 33,1 35,2/3 42,1 43,1/2 51,2-7 52,1
 68,1/2/3 100,1/2 857,2 858,3 865,3 876,1 877,2 888,1-2 890,1
 893,1 894,1 896,1 899<A large a diverse family of primarily xeric
 adapted ferns representing seven genera and 15 species in Oklahoma>

#10. Thelypteridaceae/

1,1 2,1 4,2 7,1 9,1 11,3/4 23,2 26,1 33,1 42,1 43,1 51,2-3 52,1 54,1-5
 57,1-6 59,4 74,4 82,1 84,1/2 108,11/8 109,1/2 110,1/1&2 790,4 840<scales
 only at base> 857,1 858,2 862,1 864,1/2 869,2 870,2 872,4 877,2 890,2
 886,1 888,2 893,1 899<The family in Oklahoma is represented by two
 genera and three species>

APPENDIX M

DELTA-ITEMS FOR AQUATIC FERN FAMILIES OF OKLAHOMA

*SHOW: Aquatic Ferns of Oklahoma - Items. Revised 17 March 1997.

*ITEMS DESCRIPTIONS

MARSILEACEAE (C.F.B. de Mirbel Water Clover Family)/

1,1 2,1 4,2/3<often partly submerged> 6,2 9,1 15,1 18,1 19,3 20,1/2
 21,4<with hairs laterally attached and multicellular> 32,1 36,1/2/3
 37,1/2 39,1/2 40,1 41,3/4 45,1 46,1/2 49,1 50,1 51,2 53,1/5 55,1/5
 59<4> 60,1 67,4<or toothed> 68,10 74,1 76,3 78,1/2 79,1/2 80,1
 81,1-2/4 82,21/20 83,1 84,1/2 85,1 86,1/2 87,1/2 88,1/2 95,1/2 97,1
 99,2 100,2 107,1 111,1 113,2 124,1 134,2 137,1 149,1 150<The family
 is represented in Oklahoma by 2 genera and 2 species.>

AZOLLACEAE (R. Wettstein Azolla Family)/

1,3 2,1 4,4<or subsisting or stranded on mud flats> 5,1/2 9,2 11,1
 13,1-2 14,2 15,4 19,8-7 21,3 22,1 29,1 35,1 40,1 41,1 42,1<with 2
 oval or suborbicular lobes, the upper lobe floating and the lower
 lobe submersed> 52,2 74,2 75,1 76,2 93,2 99,2 100,2 105,3 111,1
 113,2 124,1 126<with 3 floats> 129,5 130,11/12/13/15 134,2 138,1
 150<The family is represented in Oklahoma by 1 genus and 2 species>
 151<The members are often mistaken for species of leafy liverworts.>
 152<The dense cover often formed by these plants over the surface
 of ponds, lagoons, and inlets provides shade and habitat for fish. The
 plants also serve as a food source for ducks and other water fowl.>

SALVINIACEAE (C. L. von Reichenbach Floating Fern Family)/

1,3 2,1 4,4<or on mud> 9,3 11,2 19,3 21,4<with many dark multicellular
 hairs> 40,3 48,13-8 50,1 51,1 53,18 55,1 56,5<or notched> 58<4-5>
 74,2 75,2 76,1 77,2 95,1 99,2 100,2 107,3 111,1 113,2 115,2 117,1
 144,3<with ventral pendent archegonia> 150<The family in Oklahoma
 is represented by 1 genus and 1 species.>

APPENDIX N
DELTA-ITEMS FOR FERN ALLY FAMILIES OF OKLAHOMA

*SHOW: Fern Allies of Oklahoma - items. Revised 17 March 1997

*ITEM DESCRIPTIONS

ISOETACEAE <C. L. Von Richenbach Quillwort Family>/

1,1 2,1 4,6 6,1/2 7,1 10,1 12,1 15,1 17,2 18,2 19,1 63,3/1 64,1/2 70,1 71,4
 82,17 84,3 86,1 87,4 88,9 97,2 118,2 121,1 130,1 132,2 134,2 136,2 142,1
 145,2 151,2 154,6/10 161,1 163,2 164,3/5 168,1 170,1 171<The family is
 represented in Oklahoma by 1 genus and 2 species.>

