MILWAUKEE PUBLIC MUSEUM

Contributions

in
BIOLOGY
and
GEOLOGY

Number 53 **November 5, 1982**

Ferns and Fern Allies of the Driftless Area of Illinois, Iowa, Minnesota and Wisconsin

James H. Peck

MILWAUKEE PUBLIC MUSEUM

Contributions

in
BIOLOGY
and
GEOLOGY

Number 53 November 5, 1982

Ferns and Fern Allies of the Driftless Area of Illinois, Iowa, Minnesota and Wisconsin

James H. Peck, Ph.D.,
Department of Biology,
University of Arkansas at Little Rock,
Little Rock, Arkansas
Museum Research Associate, Botany Section,
Milwaukee Public Museum

REVIEWERS FOR THIS PUBLICATION:
Donald R. Farrar, Iowa State University
William E. Tans, Wisconsin Department of Natural Resources
W. Carl Taylor, Milwaukee Public Museum

ISBN 0-89326-083-5

Milwaukee Public Museum Press
Published by the Order of the Board of Trustees

CONTENTS

ILLUSTRATIONS

TABLES

ACKNOWLEDGMENTS

Curators of the herbaria cited in the report are thanked for their permission and assistance in inspecting specimens. Thanks are due the individuals who suggested collecting localities, aided in collection, or identified problematic specimens: Joseph Beitel, Theodore Cochrane, Jerry Davis, Eric Epstein, Donald Farrar, Richard Hauke, Hugh Iltis, Robin Moran, Robert Read, Dean Roosa, William Smith, William Tans, W. Carl Taylor, and Warren Wagner, Jr. Moran is thanked for permission to report a *Cystopteris* hybrid. Taylor is thanked for permission to report two *Dryopteris* hybrids. Both Taylor and Wagner provided significant encouragement for which I am most grateful.

ABSTRACT

The ferns and fern allies (pteridophytes) of the Driftless Area of Illinois, Iowa, Minnesota, and Wisconsin consist of 73 species, 13 hybrids, and 6 infraspecific taxa. The annotated list of the flora in this report includes common names, synonyms, habitats, distributions, representative specimen citations, and remarks concerning published accounts or personal observations on populations in the Driftless Area. Maps of the Upper Midwest (including Illinois, Iowa, Minnesota, Missouri, and Wisconsin) are dotted for county occurrence of each Driftless Area pteridophyte. These maps are the first generated for pteridophytes of this geographic unit of the Upper Midwest, and provide a visual presentation of distribution patterns. The flora consists of 23 taxa (26%) of widespread distribution in the Driftless Area and the Upper Midwest, 48 taxa (54%) at the periphery of their range in the Driftless Area, and 18 taxa (20%) with a disjunct occurrence in the Driftless Area. The high percentage (74%) of peripheral and disjunct taxa is probably accounted for by 1) the occurrence of the Driftless Area at the junction of three vegetation formations (Tall Grass Prairie, Eastern Deciduous Forest, and Northern Mixed Coniferous Forest), 2) the presence of extensive limestone and sandstone outcrops, large areas with highly dissected topography providing protected, moist stations with moderated environments, and a large boggy glacial lakebed, and 3) by a geologic history of having been unglaciated or glaciated only by Nebraskan age ice approximately 1.5 million years ago. The pteridophyte flora of the Driftless Area contrasts with the comparatively less rich and diverse pteridophyte floras in the counties surrounding it in the Upper Midwest. A key and checklist are included.

INTRODUCTION

The Driftless Area of the Upper Midwest includes approximately 39,000 sq km in 37 counties in Illinois, Iowa, Minnesota, and Wisconsin (Figure 2). The absence of conspicuous glacially derived features within the Driftless Area contrasts with the readily observed glacial features in the region which surrounds it. Consequently, the Driftless Area has generally been regarded as unglaciated (Martin, 1932; Hartley, 1966). During the last glacial epoch, the Wisconsin Glaciation (Figure 1), the glaciers passed to the east and west of the Driftless Area, but did not cross it, nor did they completely surround the area at any given time. Earlier glaciers are less easily depicted, since the evidence used to follow their courses is scant in comparison to that available for Wisconsin Glaciation. Although three earlier glaciers passed as far south as Missouri and Illinois, it has generally been accepted that these glaciers did not cover the Driftless Area. New evidence concerning glaciation, erosion, and ancient environments in the Driftless Area and the surrounding Upper Midwest during the Pleistocene and post-Pleistocene continues to be reported (Knox and Mickelson, 1974; Black, Bleurer, Hole, Lasca, and Maher, 1970; Mahaney, 1976). Unfortunately, a comprehensive summary of much of these and other recent studies is lacking, thus precluding a detailed analysis of the geological and environmental history as part of this paper. The studies, however, promise that the Driftless Area will remain an area generating many challenging questions regarding historical factors and their influence on plant distributions.

As a result of its distinctive geologic history, the Driftless Area has a very different landscape than the rest of the Upper Midwest. The Driftless Area is a region of two contrasting landscapes; a highly dissected upland and a lower, flat glacial lakebed of Glacial Lake Wisconsin (Figure 1). These two landscapes provide very different environments for plants. The highly dissected upland provides a diversity of wetland, woodland, grassland, and rock outcrop habitats which are conducive to the occurrence of a large number of species (Hartley, 1957; 1960). The dry, exposed slopes and rock outcrops in the dissected terrain contain many plants which are at their northernmost stations in the Upper Midwest. On the other hand, the old lakebed in the northeastern portion of the Driftless Area provides bog and swamp habitats similar to those found in northern Minnesota and Wisconsin. Consequently, many plants typically found farther north occur in this old lakebed. Species with northern affinities may also be encountered on the steeper north-facing slopes and bluffs in the portion of the Driftless Area with dissected topography.

Botanically, the Driftless Area is located at the junction of three vegetation formations (Tall Grass Prairie, Eastern Deciduous Forest, and Northern Mixed Coniferous Forest). Consequently, the area is characterized by 1) a greater diversity of vegetation and community types than that found in the surrounding region, 2) a large native flora (1,344 species), and 3) the presence of species which occur as peripheral or disjunct populations (Hartley, 1966). Discussions on the interpretation of the disjunct populations usually relate to two diametrically opposed positions. One position is to suggest that the disjunct populations are relicts of once widespread pre-glacial, interglacial, or post-glacial vegetation which has become extripated in the region surrounding the Driftless Area. The other position is to

suggest that the disjunct populations are relatively recent introductions which arrived primarily by long-distance dispersal. These discussions are quite numerous and are well summarized by Cushing (1965), Hartley (1966), and Schuster (1957; 1958). There seems to be strong support for the position that the present flora probably accumulated during the Pleistocene and post-Pleistocene, being a mixture of relict and recent species.

The richness and distinctiveness of the Driftless Area pteridophyte flora was first recognized almost 100 years ago by Swezey (1883). Other botanists soon followed Swezey by commenting on the abundance, diversity, and distinctive character of pteridophytes within the Driftless Area, including: Wheeler (1900), Shimek (1901), Pammel and King (1902), Lyon (1903), Rosendahl (1903), Pammel (1905), Rosendahl and Butters (1909), Marshall (1910), Hill (1911), Fitzpatrick (1918), Ellen (1924), Steil and Fuller (1928; 1929), Graves (1931), Wilson (1932), and Rosendahl and Moore (1947). Further information has been compiled through intensive studies of vascular floras of Driftless Area counties in Illinois (Pepoon, 1909; Fuller, 1945; Wunderlin, 1966), Iowa (Shimek, 1905; Tolstead, 1938; Peck, Roosa, and Eilers, 1980), Minnesota (Moore, 1968; Emanuel, 1977), and Wisconsin (Nee, 1970; Nontelle, 1972). In addition, state pteridophyte floras have been prepared for each state: Illinois (Mohlenbrock, 1967; Mohlenbrock and Ladd, 1978; Mohlenbrock and Ladd, in press), Iowa (Cooperrider, 1959; Peck, 1976a; 1976b), Minnesota (Tryon, 1954; 1980), and Wisconsin (Tryon, Fassett, Dunlop, and Diemer (1939; 1953). Considering the amount of attention received by the pteridophytes of this region, it is somewhat surprising that the first vascular plant flora of the entire Driftless Area (Hartley, 1962; 1966) was also the first comprehensive listing of the pteridophytes. Especially so, since some of the most striking examples of disjunctions by North American pteridophytes occur in the Driftless Area (Wagner, 1972).

A comparison of dot maps in the unpublished dissertation of Hartley (1962) with dot maps in the various state fern treatments, along with discoveries made while investigating the Iowa pteridophyte flora (Peck, 1976a; 1976b), suggested that additional field and herbarium investigations on the Driftless Area pteridophytes would be a significant contribution to pteridophyte floristics in the Upper Midwest and to the continued study of the phytogeographic relations of the Driftless Area.

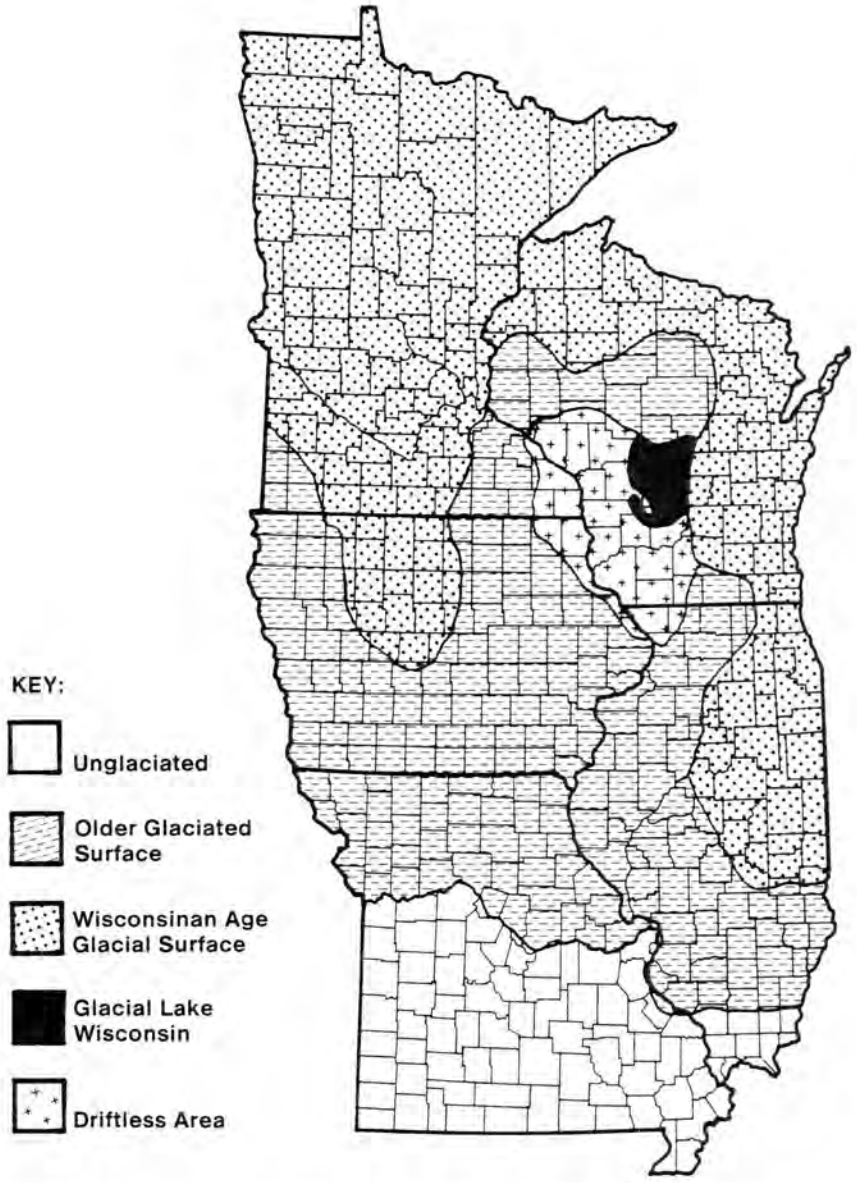


FIGURE 1. Geographic relationship of the Driftless Area is presented with respect to the region of the Upper Midwest covered by Wisconsin glaciation and by older Pleistocene glaciations. To the south, the maximum southern boundary of Pleistocene glaciation is evident. Glacial lobes passed to the south of the Driftless Area on the east and west. The old lakebed of Glacial Lake Wisconsin is located in the northeastern corner of the Driftless Area, in contact with Wisconsin age glacial deposits.

METHODS

From 1974-1981, the flora was studied by field survey in each of the 37 counties in the Driftless Area (Figure 2) and by inspection of specimens in 37 herbaria (Table 1). Preliminary results have been reported for Illinois (Mohlenbrock and Ladd, in press), Iowa (Peck, 1980a), Minnesota (Tryon, 1980), and Wisconsin (Peck and Taylor, 1980).

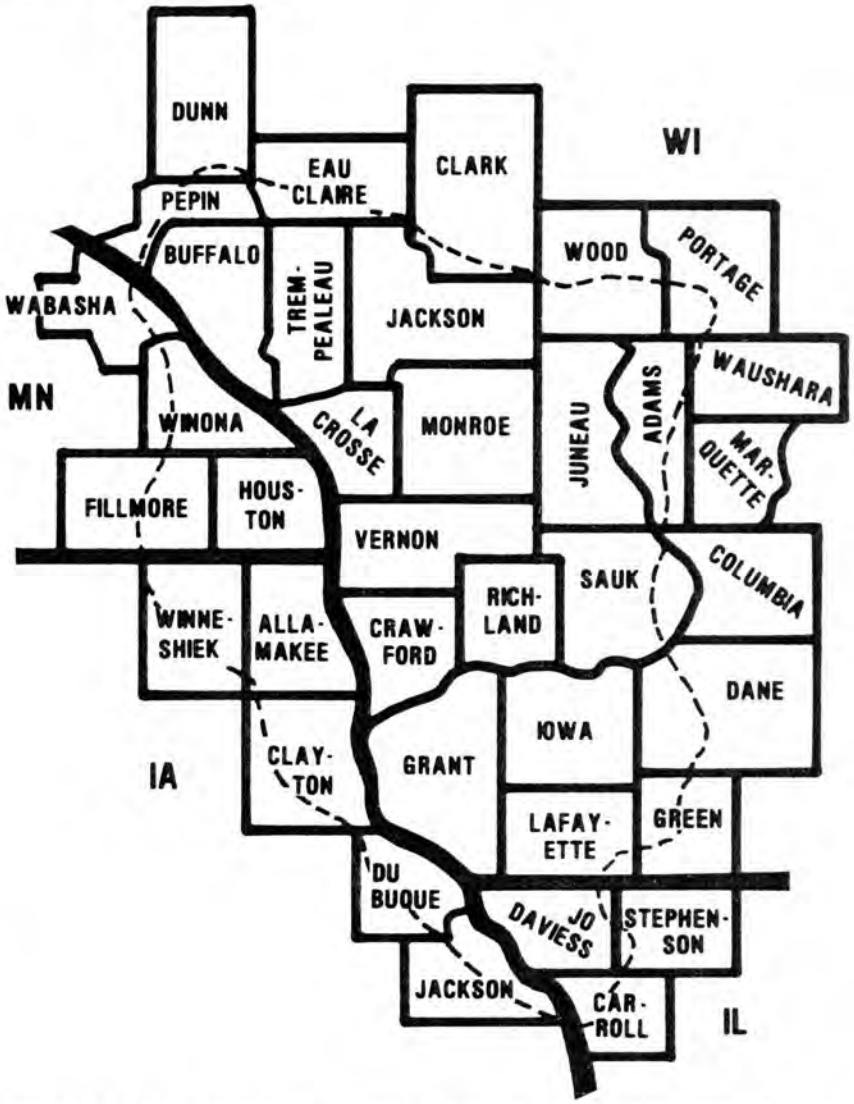


FIGURE 2. Map of Driftless Area of Illinois, Iowa, Minnesota and Wisconsin with county names. Dashed line indicates perimeter of the Driftless Area.

In the annotated list, the sequence of the list of families and genera follows Crabbe, Jermy, and Mickel (1975). Lesser taxa are arranged alphabetically with species preceeding hybrids. Synonyms are given in brackets. Habitat descriptions are prepared from personal observations and from data on herbarium specimens. A representative specimen is cited for each county in which the species, hybrid, and infraspecific taxon has been collected. See Figure 2 for county names.

Nomenclature generally follows the manuals of Wherry (1961) and Mickel (1979a). These manuals also provide descriptions and keys suitable for identifying

TABLE 1. List of Herbaria Examined.
(Abbreviations after Holgrem and Keuken, 1974.)

