

MISSISSIPPI FLORA: A GUIDE TO THE FERNS AND FERN ALLIES

A. MURRAY EVANS¹

Department of Botany, The University of Tennessee, Knoxville, TN. 37916

ABSTRACT

Keys, distribution maps, habitats, nomenclature, and notes are given for the ferns and fern allies known to occur naturally or naturalized in Mississippi.

INTRODUCTION

This paper represents my contribution to the Flora of Mississippi Project, an effort being undertaken primarily by Drs. Sam Jones, (University of Georgia), Tom Pullen, (University of Mississippi), and Ray Watson (Mississippi State University). Hopefully, this information will stimulate efforts to improve knowledge of the ferns and fern allies of the state, so that any additions or corrections can be incorporated before the proposed comprehensive guide to the flora of Mississippi is published. Any overlooked species, additional collections, needed modifications, or suggestions are welcomed so that appropriate revisions can be made.

The primary sources of information for this treatment are the herbarium collections of the University of Mississippi, Mississippi State University, and the University of Southern Mississippi, and only those taxa supported by voucher materials or unquestionably substantiated in the literature are included. References made to some of the standard manuals of the southeastern flora are abbreviated as follows: Small, 1938 (S); Fernald, 1950 (F); Gleason and Cronquist, 1963 (G); Evans, in Radford et al., 1968 (R). Other taxonomic works used in preparation of this treatment are cited in the text.

The physiographic regions of Mississippi, based on those of Lowe (1921) are outlined in Fig. 1. The abbreviations used in the text are: Tennessee River Hills (TRH); Northeastern Pine Belt (NPB); Pontotoc Ridge (PR); Flatwoods (FW); North Central Plateau (NCP); Jackson Prairie (JP); Loess Bluff Hills (LBH); Yazoo-Mississippi Delta (YMD); Longleaf Pine Region (LPR); and Coastal Pine Meadows (CPM).

PTERIDOPHYTA

1. Plant free-floating on water or resting on mud; spores of 2 sizes, megaspores and microspores 13. Azollaceae.
1. Plants rooted to soil or mud; spores of one or two sizes.
 2. Plant conspicuously jointed; the leaves fused together at least basally

¹ Contr. Bot. Lab., Univ. Tenn., N.S. 497.

- into sheaths; sporangia borne below peltate plates in terminal cones. 1. Equisetaceae.
2. Plant not jointed; the leaves all separate and not forming sheaths; sporangia borne variously but not on peltate plates.
3. Sporangia in axils of scale-leaves or buried in basal pockets of soft tubular rush-like leaves; leaves with only a single vein or midrib, or none.
4. Plant tufted, rush-like, the stem forming a lobed corm; leaves 5–50 cm long; spores of two sizes 4. Isoetaceae.
4. Plant like coarse moss; the stems elongate and branching; leaves 0.1–1.5 cm long.
5. Plant robust, usually 8–40 cm tall; the shoots usually 5–20 mm broad; spores of one size 2. Lycopodiaceae.
5. Plant slender, usually low, rarely more than 5 cm tall; shoots usually 2–6 mm broad; spores of 2 sizes 3. Selaginellaceae.
3. Sporangia on long, simple or branching "fertile spikes" arising from the leaf, or borne upon surfaces of normal or contracted leaf blades; leaves simple or divided, with lateral veins arising from the midribs.
6. Sporangia 0.5–1 mm broad, exposed on panicle-like cluster or sunken in spike-like projections from the blade base or petiole base but not on separate modified non-green leaf. 5. Ophioglossaceae.
6. Sporangia 0.1–0.4 mm broad, borne directly upon leaf blade or on non-green skeletonized leaf or leaf apex (Osmundaceae), or inrolled bead-like leaflets ca. 2–4 mm in diam. of specialized non-green leaf in *Onoclea* (Aspleniaceae).
7. Leaves specialized into "vine-like" organs which climb upon other vegetation; sporangial annulus apical 7. Schizaeaceae.
7. Leaves typically fern-like, not "vine-like"; sporangial annulus lateral, or as a more or less vertical bow.
8. Bases of leaves with stipules or thin lateral wings; sporangia with only a lateral patch of thickened annular cells. 6. Osmundaceae.
8. Bases of leaves lacking stipules; sporangia with a well-defined bow-shaped annulus.
9. Leaf blade delicate, filmy, only 1 cell thick between the veins; sporangia in outward-facing cup-like or 2-valved involucre at the leaf margin. 8. Hymenophyllaceae.
9. Leaf blade thick, at least 2 or more cells thick between veins; sporangia dorsal or marginal, but not in an outward-facing marginal cup.
10. Sori marginal, covered by revolute marginal leaf tissue.
11. Rhizome and leaf bases clothed with hairs only; sorus continuous along leaf margin, petioles green or stramineous, coarse and tough. 9. Dennstaedtiaceae.
11. Rhizome and leaf bases clothed with scales; sorus continuous along leaf margin, or, if round, the petiole ebony colored and brittle. 10. Adiantaceae.
10. Sori on the underside of the leaf blade, if marginal the indusium kidney-shaped and not continuous with the leaf margin.
12. Sorus round, or linear along the veins; indusium present or, if lacking, the leaf pinnate or more dissected. 11. Aspleniaceae.
12. Sorus round; indusium lacking; leaf 1-pinnatifid. 12. Polypodiaceae.