EQUISETACEAE <A. Michaux. ex A.P. DeCandolle Horsetail Family>/

1,1 2,1 4,3 6,1-2 7,4 11,1 31,1 32,1/2 39,1/2/3/4 40,1 41,1/2 42,1 43,1
 44,2 45,2 46,1 47,1 48,1 49,1 51,1 56,2 61,1 62,2 65,2 66,4 71,3 73,2
 94,1/2 95,1/2 96,1/2 97,1 98,1 100,1 101,1 102,1 103,1 104,2
 105,2/1<rounded to apiculate with blunt tips> 118,1 129,1/10 135,2
 137,2 145,1 147,3/7 150,1 171,1 175<The family is represented in Oklahoma
 by 1 genus and 4 species.> 177<The family has little wildlife significance.
 The plants however are browsed and eaten by cattle, deer,
 and muskrats.>

LYCOPODIACEAE <C.F.B. de Mirbel Club Moss Family>/

1,1 2,1 4,4 5,2 6,1 7,3 13,1 25,2 26,1 27,1 28,2 71,5 76,1 79,6/2 84,3
 87,4<or slightly toothed below> 89,1 98,1 99,1 101,2 102,1 104,2
 107,1 109,3 110,2 111,2-1 117,4 118,1 123,1 134,1 138,3 151,1 168,2 169,1
 172,1 173,1 175<The family is represented in Oklahoma by 1 genus and 1
 species.>

SELAGINELLACEAE <H.M. Wilkomm Spikemoss Family>/

1,1 2,1 5,2 6,1/5 7,2 10,2 22,1 23,3/2/14/8/1 53,1 54,3 61,1 62,3 68,1/2
 74,3/4 77,3/4 79,1/6/3/4 80,1 89,1 99,1/2 100,1 101,1 102,1/2/3 104,3
 105,2 117,3 118,2 119,2/3 120,3 121,1 130,1 134,2 135,2 139,1 140,1 146,2
 154,9 161,2/7 168,1 175<The family is represented in Oklahoma by 1 genus
 and 7 species.>