CC	Coe College, Cedar Rapids, IA
DLSP	Devils Lake State Park, Baraboo, WI
EMNM	Effigy Mounds National Monument, Marquette, IA
GRI	Grinnell College, Grinnell, IA
IA	University of Iowa, Iowa City, IA
ILL	University of Illinois, Urbana, IL
ILLS	Illinois State Natural History Survey, Urbana, IL
ISC	Iowa State University, Ames, IA
ISM	Illinois State Museum, Springfield, IL
ISTC	University of Northern Iowa, Cedar Falls, IA
IWC	Iowa Wesleyan College, Mt. Pleasant, IA
LC	Loras College, Dubuque, IA
MANK	Mankato State University, Mankato, MN
MIL	Milwaukee Public Museum, Milwaukee, WI
MIN	University of Minnesota, St. Paul, MN
MO	Missouri Botanical Garden, St. Louis, MO
MWI	Western Illinois University, Macoomb, IL
OPM	Oshkosh Public Museum, Oshkosh, WI
OSH	University Wisconsin-Oshkosh, Oshkosh, WI
RIVE	University Wisconsin-River Falls, River Falls, WI
SICH	Simpson College, Indianola, IA
SIU	Southern Illinois University, Carbondale, IL
SUWS	University Wisconsin-Superior, Superior, WI
UD	University of Dubuque, Dubuque, IA
UI	Upper Iowa University, Fayette, IA
UMR	Upper Mississippi River Federal Fish & Wildlife Refuge, Winona, MN
UWB	University Wisconsin Center-Baraboo, Baraboo, WI
UWG	University Wisconsin-Green Bay, Green Bay, WI
UWJ	University Wisconsin-Janesville, Janesville, WI
UWL	University Wisconsin-La Crosse, La Crosse, WI
UWM	University Wisconsin-Milwaukee, Milwaukee, WI
UWP	University Wisconsin-Plattville, Plattville, WI
UWSP	University Wisconsin-Stevens Point, Stevens Point, WI
UWW	University Wisconsin-Whitewater, Whitewater, WI
VIT	Viterbo College, La Crosse, WI
WIS	University of Wisconsin-Madison, Madison, WI
WSA	Wisconsin Scientific Areas Preservation Council, Department Natural Resources, Madison, WI

plants from the Driftless Area. To clarify taxonomic and distributional data, the following reports were consulted: *Asplenium* (Mickel, 1974; Wagner, 1954), *Athyrium* (Butters, 1917; Liew, 1972), *Azolla* (Svenson, 1944), *Botrychium* (Clausen, 1938; Wagner, 1959; 1960; 1961; Wagner and Wagner, 1981), *Cheilanthes* (Mickel, 1979b), *Cystopteris* (Blasdell, 1963), *Dennstaedtia* (Tryon, 1960), *Dryopteris* (Fraser-Jenkins & Jermy, 1977; Montgomery & Paulton, 1981; Wagner, 1971), *Equisetum* (Hauke, 1963; 1965; 1978), *Gymnocarpium* (Sarvela, 1978; Wagner, 1966), *Isoetes* (Löve, 1962; Pfeiffer, 1922), *Lycopodium* (Beitel, 1979; Hickey, 1977; Hickey and Beitel, 1979; Marie-Victorin, 1925; Wilce, 1965), *Matteuccia* and *Onoclea* (Lloyd, 1971), *Ophioglossum* (Clausen, 1938), *Pellaea* (Tryon, 1957), *Phegopteris* (Holltum, 1969; Mulligan, Cinq-Mars, and Cody, 1972), *Polypodium* (Fernald, 1922; Lloyd and Lang, 1964), *Pteridium* (Tryon, 1941), *Selaginella* (Buck, 1977; Tryon, 1955), *Thelypteris* (Holub, 1972; Tryon, 1971; Tryon and Tryon, 1973; Tryon, Tryon, and Badre, 1980), and *Woodsia* (Brown, 1964).

The distribution of the species within the Driftless Area and in the states of the Upper Midwest is plotted by county to allow evaluation of patterns of occurrence and geographical affinity. The dots represent varying levels of accuracy. All dots in the Driftless counties and in the states of Iowa and Wisconsin are based upon personal inspection of herbarium sheets. Dots in the non-Driftless Area in Illinois, Minnesota, and Missouri are mainly or entirely based upon published works of other authors (Mohlenbrock, 1967; Mohlenbrock and Ladd, 1978; Mohlenbrock and Ladd, in preparation; Steyermark, 1960; Tryon, 1980). Thus, although some errors may be perpetuated in these maps, they are the first prepared for the Upper Midwest states and reflect the best available information. Moreover, these maps will better indicate species or areas which should be studied more carefully. Maps are to be found on pages 51-139 at the end of this report.

Based upon the distribution maps and field notes, the distribution of each species is classified into one of three general categories: widespread, peripheral, or disjunct. *Widespread* indicates that the species occurs across most of the Upper Midwest and is well distributed across the Driftless Area. *Peripheral* means that the species occurs across a portion of the Upper Midwest, but has a distributional limit occurring at or within the Driftless Area. *Disjunct* indicates that the species occurs within the Driftless Area, but lacks populations or has very few populations between the Driftless Area and its metropolitan area of abundance. Obviously, a meaningful concept of disjunction is dependent on the distance between the metropolis and the outlier populations. For this paper, a minimal disjunction of 250 km was selected. Many species "fade-out" rather than have sharp limits to their ranges. Species with this type of limitation to their distribution were usually described as "essentially reaching their distributional limit near the Driftless Area."

Special efforts have been made to clarify the status of *Thelypteris simulata* in the Driftless Area. Until this study, the species was reported from only two stations in Jackson County, Wisconsin (Hartley, 1965). These populations are disjunct from their nearest populations in West Virginia and Pennsylvania. An extensive field survey of this species was conducted in Jackson County and in surrounding counties in Wisconsin.

A key to the pteridophytes of the Driftless Area is located at the end of this report (p. 37). The key is constructed so that an unknown plant is identified to genus first, then by turning to the genus key (p. 39), the genus key being arranged alphabetically, the plant is then keyed to species. The key is designed for efficient keying of fertile plants, although some success with sterile plants is possible. Hybrid plants were not treated. These plants are initially difficult to recognize, often requiring a compound microscope to determine whether the spores are abortive (hybrid plant), and generally reflect intermediate aspects between the characters of their parent species. The manuals by Mickel (1979a) and Wherry (1961), the various state manuals, and the technical literature for each genus that was cited earlier, provide descriptions with additional characters, both morphologic and ecologic, which can add measurably to the identification process. Material which seems recalcitrant or mysteriously unidentifiable, if accompanied with sufficient data on its collection, may be sent to the author or to Dr. W.C. Taylor, Botany Section, Milwaukee Public Museum, for identification or verification.

THE FLORA

The pteridophyte flora of the Driftless Area, as presented in this study, consists of 73 species, 13 hybrids, and 6 infraspecific taxa. The study resulted in records or additions to the flora of each state: Illinois *(Gymnocarpium robertianum* and *Lycopodium clavatum),* Iowa *(Dryopteris* X *bootii, Dryopteris* X *triploidea, Dryopteris* X *uliginosa,* and *Equisetum* X *litorale),* Minnesota *(Asplenium platyneuron, Cystopteris* X *illinoensis, Cystopteris* X *tennesseensis, Dryopteris marginalis, Lycopodium porophilum, Lycopodium lucidulum* X *porophilum,* and *Polystichum acrostichoides),* and Wisconsin *(Botrychium mormo, Cystopteris* X *tennesseensis, Dryopteris* X *pittsfordensis,* and *Dryopteris marginalis* X *spinulosa).* Numerous county records were also added to each state flora.

The Driftless Area pteridophytes all have a strong affinity to Eastern North America, being found either in the Great Lakes region or the deciduous forest regions of central or southern portions of Eastern North America. The flora consists of 23 taxa (26%) with widespread distribution in the Upper Midwest, 48 taxa (54%) with peripheral or essentially a peripheral distribution pattern with respect to the Driftless Area, and 18 taxa (20%) with a disjunctive pattern.

Peripheral Taxa

The presence of the Driftless Area at the junction of three vegetation formations coupled with the greater habitat diversity of the Driftless Area most likely explains why 74% of the pteridophyte flora is peripheral, essentially peripheral, or disjunct in its range in this region. Without the deeply dissected, protected wooded valleys and the special edaphic conditions of the Glacial Lake Wisconsin lakebed, the Driftless Area would probably not provide suitable habitats for outlier populations for the numerous disjunct and peripheral populations. If the Driftless Area were not located at the junction of three vegetation formations, fewer species would likely reach the limit of their range here, or be present at all. The migration of species common to three vegetation formations during the Pleistocene, across the Driftless Area, resulted in the accumulation of species from all three formations.

Disjunct Taxa

The 18 disjunct taxa include five hybrids. The occurrence of hybrids as disjunct is not surprising in that hybrid populations reflect the probability of co-occurrence of the parent species in close proximity and sufficient abundance to facilitate hybridization during sexual reproduction. Of the 13 species which occur as disjuncts in the Driftless Area, two have not been observed since their discovery *(Dennstaedtia punctilobula* and *Dryopteris expansa),* suggesting that they were transient plants which did not establish a persistent population or that they were the last plants of a declining population. The other 11 species occur as persistent populations. Seven of the 13 disjunct species have rock outcrop habitat preferences (Table 2) in the Driftless Area. As rock outcrops are not uniformly distributed in the Upper Midwest, these species would predictably have disjunctive patterns of occurrence which strongly correlate to the pattern of rock outcrops in this region. The deep glacial till covering most of the Upper Midwest, probably precludes the

TABLE 2. Disjunct Driftless Area pteridophytes with habitat and character of disjunction.

Species	*Habitat*	*Metropolitan Area*	*Character of Disjunction*	
			Distance (km)	*Direction*
Asplenium trichomanes	sandstone outcrops	s. Illinois	370	south
Asplenosorus rhizophyllus	sandstone outcrops	s. Illinois	370	south
Botrychium mormo	maple woods	n. Wisconsin	250	north
Dennstaedtia punctilobula	oak wood ravine	s. Illinois	370	south
Dryopteris expansa	alder thicket	n. Wisconsin	250	north
Dryopteris fragrans	sandstone outcrops	n. Wisconsin	250	north
Dryopteris marginalis	sandstone outcrops	s. Illinois	370	south
Equisetum palustre	tamarack swamps	n. Wisconsin	250	north
Gymnocarpium robertianum	limestone outcrops	n. Wisconsin	250	north
Isoetes macrospora	littoral zone, lake	n. Wisconsin	250	north
Lycopodium porophilum	sandstone outcrops	s. Illinois	370	south
Pellaea atropurpurea	sandstone outcrops	s. Illinois	370	south
Thelypteris simulata	sphagnous-alder thickets	e. Pennsylvania	950	east

occurrence of these species except where water has cut through the till into bed along major rivers. Consequently, the discontinuity of suitable habitats prob accentuates the apparent disjunction of species inhabiting rock outcrops ir Upper Midwest.

Twelve of the 13 disjunct species display a north-south distribution with res to their disjunct occurrence in the Driftless Area. Species of southern affinity c in the Driftless Area on exposed, south-facing slopes, while species of nort affinity occur on north-facing slopes, cold air seepage areas, and cold water bo seeps. The north-south trend is also in accordance with the directions of vegeta migration which occurred with changing environments during the Pleistocene post-Pleistocene. Although this does not indicate whether the plants are advar or retreating in range at present, it is suggestive that their present range has l influenced by past environmental changes.

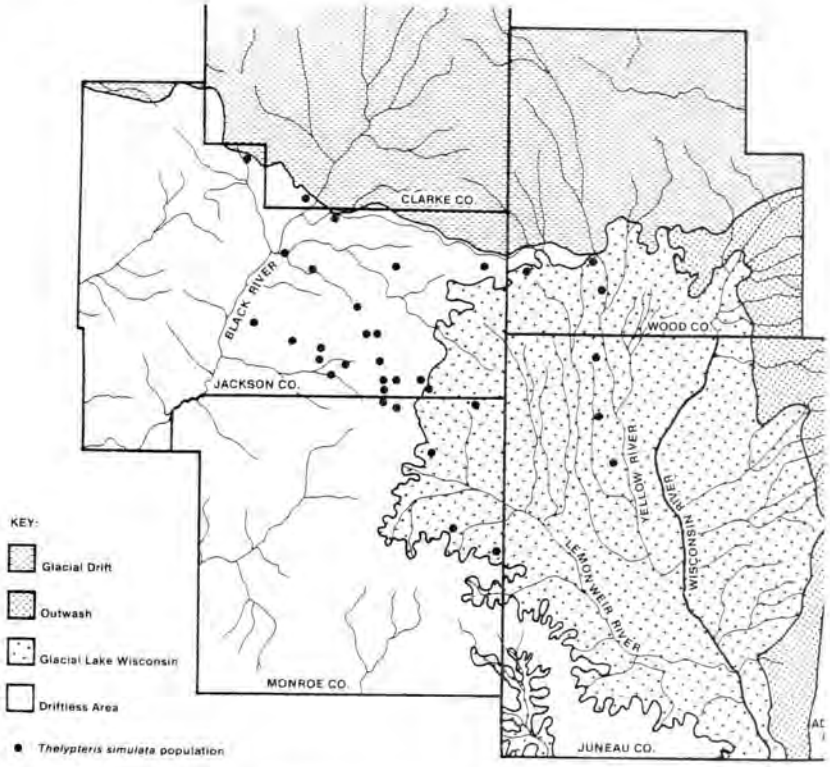


FIGURE 3. The distribution of 34 population of *Thelypteris simulata* known from 5 coun in Wisconsin. The localities include the old lakebed of Glacial Lake Wisonsin and landscape to the west, including the early drainage route of Glacial Lake Wisconsin (Bl River). It seems likely that additional populations occur in these five counties, and l populations might be located in Adams, La Crosse, and Portage counties. Efforts to loc population on glaciated surfaces to the north are also warranted.

The most striking example of disjunction evident in the Driftless Area pteridophyte flora is an east-west disjunction expressed by *Thelypteris simulata*, 950 km west of its metropolitan range in New England. The species was first collected in Wisconsin by David Grether in 1947 *(Grether 6603*, WIS), and first reported by Hartley (1965) from two localities in Jackson County, Wisconsin. As a result of this study, and efforts by others, especially Mr. Eric Epstein, Norwalk, WI, the species is now known from 34 stations in five Wisconsin counties (Fig. 3). Based upon the two localities first reported, Hartley (1965) suggested that its occupation could have resulted from recent dispersal or, that it could have persisted through post-glacial times in very restricted numbers. However, in light of the present information on its occurrence, the latter explanation now seems more likely. It may have occupied the northern end of the Glacial Lake Wisconsin lakebed shortly after it was exposed, or it might have been at the edge of the lake or its vicinity before, during, and after the presence of Glacial Lake Wisconsin. This possibility is strengthened by the discovery of *T. simulata* on sandstone outcrops at the edge of the old lakebed, a habitat only recently discovered and reported for the species (Moran, 1980). Study of the population dynamics, reproductive ecology, and genetic status of the Driftless Area populations of *T. simulata* in conjunction with study of metropolitan populations in the east would contribute significantly to the phytogeographic interpretation of these plants.

Future Challenges

Eight taxa occur adjacent to the Driftless Area, but have not yet been collected within the Driftless Area. Additional field efforts might add them to the flora. The taxa and their region of occurrence relative to the Driftless Area are presented in Table 3. Hartley (1966) included *Equisetum variegatum* based upon a specimen

TABLE 3. Excluded taxa and direction in which these species occur relative to the Driftless Area. These species might yet be found in the Driftless Area.

Taxa	***Occurrence Adjacent to Driftless Area***
Cheilanthes lanosa (Michx.) D.C. Eat.	southern
Cystopteris X *illinoensis* Moran	southern
Dryopteris clintoniana (D.C. Eat.) Dowell	eastern
Equisetum X *nelsoni* (A.A. Eat.) Schaffn.	northern/eastern
Equisetum variegatum Schleid.	northern/eastern
Isoetes melanopoda Gay & Dur.	southern
Lycopodium complanatum X digitatum	northern
Thelypteris novaboracensis (L.) Nieuwl.	eastern/southern

from Carroll County, Illinois. I exclude the species from the Driftless Area pteridophyte flora, since the specimen was mis-identified. The voucher *(Winterringer 2774,* ISM) was a specimen of *Equisetum laevigatum,* not *E. variegatum.*

This distributional study is the beginning, not the conclusion, of what needs to be known about the pteridophytes in the Driftless Area. Ecological studies are needed on the common, peripheral, and disjunct species, particularly on their relative abilities to disperse and maintain populations under today's conditions. Although advances have been made in the understanding of the environmental conditions existing within and around the Driftless Area during and since the Pleistocene, there are still many aspects which will require study before a consensus and comprehensive statement can be made. Until then, conditions experienced by relict plants are not known with any certainty. An indepth phytogeographical analysis of the pteridophytes of the Driftless Area must remain an interesting and challenging topic for future study. When both the fern ecological studies and the paleoenvironmental studies are available, such a phytogeographic analysis is certain to be fascinating.

AN ANNOTATED LIST OF THE PTERIDOPHYTES OF THE DRIFTLESS AREA

LYCOPODIACEAE

1. ***Lycopodium annotinum*** L., Sp. Pl. 1103. 1753. Stiff Clubmoss.

Moist red maple woods; peripheral, reaches southern limit in Driftless Area.

Wisconsin: Clark Co.: *Peck 79-641* (UWL). Jackson Co.: *Hartley 4017* (WIS).

2. ***Lycopodium clavatum*** L., Sp. Pl. 1101. 1753. Running Clubmoss.