1. EQUISETACEAE
EQUISETUM L. Scouring-Rush

1. *E. hyemale* var. *affine* (Engelm.) A. A. Eat. May-Aug. Railroads, roadsides, stream banks; LBH, NCP, YMD. *E. praealtum* Raf.—S. Fig. 1.

2. LYCOPODIACEAE
LYCOPODIUM L. Clubmoss

1. Upright shoot diffusely branched; strobili nodding. . . . 1. *L. cernuum*.
 1. Upright shoot unbranched or few-branched, terminating with 1-few erect strobili.
 2. Leaves of the fertile upright shoot sharply differentiated between peduncle and strobilus; leaves of the peduncle not imbricated; horizontal stems strongly dorsiventral. 2. *L. carolinianum*.
 2. Leaves of the fertile upright shoots with similar sporophylls and vegetative leaves; leaves of the peduncle densely imbricate; horizontal stems only slightly dorsiventral. (Hybrids with intermediate morphology are typically encountered between the following three taxa when in mixed populations.)
 3. Upright shoots (including leaves) 4 mm or less in diam.; leaves of the peduncle and strobilus appressed and entire, or rarely with a few cilia at the leaf base; horizontal stems somewhat dorsiventral and rooting to the ground throughout. 3. *L. appressum*.
 3. Upright shoots (including leaves) 6 mm or more in diam.; leaves of peduncle ascending and incurved and those of the strobilus spreading, leaves ciliate throughout; horizontal stems not, or only slightly, dorsiventral either flat and rooting continuously or arching and rooting intermittently.
 4. Horizontal stems rooting continuously along the ground, the rhizome (less leaves) 2 mm or less in diam., the leaves usually spreading almost at right angles to the rhizome; growth of the current year usually with only one (occasionally 2) erect fertile shoots, and usually without additional stiffly erect but sterile shoots. 4. *L. prostratum*.
 4. Horizontal stems strongly arching and rooting only intermittently, the rhizome 3 mm or more in diam., the leaves usually ascending and/or incurved; growth of the current year usually with 2 or more (occasionally only one) erect fertile shoots, and usually with 1-several additional stiffly erect sterile shoots. 5. *L. alopecuroides*.
1. *L. cernuum* L., Nodding C. All year. Wet loamy roadbanks; George and Jackson Cos. Fig. 1.
2. *L. carolinianum* L., Slender C. Jul-Nov. Wet bogs, sandy meadows, pinelands, and roadsides; CPM, LPR, and NCP. Fig. 1.
3. *L. appressum* (Chapm.) Lloyd & Underw., Southern Bog C. Jul-Nov. Bogs, wet meadows, pinelands, roadsides, and lake shores; CPM, LPR, NCP, and TRH. *L. inundatum* var. *bigelovii* Tuckerm.—F, G. Hybridizes frequently with nos. 4 and 5. Fig. 1.
4. *L. prostratum* Harper, Prostrate Foxtail C. Jul-Nov. Bogs, wet roadsides, lake shores, savannahs and pinelands; CPM, LPR, and NCP. *L. alopecuroides* L.—F, G, R, in part. Hybridizes frequently with nos. 3 and 5. Fig. 1.

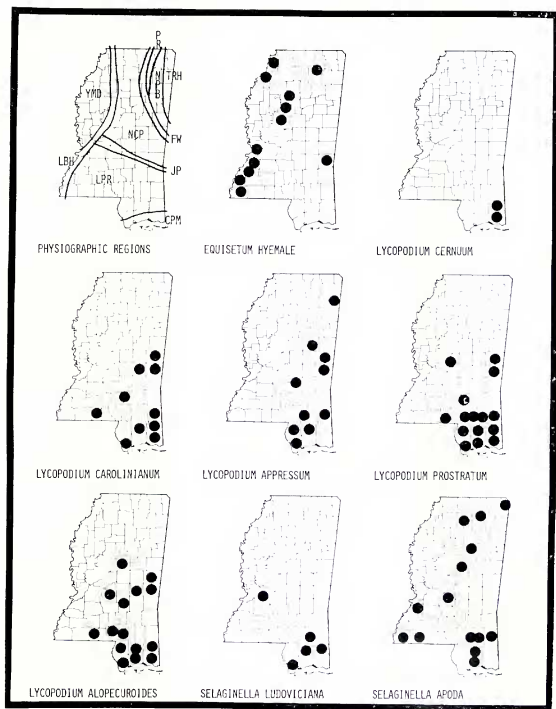


Figure 1. Physiographic regions of Mississippi (see text) and distribution in Mississippi of *Equisetum hyemale* var. *affine*, *Lycopodium cernuum*, *L. carolinianum*, *L. appressum*, *L. prostratum*, *L. alopecuroides*, *Selaginella ludoviciana*, *S. apoda*.