APPENDIX O

DELTA-TONAT FOR FERN FAMILIES OF OKLAHOMA

*SHOW:Translate into natural language

*HEADING: Ferns of Oklahoma

*LISTING FILE TONAT.LST *PRINT FILE TONAT.PRT

*DATA BUFFER SIZE 6000

*INPUT FILE SPECS

*SPECIAL STORAGE

*TRANSLATE INTO NATURAL LANGUAGE

*OMIT TYPESETTING MARKS

*REPLACE ANGLE BRACKETS

*OMIT CHARACTER NUMBERS

*OMIT INAPPLICABLES

*LINK CHARACTERS 1-9 10-16 17-21 22-40 41-55 56-58 59-62 63-65

66-67 68-70 71-73 74-75 77-78 79-86 87-89 90-93 94-96 97-98 99-102

103-105 108-110 111-117 118-119 120-123 124-126 127-128 129-132 133-135

139-143 144-145 146-149 150-152 153-154 155-158 159-161 165-179 180-182

183-186 187-189 190-191 192-194 195-197 200-201 202-205 206-207 208-213

214-216 217-218 219-221 222-223 225-226 228-234 235-237 238-241 242-244

245-246 247-249 250-251 254-257 258-264 265-267 268-271 272-274 275-276

277-279 280-281 284-287 288-291 292-294 295-297 298-300 301-302 303-305

306-307 311-325 326-328 329-332 333-335 336-337 338-340 341-343 346-347

348-351 352-353 354-359 360-362 363-364 365-367 368-369 371-372 374-380

381-383 384-387 388-390 391-392 393-395 396-397 400-403 404-410 411-413

414-417 418-420 421-422 423-425 426-427 430-433 434-437 438-439 440-443

444-446 447-448 449-451 452-453 457-471 472-474 475-478 479-481 482-483

484-486 487-489 492-493 494-497 498-499 500-505 506-508 509-510 511-513

514-515 517-518 520-526 527-530 531-533 534-536 537-538 539-541 542-543

546-549 550-556 557-559 560-563 564-566 567-568 569-571 572-573 576-579

580-583 584-585 586-589 590-592 593-594 595-597 598-599 603-614

615-617 618-621 622-624 625-626 627-629 630-632 635-636 637-640 641-642

643-645 646-647 648-650 651-652 654-655 657-663 664-666 667-669 670-671

672-674 675-676 679-682 683-689 690-692 693-695 696-697 698-700 701-702

705-708 709-712 713-714 715-717 718-719 720-722 723-724 728-732 733-734

735-736 737-741 742-743 744-745 746-750 751-752 753-754 755-759 760-761

762-763 764-771 772-773 774-775 776-782 783-784 785-786 787-794 795-796

797-798 799-805 806-807 808-809 810-854 855-865 866-874 875-880 881-884

885-891 892-897

*INPUT FILE CHARS

APPENDIX P**DELTA-TONAT FOR AQUATIC FERN FAMILIES OF OKLAHOMA**

*SHOW: Translate into natural language
*HEADING: Aquatic Ferns of Oklahoma
*LISTING FILE TONAT.LST *PRINT FILE TONAT.PRT
*DATA BUFFER SIZE 6000
*INPUT FILE SPECS
*SPECIAL STORAGE

*TRANSLATE INTO NATURAL LANGUAGE
*OMIT TYPESETTING MARKS
*REPLACE ANGLE BRACKETS
*OMIT CHARACTER NUMBERS
*OMIT INAPPLICABLES

*LINK CHARACTERS 1-10 11-16 17-22 23-25 26-29 30-45 46-48
49-51 52-54 59-60 61-63 69-72 73-87 89-90 91-92 93-97 98-103 104-107
108-111 112-118 119-125 126-132 133-134 135-142 143-149

*INPUT FILE CHARS

*PRINT HEADING
*INPUT FILE ITEMS

APPENDIX Q

DELTA-TONAT FOR FERN ALLY FAMILIES OF OKLAHOMA

*SHOW: Translate into natural language
*HEADING: Fern Allies of Oklahoma
*LISTING FILE TONAT.LST *PRINT FILE TONAT.PRT
*DATA BUFFER SIZE 6000
*INPUT FILE SPECS
*SPECIAL STORAGE

*TRANSLATE INTO NATURAL LANGUAGE
*OMIT TYPESETTING MARKS
*REPLACE ANGLE BRACKETS
*OMIT CHARACTER NUMBERS
*OMIT INAPPLICABLES

*LINK CHARACTERS 1-10 11-16 17-22 23-25 26-29 30-45 46-48 49-51 52-54
59-60 61-63 69-72 73-87 89-90 93-97 98-103 104-107 108-111 112-118
119-125 126-132 133-134 135-142 143-149

*INPUT FILE CHARS

*PRINT HEADING
*INPUT FILE ITEMS

2

VITA

Bruce A. Smith

Candidate for the Degree of

Doctor of Philosophy

Thesis: FLORISTIC INVESTIGATIONS OF THE FLORA OF OKLAHOMA

Major Field: Botany

Biographical:

Education: Graduated from Temple City High School, Temple City, California in June 1969; received Bachelor of Science degree in Biological Sciences from Cameron University in July of 1978; received a Masters of Education from Central State University in July 1981. I will complete the requirements for the Doctor of Philosophy with a major in Botany at Oklahoma State University in December, 1997.

Experience: Since 1979 I have taught science at McLoud High School; instructor of biology at Seminole Junior College 1981; teaching assistant field botany at the O.U. Biological Station 1987-89; instructor of botany at Rose State College 1992; teaching assistant biology at OSU 1993-94.

Professional Organizations

**Oklahoma Academy of Science
Oklahoma Junior Academy of Science
Native Plant Society of Oklahoma**