Moist woods with sandy peat soils; dry sandy fields; sandy slopes of road cuts; peripheral, reaches southwestern limit in the Driftless Area.

Illinois: Carroll Co.: *Peck 77-188* (UWL).

Iowa: Allamakee Co.: *Peck 80-625* (ISTC).

Minnesota: Winona Co.: *Peck 80-875* (MIN).

Wisconsin: Adams Co.: *Sorenson 4841* (WIS). Buffalo Co.: *Christopherson 14* (WIS). Clark Co.: *Peck 70-639* (UWL). Columbia Co.: *Finger* in 1909 (MIL). Dane Co.: *Cheney* in 1893 (WIS). Dunn Co.: *Cheney* in 1893 (WIS). Eau Claire Co.: *Peck 78-869* (UWL). Iowa Co.: *Davis* in 1927 (WIS). Jackson Co.: *Peterson 158* (WIS). Juneau Co.: *Longnecker* in 1961 (WIS). La Crosse Co.: *Hartley 4642* (WIS). Marquette Co.: *Hartwell* no number, no date (WIS). Monroe Co.: *Hartley 2895* (WIS). Pepin Co.: *Peck 80-658* (MIL). Portage Co.: *Phillips 899* (WIS). Richland Co.: *Peck 78-830* (UWL). Sauk Co.: *Zimmerman 1254* (WIS). Trempealeau Co.: *Sveum 3* (WIS). Vernon Co.: *Hartley 3296* (WIS). Waushara Co.: *Plochman 37* (WIS). Wood Co.: *Sorenson 1393* (WIS).

3. ***Lycopodium complanatum*** L., Sp. Pl. 1104. 1753. Flat-branched Groundpine.

Low sandy woods and wooded slopes; peripheral, reaches southern limit in Driftless Area.

Wisconsin: Clark Co.: *Peck 78-938* (UWL). Portage Co.: *Sylvester 1617* (UWSP). Waushara Co.: *Harriman 6052* (OSH).

4. ***Lycopodium dendroideum*** Michx., Fl. Bor. Am. 2:282. 1803. Round-branched Groundpine. [*L. obscurum* var. *dendroideum* (Michx.) D.C. Eat. *ex* A. Gray].

Wooded, sandy slopes and moss covered sandstone outcrops; moist sandy woods; peripheral, reaches western limit in Driftless Area.

Iowa: Allamakee Co.: *Hartley 6871* (IA). Clayton Co.: *Peck* in 1976 (ISC). *Hartley 7113* (IA).

Minnesota: Houston Co.: *Peck 80-880* (MIN). Wabasha Co.: *Peck 80-902* (MIN). Winona Co.: *Moore & Dorn 27052* (MIN).

Wisconsin: Adams Co.: *Peck 79-664* (UWL). Buffalo Co.: *Peck 78-920* (UWL). Clark Co.: *Peck 79-640* (UWL). Columbia Co.: *Smith* in 1978 (WIS). Crawford Co.: *Peck 78-892* (UWL). Dane Co.: *Ellarson* in 1946 (WIS). Dunn Co.: *Peck 78-1123* (UWL). Eau Claire Co.: *Peck 78-884* (UWL). Grant Co.: *Peck 78-1104* (UWL). Green Co.: *Peck 78-824* (UWL). Iowa Co.: *Iverson* no date, no number (WIS). Jackson Co.: *Hansen 2109* (WIS). Juneau Co.: *Hansen* in 1932 (WIS). La Crosse Co.: *Smith 68-76* (UWL). Lafayette Co.: *Stickney* in 1959 (WIS). Marquette Co.: *Gohlke* in 1974 (UWSP). Monroe Co.: *Hall* in 1966 (WIS). Pepin Co.: *Peck 80-651* (MIL). Portage Co.: *Harriman 2785* (WIS). Richland Co.: *Nee 5780* (WIS). Sauk Co.: *Davis* in 1979 (UWL). Trempealeau Co.: *Peck 78-909* (UWL). Vernon Co.: *Fassett 12996* (WIS). Waushara Co.: *Schultz 45* (OSH). Wood Co.: *Sorenson 3008* (WIS).

5. ***Lycopodium digitatum*** A. Br., Am. J. Sci. & Arts, ser. II, 6:81. 1848. Crowfoot Clubmoss. [*L. complanatum* var. *flabelliforme* Fern.; *L. flabelliforme* (Fern.) Blanch.]

Low sandy woods; sandy road cuts; sandy slopes and disturbed openings in woods; peripheral, essentially reaches its southwestern limit in Driftless Area.

The name used here follows the proposal of Hickey and Beitel (1979).

Illinois: Carroll Co.: *Peck 78-1286* (UWL). Jo Daviess Co.: *Peck 78-1205* (UWL).

Iowa: Allamakee Co.: *Roosa 3032* (ISTC). Clayton Co.: *Trower* in 1932 (ISC).

Minnesota: Fillmore Co.: *Peck 79-712* (MIN). Houston Co.: *Peck 79-729* (MIN). Wabasha Co.: *Peck 79-704* (MIN). Winona Co.: *Peck 79-722* (MIN).

Wisconsin: Adams Co.: *Brown 337* (WIS). Buffalo Co.: *Peck 79-732* (UWL). Clark Co.: *Peck 79-641a* (UWL). Columbia Co.: *Hartley 3385* (WIS). Crawford Co.: *Peck 78-894* (UWL). Dane Co.: *Peck 79-1404* (UWL). Dunn Co.: *Weinzirl* in 1892 (WIS). Eau Claire Co.: *Peck 78-890* (UWL). Grant Co.: *Hansen 2399* (WIS). Jackson Co.: *Hartley 3346* (WIS). La Crosse Co.: *Nelson 169* (UWL). Lafayette Co.: *Nee 5456* (WIS). Marquette Co.: *Gohlke* in 1974 (WIS). Monroe Co.: *Hall* in 1966 (WIS). Pepin Co.: *Peck 80-648* (MIL). Portage Co.: *Freckmann 11195* (UWSP). Richland Co.: *Nee 2765* (WIS). Sauk Co.: *Zimmerman 1295* (WIS). Trempealeau Co.: *Peck 79-733* (UWL). Vernon Co.: *Davis* in 1977 (UWL). Waushara Co.: *Schultz 18* (OSH). Wood Co.: *Bogdansky* in 1974 (USWP).

6. ***Lycopodium inundatum*** L., Sp. Pl. 1102. 1753. Bog Clubmoss.

Sandy roadside ditches; moist open sandy fields; peripheral, reaches southern limit in Driftless Area.

Wisconsin: Adams Co.: *Sorenson 4887* (WIS). Clark Co.: *Purchase 504-64* (WIS). Jackson Co.: *Grether 6031* (WIS). Portage Co.: *Freckmann 5663* (UWSP). Richland Co.: *Peck 78-834* (UWL). Waushara Co.: *McLaughlin 673* (WIS). Wood Co.: *Alverson 803* (WIS).

7. ***Lycopodium lucidulum*** Michx., Fl. Bor. Am. 2:284. 1803. Shining Clubmoss.

Sandstone outcrops, sandy slopes, disturbed soil slumps along drainages in woods; widespread, but reaches its western limit not far west of the Driftless Area.

Illinois: Carroll Co.: *Peck 78-1285* (UWL). Jo Daviess Co.: *Peck 78-1204* (UWL).

Iowa: Allamakee Co.: *Peck 79-10* (ISTC). Clayton Co.: *Roosa 1138* (ISC). Dubuque Co.: *Farrar 1071* (ISC). Jackson Co.: *Peck 80-604* (ISTC). Winneshiek Co.: *Peck 79-784* (UWL).

Minnesota: Fillmore Co.: *Peck 79-713* (MIN). Houston Co.: *Butters & Rosendahl 3999* (MIN). Wabasha Co.: *Rosendahl 4925* (MIN). Winona Co.: *Rosendahl 7501* (MIN).

Wisconsin: Adams Co.: *Peck 79-665* (UWL). Buffalo Co.: *Peck 79-435* (UWL). Clark Co.: *Grether 7361* (WIS). Columbia Co.: *Pastrovich* in 1968 (OSH). Crawford Co.: *Peck 78-273* (UWL). Dane Co.: *Fassett 7369* (WIS). Dunn Co.: *Denniston* in 1927 (WIS). Eau Claire Co.: *Peck 79-425* (UWL). Grant Co.: *Nee 1176* (WIS). Green Co.: *Fassett 5674* (WIS). Iowa Co.: *Fassett 2065* (WIS). Jackson Co.: *Grether 6331* (WIS). Juneau Co.: *Fassett 12652* (WIS). La Crosse Co.: *Olson 99* (UWL). Lafayette Co.: *Zimmerman 1970* (WIS). Marquette Co.: *Sorenson 3252* (WIS). Monroe Co.: *Smith 542* (UWL). Pepin Co.: *Peck 79-445* (UWL). Portage Co.: *Smith 650* (UWL). Richland Co.: *Cochrane 5637* (WIS). Sauk Co.: *Nee 2233 (WIS). Trempealeau Co.: Grether 6128* (WIS). Vernon Co.: *Nee 3182* (WIS). Waushara Co.: *Plochmann 40* (WIS). Wood Co.: *Peck 79-651* (UWL).

8. ***Lycopodium obscurum*** L., Sp. Pl. 1102. 1753. Two varieties are recognized in the state following the treatment by Hickey (1977).

8a. ***Lycopodium obscurum*** L. var. ***isophyllum*** Hickey, Amer. Fern J. 40:47, 1977. Intermediate Groundpine.

Moist sandy woods and sphagnous alder thickets; peripheral, reaches southwestern limit in Driftless Area.

Wisconsin: Adams Co.: *Heddle 618* (WIS). Clark Co.: *Kienholz* in 1940 (WIS). Dunn Co.: *Peck 78-1122* (UWL). Iowa Co.: *Iverson* in 1955 (WIS). Jackson Co.: *Peterson 53* (WIS). Juneau Co.: *Bramschrieber* in 1959 (WIS). Monroe Co.: *Hartley 2889* (WIS). Portage Co.: *Iltis 5646* (WIS). Richland Co.: *Peck 79-835* (UWL). Sauk Co.: *Peck 79-1204* (UWL). Waushara Co.: *Plochmann 20* (WIS). Wood Co.: *Williams* in 1956 (WIS).

98b. ***Lycopodium obscurum*** var. ***obscurum*** Flat-branched Groundpine.

Moist sandy woods and sphagnous alder thickets; peripheral, reaches southern limit in Driftless Area.

Wisconsin: Adams Co.: *Brown 334* (WIS). Clark Co.: *Peck 78-940* (UWL). Jackson Co.: *Peck 78-1085* (UWL). Juneau Co.: *Peck 78-1143* (UWL). La Crosse Co.: *Hartley 2421* (WIS). Monroe Co.: *Peck 78-1210* (UWL). Portage Co.: *Markert 109* (UWSP). Sauk Co.: *Erickson & Johnson* in 1960 (WIS). Waushara Co.: *Taylor 4175* (MIL). Wood Co.: *Peck 78-827* (UWL).

9. ***Lycopodium porophilum*** Lloyd & Underw., Bull. Torrey Bot. Club 27:150. 1900. Rock Clubmoss [*L. selago* var. *patens* (Beauv.) Desv.].

North-facing sandstone bluffs and outcrops; disjunct from southern Illinois and Kentucky.

A taxonomic study of *L. porophilum* and *L. lucidulum* by Waterway (1977) utilized mass collections from populations in the Wisconsin Driftless Area. The hybrid formed by these species was readily discerned by leaf, spore, and gemmae characteristics.

Iowa: Allamakee Co.: *Hartley 9072* (IA). Clayton Co.: *Roosa 1506* (ISTC).

Minnesota: Houston Co.: *Peck 80-22* (MIN). Winona Co.: *Peck 80-12* (MIN).

Wisconsin: Adams Co.: *Cheney 3933* (WIS). Dane Co.: *Wilson 405* (WIS). Eau Claire Co.: *Peck 80-662* (MIL). Grant Co.: *Nee 5560* (WIS). Green Co.: *Musselman 1736* (UWJ). Iowa Co.: *Hansen* in 1969 (WIS). Jackson Co.: *Grether 6723* (WIS). Juneau Co.: *Cheney 3933* (MIL). La Crosse Co.: *Peck 80-32* (UWL). Monroe Co.: *Peck 80-1776* (MIL). Pepin Co.: *Peck 80-647* (MIL). Richland Co.: *Nee 12943* (WIS). Sauk Co.: *Tans 1498* (WSA). Trempealeau Co.: *Peck 80-18* (UWL). Vernon Co.: *Fassett 22061* (WIS).

10. ***Lycopodium tristachyum*** Pursh, Fl. Amer. 2:653. 1814. Ground-cedar Clubmoss.

Sandy slopes and sandy jack pine woods; peripheral, reaches southwestern limit in Driftless Area.

Wisconsin: Adams Co.: *Sorensen 1187* (WIS). Clark Co.: *Peck 79-644a* (UWL). Columbia Co.: *Benke* in 1911 (MIL). Jackson Co.: *Grether 6447* (WIS). Juneau Co.: *Fuller 2267* (MIL). La Crosse Co.: *Hartley 889* (WIS). Marquette Co.: *Hartwell* in 1912 (WIS). Monroe Co.: *Peck 78-1088* (UWL). Portage Co.: *Illis 5647* (WIS). Sauk Co.: *Kremers* in 1888 (WIS). Waushara Co.: *Christensen* in 1957 (WIS). Wood Co.: *Sorensen 2194* (WIS).

11. ***Lycopodium* X *habereri*** House, N.Y. St. Mus. Bull. 176:36. 1915. [*L. digitatum* X *tristachyum*; *L. tristachyum* var. *habereri* (House) Vict.]

Dry sandstone outcrop with white pine; peripheral, reaches southern limit in Driftless Area.

Wisconsin: Dane Co.: *Watson* no number, no date (WIS).

12. ***Lycopodium* X *zeilleri*** (Rouy) Vict., Contr. Lab. Bot. Univ. Montreal 3:38. 1925. [*L. complanatum* X *tristachyum*].

Dry to moist sandy field and jack pine woods; peripheral, reaches southern limit in Driftless Area.

Wisconsin: Juneau Co.: *McIntosh 652* (MIL). Washara Co.: *Fuller 3912* (MIL).

13. ***Lycopodium lucidulum* X *porophilum***

Sandstone outcrops with parents; disjunct from southern Illinois and Kentucky.

Iowa: Allamakee Co.: *Peck* in 1977 (ISTC). Clayton Co.: *Shimek* in 1921 (IA).

Minnesota: Winona Co.: *Peck 80-13* (MIN).

Wisconsin: Adams Co.: *Fassett 9951* (WIS). Columbia Co.: *Fuller 1339* (MIL). Dane Co.: *Wilson 405* (WIS). Eau Claire Co.: *Fassett 20366* (WIS). Grant Co.: *Nee 5661* (WIS). Iowa Co.: *Fassett 13328* (WIS). Jackson Co.: *Peck 80-699* (MIL). La Crosse Co.: *Peck 80-33* (UWL). Monroe Co.: *Peck 80-1775* (MIL). Richland Co.: *Nee 15581* (WIS). Sauk Co.: *Fassett 2842* (WIS). Trempealeau Co.: *Peck 80-19* (UWL). Vernon Co.: *Fassett 22061* (WIS).

SELAGINELLACEAE

14. ***Selaginella eclipes*** Buck, Can. J. Bot. 55:366. 1977. Northern Meadow Spikemoss. [*S. apoda* (L.) Fern.; *S. apus* (L.) Spring.].

Calcareous fen complex; peripheral, reaches northwestern limit at edge of Driftless Area.

Wisconsin: Waushara Co.: *Tans 1946* (WSA).

15. ***Selaginella rupestris*** (L.) Spring., Flora 21(12):149, 182. 1838. Rock Spikemoss.

Sandstone outcrops, sandy disturbed fields, sandy jack pine woods; widespread.

Illinois: Carroll Co.: *Sheviak 208a* (ILL). Jo Daviess Co.: *Gleason 2531* (ILL).

Iowa: Allamakee Co.: *Peck 79-9 (ISTC). Clayton Co.: Grant 8236* (ISTC). Dubuque Co.: *Bartsch* in 1895 (IA). Jackson Co.: *Peck 80-609* (ISTC). Winneshiek Co.: *Hartley 6992* (ISC).

Minnesota: Fillmore Co.: *Moore 19864* (MIN). Houston Co.: *Moore 26045* (MIN). Wabasha Co.: *Peck 79-707* (MIN). Winona Co.: *Hartley 6992* (ISC).