5. *L. alopecuroides* L., Foxtail C. Jul-Nov. Bogs, wet roadsides, lake shores, savannahs, and pinelands; CPM, JP, LPR, and NCP. Hybridizes frequently with nos. 3 and 4. Fig. 1.

Species nos. 3, 4, and 5 represent a confusing complex of taxa which are presently under investigation. Intermediates which we interpret to be hybrids are encountered when two or more grow in proximity; pure stands appear uniformly to conform to the species standards outlined here (with J. C. Odenwelder, *pers. com.*).

3. SELAGINELLACEAE

SELAGINELLA Beauv. Spikemoss

1. Leaf blades with wide hyaline margins with 2-4 rows of elongate hyaline cells; strobilus 10-20 mm long; plant mostly ascending. 1. *S. ludoviciana*.

1. Leaf blades with narrow hyaline margins with 0-1 row of elongate hyaline cells; strobilus 6-15 mm long; plant mostly creeping. . . . 2. *S. apoda*.

1. *S. ludoviciana* A. Br., Louisiana S. Jun-Oct. Moist deciduous and pine woods; CPM and LPR. *Diplostachyum ludovicianum* (A. Br.) Small—S. Fig. 1.

2. *S. apoda* (L.) Spring., Meadow. S. Jun-Oct. Wet roadsides, deciduous woods, bogs, and stream banks; CPM, LPR, NCP, and TRH. *Diplostachyum apodum* (L.) Beauv.—S; *S. apoda* (L.) Fern.—F. Fig. 1.

This treatment follows that of Somers and Buck (1975).

4. ISOETACEAE

ISOETES L. Quillwort

1. *I. engelmannii* A. Br., Engelmann's Q. Apr-Nov. Small pond margin; Tishomingo Co. First collected for the state in 1975. Fig. 6.

5. OPHIOGLOSSACEAE

1. Sterile segment of leaf dissected; fertile spike branched. 1. *Botrychium*.
1. Sterile segment of leaf simple; fertile spike simple. . . . 2. *OphioGLOSSUM*.

1. BOTRYCHIUM Sw. Grapefern

1. Leaves herbaceous, or coriaceous; leaves and spores maturing in late winter or spring; fertile segment separating from the petiole 0.5 cm or less below sterile pinnae.

2. Leaves herbaceous, 8-80 cm high, sterile blade raised well above the ground. 1. *B. virginianum*.

2. Leaves coriaceous, 6-14 cm high, sterile blade lying close to the ground. 2. *B. lunarioides*.

1. Leaves coriaceous, evergreen or appearing only in late summer or fall; spores maturing in late summer or fall; fertile segment joining petiole more than 0.5 cm below sterile pinnae.

3. Ultimate segments with central veins poorly developed or absent; leaves often two or more per season. 2. *B. alabamense*.

3. Ultimate segments with conspicuous central veins; leaves normally one per year.

4. Blades mostly tripinnate, the outline of the small lateral lobes of

pinnae, or pinnules of more dissected pinnae, rhomboidal and angular, or whole sterile portion highly dissected. . . . 3. *B. dissectum*.

4. Blades mostly bipinnate, the outline of the small lateral lobes of pinnae, or pinnules of the more dissected pinnae, oblong and somewhat rounded. 4. *B. biternatum*.

1. *B. virginianum* (L.) Sw., Rattlesnake-fern. Mar-June. Rich deciduous woods, swamps, ravines, and upland woods; throughout except CPM, Fig. 2.

2. *B. lunarioides* Sw., Prostrate G. Mar-May. Disturbed grassy areas, cemeteries; Clark, George, Greene, Jones, Lauderdale, Wayne Cos. *B. biternatum* sensu Small, not Underwood—S. Fig. 2.

3. *B. alabamense* Maxon, Alabama G. Sep-Oct. Old fields, rare; George Co. Fig. 2.

4. *B. dissectum* Spreng., Common G. Sep.-Oct. Deciduous woods; uncommon and usually confused with the following species; Lafayette, Marshall Cos. includes *B. obliquum* Muhl.—S in part; *B. dissectum* var. *obliquum* (Muhl.) Clute—G. Fig. 2.

5. *B. biternatum* (Sav.) Underw., Southern G. Aug-Oct. Moist pine and deciduous woods, and ravines; scattered throughout except CPM and YMD. *B. dissectum* var. *tenuifolium* (Underw.) Farw.—F, G; *B. obliquum* Muhl.—S, in part; not *B. biternatum* sensu Small—S. Fig. 2.

2. OPHIOGLOSSUM L. ADDER'S-TONGUE

1. Leaf blades less than 3.5 cm long, 2 or more per plant; rhizome short cylindrical to globose.

2. Rhizome globose-bulbose, 4-15 mm in diam.; leaf blades 1-3.5 cm long. 1. *O. crotalophoroides*.

2. Rhizome short-cylindric, 2-3 mm in diam.; leaf blades 0.5-1.5 cm long. 2. *O. nudicaule*.

1. Leaf blades more than 3.5 cm long, mostly 1 per plant; rhizome cylindrical.

3. Main veins forming large primary areoles with included smaller veins forming secondary areoles; leaf apex acute to apiculate. 3. *O. engelmanni*.