Wisconsin: Adams Co.: *Stahman 591* (WIS). Buffalo Co.: *Peck 79-468* (UWL). Clark Co.: *Grether 5321* (WIS). Columbia Co.: *Fassett 8303* (WIS). Crawford Co.: *Fassett 20676* (WIS). Dane Co.: *Fassett 9586* (WIS). Dunn Co.: *Goessl 6581* (MIL). Eau Claire Co.: *Freckmann 2881* (UWSP). Grant Co.: *Nee 2202* (WIS). Green Co.: *Hartley 6411 (WIS). Iowa Co.: Mori 967* (WIS). Jackson Co.: *Grether 5353* (WIS). Juneau Co.: *Sorensen 26* (WIS). La Crosse Co.: *Hartley 541* (IA). Lafayette Co.: *Cheney* in 1888 (WIS). Marquette Co.: *Parfitt 1487* (OSH). Monroe Co.: *Iltis 8978* (WIS). Pepin Co.: *Hansen 4513* (WIS). Portage Co.: *Freckmann 6918* (USWP). Richland Co.: *Nee 12971 (WIS). Sauk Co.: Philips 806* (WIS). Trempealeau Co.: *Sefton 221* (UWL). Vernon Co.: *Philips 832* (WIS). Waushara Co.: *Below 86* (OSH). Wood Co.: *Peck 78-826* (UWL).

ISOETACEAE

16. ***Isoetes echinospora*** Dur., Bull. Soc. Bot. France 8:164. 1861. Spiney-spored Quillwort. [*I. muricata* Dur.]

Rocky shallows of clear water lakes, submerged; peripheral, reaches southern limit in Driftless Area.

Wisconsin: Portage Co.: *Freckmann 9693* (UWSP). Sauk Co.: *Hartley 5806a* (IA).

17. ***Isoetes macrospora*** Dur., Bull. Soc. Bot. France 11:101. 1864. Lake Quillwort.

Rocky shallows of Devil's Lake, submerged; disjunct, reaches southern limit in Driftless Area.

Wisconsin: Sauk Co.: *Hartley 5806b* (IA).

EQUISETACEAE

18. ***Equisetum arvense*** L., Sp. Pl. 2:1061. 1753. Field Horsetail. Roadsides, drainages, wetlands, and old fields; widespread.

Illinois: Carroll Co.: *Wunderlin 165* (MWI). Jo Daviess Co.: *Peck 78-1206* (UWL). Stephenson Co.: *Evers 1395* (ILL).

Iowa: Allamakee Co.: *Peck 79-807 (ISTC). Clayton Co.: Roosa 855* (ISC). Dubuque Co.: *Pammel* in 1891 (ISC). Jackson Co.: *Cooperrider 745* (IA). Winnieshiek Co.: *Farrar 1041* (ISC).

Minnesota: Fillmore Co.: *Moore 13943* (MIN). Houston Co.: *Moore 14262* (MIN). Wabasha Co.: *Rosendahl 7611* (MIN). Winona Co.: *Rosendahl 7622 (MIN).*

Wisconsin: Adams Co.: Sorensen 4895 (IA). Buffalo Co.: *Iltis 9305* (WIS). Clark Co.: *Herzog* in 1962 (UWSP). Columbia Co.: *Iltis 20208* (WIS). Crawford Co.: *Fassett 20677* (WIS). Dane Co.: *Beversdorf 6* (WIS). Dunn Co.: *Meyer 418* (WIS). Eau Claire Co.: *Peck 79-419* (UWL). Grant Co.: *Bennett 185* (UWP). Green Co.: *Rice 1221* (UWJ). Iowa Co.: *Wislinsky 129* (WIS). Jackson Co.: *Grether 5499* (WIS). Juneau Co.: *Edwards & Raasch 18* (MIL). La Crosse Co.: *Nontelle 2726* (UWL). Lafayette Co.: *Stuntz* in 1893 (WIS). Marquette Co.: *Kurhajec 29* (OSH). Monroe Co.: *Strenski 73* (UWL). Pepin Co.: *Peck 78-288* (UWL). Portage Co.: *Freckmann 6472* (UWSP). Richland Co.: *Hartley 5241a* (IA). Sauk Co.: *Fassett 16072* (WIS). Trempealeau Co.: *Fassett 4415* (WIS). Vernon Co.: *Sohmer 7749* (UWL). Waushara Co.: *Sorensen 3899* (WIS). Wood Co.: *Fremness 10* (UWSP).

19. ***Equisetum fluviatile*** L., Sp. Pl. 2:1062. 1753. Water Horsetail.

Marshes, backwater sloughs, springs, and edge of tamarack bogs; peripheral, essentially reaches southwestern limit in Driftless Area.

Illinois: Carroll Co.: *Peck 78-1309* (UWL). Jo Daviess Co.: *Peck 78-1220* (UWL). Stephenson Co.: *Fell 53198* (ISM).

Iowa: Allamakee Co.: *Peck 78-55* (ISTC). Clayton Co.: *Peck 80-618* (ISTC). Dubuque Co.: *Merritt* in 1901 (UD). Jackson Co.: *Peck 80-600* (ISTC).

Minnesota: Fillmore Co.: *Peck 79-710* (MIN). Houston Co.: *Moore 26025* (MIN). Wabasha Co.: *Peck 79-708* (MIN). Winona Co. *Emanuel 513* (MIN).

Wisconsin: Adams Co.: *Sorensen 1236* (WIS). Buffalo Co.: *Thiel 126* (UWL). Clark Co.: *Peck 79-646* (UWL). Columbia Co.: *Fassett* in 1830 (WIS). Dane Co.: *Terrell 2425* (WIS). Dunn Co.: *Peck 79-453* (UWL). Eau Claire Co.: *Peck 79-420* (UWL). Grant Co.: *Davis* in 1932 (WIS). Iowa Co.: *Iltis 18375* (WIS). Jackson Co.: *Hartley 2083* (WIS). Juneau Co.: *Grether 7197* (WIS). La Crosse Co.: *Smith 35-76* (UWL). Marquette Co.: *Paulinus 140* (WIS). Monroe Co.: *Peck 79-407* (UWL). Pepin Co.: *Peck 79-448* (UWL). Portage Co.: *Freckmann 6551* (UWSP). Richland Co.: *Nee 6169* (WIS). Sauk Co.: *Zimmerman 1373* (WIS). Trempealeau Co.: *Ekern 66* (UWL). Vernon Co.: *Brimmer 56* (UWL). Waushara Co.: *Harriman 8290* (OSH). Wood Co.: *Sorensen 1370* (IA).

20. ***Equisetum hyemale*** L. var. ***affine*** (Engelm.) A. A. Eat., Fern Bull. 11:111. 1903. Common Scouring-rush.

Drainage ditches, roadsides, backwater sloughs, sandy moist woods; widespread.

Illinois: Carroll Co.: *Wunderlin 617* (MWI). Jo Daviess Co.: *Peck 78-1207* (UWL). Stephenson Co.: *Peck 78-1246* (UWL).

Iowa: Allamakee Co.: *Roosa 1305* (ISTC). Clayton Co.: *Roosa 853* (ISC). Dubuque Co.: *Farrar 1072* (ISTC). Jackson Co.: *Cooperrider 405* (IA). Winneshiek Co.: *Peck* in 1976 (ISC).

Minnesota: Fillmore Co.: *Moore 13944* (MIN). Houston Co.: *Farina 29* (MIN). Wabasha Co.: *Swanson 3356* (UWL). Winona Co.: *Ownby 4021* (MIN).

Wisconsin: Adams Co.: *Brown 332* (WIS). Buffalo Co.: *Fassett 5175 (WIS). Clark Co.: Peck 79-644* (UWL). Columbia Co.: *Fassett 1209* (WIS). Crawford Co.: *Keller 52* (WIS). Dane Co.: *Kunz* in 1929 (WIS). Dunn Co.: *Carlson* in 1971 (SUWS). Eau Claire Co.: *Peck 79-421* (UWL). Grant Co.: *Nee 2873* (WIS). Green Co.: *Musselman 1607* (WIS). Iowa Co.: *Wilinsky 129* (WIS). Jackson Co.: *Grether 6084* (WIS). Juneau Co.: *Hartley 8175* (WIS). La Crosse Co.: *Hartley 3030* (WIS). Lafayette Co.: *Dennis* in 1966 (WIS). Marquette Co.: *Paulinus 130* (WIS). Monroe Co.: *Sohmer 1791* (UWL). Pepin Co.: *Fassett 4418* (WIS). Portage Co.: *Volke 10* (UWSP). Richland Co.: *Nee 15636* (WIS). Sauk Co.: *Zimmerman 1241* (WIS). Trempealeau Co.: *Hartley 398* (WIS). Vernon Co.: *Cook 66* (UWL). Waushara Co.: *Poehmann* in 1958 (WIS). Wood Co.: *Peck 79-650* (UWL).

21. ***Equisetum laevigatum*** A. Br. ex Engelman., Amer. J. Sci. & Arts. 46: 87. 1844. Smooth Scouring-rush. [*E. kansanum* Schaffn.].

Dry, sandy roadside ditches, sandy fields, upland prairies, especially along railroad right-of-ways; widespread.

Illinois: Carroll Co.: *Winterringer 2774* (ISM). Jo Daviess Co.: *Hartley 9323* (IA). Stephenson Co.: *Evers 1404* (ILL).

Iowa: Allamakee Co.: *Peck 78-57* (ISTC). Clayton Co.: *Peck* in 1977 (ISC). Dubuque Co.: *Peck* in 1976 (ISC). Jackson Co.: *Cooperrider 1479* (IA). Winneshiek Co.: *Peck* in 1976 (ISC).

Minnesota: Fillmore Co.: *Peck 80-863* (MIN). Houston Co.: *Moore 26318* (MIN). Wabasha Co.: *Peck 80-910* (MIN). Winona Co.: *Moore 27158* (MIN).

Wisconsin: Adams Co.: *Peck 80-729* (MIL). Buffalo Co.: *Peck 78-291* (UWL). Columbia Co.: *Nuzzo 210* (WIS). Crawford Co.: *Peck 78-293* (UWL). Dane Co.: *Fassett 15894* (WIS). Dunn Co.: *Peck 78-1126* (UWL). Eau Claire Co.: *Peck 78-873* (UWL). Grant Co.: *Fassett 15095* (WIS). Green Co.: *Rice 1407* (UWJ). Iowa Co.: *Iltis 9760* (WIS). Jackson Co.: *Peck 79-1225* (UWL). Juneau Co.: *Peck 80-727* (MIL). La Crosse Co.: *Hartley 1554* (UWL). Lafayette Co.: *Smallwood 136* (UWP). Marquette Co.: *Fasset 18973* (WIS). Monroe Co.: *Harriman 9995* (OSH). Pepin Co.: *Peck 80-657* (MIL). Portage Co.: *Rill 1714* (OSH). Richland Co.: *Iltis 11889* (WIS). Sauk Co.: *Freriks* in 1960 (WIS). Trempealeau Co.: *Peck 78-908 (UWL). Vernon Co. Peck 78-292* (UWL). Waushara Co.: *Lodes 238* (OSH).

22. ***Equisetum palustre*** L., Sp. Pl. 2:1061. 1753. Marsh Horsetail.

Edge of tamarack bogs; disjunct; reaches southern limit in Driftless Area.

Wisconsin: La Crosse Co.: *Peck 79-804* (UWL). Trempealeau Co.: *Hartley 156a* (WIS).

23. ***Equisetum pratense*** Ehrh., Hannov. Mag. 22:138. 1784. Meadow Horsetail.

Sandy, moist thickets and steep sandy slopes, usually north-facing; edge of tamarack bogs; peripheral, essentially reaches southwestern limit in Driftless Area.

Illinois: Jo Daviess Co.: *Evers 114649* (ISM).

Iowa: Allamakee Co.: *Roosa 1775* (ISTC). Clayton Co.: *Roosa 1255* (ISTC). Dubuque Co.: *Hartley 7098* (IA). Jackson Co.: *Cooperrider 3442* (IA). Winneshiek Co.: *Roosa 1142* (ISTC).

Minnesota: Fillmore Co.: *Peck 78-29* (MIN). Houston Co.: *Moore 27192 (MIN). Wabasha Co.: Butters & Rosendahl 3540* (MIN). Winona Co.: *Hartley 3522* (IA).

Wisconsin: Adams Co.: *Sorensen 4578* (IA). Buffalo Co.: *Peck 79-432* (UWL). Clark Co.: *Peck 79-640* (UWL). Crawford Co.: *Peck 78-269* (UWL). Dunn Co.: *Peck 79-473* (UWL). Eau Claire Co.: *Peck 79-422* (UWL). Grant Co.: *Fassett 10318* (WIS). Green Co.: *Rice 3464* (UWJ). Iowa Co.: *Zimmerman 3209* (WIS). Jackson Co.: *Peck 79-462* (UWL). Juneau Co.: *Peck 79-622a* (UWL). La Crosse Co.: *Nontelle 98* (UWL). Monroe Co.: *Peck 79-463* (UWL). Pepin Co.: *Peck 79-447* (UWL). Portage Co.: *Peck 79-653* (UWL). Richland Co.: *Peck 78-268* (UWL). Sauk Co.: *Fassett 22571* (WIS). Trempealeau Co.: *Fassett 18202* (WIS). Vernon Co.: *Hartley 1788* (WIS). Waushara Co.: *Smith 777* (WSA). Wood Co.: *Sorensen 1145* (IA).

24. ***Equisetum scirpoides*** Michx., Fl. Bor. Amer. 2:281. 1803. Dwarf Scouring-rush.

North-facing slopes with white pine on sandy soils; moist limestone soils with abundant moss cover; peripheral, reaches southwestern limit in Driftless Area.

Illinois: Carroll Co.: *Peck 78-1290* (UWL). Jo Daviess Co.: *Peck 78-1208* (UWL).

Minnesota: Fillmore Co.: *Peck 80-858* (MIN). Houston Co.: *Butters 3640* (MIN). Wabasha Co.: *Peck 80-907* (MIN). Winona Co.: *Peck 80-852* (MIN).

Wisconsin: Buffalo Co.: *Peck 79-433* (UWL). Clark Co.: *Peck 79-644a* (UWL). Crawford Co.: *Peck 78-890* (UWL). Dunn Co.: *Peck 78-1124* (UWL). Eau Claire Co.: *Peck 79-423* (UWL). Grant Co.: *Sylvester* in 1884 (NY). Iowa Co.: *Peck 80-740* (MIL). Jackson Co.: *Peck 79-464* (UWL). La Crosse Co.: *Hartley 740* (WIS). Monroe Co.: *Matalock 1028* (WIS). Pepin Co.: *Peck 79-449* (UWL). Richland Co.: *Nee 5781* (WIS). Sauk Co.: *Evans* in 1928 (WIS). Trempealeau Co.: *Pammel* in 1923 (ISC). Vernon Co.: *Hartley 7698* (WIS).

25. ***Equisetum sylvaticum*** L., Sp. Pl. 2:1061. 1753. Woodland Horsetail.

Hillside seepage bogs, low sandy woods, edge of tamarack bogs, and open sphagnous fields; widespread, but essentially reaches southwestern limit in Driftless Area.

Iowa: Winneshiek Co.: *Goddard* in 1880 (ISC).

Minnesota: Fillmore Co.: *Butters 3009* (MIN). Winona Co.: *Peck 80-78* (MIN).

Wisconsin: Adams Co.: *Peck 79-663* (UWL). Buffalo Co.: *Peck 79-434* (UWLJ). Clark Co.: *Ehm* in 1969 (OSH). Dunn Co.: *Meyer 63* (WIS). Eau Claire Co.: *Peck 79-424* (UWL). Jackson Co.: *Hartley 4882* (IA). Juneau Co.: *Hartley 7786* (WIS). La Crosse Co.: *Hartley 3104* (WIS). Monroe Co.: *7954* (WIS). Pepin Co.: *Peck 79-465* (UWL). Portage Co.: *Freckmann 6531* (UWSP). Richland Co.: *Fassett 13940* (WIS). Sauk Co.: *Koeppen 345* (WIS). Trempealeau Co.: *Peck 79-418* (UWL). Vernon Co.: *Iltis 8871* (WIS). Wood Co.: *Hansen 2158* (WIS).

26. ***Equisetum* X *ferrissii*** Clute, Fern Bull. 12:22. 1904. [*E. hyemale* X *laevigatum*; *E. hyemale* var. *intermedium* A. A. Eat.].

Roadside ditches, upland prairies, along railroad right-of-ways, sandy disturbed fields; widespread.

Illinois: Carroll Co.: *Wunderlin 11* (ISM). Jo Daviess Co.: *Peck 78-1224* (UWL). Stephenson Co.: *Peck 78-1247* (UWL).

Iowa: Allamakee Co.: *Shimek* in 1901 (ISTC). Jackson Co.: *Peck* in 1976 (ISC). Winneshiek Co.: *Orr* in 1910 (EMNM).

Minnesota: Fillmore Co.: *Peck 79-714* (MIN). Houston Co.: *Lyon 790* (MIN). Wabasha Co.: *Manning 84* (MIN). Winona Co.: *Peck 79-726* (MIN).

Wisconsin: Adams Co.: *Thomson* in 1937 (WIS). Buffalo Co.: *Peck 79-435a* (UWL). Columbia Co.: *Weis 46* (WIS). Crawford Co.: *Hartley 5062* (WIS). Dane Co.: *Fassett 8675* (WIS). Dunn Co.: *Meyer 110* (WIS). Eau Claire Co.: *Peck 79-421a* (UWL). Grant Co.: *Fassett* in 1930 (WIS). Green Co.: *Peck 78-823* (UWL). Iowa Co.: *Wordell* in 1967 (WIS). Jackson Co.: *Peck 79-410a* (UWL). Juneau Co.: *Lumke 109* (WIS). La Crosse Co.: *Hartley 702* (WIS). Lafayette Co.: *Ilus 9557* (WIS). Marquette Co.: *Fassett 19505* (WIS).

Monroe Co.: *Peck 79-415a* (UWL). Pepin Co.: *Peck 79-441a* (UWL). Portage Co.: *Philips 354* (WIS). Richland Co.: *Peck 78-291 (UWL). Sauk Co.: Wright 105* (WIS). Trempealeau Co.: *Hartley 444* (WIS). Vernon Co.: *Skrupky* in 1973 (UWL). Waushara Co.: *Lancelle* in 1978 (UWGB).

27. ***Equisetum* X *litorale*** Kuhlw., Beitr. Pflanz. Russ. Reichs 4:91. 1845. Shore Horsetail. [*E. arvense* X *fluviatile*].

Marshes and sloughs of the Mississippi and Wisconsin rivers and their tributaries; often occurs to the exclusion of both parents; disjunct, essentially reaches western limit in Driftless Area.

A discussion of the occurrence, abundance and reproductive ecology of *E.* X *litorale* is presented by Peck (1980c). The relation of flooding to persistence, dispersal, and sexual formation of the hybrid was similar to that reported in Great Britain by Duckett and Duckett (1980).

Illinois: Carroll Co.: *Wunderlin 2668* (MWI). Jo Daviess Co.: *Evers 79984* (ILLS).

Iowa: Allamakee Co.: *Peck 78-54* (ISTC). Jackson Co.: *Peck 80-603* (ISTC).

Minnesota: Houston Co.: *Peck 79-734* (MIN). Wabasha Co.: *Peck 79-709* (MIN). Winona Co.: *Peck 79-727* (MIN).

Wisconsin: Buffalo Co.: *Peck 79-824* (UWL). Crawford Co.: *Dawson* in 1973 (UWL). Grant Co.: *Patman* in 1959 (WIS). Iowa Co.: *Peck 80-739* (MIL). La Crosse Co.: *Peck 79-803* (UWL). Pepin Co.: *Peck 80-654* (MIL). Richland Co.: *Hartley 5266* (WIS). Trempealeau Co.: *Peck 79-814* (UWL). Vernon Co.: *Peck 79-813* (UWL).

28. ***Equisetum* X *trachyodon*** A. Br., Flora 20:308. 1839. [*E. hyemale* X *variegatum*; E. variegatum var. *jesupi* A. A. Eat.].

Edge of shallow lakes and wet marshes; disjunct, reaches southwestern limit at edge of Driftless Area.

Wisconsin: Portage Co.: *Freckman 6749* (UWSP). Waushara Co.: *Smith 777* (WSA).

OPHIOGLOSSACEAE

29. ***Botrychium dissectum*** Spreng., Anleit. Gewachse 3:172. 1804.

Following Wagner (1959; 1960; 1961), two forms are recognized in the state. They are quite distinct in the Driftless Area, but in northern Wisconsin, where they are far more abundant, they intergrade.

29a. ***Botrychium dissectum*** Spreng. f. ***dissectum.*** Dissected Grape Fern. [*Botrychium dissectum* Spreng. var. *dissectum*].

Sandy wooded slopes, upland woods, and thickets; commonly associated with white pine stands; widespread.

Illinois: Carroll Co.: *Peck 78-1294* (UWL). Jo Daviess Co.: *Hartley 6301a* (IA). Stephenson Co.: *Peck 78-1250* (UWL).

Iowa: Allamakee Co.: *Peck 79-87* (ISTC). Clayton Co.: *Roosa 1658* (ISTC). Dubuque Co.: *Peck 80-610* (ISTC). Jackson Co.: *Peck 80-608* (ISTC). Winneshiek Co.: *Peck 80-26* (ISTC).

Minnesota: Fillmore Co.: *Peck 80-19* (UWL). Houston Co.: *Moore 25897* (MIN). Wabasha Co.: *Peck 80-5* (UWL). Winona Co.: *Peck 78-295* (MIN).

Wisconsin: Adams Co.: *Peck 79-667 (UWL). Buffalo Co.: Peck 79-436* (UWL). Clark Co.: *Peck 79-635a* (UWL). Columbia Co.: *Peck 80-745* (MIL). Crawford Co.: *Peck 79-400* (UWL). Dane Co.: *Peck 80-744* (MIL). Dunn Co.: *Peck 79-655* (UWL). Eau Claire Co.: *Peck 79-1103* (UWL). Grant Co.: *Peck 79-1143* (UWL). Green Co.: *Maurer 245* (OSH). Iowa Co.: *Zimmerman 3005* (WIS). Jackson Co.: *Peck 79-408* (UWL). Juneau Co.: *Longnecker* in 1961 (WIS). La Crosse Co.: *Hartley 6780* (WIS). Lafayette Co.: *Hartley 6464b* (IA). Monroe Co.: *Peck 79-414* (UWL). Pepin Co.: *Peck 80-642* (MIL). Portage Co.: *Smith* in 1978 (WSA). Richland Co.: *Nee 14493b* (WIS). Sauk Co.: *Erdmann* in 1936 (WIS). Trempealeau Co.: *Hartley 2394* (WIS). Vernon Co.: *Smith 578* (UWL). Wood Co.: *Herberger 1* (WIS).

29b. ***Botrychium dissectum*** Spreng. f. ***obliquum*** (Muhl.) Fern., Rhodora

23:151. 1921. Oblique Grape Fern. [*B. dissectum* var. *obliquum* (Muhl.) Clute, *B. obliquum* Muhl.].

Sandy wooded slopes, upland woods, and thickets; commonly associated with white pine stands; widespread.

Illinois: Carroll Co.: *Peck 78-1289* (UWL). Jo Daviess Co.: *Hartley 6301b* (WIS).

Iowa: Allamakee Co.: *Peck 79-2* (ISTC). Clayton Co.: *Roosa 1940* (ISTC). Dubuque Co.: *Roosa 1946* (ISTC). Jackson Co.: *Roosa 1951* (ISTC). Winneshiek Co.: *Hartley 6217* (IA).

Minnesota: Fillmore Co.: *Peck 77-25* (MIN). Houston Co.: *Moore 25896* (MIN). Wabasha Co.: *Peck 79-702* (MIN). Winona Co.: *Peck 78-296* (MIN).

Wisconsin: Adams Co.: *Peck 79-666* (UWL). Buffalo Co.: *Fassett 2834* (WIS). Clark Co.: *Peck 79-635* (UWL). Columbia Co.: *Peck 80-746* (MIL). Crawford Co.: *Peck 79-401* (UWL). Dane Co.: *Greene* in 1962 (WIS). Dunn Co.: *Peck 79-654* (UWL). Eau Claire Co.: *Peck 79-426a* (UWL). Grant Co.: *Nee 5321* (WIS). Green Co.: *Bridge* in 1958 (UWP). Iowa Co.: *Zimmerman 3005b* (WIS). Jackson Co.: *Peterson 257* (WIS). Juneau Co.: *Peck 79-657* (UWL). La Crosse Co.: *Peck 771001-5* (UWL). Lafayette Co.: *Hartley 6464a* (WIS). Monroe Co.: *Peck 79-415* (UWL). Pepin Co.: *Peck 80-643* (MIL). Portage Co.: *Smith* in 1978 (WSA). Richland Co.: *Nee 2602* (WIS). Sauk Co.: *Koeppen 343* (WIS). Trempealeau Co.: *Hartley 2395* (WIS). Vernon Co.: *Peck 79-405* (UWL). Wood Co.: *Peck 79-652* (UWL).

30. ***Botrychium lanceolatum*** (S. G. Gmel.) Angstr. var. ***angustisegmentum*** Pease & Moore, Bull. Torrey Bot. Club 64:280. 1937. Triangle Grape Fern.

Maple woods with thick litter and humus; peripheral, reaches southern limit at edge of Driftless Area.

Wisconsin: Clark Co.: *Peck 79-637* (UWL). Portage Co.: *Peck 79-656* (UWL). Wood Co.: *Freckmann 12115* (UWSP).

31. ***Botrychium matricariifolium*** A. B. *ex* Koch., Doll. Rhein. Fl. 24. 1843. Daisy-leaf Grape Fern.

Oak woods with thick humus soil; maple woods with thick humus soil; peripheral, reaches southern limit in Driftless Area.

Wisconsin: Clark Co.: *Bergseng* in 1955 (WIS). Grant Co.: *Whitford 1225* (UWM). Portage Co.: *Peck 79-654* (UWL). Sauk Co.: *Lange* in 1970 (DLSP). Wood Co.: *Peck 79-651a* (UWL).

32. ***Botrychium mormo*** Wagner and Wagner, Amer. Fern J. 61:20. 1981. Goblin Grape Fern.

Low maple woods; disjunct, reaches southwestern limit at edge of Driftless Area. The occurrence of this species is probably more widespread than indicated by the four localities known for it in Wisconsin (Peck, 1980b; Peck and Taylor, 1980; Wagner and Wagner, 1981).

Wisconsin: Wood Co.: *Groessl 309* (MIL).

33. ***Botrychium multifidum*** (S. G. Gmel) Rupr., Schrad. J. Bot. 1800 (2):110. 1801. Leather-leaf Grape Fern.

White pine stands, dry upland woods, sandy slopes and fields; peripheral, reaches southwestern limit in Driftless Area.

Illinois: Carroll Co.: *Peck 78-1297* (UWL). Jo Daviess Co.: *Peck 78-1209* (UWL). Stephenson Co.: *Peck 78-1248* (UWL).

Iowa: Allamakee Co.: *Hartley 5715* (ISC). Clayton Co.: *Peck 80-621* (ISTC). Dubuque Co.: *Peck 80-611* (ISTC). Winneshiek Co.: *Hartley 9110* (IA).

Minnesota: Fillmore Co.: *Peck 80-864* (MIN). Houston Co.: *Rosendahl 660* (MIN). Wabasha Co.: *Peck 80-901* (MIN). Winona Co.: *Peck 80-858* (MIN).

Wisconsin: Adams Co.: *Sorenson 2070* (IA). Buffalo Co.: *Peck 79-1113* (UWL). Clark Co.: *Peck 70-634* (UWL). Columbia Co.: *Kakma 6* (WIS). Crawford Co.: *Peck 79-1112* (UWL). Eau Claire Co.: *Peck 79-942* (UWL). Grant Co.: *Peck 79-1103* (UWL). Green Co.: Fell 58-831f (UWL). Iowa Co.: *Backus* in 1943 (WIS). Jackson Co.: *Hartley 6945* (WIS). Juneau Co.: *Longenecker* in 1961 (WIS). La Crosse Co.: *Hartley 3005* (WIS). Lafayette Co.: *Peck 79-734* (UWL). Marquette Co.: *Lapham* no number, no date (WIS). Monroe Co.:

Hartley 2917 (WIS). Pepin Co.: *Peck 80-656* (MIL). Portage Co.: *Whitemire* in 1972 (UWSP). Richland Co.: *Peck 79-923* (UWL). Sauk Co.: *Davis* in 1979 (UWL). Trempealeau Co.: *Wilson 4127* (WIS). Vernon Co.: *Peck 79-1076* (UWL). Waushara Co.: *Sorenson 4444* (IA). Wood Co.: *Peck 78-824* (UWL).

34. ***Botrychium oneidense*** (Gilb.) House, Amer. Midl. Nat. 7:126. 1921. Blunt-lobed Grape Fern. [*B. dissectum* f. *oneidense* (Gilb.) Clute].

Second growth maple woods; peripheral, reaches southwestern limit at edge of Driftless Area.

Differences which separate this taxon from *B. dissectum, B. multifidum,* and *B. ternatum* are presented by Wagner (1959; 1960; 1961).

Wisconsin: Sauk Co.: *Clarke* in 1953 (WIS). Wood Co.: *Hansen 2138* (WIS).

35. ***Botrychium simplex*** E. Hitchc., Amer. J. Sci. 6:103. 1823. Least Moonwort.

Moist, sandy meadow; peripheral, essentially reaching southwestern limit in Driftless Area.

Wisconsin: Jackson Co.: *Peck 80-1768* (MIL); Portage Co.: *Zedlerson* in 1976. (WIS).

36. ***Botrychium ternatum*** (Thunb.) Sw., Schrad. J. Bot. 1800(2):111. 1801. Ternate Grape Fern. [*B. multifidum* f. *dentatum* Tryon].

Sandy fields and wet, sandy lake margins; peripheral, reaches southwestern limit at edge of Driftless Area.

Differences which separate this taxon from *B. dissectum, B. multifidum,* and *B. oneidense* are presented by Wagner (1959; 1960; 1961).

Wisconsin: Portage Co.: *Thomson* in 1938 (WIS). Waushara Co.: *Sorenson 2660* (WIS).

37. ***Botrychium virginianum*** (L.) Sw., Schrad. J. Bot. 1800(2):111. 1801. Rattlesnake Fern.

Upland woods and wooded slopes with humus; widespread.

Illinois: Carroll Co.: *Wunderlin 248* (MWI). Jo Daviess Co.: *Graham 9923* (ISM). Stephenson Co.: *Fell 52964* (ISM).

Iowa: Allamakee Co.: *Peck 78-51* (ISTC). Clayton Co.: *Roosa 854* (ISC). Dubuque Co.: *Farrar 1062* (ISC). Jackson Co.: *Cooperrider 1454* (IA). Winneshiek Co.: *Roosa 1394* (ISC).

Minnesota: Fillmore Co.: *Peck 78-27* (MIN). Houston Co.: *Rosendahl 306* (MIN). Wabasha Co.: *Manning 7* (MIN). Winona Co.: *Moore 27205* (MIN).

Wisconsin: Adams Co.: *Iltis 16987* (WIS). Buffalo Co.: *Peck 78-284* (UWL). Clark Co.: *Bergseng* in 1941 (WIS). Columbia Co.: *Becker* in 1954 (WIS). Crawford Co.: *Fassett 22106* (WIS). Dane Co.: *Heddle 597* (WIS). Dunn Co.: *Denniston* in 1927 (WIS). Eau Claire Co.: *Peck 79-426* (UWL). Grant Co.: *Harriman 9920* (OSH). Green Co.: *Fell 58-78* (WIS). Iowa Co.: *Heddle 352* (WIS). Jackson Co.: *Peck 79-410* (UWL). Juneau Co.: *Peck 79-660* (UWL). La Crosse Co.: *Nontelle 1508* (UWL). Lafayette Co.: *Hansen 1118* (WIS). Marquette Co.: *Koeppen 375* (WIS). Monroe Co.: *Peck 78-1304* (UWL). Pepin Co.: *Peck 78-285* (UWL). Portage Co.: *Freckmann 4964* (UWSP). Richland Co.: *Koch 6948* (WIS). Sauk Co.: *Zimmerman 1351* (WIS). Trempealeau Co.: *Grether 6130* (WIS). Vernon Co.: *Hansen 208* (WIS). Waushara Co.: *Sorensen 1519* (IA). Wood Co.: *Harriman 5986* (OSH).

38. ***Ophioglossum vulgatum*** L. var. ***pseudopodum*** (Blake) Farw., Ann. Rept. Mich. Acad. Sci. 18:84. 1916. Northern Adder's-tongue Fern.

Wet, sandy meadows; sandy aspen groves, moist sandy roadside ditches; peripheral, essentially reaching southwestern limit in Driftless Area.

Wisconsin: Adams Co.: *Hartley 5996* (IA). Clark Co.: *Grether 6016* (WIS). Columbia Co.: *Peck 80-747* (MIL). Dane Co.: *Zimmerman 3031* (WIS). Grant Co.: *Anonymous,* no date, no number (UWP). La Crosse Co.: *Peck 80-898* (MIL). Marquette Co.: *Curtis* in 1951 (WIS). Portage Co.: *Dimit* in 1966 (WIS). Richland Co.: *Nee 843* (WIS). Waushara Co.: *Curtis* in 1956 (WIS).

OSMUNDACEAE

39. ***Osmunda cinnamomea*** L., Sp. Pl. 2:1066. 1753. Cinnamon Fern.

Wet, sandy woods and thickets, hillside seeps, alder thickets, skunk cabbage bogs; peripheral, essentially reaches western limit in Driftless Area.

Illinois: Carroll Co.: *Peck 77-189* (SIU).

Iowa: Clayton Co.: *Savage* in 1945 (IWC). Jackson Co.: *Pammel* in 1905 (ISC).

Minnesota: Fillmore Co.: *Peck 79-715* (MIN). Winona Co.: *Peck 80-92* (MIN).

Wisconsin: Adams Co.: *Brown 311* (WIS). Buffalo Co.: *Christopherson 27* (WIS). Clark Co.: *Purchase 501-64* (WIS). Columbia Co.: *Nee 899* (WIS). Crawford Co.: *Murphy* in 1968 (UWSP). Dane Co.: *Shake 200* (WIS). Dunn Co.: Peck 79-452 (UWL). Eau Claire Co.: *Peck 78-874* (UWL). Grant Co.: *Smith 7867* (WIS). Jackson Co.: *Grether 5894* (WISJ). Juneau Co.: *Thomson* in 1938 (WIS). La Crosse Co.: *Pammel* in 1901 (ISC). Lafayette Co.: *Peck 78-845 (UWL). Marquette Co.: Harriman 754* (OSH). Monroe Co.: *Peterson 28* (WIS). Pepin Co.: *Peck 78-1020* (UWL). Portage Co.: *Portage 94* (WIS). Richland Co.: *Nee 2911* (WIS). Sauk Co.: *Koeppen 339* (WIS). Trempealeau Co.: *Nee 14937* (WIS). Vernon Co.: *Peck 78-1014* (UWL). Waushara Co.: *Harriman 884* (OSH). Wood Co.: *Sorensen 2991* (WIS).