3. Main veins forming areoles not enclosing finer secondary areoles; leaf apex rounded to acute.

4. Plants clonal with horizontal stolons producing numerous new plants; usually with 4-8 parallel veins passing through base of sterile blade, producing a slender basal midvein. 4. *O. petiolatum*.

4. Plants not clonal, without proliferous stolons; usually with 8-20 veins passing through blade base, producing a heavy basal midvein. 5. *O. vulgatum*.

1. *O. crotalophoroides* Walt., Bulbous A. Mar-Aug. Sandy lawns and cemeteries; LPR, NCP. Frequent but little collected. Fig. 2.

2. *O. nudicaule* L. f., Least A. Mar-Aug. Lawns, pastures and cemeteries; CPM, LPR, NCP. *O. tenerum* Mett.—S. Frequent but little collected. Fig. 2.

3. *O. engelmanni* Prantl, Limestone A. Mar-Aug. Pastures and open woods, on limestone; Chickasaw, Lafayette, Lee and Madison, Oktibbeha, Warren Cos. Fig. 2.

4. *O. petiolatum* Hook., Stalked A. Feb-Aug. Lawns and cemeteries; LPR. Fig. 2.

5. *O. vulgatum* L. var. *pycnostichum* Fern., Southern A. Mar-Aug. Rich woods and grassy areas; Lafayette, Leflore, Marion, Monroe, Tate, Tishomingo, and Wilkinson Cos. Fig. 3.

Many distribution records in the Ophioglossaceae were contributed by Dr. R. Dale Thomas (Pers. Comm.).

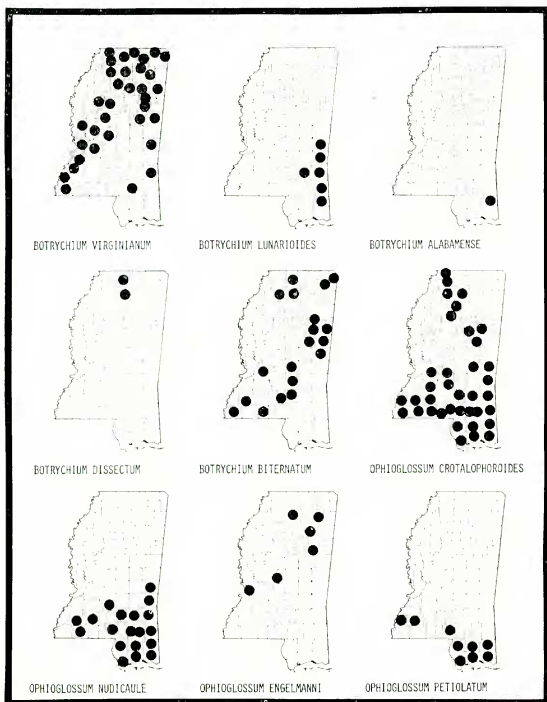


Figure 2. Distribution in Mississippi of *Botrychium virginianum*, *B. lunarioides*, *B. alabamense*, *B. dissectum*, *B. biternatum*, *Ophioglossum crotalophoroides*, *O. nudicaule*, *O. engelmanni*, *O. petiolatum*.

6. OSMUNDACEAE

OSMUNDA L.

1. Leaves 2-pinnatifid, dimorphic, the fertile leaves without lamina. 1. *O. cinnamomea*.
1. Leaves 2-pinnate, the fertile pinnae confined to the terminal portion of the blade. 2. *O. regalis*.
1. *O. cinnamomea* L., Cinnamon Fern. Mar-May. Bogs, swamps, pine, and deciduous forests; throughout, except LBH and YMD. Fig. 3.
2. *O. regalis* L. var. *spectabilis* (Willd.) Gray, Royal Fern. Mar-June. Woods, bogs, wet savannahs; throughout, except LBH and YMD. Fig. 3.

7. SCHIZAEACEAE

LYGODIUM Sw. Climbing Fern

1. *L. japonicum* (Thunb.) Swartz, Japanese C. F. May-Nov. Woods and roadsides; chiefly CPM and LPR. Naturalized from Asia. Fig. 3.

8. HYMENOPHYLLACEAE

TRICHOMANES L. Filmy-Fern

1. *T. petersii* Gray, Dwarf Filmy Fern. All year. Wet shaded sandstone, rare; Amite, Simpson, and Smith Cos. Fig. 3.

9. DENNSTAEDTIACEAE

PTERIDIUM Gleditsch Bracken

1. *P. aquilinum* (L.) Kuhn. Jun-Sept. Old fields, open woods and roadsides; throughout, except YMD. *Pteris latiuscula* Desv.—S; *P. caudata* L.—S (in part). Fig. 3.

10. ADIANTACEAE

1. Leaf blades pedate or ovate in outline; sori and indusoid leaflet margin discontinuous. 1. *Adiantum*.
1. Leaf blades ovate or lanceolate in outline; leaflet margin reflexed producing continuous indusoid margin.
2. Leaves villose, ultimate segments usually 1-4 mm long. 2. *Cheilanthes*.
2. Leaves glabrous, ultimate segments usually 8 mm or more long. 3. *Pteris*.

1. ADIANTUM L.

1. Leaf dichotomous in a fan-like pattern. 1. *A. pedatum*.
1. Leaf pinnate with a prominent central axis. 2. *A. capillus-veneris*.
1. *A. pedatum* L., Maidenhair Fern. Jun-Aug. Rich mesic woods; LBH, NCP, PR, NPB, and TRH. Fig. 3.
2. *A. capillus-veneris* L., Venus'-hair Fern. Jun-Aug. On limestone; Clarke and Wayne Cos. Fig. 3.

2. CHEILANTHES Sw. Lip-Fern

1. *C. lanosa* (Michx.) D.C. Eat., Hairy L. F. Jun-Aug. On sandstone; Lafayette and Tishomingo Cos. Fig. 3.

3. PTERIS L. Brake

1. *Pteris multifida* Poir., Spider B. May-Oct. Rocky woods; Hinds, Jefferson, Warren and Wilkinson Cos. *Pycnodoria multifida* (Poir.) Small—S. Fig. 4.

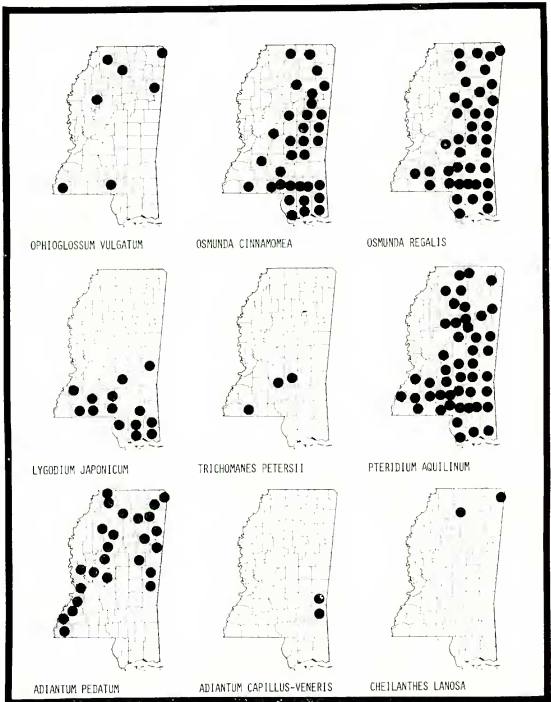


Figure 3. Distribution in Mississippi of *Ophioglossum vulgatum* var. *pycnostichum*, *Osmunda cinnamomea*, *O. regalis* var. *spectabilis*, *Lygodium japonicum*, *Trichomanes petersii*, *Pteridium aquilinum*, *Adiantum pedatum*, *A. capillus-veneris*, *Cheilanthes lanosa*.

11. ASPLENIACEAE*

1. Leaves dimorphic, the fertile leaves with sporangia borne inside of rolled up, much contracted leaflet segments; sterile leaves coarsely lobed with netted veins throughout. 5. *Onoclea*.
1. Leaves not dimorphic, the sporangia borne exposed on mainly unmodified segments, the fertile segments never rolled up; veins free, or only partially anastomosing (or veins anastomosing and sori elongate and irregularly shaped following along the veins in *Asplenium rhizophyllum*).
2. Sori round, without indusia; leaves herbaceous, broadly triangular. 1. *Thelypteris*.
2. Sori round or elongate, with indusia; leaves of various textures, narrowly triangular to lanceolate.
3. Sori elongate, linear or crescent-shaped, indusium attached to leaf along one side.
 4. Sori in two parallel lines along the midrib of the pinnae or the pinnules; veins anastomosing along the midrib and free near the lobe margin. 8. *Woodwardia*.
 4. Sori diverging at an acute angle from the midrib of the pinnae or pinnules; veins free.
 5. Scales of the rhizome with blackish, thick secondary lateral cell walls; at least the base of the stipe polished black or brown; sori straight. 6. *Asplenium*.
 5. Scales of the rhizome with similar thin lateral, dorsal and ventral cell wall faces; stipe base dull green, reddish or stramineous; sori straight, arched or hooked. 4. *Athyrium*.
3. Sori round or kidney-shaped, indusium attached beneath sorus.
 6. Indusia composed of more or less separated flaps or filaments, these beneath and around the sporangial cluster like a cup. 2. *Woodsia*.
 6. Indusia composed of single units not divided into flaps or filaments, the shapes various.
 7. Indusium hood-like, attached by a broad base beneath the sorus and arching over the sorus from one side, not peltate or reniform. 3. *Cystopteris*.
 7. Indusium peltate or reniform.
 8. Indusium peltate, attached to leaf by a median stalk through sorus; sori confined to terminal constricted leaflets. 7. *Polystichum*.
 8. Indusium reniform, attached to leaf along the sinus; sori on unmodified leaflets. 1. *Thelypteris*.