40. ***Osmunda claytoniana*** L., Sp. Pl. 2:1066. 1753. Interrupted Fern.

Wooded slopes with high humus, often becoming a dominant herbaceous cover; widespread.

Illinois: Carroll Co.: *Wunderlin 164* (MWI). Jo Daviess Co.: *Koelling 394* (ILL).

Iowa: Allamakee Co.: *Hartley 7468* (IA). Clayton Co.: *Peck* in 1976 (ISC). Dubuque Co.: *Farrar 1032* (ISC). Jackson Co.: *Cooperrider 2467* (IA). Winneshiek Co.: *Grant 11715* (ISTC).

Minnesota: Fillmore Co: *Moore 13955* (MIN). Houston Co.: *Rosendahl 294* (MIN). Wabasha Co.: *Manning 10* (MIN). Winona Co.: *Peck 80-90* (MIN).

Wisconsin: Adams Co.: *Harriman 7728* (OSH). Buffalo Co.: *Smith 7206* (WIS). Clark Co.: *Grether 5371* (WIS). Columbia Co.: *Harriman 12928* (OSH). Crawford Co.: *Smith 7644* (WIS). Dane Co.: *Heddle 2414* (WIS). Dunn Co.: *Meyer 195* (WIS). Eau Claire Co.: *Goessl 1835* (MIL). Grant Co.: *Hansen 2501* (WISJ). Green Co.: *Fell 58-421a* (WIS). Iowa Co.: *Cross 216* (WIS). Jackson Co.: *Grether 6161* (WIS). Juneau Co.: *Harriman 5940* (OSH). La Crosse Co.: *Nontelle 2853* (UWL). Lafayette Co.: *Peck 78-847* (UWL). Marquette Co.: *Sorensen 1546* (WIS). Monroe Co.: *Sohmer 1848* (WIS). Pepin Co.: *Hansen 4577* (WIS). Portage Co.: *Freckmann 6422* (UWSP). Richland Co.: *Nee 13715* (WIS). Sauk Co.: *Smith 8159* (WIS). Trempealeau Co.: *Hansen 4220* (WIS). Vernon Co.: *Hansen 1042* (WIS). Waushara Co.: *Sorensen 4791* (IA). Wood Co.: *Freckmann 8474* (UWSP).

41. ***Osmunda regalis*** L. var. ***spectabilis*** (Wild.) Gray., Man. ed. 2:600. 1856. American Royal Fern.

Wet sandy meadows, thickets, and bogs; peripheral, essentially reaches western limit in Driftless Area.

Illinois: Jo Daviess Co.: *Peck 77-204* (UWL).

Iowa: Allamakee Co.: Hartley *5730* (IA).

Minnesota: Houston Co.: *Orr* in 1905 (ISC).

Wisconsin: Adams Co.: *Sorensen 1307* (WIS). Buffalo Co.: *Swanson 3271* (UWL). Clark Co.: *Goessl 1311* (MIL). Columbia Co.: *Miller 374* (WIS). Dane Co.: *Steil* in 1912 (WIS). Dunn Co.: *Peck 78-1051* (UWL). Eau Claire Co.: *Peck 78-876* (UWL). Grant Co.: *Nee 2877* (WIS). Iowa Co.: *Cross 385* (WIS). Jackson Co.: *Grether 6227* (WIS). Juneau Co.: *Harriman 5942* (OSH). La Crosse Co.: *Smith 644* (UWL). Marquette Co.: *Iltis 6322* (WIS). Monroe Co.: *Hauser 64* (WIS). Pepin Co.: *Peck 80-760 (MIL). Portage Co.: Freckmann 11177* (UWSP). Richland Co.: *Nee 852* (WIS). Sauk Co.: *Zimmerman 1027* (WIS). Trempealeau Co.: *Hartley 503* (WIS). Waushara Co.: *Harriman 9272* (OSH). Wood Co.: *Harriman 5894* (OSH).

ADIANTACEAE

42. ***Adiantum pedatum*** L., Sp. Pl. 2:1095. 1753. Northern Maidenhair Fern.

Woodlands and rock outcrops; widespread.

Illinois: Carroll Co.: *Wunderlin 58* (MWI). Jo Daviess Co.: *Evers 13753* (SIU). Stephenson Co.: *Fell 53249* (ISM).

Iowa: Allamakee Co: *Peck 78-44* (ISTC). Clayton Co.: *Fults 1654* (ISC). Dubuque Co.: *Thorne 30014* (IA). Jackson Co.: *Cooperrider 404* (IA). Winneshiek Co.: *Peck* in 1976 (ISC).

Minnesota: Fillmore Co.: *Moore 15716* (MIN). Houston Co.: *Lyon 44* (MIN). Wabasha Co.: *Manning 23*

(MIN). Winona Co.: *Wallace* in 1971 (MANK).

Wisconsin: Adams Co.: *Fuller 1172* (MIL). Buffalo Co.: *Fassett 4121* (WIS). Clark Co.: *Purchase 501-64* (WIS). Columbia Co.: *Baumgartner 13* (WIS). Crawford Co.: *Fassett 19467* (WIS). Dane Co.: *Seymour 1001* (WIS). Dunn Co.: *Goessl 9071* (MIL). Eau Claire Co.: *Kinney 73* (WIS). Grant Co.: *Hansen 3139* (WIS). Green Co.: *Musselman 1865* (UWJ). Iowa Co.: *Scheutt 133* (WIS). Jackson Co.: *Grether 6062* (WIS). Juneau Co.: *Brueckner* in 1961 (WIS). La Crosse Co.: *Nontelle 1125* (UWL). Lafayette Co.: *Ryckman 23* (WIS). Marquette Co.: *Peck 78-984* (UWL). Monroe Co.: *Peck 78-270* (UWL). Pepin Co.: *Anderson 439* (WIS). Portage Co.: *Freckmann 8262* (UWSP). Richland Co.: *Koch 4133* (WIS). Sauk Co.: *Hansen 38* (OSH). Trempealeau Co.: *Demaske 525* (UWL). Vernon Co.: *Ugent 434* (WIS). Waushara Co.: *Pochmann 48* (WIS). Wood Co.: *Sorensen 1435* (IA).

43. ***Cheilanthes feei*** Moore, Index Fil. 38. 1857. Slender Lip Fern.

Usually, dry, exposed limestone cliffs and ledges; occasionally, calcareous sandstone cliffs; peripheral, essentially reaching northern limit in Driftless Area.

Illinois: Carroll Co.: *Cowles 8044* (ISM). Jo Daviess Co.: *Fuller 1732* (ISM).

Iowa: Allamakee Co.: *Hartley 7036* (IA). Clayton Co.: *Farrar 1059* (ISC). Dubuque Co.: *Calvin* in 1899 (IA). Jackson Co.: *Cooperrider 1996* (IA). Winneshiek Co.: *Cooperrider 1996* (IA). Winneshiek Co.: *Hartley 9441* (ISTC).

Minnesota: Houston Co.: *Moore 25381* (MIN). Winona Co.: *Moore 18162* (MIN).

Wisconsin: Buffalo Co.: *Fassett 2888* (WIS). Columbia Co.: *Fassett 10041* (WIS). Crawford Co.: *Hartley 3182* (WIS). Dane Co.: *Heddle 2673* (WIS) Grant Co.: *Fassett 14978* (WIS). Iowa Co.: *Nee 5462* (WISJ). La Crosse Co.: *Peck* in 1978 (UWL). Lafayette Co.: *Hartley 3616* (IA). Pepin Co.: *Peck 80-659* (MIL). Richland Co.: *Nee 1584* (WIS). Sauk Co.: *Jones 424* (WIS). Trempealeau Co.: *Peck 78-908* (UWL). Vernon Co.: *Hartley 2028* (WIS).

44. ***Cryptogramma stelleri*** (S. G. Gmel.) Prantl, in Engler's Bot. Jahrb. 3:413. 1882. Slender cliff-brake Fern.

Crevices of moist sandstone and limestone outcrops; moist moss cover on north-facing sandy slopes; widespread, but essentially reaching southwestern limit in Driftless Area.

Illinois: Carroll Co.: *Fuller 1093h* (ISM). Jo Daviess Co.: *Fuller 8002* (ISM).

Iowa: Allamakee Co.: *Roosa 874* (ISC). Clayton Co.: *Roosa 1260* (ISTC). Dubuque Co.: *Thorne 12305* (IA). Jackson Co.: *Cooperrider 882* (IA). Winneshiek Co.: *Grant 11745* (ISC).

Minnesota: Fillmore Co.: *Butters 2943* (MIN). Houston Co.: *Rosendahl 427* (MIN). Wabasha Co.: *Manning 63* (MIN). Winona Co.: *Rosendahl 7557* (MIN).

Wisconsin: Adams Co.: *Wadmond* in 1908 (WIS). Buffalo Co.: *Peck 78-929* (UWL). Columbia Co.: *Evans* in 1938 (WIS). Crawford Co.: *Nee 1958* (WIS). Dane Co.: *Cheney* in 1893 (WIS). Grant Co.: *Fassett 10327* (WIS). Iowa Co.: *Zimmerman 3211* (WIS). Jackson Co.: *Grether 6136a* (WIS). La Crosse Co.: *Hartley 2198* (WIS). Lafayette Co.: *Iltis 10597* (WIS). Monroe Co.: *Smith 525* (UWL). Pepin Co.: Peck 80-645 (MIL). Richland Co.: *Nee 1582* (WIS). Sauk Co.: *Morgans 655* (IA). Trempealeau Co.: *Fassett 4116* (WIS). Vernon Co.: *Hartley 1796* (WIS).

45. ***Pellaea atropurpurea*** (L.) Link, Fil. Sp. Hort. Reg. Bot. Berol. Cul. 59. 1841. Purple Cliff-brake Fern.

South-west to west-facing, dry sandstone bluffs, often just below the limestone-capped summit on steep and eroding ledges; disjunct, reaches northern limit in the Driftless Area from populations in southern Illinois and Missouri.

Illinois: Jo Daviess Co.: *Peck 78-1237* (UWL).

Iowa: Allamakee Co.: *Peck 79-8* (ISTC).

Minnesota: Houston Co.: *Hartley 6670* (MIN). Wabasha Co.: *Peck 80-632* (MIN).

Wisconsin: Columbia Co.: *Smith 756* (WSA). Dane Co.: *Rigby* in 1967 (WIS). Grant Co.: *Musselman 2298* (UWJ). Iowa Co.: *Peck 80-741* (MIL). Richland Co.: *Nee 3259* (WIS). Sauk Co.: *Hartley 5380* (WIS). Vernon Co.: *Hartley 1040* (WIS).

46. ***Pellaea glabella*** Mett. ex Kuhn, Linnaea 36:87. 1869. Smooth Cliff-brake Fern.

Crevices in dry sandstone and limestone outcrops; peripheral, essentially reaches

northern limit in Driftless Area.

Illinois: Carroll Co.: *Wunderlin 88* (MWI). Jo Daviess Co.: *Chase 9361* (ILL). Stephenson Co.: *Peck 78-1255* (UWL).

Iowa: Allamakee Co.: *Roosa 1144* (ISTC). Clayton Co.: *Roosa 1390* (ISC). Dubuque Co.: *Roosa 3092* (ISTC). Jackson Co.: *Cooperrider 450* (IA). Winneshiek Co.: *Farrar 1039* (ISC).

Minnesota: Fillmore Co.: *Moore 15714* (MIN). Houston Co.: *Rosendahl 7156* (MIN). Wabasha Co.: *Rosendahl 3512* (MIN). Winona Co.: *Moore 16039* (MIN).

Wisconsin: Adams Co.: *Thomson* in 1971 (WIS). Buffalo Co.: *Smith 7146* (WIS). Columbia Co.: *Cochrane 4020* (WIS). Crawford Co.: *Smith 645* (UWL). Dane Co.: *Fassett 18368* (WIS). Grant Co.: *Fassett 15103* (WIS). Green Co.: *Rice 1379* (UWJ). Iowa Co.: *Wislinsky 383* (WIS). Jackson Co.: *Peck 79-1224* (UWL). Juneau Co.: *Sorensen 2920* (WIS). La Crosse Co.: *Nontelle 1466* (UWL). Lafayette Co.: *Smith 7777* (WIS). Monroe Co.: *Nee 14955* (WIS). Pepin Co.: *Anderson 433* (WIS). Richland Co.: *Nee 2386* (WIS). Sauk Co.: *Fassett 16080* (WIS). Trempealeau Co.: *Hartley 391* (IA). Vernon Co.: *Smith 209* (UWL).

POLYPODIACEAE

47. ***Polypodium virginianum*** L., Sp. Pl. 2:1085. 1753. Common Polypody. [*P. vulgare* L. var. *virginianum* A. A. Eat.]

Ledges and cliffs of sandstone and quartzite; occasionally observed to climb bases of trees; sandy soil slopes; widespread.

Illinois: Carroll Co.: *Peck 78-1298* (UWL). Jo Daviess Co.: *Peck 78-1210* (UWL).

Iowa: Allamakee Co.: *Roosa 773* (ISC). Clayton Co.: *Roosa 1391* (ISC). Dubuque Co.: *Hartley 9014* (IA). Jackson Co.: *Roosa 3015* (ISTC). Winneshiek Co.: *Hartley 8486* (IA).

Minnesota: Fillmore Co.: *Huff 1941* (MIN). Houston Co.: *Rosendahl 515* (MIN). Wabasha Co.: *Ownbey 2307* (MIN). Winona Co.: *Moore 27048* (MIN).

Wisconsin: Adams Co.: *Sorensen 1189* (WIS). Buffalo Co.: *Peck 79-470* (UWL). Clark Co.: *Grether 5375* (WIS). Columbia Co.: *Harriman 12942* (OSH). Crawford Co.: *Nee 1986* (WIS). Dane Co.: *Fassett 5529* (WIS). Dunn Co.: *Goessl 6660* (MIL). Eau Claire Co.: *Peck 79-469* (UWL). Grant Co.: *Dziekanowski 2792* (UWP). Green Co.: *Fassett 5671* (WIS). Iowa Co.: *Smith 655* (UWL). Jackson Co.: *Grether 5469* (WIS). Juneau Co.: *Cheney 3695* (WIS). La Crosse Co.: *Grether 8834* (WIS). Lafayette Co.: *Stickney* in 1959 (WIS). Marquette Co.: *Fassett 14940* (WIS). Monroe Co.: *Ugent* in 1961 (WIS). Pepin Co.: *Goessl 6535* (MIL). Portage Co.: *Freckmann* in 1975 (UWSP). Richland Co.: *Nee 1397* (WIS). Sauk Co.: *Cochrane 5162* (WIS). Trempealeau Co.: *Fassett 4018* (WIS). Vernon Co.: *Hansen 207* (WIS).

DENNSTAEDTIACEAE

48. ***Dennstaedtia punctilobula*** (Michx.) Moore, Ind. Fil., 307. 1857. Hayscented Fern.

Sandy, wooded ravine; disjunct, reaches northern limit in Driftless Area from southern Illinois.

The population was transitory in its occurrence (Threlfall, 1979); this species was also transitory in Michigan approximately at the same time (Wagner, 1972).

Wisconsin: Sauk Co.: *Threlfall* in 1965 (WIS).

49. ***Pteridium aquilinum*** (L.) Kuhn. var. ***latiusculum*** (Desv.) Underw. *ex* Heller, Cat. N. Am. Pl., 17. 1909. Bracken Fern.

Sandy soils of prairies, woods and thickets, upland dry woods; widespread.

Illinois: Carroll Co.: *Wunderlin 251* (MWI). Jo Daviess Co.: *Fuller 6978* (ISM). Stephenson Co.: *Winterringer 14378* (ISM).

Iowa: Allamakee Co.: *Lammers 576* (ISC). Clayton Co.: *Farrar 1024* (ISC). Dubuque Co.: *Farrar 1064* (ISC). Jackson Co.: *Cooperrider 1973* (IA). Winneshiek Co.: *Niemann 1031* (ISC).

Minnesota: Fillmore Co.: *Peck 78-30* (MIN). Houston Co.: *Moore 26579* (MIN). Wabasha Co.: *Roberts* in 1904 (MIN). Winona Co.: *Peck 80-86* (MIN).