1. THELYPTERIS Schmidel

1. Blade triangular.
 2. Leaves 1-pinnatifid, the pinnae lobed and with adnate wings along the rachis joining the pinnae. 1. *T. hexagonoptera*.
 2. Leaves 3-, 4-pinnatifid, the pinnae without wide attachment to the rachis. 2. *T. torresiana*.
1. Blade lanceolate to oblong-lanceolate.
 3. Blade base with 3-7 pairs of gradually reduced to rudimentary pinnae. 3. *T. noveboracensis*.

* The illegitimate name "Aspidiaceae," or Polypodiaceae *sensu lato*, has often been applied to this group.

3. Blade base lacking rudimentary pinnae, the lowest pinnae only slightly reduced or not at all.
 4. Basal veinlets of adjacent pinna lobes running toward the sinus without uniting, or uniting at the base of the sinus.
 5. Rhizome short-creeping to suberect; leaves spreading, with soft pubescence, tending to become light green or yellowish at maturity, usually less than 0.5 m tall; veins simple. 4. *T. quadrangularis* var. *versicolor*.
 5. Rhizome short- or long-creeping to suberect; leaves stiffer, dark to light green at maturity, usually more than 0.5 m tall; veins simple or forked.
 6. Leaves light green; margins of fertile fronds usually revolute; lateral veinlets of segments mostly forked; segments cut nearly to the pinna axis. 5. *T. palustris*.
 6. Leaves dark green; margins usually flat; lateral veinlets of segments simple; segments cut only 0.5 to 0.75 of the way to the pinna axis. 6. *T. kunthii*.
 4. Basal veinlets of adjacent pinna lobes uniting below the sinus with a common vein extending to the base of the sinus.
 7. Petiole reddish; leaves tending to be slightly dimorphic, the earliest smaller, wider, spreading and sterile, the later ones more erect, narrower and fertile; the united vein to the sinus long, the pinnae being shallowly lobed. 7. *T. dentata*.
 7. Petiole yellowish; leaves not dimorphic; united vein short, the pinnae deeply lobed. 4. *T. quadrangularis* var. *versicolor*.
1. *T. hexagonoptera* (Michx.) Weath., Broad Beech Fern. Apr-Sept. Rich hardwood forests, ravines and loess hills; scattered throughout except YMD. *Phegopteris hexagonoptera* (Michx.) Fée—S, *Dryopteris hexagonoptera* (Michx.) C. Chr.—F. Fig. 4.
2. *T. torresiana* (Gaud.) Alston, Mariana Fern. May-Oct. Wet woods and stream banks; scattered in LPR, and Marshal and Warren Cos. *Dryopteris setigera* (Bl.) Ktze.—S(misapplied). Fig. 4.
3. *T. novaboracensis* (L.) Nieuwl., New York Fern. May-Oct. Rich woods; TRH. *Dryopteris novaboracensis* (L.) Gray—F. Fig. 4.
4. *T. quadrangularis* (Fée) Schelpe var. *versicolor* (R. St. John) A. R. Smith, Variable Maiden Fern. May-Oct. Rich deciduous woods and ravines; scattered in LBH, LPR, and Scott Co. *T. versicolor* R. St. John—S. Fig. 4.
5. *T. palustris* Schott, Marsh Fern. Jun-Oct. Wet roadsides, stream banks, marshy lake shores, bogs and wet woods; CPM, LPR, and Attala Co. *Dryopteris thelypteris* (L.) Gray-F; *T. thelypteris* (L.) Nieuwl.—S. Fig. 4.
6. *T. kunthii* (Desv.) Morton, Widespread Maiden Fern. Apr-Nov. Wet woods, roadsides, stream banks, and sandy flatwoods; CPM; LBH, LPR, and NCP. *T. normalis* (C.Chr.) Moxley—S. Fig. 4.
7. *T. dentata* (Forssk.) C. Chr., Tapering Tri-vein Fern. Jun-Aug. Edge of mixed woods and sandy loam; Forrest, Lauderdale and Pike Cos. Fig. 4.
- This treatment follows that of Smith (1971).

2. WOODSIA R. Br.

1. *Woodsia obtusa* (Spreng.) Torr., Blunt-lobed Woodsia. May-Aug. De-

ciduous woods, sandy soil and sandstone outcrops; scattered in LBH, LPR, NCP, NPB, and TRH. Fig. 4.