Wisconsin: Adams Co.: *Brown 327* (WIS). Buffalo Co.: *Fassett 4122* (WIS). Clark Co.: *Bergseng* in 1941 (WIS). Columbia Co.: *Harriman 12939* (OSH). Crawford Co.: *Peck 79-402* (UWL). Dane Co.: *Tryon 3579*

(WIS). Dunn Co.: *Meyer 198* (WIS). Eau Claire Co.: *Goessl 1836* (MIL). Grant Co.: *Pammel 366* (ISC). Green Co.: *Fell 58-137* (WIS). Iowa Co.: *Wislinsky 260* (WIS). Jackson Co.: *Grether 5878* (WIS). Juneau Co.: *Thomson* in 1938 (WIS). La Crosse Co.: *Fassett 4124* (WIS). Lafayette Co.: *Hansen 1119* (WIS). Marquette Co.: *Tans* in 1966 (WSA). Monroe Co.: *Sohmer 884A* (UWL). Pepin Co.: *Hansen 4596* (WIS). Portage Co.: *Freckmann 6424* (UWSP). Richland Co.: *Schwartz 186* (WIS). Sauk Co.: *Zimmerman 938* (WIS). Trempealeau Co.: *Demaske 411* (UWL). Vernon Co.: *Smith* in 1922 (WIS). Waushara Co.: *Redmond 415* (OSH). Wood Co.: *Thomson* in 1938 (WIS).

THELYPTERIDACEAE

50. ***Phegopteris connectilis*** (Michx.) Watt, Can. Nat. II. 3:159. 1866. Narrow Beech Fern. [*Thelypteris phegopteris* (L.) Sloss.; *Dryopteris thelypteris* (L.) Christens.]

Sandstone ledges and sandy soil slopes, often moist or north-facing; peripheral, essentially reaching its southern limit in Driftless Area.

Iowa: Allamakee Co.: *Peck 80-626* (ISTC).

Minnesota: Fillmore Co.: *Peck 79-716* (MIN). Houston Co.: *Moore 26886* (MIN). Wabasha Co.: *Peck 79-706* (MIN). Winona Co.: *Peck 79-723*.

Wisconsin: Adams Co.: *Cheney 3742* (WIS). Buffalo Co.: *Peck 79-439* (UWL). Clark Co.: *Peck 79-642* (UWL). Columbia Co.: *Sylvester* in 1886 (WIS). Dunn Co.: *Peck 79-454* (UWL). Eau Claire Co.: *Peck 79-431* (UWL). Jackson Co.: *Grether 6089* (WIS). Juneau Co.: *Hartley 3352* (WIS). La Crosse Co.: *Peck 78-271* (UWL). Marquette Co.: *Sorensen 3254* (WIS). Monroe Co.: *Fuller 4156* (MIL). Pepin Co.: *Peck 79-446* (UWL). Portage Co.: *Phillips 913* (WIS). Richland Co.: *Nee 10136* (WIS). Sauk Co.: *Zimmerman 1823* (WIS). Trempealeau Co.: *Hartley 1816* (WIS). Vernon Co.: *Hartley 1431* (WIS). Waushara Co.: *Sorensen 4442* (IA). Wood Co.: *Chase* in 1883 (WIS).

51. ***Phegopteris hexagonoptera*** (Michx.) Fee, Gen. Fil. 243. 1850-52. Broad Beech Fern. [*Thelypteris hexagonoptera* (Michx.) Weath.; *Dryopteris hexagonoptera* (Michx.) Christens.]

North-facing slopes with high humus, generally maple-basswood or basswood-red oak forests; peripheral, reaches northwestern limit in Driftless Area.

Illinois: Carroll Co.: *Wunderlin 705* (MWI). Jo Daviess Co.: *Winterringer 8176* (ISM).

Iowa: Allamakee Co.: *Roosa 2017* (ISTC). Clayton Co.: *Roosa 1938* (ISTC). Dubuque Co.: *Roosa 1947* (ISTC). Jackson Co.: *Cooperrider 563* (IA). Winneshiek Co.: *Hartley 8421* (IA).

Minnesota: Fillmore Co.: *Peck 79-717* (MIN). Houston Co.: *Lyon 798* (MIN). Wabasha Co.: *Peck 80-634* (MIN). Winona Co.: *Peck 80-102* (MIN).

Wisconsin: Buffalo Co.: *Peck 80-692* (MIL). Clark Co.: *Peck 78-935*. (UWL). Crawford Co.: *Peck 80-669* (MIL). Dane Co.: *Field Club* in 1901 (WIS). Eau Claire Co.: *Peck 80-665* (MIL). Grant Co.: *Hartley 4400* (WIS). Green Co.: *Whitford 1686* (UWM). Iowa Co.: *Peck 80-735* (MIL). Jackson Co.: *Peck 80-698* (MIL). La Crosse Co.: *Peck 80-707* (MIL). Monroe Co.: *Peck 80-705* (MIL). Pepin Co.: *Peck 80-639 (MIL). Richland Co.: Peck 80-738* (MIL). Sauk Co.: *Zimmerman 1096* (WIS). Trempealeau Co.: *Peck 80-680* (MIL). Vernon Co.: *Peck 80-674* (MIL). Wood Co.: *Peck 78-829* (UWL).

52. ***Thelypteris palustris*** (L.) Schott var. ***pubescens*** (Laws.) Fern., Rhodora 31:34. 1929. Marsh Fern.

Marshes, sloughs, wet prairies, ditches, especially sandy soils, widespread.

Illinois: Carroll Co.: *Waite 28870* (ILL). Jo Daviess Co.: *Graham 9922* (ISM).

Iowa: Allamakee Co.: *Hayden 10292* (ISC). Clayton Co.: *Pammel 579* (ISC). Dubuque Co.: *Peck 80-616* (ISTC). Jackson Co.: *Peck 80-601* (ISTC). Winneshiek Co.: *Shimek* in 1903 (IA).

Minnesota: Fillmore Co.: *Peck 78-26* (MIN). Houston Co.: *Lyon 481* (MIN). Wabasha Co.: *Peck 79-701* (MIN). Winona Co.: *Holzinger* in 1905 (MIN).

Wisconsin: Adams Co.: *Sorensen 1279* (IA). Buffalo Co.: *Swanson 3257* (UWL). Clark Co.: *Goessl 1518* (MIL). Columbia Co.: *Middleton 142* (WIS). Crawford Co.: *Peck 78-644* (UWL). Dane Co.: *Shake 234* (WIS). Dunn Co.: *Meyer 59* (WIS). Eau Claire Co.: *Peck 79-472* (UWL). Grant Co.: *Peck 78-643* (UWL). Green Co.: *Fell 58-708* (WIS). Iowa Co.: *Wislinsky 362* (WIS). Jackson Co.: *Grether 6422* (WIS). Juneau Co.: *Thomson* in 1938 (WIS). La Crosse Co.: *Hartley 1385* (WIS). Lafayette Co.: *Peck 78-849* (UWL). Marquette Co.: *Nee 868* (WIS). Monroe Co.: *Hartley 2918* (WIS). Pepin Co.: *Peck 79-471a* (UWL). Portage Co.: *Freckmann 13371*

(UWSP). Richland Co.: *Nee 5301* (WIS). Sauk Co.: *Kueppen 329* (WIS). Trempealeau Co.: *Hausser 577* (WIS). Vernon Co.: *Peck 78-645* (UWL). Waushara Co.: *Hansen 2195* (WIS). Wood Co.: *Sorensen 2991* (WIS).

53. ***Thelypteris simulata*** (Davenp.) Nieuwl., Amer. Midl. Nat. 1:226. 1910. Massachusetts Fern.

Sphagnous alder thickets and stream drainages at northern edge of Glacial Lake Wisconsin; disjunct, reaches western limit, with nearest populations located in Pennsylvania and West Virginia (Hartley, 1965; Moran, 1980; 1981).

Wisconsin: Clark Co.: *Peck 80-713* (MIL). Jackson Co.: *Grether 6603* (WIS). Juneau Co.: *Peck 80-720* (MIL). Monroe Co.: *Peck 80-723* (MIL). Wood Co.: *Peck 80-718* (MIL).

ASPLENIACEAE

54. ***Asplenium platyneuron*** (L.) B. S. P. Prel. Cat. Anth. Pter. 3. 1888. Ebony Spleenwort. [See Lellinger (1981) for discussion of the authority.]

Slumps in sandy hillslopes; sandstone talus and slopes; peripheral, reaches northwestern limit in Driftless Area.

Wagner and Johnson (1981) suggest that this species may have expanded its range northward in the Driftless Area since 1950. I feel that this species occurred in the Driftless Area for a much longer period, but that its populations were always small and transient, and consequently overlook by earlier workers.

Illinois: Jo Daviess Co.: *Hartley 6344* (IA).

Iowa: Allamakee Co.: *Hartley 7151* (IA). Clayton Co.: *Peck 80-622* (ISTC). Dubuque Co.: *Roosa 3089* (ISTC). Jackson Co.: *Cooperrider 1909* (ISTC).

Minnesota: Fillmore Co.: *Peck 79-718* (MIN). Houston Co.: *Peck 79-731* (MIN). Wabasha Co.: *Peck 80-633* (MIN). Winona Co.: *Peck 79-725* (MIN).

Wisconsin: Crawford Co.: *Peck 79-741* (UWL). Dane Co.: *Heddle 2662* (WIS). Grant Co.: *Cochrane 5565* (WIS). Green Co.: *Fell 58-905* (WIS). Iowa Co.: *Waterway 407* (WIS). La Crosse Co.: *Hartley 1609* (WIS). Lafayette Co.: *Peck 79-28* (UWL). Richland Co.: *Nee 15591* (WIS). Sauk Co.: *Nee 2995* (WIS). Vernon Co.: *Peck 79-741* (UWL).

55. ***Asplenium trichomanes*** L., Sp. Pl. 2:1080. 1753. Maidenhair Spleenwort.

Moist, shaded sandstone ledges along the Wisconsin River in the vicinity of Wisconsin Dells region; disjunct, essentially reaches western limit in the Driftless Area, but also is disjunct along Lake Superior. Cytomorphology and substrate preference is summarized by Moran (1982a).

Wisconsin: Adams Co.: *Iltis 17038* (WIS). Columbia Co.: *Nee 1180* (WIS). Dane Co.: *Steel* in 1921 (MIL). Juneau Co.: *Hartley 3349* (WIS). Sauk Co.: *Fassett 13030* (WIS).

56. ***Asplenosorus pinnatifidus*** (Nutt.) Mickel, Amer. Fern. J. 64:119. 1974. Lobed Spleenwort. [*Asplenium pinnatifidum* Nutt.]

Shaded, dry sandstone ledges; disjunct, reaches northwestern limit in Driftless Area, nearest populations in southern Illinois and Indiana.

Status of this species was reviewed by Hanson (1970) and Hanson and Hanson (1979).

Wisconsin: Iowa Co.: *Iltis 14507* (WIS).

57. ***Athyrium angustum*** (Willd.) Presl, Rel. Haenk. 1:39. 1825. Northeastern Lady Fern. [*Athyrium filix-femina* (L.) Roth. var *angustum* (Willd.) Moore, A. filix-femina (L.) Roth. var. *Michauxii* (Spreng.) Farw.]

Upland, slopes, and ravines in woods; moist ditches and edges and openings in woods; thickets and open wetlands; widespread.

Illinois: Carroll Co.: *Wunderlin 162* (MWI). Jo Daviess Co.: *Evers 69263* (MWI). Stephenson Co.: *Peck 78-*

1248 (UWL).

Iowa: Allamakee Co.: *Roosa* in 1976 (ISC). Clayton Co.: *Roosa 850* (ISC). Dubuque Co.: *Farrar 1066* (ISC). Jackson Co.: *Cooperrider 3934* (IA). Winneshiek Co.: *Peck* in 1976 (ISC).

Minnesota: Fillmore Co.: *Moyle 2839* (MIN). Houston Co.: *Butlers 3982* (MIN). Wabasha Co.: *Peck 78-264* (UWL). Winona Co.: *Peck 80-95* (MIN).

Wisconsin: Adams Co.: *Brown 319* (WIS). Buffalo Co.: *Smith 7204* (WIS). Clark Co.: *Iltis 5753* (WIS). Columbia Co: *White 650* (WIS)., Crawford Co.: *Smith 7645* (WIS). Dane Co.: *Koeppen 374* (WIS). Dunn Co.: *Meyer 329* (WIS). Eau Claire Co.: *Peck 78-888* (UWL). Grant Co.: *Smith 7869* (WIS). Green Co.: *Rock 39* (WIS). Iowa Co.: *Fassett 14993* (WIS). Jackson Co.: *Grether 6707* (WIS). Juneau Co.: *Hansen 471* (WIS). La Crosse Co.: *Nontelle 177* (UWL). Lafayette Co.: *Ryckman 22* (WIS). Marquette Co.: *Sorensen 1599* (WIS). Monroe Co.: *Hansen 668* (WIS). Pepin Co.: *Hansen 4652* (WIS). Portage Co.: *Sorensen 3300* (WIS). Richland Co.: *Nee 2607* (WIS). Sauk Co.: *Zimmerman 1238* (WIS). Trempealeau Co.: *Hartley 1150* (WIS). Vernon Co.: *Smith 7245* (WIS). Waushara Co.: *Sorensen 4438* (WIS). Wood Co.: *Hansen 2164* (WIS).

58. ***Athyrium pycnocarpon*** (Spreng.) Tidest., Elys. Marianum 1:36. 1906. Glade Fern.

Sandy alluvium in ravines; steep north and east facing slopes of mesic woodlands; peripheral, essentially reaching northwestern limit in Driftless Area.

Illinois: Jo Daviess Co.: *Umbach* in 1896 (ILL).

Iowa: Allamakee Co.: *Farrar 1057* (ISC). Clayton Co.: *Hartley 8637* (IA). Dubuque Co.: *Thorne 18457* (IA). Jackson Co.: *Roosa 3024* (ISTC). Winneshiek Co.: *Hartley 8344* (IA).

Minnesota: Fillmore Co.: *Rosendahl 6679* (MIN). Houston Co.: *Lyon 224* (MIN). Wabasha Co.: *Peck 80-636* (MIN). Winona Co.: *Peck 80-96* (MIN).

Wisconsin: Buffalo Co.: *Peck 80-694* (MIL). Columbia Co.: *Rich* in 1974 (DLSP). Crawford Co.: *Birch 1790* (WSA). Dunn Co.: *Peck 79-452* (UWL). Grant Co.: *Zimmerman 3666* (WIS). Green Co.: *Throne* in 1932 (UWM). Iowa Co.: *Peck 80-734* (MIL). La Crosse Co.: *Peck 80-682* (MIL). Vernon Co.: *Smith 564* (UWL).

59. ***Athyrium thelypterioides*** (Michx.) Desv., Mem. Soc. Linn. Paris 6:266. 1827. Silvery Grade Fern.

Steep, north-facing, wooded limestone and sandstone slopes; sandy road cuts and disturbed sandy slopes which remain somewhat moist; peripheral, essentially reaches western limit in Driftless Area.

Illinois: Carroll Co.: *Wunderlin 236* (MWI). Jo Daviess Co.: *Graham 9918* (ISM). Stephenson Co.: *Peck 78-1249* (UWL).

Iowa: Allamakee Co.: *Peck 78-42* (ISTC). Clayton Co.: *Farrar 1025* (ISC). Dubuque Co.: *Ellis* in 1958 (IA). Jackson Co.: *Cooperrider 1785* (IA). Winneshiek Co.: *Hartley 8343* (IA).

Minnesota: Fillmore Co.: *Rosendahl 6678* (MIN). Houston Co.: *Butters 3981* (MIN). Wabasha Co.: *Peck 78-205* (MIN). Winona Co.: *Peck 78-294* (MIN).

Wisconsin: Adams Co.: *Sylvester 1590* (UWSP). Buffalo Co.: *Peck 79-1003* (UWL). Clark Co.: *Bergseng* in 1941 (WIS). Columbia Co.: *Sylvester* in 1886 (MIL). Crawford Co.: *Peck 78-297* (UWL). Dane Co.: *Peck 80-746* (MIL). Dunn Co.: *Goessl 9025* (WIS). Eau Claire Co.: *Peck 79-882* (UWL). Grant Co.: *Hartley 4389* (WIS). Green Co.: *Peck 78-820* (UWL). Iowa Co.: *Peck 78-990* (UWL). Jackson Co.: *Peck 79-949* (UWL). Juneau Co.: *Taylor 3985* (MIL). La Crosse Co.: *Peterson 551* (WIS). Lafayette Co.: *Peck 78-855* (UWL). Marquette Co.: *Peck 78-1358* (UWL). Monroe Co.: *Peck 79-1006* (UWL). Pepin Co.: *Peck 80-641* (UWL). Portage Co.: *Peck 79-765* (UWL). Richland Co.: *Nee 13461* (WIS). Sauk Co.: *Iltis 21878* (WIS). Trempealeau Co.: *Peck 78-907* (UWL). Vernon Co.: *Philips 868* (WIS). Waushara Co.: *Peck 79-773* (UWL). Wood Co.: *Peck 79-759* (UWL).

60. ***Camptosorus rhizophyllus*** (L.) Link, Hort. Berol 2:69. 1833. Walking Fern. [*Asplenium rhizophyllum* L.]

Moist, moss-covered limestone and sandstone boulders and ledges; peripheral, essentially reaches northern limit in Driftless Area.

Illinois: Carroll Co.: *Fuller 8408* (ISM). Jo Daviess Co.: *Winterringer 7259* (ISM). Stephenson Co.: *Fell 45838* (ISM).