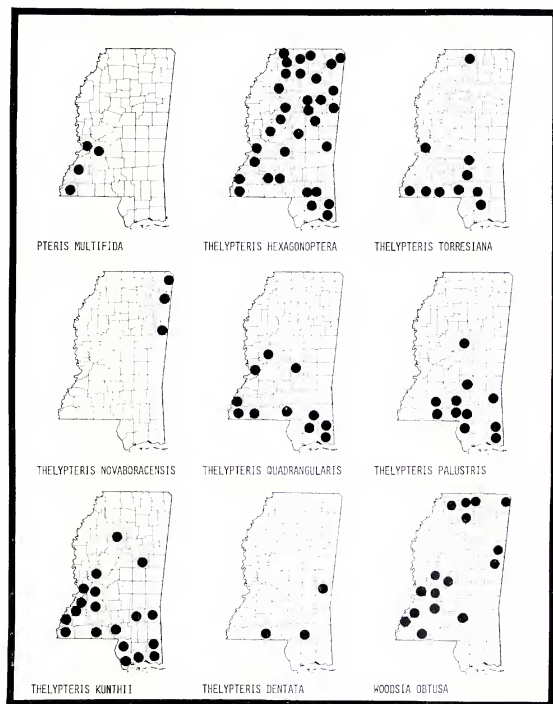


Figure 4. Distribution in Mississippi of *Pteris multifida*, *Thelypteris hexagonoptera*, *T. torresiana*, *T. novaboracensis*, *T. quadrangularis* var. *versicolor*, *T. palustris*, *T. kunthii*, *T. dentata*, *Woodsia obtusa*.

3. CYSTOPTERIS Bernh. Bladder Fern

1. *C. protrusa* (Weath.) Blasdell, Spreading B.F. Apr-Jul. Rich woods, ravines and loess bluffs; LBH and JP. *C. fragilis* (L.) Bernh. var. *protrusa* Weath.—F, G; *C. fragilis* (L.) Bernh.—S. Fig. 5.

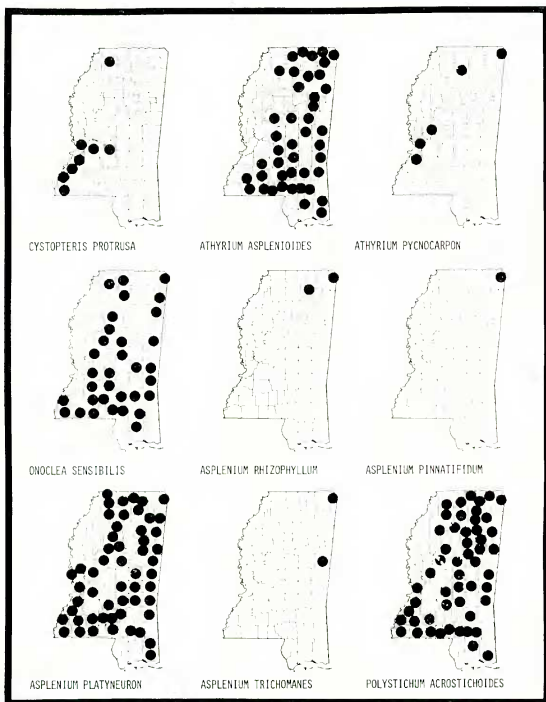


Figure 5. Distribution in Mississippi of *Cystopteris protrusa*, *Athyrium asplenioides*, *A. pycnocarpon*, *Onoclea sensibilis*, *Asplenium rhizophyllum*, *A. pinnatifidum*, *A. platyneuron*, *A. trichomanes*, *Polystichum acrostichoides*.

4. ATHYRIUM Roth

1. Leaves 2-3 pinnate; sori crescent-shaped, usually 1 mm or less long.
 1. *A. asplenioides*.

1. Leaves 1-pinnate; sori nearly straight, usually 2 mm or more long.
 2. *A. pycnocarpon*.

1. *A. asplenioides* (Michx.) Desv., Southern Lady Fern. May-Oct. Swamp forests, stream banks, marshes and lake shores, wet woods and ravines; throughout except YMD. *A. filix-femina* (L.) Roth var. *asplenioides* (Michx.) Farw.—F, G. Fig. 5.

2. *A. pycnocarpon* (Spreng.) Tidestr., Glade Fern. Jul-Aug. Rich woods and ravines; Claiborne, Lafayette, Tishomingo, Warren, and Yazoo Cos. *Homalosorus pycnocarpus* (Spreng.) Small—S. Fig. 5.

5. ONOCLEA L. Sensitive Fern

1. *O. sensibilis* L. Jul-Nov. Swamps, bogs, stream banks, wet roadsides, wet woods and ravines; throughout except YMD, CPM, FW, and PR. Fig. 5.

6. ASPLENIUM L. Spleenwort

1. Leaves undivided or lobed basally only; veins anastomosing.
 1. *A. rhizophyllum*.

1. Leaves deeply lobed or pinnate; veins free.

2. Blades deeply lobed at most, or pinnate at the base only; apex narrowly caudate.
 2. *A. pinnatifidum*.

2. Blades pinnate throughout; apex not caudate.

3. Pinnae alternate, sessile, the bases usually overlapping the rachis; leaves somewhat dimorphic, the fertile ones upright and taller than the spreading sterile leaves. 3. *A. platyneuron*.

3. Pinnae opposite, short stalked, the bases not overlapping the rachis; leaves monomorphic. 4. *A. trichomanes*.

1. *A. rhizophyllum* L., Walking Fern. May-Oct. Sandstone ledges; Tishomingo and Union Cos. *Camptosorus rhizophyllus* (L.) Link—F, G, S. Fig. 5.

2. *A. pinnatifidum* Nutt., Lobed S. May-Oct. Dry sandstone ledges; Tishomingo Co. Fig. 5.

3. *A. platyneuron* (L.) Oakes, Ebony S. May-Oct. Woods, pinelands, roadsides, pastures, sandy soil and sandstone outcrops; throughout. Fig. 5.

4. *A. trichomanes* L., Maidenhair S. May-Oct. Sandstone outcrops; Tishomingo and Noxubee Cos. Fig. 5.

7. POLYSTICHUM Roth

1. *P. acrostichoides* (Michx.) Schott, Christmas Fern. Apr-Aug. Rich deciduous pine and mixed woods, ravines, swamp woods, stream banks, loess and sandy soil; throughout except YMD. Fig. 5.

8. WOODWARDIA Sm. Chain-Fern

1. Leaves dimorphic, the fertile much contracted, the sterile pinnatifid to pinnate, the leaflet bases widely adnate except at blade base; veins forming a fine network throughout. 1. *W. areolata*.

1. Sterile and fertile leaves alike, pinnate-pinnatifid, the leaflet bases fully

contracted throughout; veins free except along midribs of segments.

2. *W. virginica*.

1. *W. areolata* (L.) Moore, Netted C. F. Aug-Nov. Wet places, lake shores, stream banks, swamps, bogs, low woods and ravines; throughout except YMD and LBH. *Lorinseria areolata* (L.) Presl—S. Fig. 6.

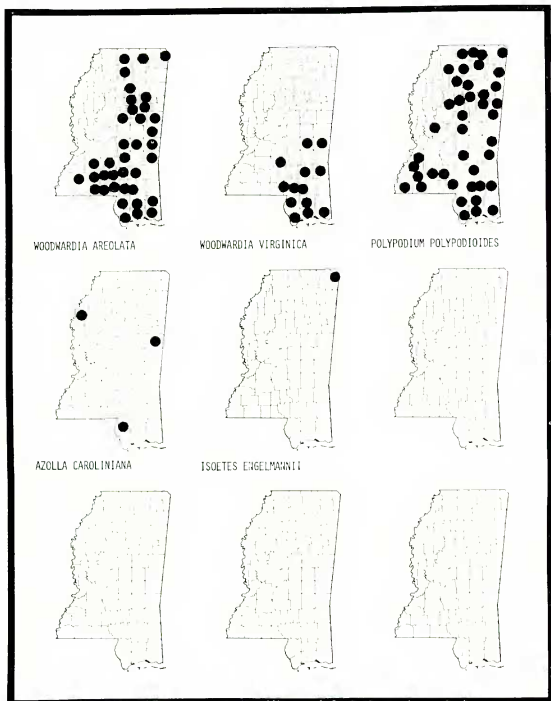


Figure 6. Distribution in Mississippi of *Woodwardia areolata*, *W. virginica*, *Polypodium polypodioides*, *Azolla caroliniana*, *Isoetes engelmannii*.

2. *W. virginica* (L.) Sm., Virginia C. F. May-Aug. Wet roadsides, pine barrens, bogs, swamp forests and wet woods; CPM, LPR, and NCP. *Anchistea virginica* (L.) Presl.—S. Fig. 6.

12. POLYPODIACEAE *sensu strictu*

POLYPODIUM L. Polypody

1. *P. polypodioides* (L.) Watt, Resurrection Fern. All year. On trees and rocks, hardwood, pine and mixed forests, cypress swamps, pastures, floodplains, and ravines; throughout except YMD. *Marginaria polypodioides* (L.) Tidestr.—S., *P. polypodioides* var. *michauxianum* Weath.—F. Fig. 6.

13. AZOLLACEAE

AZOLLA Lam. Mosquito Fern

1. *A. caroliniana* Willd. Jun-Sept. Floating or resting on mud, lakes, swamps, and ponds; Bolivar, Noxubee and Pearl River Cos. Fig. 6.

REFERENCES

- SMALL, J. K. 1938. Ferns of the southeastern states, 1964 facsimile edition. Hafner, New York.
- FERNALD, M. L. 1950. Gray's manual of botany, 8th Ed. American Book Co., New York.
- GLEASON, H. A. and A. CRONQUIST. 1963. Manual of vascular plants of northeastern United States and adjacent Canada. Van Nostrand-Reinhold Co., New York.
- EVANS, A. M. 1968. In, Radford, A. E., H. E. Ahles, and C. R. Bell. Manual of the vascular flora of the Carolinas. University of North Carolina Press, Chapel Hill.
- SOMERS, P. and W. R. BUCK. 1975. *Selaginella ludoviciana*, *S. apoda* and their hybrids in the southeastern United States. Amer. Fern J. 65: 76-82.
- SMITH, A. R. 1971. Systematics of the neotropical species of *Thelypteris* Sec. *Cyclosorus*. Univ. Calif. Publ. Bot. 59: 1-136.