Iowa: Allamakee Co.: *Peck 78-47* (ISTC). Clayton Co.: *Cooper 17* (ISTC). Dubuque Co.: *Farrar 1068* (ISC). Jackson Co.: *Cooperrider 581* (IA). Winneshiek Co.: *Grant 11742* (ISTC).

Minnesota: Fillmore Co.: *Morely 1227* (MIN). Houston Co.: *Moore 26931* (MIN). Wabasha Co.: *Moore 10683* (MIN). Winona Co.: *Wheeler 842* (MIN).

Wisconsin: Buffalo Co.: *Peck 78-924* (UWL). Clark Co.: *Grether 7360* (WIS). Columbia Co.: *Hein 27* (WIS). Grant Co.: *Nee 5592* (WIS). Green Co.: *Grether* in 1947 (IA). Iowa Co.: *Stewart* in 1916 (WIS). Jackson Co.: *Peck 78-1274* (UWL). La Crosse Co.: *Peterson 439* (WIS). Lafayette Co.: *Hansen 1193* (WIS). Monroe Co.: *Schenk* in 1944 (WIS). Pepin Co.: *Peck 80-661* (MIL). Richland Co.: *Nee 14613* (WIS). Sauk Co.: *Brown 313* (WIS). Trempealeau Co.: *Peck 78-904* (UWL). Vernon Co.: *Hansen 209* (WIS). Wood Co.: *Fassett 22642* (WIS).

61. ***Cystopteris bulbifera*** (L.) Bernh., Neu. J. Bot. Schrad. 1(2):10. 1806. Bulblet Fern.

Dry to moist sandstone and limestone cliffs and slopes; widespread, although rapidly decreasing in frequency to the west of Driftless Area.

Illinois: Carroll Co.: *Fuller 1736* (ISM). Jo Daviess Co.: *Winterringer 14928* (ISM). Stephenson Co.: *Peck 78-1250* (UWL).

Iowa: Allamakee Co.: *Hartley 8810* (IA). Clayton Co.: *Roosa 852* (ISC). Dubuque Co.: *Farrar 1067* (ISC). Jackson Co.: *Cooperrider 449* (IA). Winneshiek Co.: *Grant 8199* (ISTC).

Minnesota: Fillmore Co.: *Moore 10586* (MIN). Houston Co.: *Rosendahl 405* (MIN). Wabasha Co.: *Roberts* in 1904 (MIN). Winona Co.: *Holzinger* in 1888 (MIN).

Wisconsin: Adams Co.: *Peck 78-1305* (UWL). Buffalo Co.: *Fassett 2830* (WIS). Columbia Co.: *Smith 8055* (WIS). Crawford Co.: *Swartz 243* (WIS). Dane Co.: *Heddle 594* (WIS). Dunn Co.: *Goessl 9176* (MIL). Eau Claire Co.: *Peck 80-664* (MIL). Grant Co.: *Musselman 2084* (UWJ). Green Co.: *Lapham 1869* (WIS). Iowa Co.: *Heddle 353* (WIS). Jackson Co.: *Grether 6088* (WIS). Juneau Co.: *Peck 78-1084* (UWL). La Crosse Co.: *Nontelle 1593* (UWL). Lafayette Co.: *Hansen 1185* (WIS). Monroe Co.: *Norton* in 1959 (WIS). Pepin Co.: *Peck 80-660* (MIL). Portage Co.: *Freckmann 6846* (UWSP). Richland Co.: *Nee 13730* (WIS). Sauk Co.: *Fassett 2431* (WIS). Trempealeau Co.: *Hartley 405* (WIS). Vernon Co.: *Nee 3167* (WIS). Waushara Co.: *Davis* in 1918 (WIS). Wood Co.: *Freckmann 5357* (USWP).

62. ***Cystopteris fragilis*** (L.) Bernh., Schrad. Neu. J. Bot. 1(2):27. 1806. Fragile Fern. Two varieties are recognized in the study region.

62a. ***Cystopteris fragilis*** (L.) Bernh. var. ***fragilis.*** Northern Fragile Fern.

Crevices of igneous outcrops; peripheral, reaches southern limit at edge of Driftless Area.

Wisconsin: Clark Co.: *Grether 5374* (WIS).

62b. ***Cystopteris fragilis*** (L.) Bernh. var. ***mackayi*** Laws., Fern Flora Can. 233. 1889. [*C. tenuis* (Michx.) Desv.; see Lellinger (1981).] MacKay's Fern

Limestone and sandstone ledges and outcrops; igneous outcrops; widespread.

Illinois: Carroll Co.: *Peck 78-1299* (UWL). Jo Daviess Co.: *Hartley 3574* (ILL).

Iowa: Allamakee Co.: *Peck 78-45* (ISTC). Clayton Co.: *Hartley 9583* (IA). Dubuque Co.: *Farrar 1069* (ISC). Jackson Co.: *Cooperrider 1452* (IA). Winneshiek Co.: *Thorne 14127* (IA).

Minnesota: Fillmore Co.: *Butters 3013* (MIN). Houston Co.: *Moore 27170* (MIN). Wabasha Co.: *Butters 3049* (MIN). Winona Co.: *Moore 18458* (MIN).

Wisconsin: Adams Co.: *Sameulson* in 1967 (OSH). Buffalo Co.: *Christopherson 3* (WIS). Clark Co.: *Bergseng* in 1941 (WIS). Columbia Co.: *Harriman 4472* (OSH). Craword Co.: *Fassett 19471* (WIS). Dane Co.: *Tans 22a* (WIS). Dunn Co.: *Goessl 8986* (MIL). Eau Claire Co.: *Ellarson* in 1957 (WIS). Grant Co.: *Freckmann 3303* (UWSP). Green Co.: *Fassett 12932* (WIS). Iowa Co.: *Peck 78-299* (UWL). Jackson Co.: *Grether 5550* (IA). Juneau Co.: *Sorensen 2023* (WIS). La Crosse Co.: *Hartley 896* (WIS). Lafayette Co.: *Stickney* in 1959 (WIS). Marquette Co.: *Sorensen 1604* (WIS). Monroe Co.: *Smith 544* (UWL). Pepin Co.: *Anderson 444* (WIS). Portage Co.: *Peck 78-964* (UWL). Richland Co.: *Fassett 22653* (WIS). Sauk Co.: *Zimmerman 882* (WIS). Trempealeau Co.: *Hartley 347* (IA). Vernon Co.: *Hartley 1438* (IA). Waushara Co.: *Kring 11* (OSH). Wood Co.: *Freckmann 4949* (UWSP).

63. ***Cystopteris protrusa*** (Weath.) Blasdell, Mem. Torrey Bot. Club 21(4):41, pl. 3. 1963. Creeping Fragile Fern. [*Cystopteris fragilis* (L.) Berhn. var. *protrusa*

Weath.]

Moist, humus-rich loams of woodland slopes; peripheral, essentially reaches northern limit in Driftless Area.

Illinois: Carroll Co.: *Chase 11829* (ILL). Clayton Co.: *Melhus* in 1931 (ISC). Dubuque Co.: *Ellis* in 1958 (IA). Jackson Co.: *Roosa 3019* (ISTC). Winneshiek Co.: *Tolstead* in 1933 (ISC).

Minnesota: Fillmore Co.: *Moore 1599a* (MIN). Houston Co.: *Butters 3980* (MIN). Wabasha Co.: *Peck 80-696* (MIL). Clark Co.: *Bergseng* in 1945 (WIS). Crawford Co.: *Peck 78-286* (UWL). Dane Co.: *Tryon 3478* (WIS). Grant Co.: *Hartley 3400* (WIS). Green Co.: *Rice 2971* (UWJ). Iowa Co.: *Heddle 354* (WIS). La Crosse Co.: *Peck 78-281* (UWL). Pepin Co.: *Peck 80-652* (MIL). Richland Co.: *Peck 80-737* (MIL). Sauk Co.: *Lapham 1858* (WIS). Trempealeau Co.: *Peck 80-684* (MIL). Vernon Co.: *Peck 78-287* (UWL).

64. ***Cystopteris* X *laurentiana*** (Weath.) Blasdell, Mem. Torrey Bot. Club 21(4):51, 52, pl. 13. 1963. Northern Hybrid Fragile Fern. [*Cystopteris bulbifera* X *fragilis* var. *fragilis*] A fertile hybrid centered to the north of the Driftless Area; Moran (1982b) reports a sterile hybrid adjacent to and south of the Driftless Area in Illinois. That fern is the result of reproduction between *C. bulbifera* and *C. fragilis* var. *mackayi*. Plants are also present in the Driftless Area which are best assigned to *C.* X *tennesseensis*, the Southern Hybrid Fragile Fern. The taxonomy and systematics of *Cystopteris* hybrids in the Driftless Area will continue to require study for several years before an adequate treatment of their status can be described.

Sandstone outcrops, high-humus, sandy soils, and north-facing rocky slopes, occuring with or without parental species; peripheral, reaches southern limit in the Driftless Area.

Iowa: Allamakee Co.: *Benedict 3736* (VPI).

Wisconsin: Dane Co.: *Tryon 3550* (MIL). Green Co.: *Fell 252* (WIS). Iowa Co.: *Tryon 4822* (MO). Monroe Co.: *Iltis & Nees 8681* (WIS). Trempealeau Co.: *Fassett 4012* (DUKE). Vernon Co.: *Iltis & Nees 8756* (WIS). Wood Co.: *Fassett 22641* (WIS).

65. ***Cystopteris* X *tennesseensis*** Shaver, J. Tennessee Acad. Sci. 25(2):107. 1950. A fertile species of hybrid origin *(C. bulbifera* X *protrusa)*.

Sandstone and limmestone rocks, crevices and ledges; peripheral, reaches northern limit in Driftless Area.

Illinois: Jo Daviess Co.: *Fuller 17118* (ISM). Stephenson Co.: *Fell 45837* (ISM).

Iowa: Allamakee Co.: *Peck 80-624* (ISTC). Clayton Co.: *Roosa 1814* (ISTC). Dubuque Co.: *Peck 80-617* (ISTC). Jackson Co.: *Peck 80-607* (ISTC). Winneshiek Co.: *Rosendahl 3668* (MIN).

Wisconsin: Adams Co.: *Iltis 26592* (WIS). Dane Co.: *Tryon 3550* (WIS). Grant Co.: *O'hanlon* in 1918 (WIS). Green Co.: *Fell 58-252* (WIS). Jackson Co.: *Grether 6088* (WIS). Juneau Co.: *Hartley 5832* (WIS). La Crosse Co.: *Peck 78-282* (UWL). Richland Co.: *Nee 15582* (WIS). Sauk Co.: *Smith 8080* (WIS). Vernon Co.: *Iltis 8756* (WIS). Wood Co.: *Fassett 22641* (WIS).

65. ***Dryopteris cristata*** (L.) Gray, Man. ed. 1. 631. 1848. Crested Wood Fern.

Moist sandy areas; seepages; marsh and edges of thickets; pine stands; widespread.

Illinois: Carroll Co.: *Peck 78-1301* (UWL). Jo Daviess Co.:*Hartley 6399* (IA).

Iowa: Allamakee Co.: *Peck 78-3* (ISTC). Clayton Co.: *Shimek* in 1921 (IA). Dubuque Co.: *Roosa 3091* (ISTC). Jackson Co.: *Peck 80-602* (ISTC). Winneshiek Co.: *Orr* in 1913 (EMNM).

Minnesota: Fillmore Co.: *Peck 79-719* (MIN). Houston Co.: *Rosendahl 3847* (MIN). Wabasha Co.: *Peck 79-703* (MIN). Winona Co.: *Peck 78-297* (MIN).

Wisconsin: Adams Co.: *Sorensen 4321* (IA). Buffalo Co.: *Christopherson 26* (WIS). Clark Co.: *Bergseng* in 1947 (WIS). Columbia Co.: *Lumke 163* (WIS). Crawford Co.: *Peck 79-403* (UWL). Dane Co.: *White 391* (WIS). Dunn Co.: *Goessl 6576* (MIL). EauClaire Co.: *Krunz 277* (WIS). Grant Co.: *Peck 79-674* (UWL). Green Co.: *Fell 58-865* (WIS). Iowa Co.: *Peck 79-669* (UWL). Jackson Co.: *Hartley 874* (WIS). Juneau Co.: *Peck 79-661* (UWL). La Crosse Co.: *Hartley 262* (WIS). Lafayette Co.: *Peck 78-853* (UWL). Marquette Co.:

Sorensen 2290 (WIS). Monroe Co.: *Peck 79-411* (UWL). Pepin Co.: *Peck 79-442* (UWL). Portage Co.: *Sorensen 3299* (WIS). Richland Co.: *Nee 2605* (WIS). Sauk Co.: *Peck 79-668* (UWL). Trempealeau Co.: *Peck 79-416* (UWL). Vernon Co.: *Peck 79-406* (UWL). Waushara Co.: *Sorensen 4642* (IA). Wood Co.: *Sorensen 3016* (IA).

67. ***Dryopteris expansa*** (Presl) Fraser-Jenkins & Jermy, Fern Gaz. 11:338. 1977. Spreading Wood Fern. [*D. dilitata* Gray; *D. austriaca* (Jacq.) Woynar var. *austriaca*; *D. spinulosa* (O. F. Muell.) Watt var. *americana* (Fisch.) Fern.]

Alder thicket and sandstone bluff at Lamoille Cave, La Moille, MN; disjunct, reaches southern limit in Driftless Area; possibly extirpated.

Minnesota: *Holzinger* in 1905 (MIN).

68. ***Dryopteris fragrans*** (L.) Schott var. ***remotiuscula*** Komarov, F. U. R. S. S. 1:38. 1934. Fragrant Fern.

Dry sandstone ledges and crevices; disjunct, reaches southern limit in Driftless Area.

Habitat and status of Driftless Area populations were reviewed by Lange (1979).

Wisconsin: Adams Co.: *Fassett 9617* (WIS). Columbia Co.: *Pammel* in 1913 (ISC). Juneau Co.: *Iltis* in 1970 (WIS). Sauk Co.: *Tryon 2559* (WIS).

69. ***Dryopteris goldiana*** (Hook.) Gray, Man. ed. 1. 631. 1848. Goldie's Wood Fern.

Moist, humus-rich woodland slopes; sandy soil at base of sandstone outcrops; peripheral, essentially reaches western limit in Driftless Area.

Illinois: Carroll Co.: *Peck 78-1302* (UWL). Jo Daviess Co.: *Peck 78-1212* (UWL).

Iowa: Allamakee Co.: *Peck 78-43* (ISTC). Clayton Co.: *Hartley 8635* (IA). Dubuque Co.: *Thorne 18456* (IA). Jackson Co.: *Roosa 3025* (ISTC). Winneshiek Co.: *Hartley 8345* (IA).

Minnesota: Fillmore Co.: *Peck 78-274* (MIN). Houston Co.: *Lyon 11* (MIN). Wabasha Co.: *Peck 80-637* (MIN). Winona Co.: *Peck 78-205* (MIN).

Wisconsin: Buffalo Co.: *Peck 80-688* (MIL). Clark Co.: *Bergseng* in 1941 (WIS). Columbia Co.: *Lange* in 1970 (DLSP). Crawford Co.: *Nee 4577* (WIS). Dane Co.: *Cottam 163* (WIS). Grant Co.: *Zimmerman 3667* (WIS). Green Co.: *Iltis 10506* (WIS). Iowa Co.: *Peck 80-730* (MIL). Jackson Co.: *Peck 80-697* (MIL). Juneau Co.: *Duncan* in 1938 (WIS). La Crosse Co.: *Peck 79-737* (UWL). Monroe Co.: *Peck 80-704* (MIL). Pepin Co.: *Peck 80-646* (MIL). Richland Co.: *Nee 14515* (WIS). Sauk Co.: *Stout* in 1906 (WIS). Trempealeau Co.: *Peck 80-676* (MIL). Vernon Co.: *Marks* in 1939 (WIS).

70. ***Dryopteris intermedia*** (Muhl.) Gray, Man. ed. 1. 630. 1848. Glandular Wood Fern. [*D. spinulosa* (O. F. Muell.) Watt var. *intermedia* (Muhl.) Underw.; *D. austriaca* (Jacq.) Woynar var. *intermedia* (Muhl.) Morton].

Wooded slopes, sandstone outcrops; moist thickets and low woods; peripheral, essentially reaches western limit in Driftless Area.

Illinois: Jo Daviess Co.: *Winterringer 8173* (ISM).

Iowa: Allamakee Co.: *Peck 79-809* (ISTC). Clayton Co.: *Peck 80-619* (ISTC). Dubuque Co.: *Peck 79-1478* (ISTC). Winneshiek Co.: *Peck 80-24* (ISIC).

Minnesota: Fillmore Co.: *Peck 79-711* (UWL). Houston Co.: *Peck 79-728* (UWL). Wabasha Co.: *Peck 79-704* (UWL). Winona Co.: *Peck 79-721* (UWL).

Wisconsin: Adams Co.: *Fuller 1333* (MIL). Buffalo Co.: *Peck 78-928* (UWL). Clark Co.: *Grether 5435* (WIS). Columbia Co.: *Sylvester* in 1882 (MIL). Crawford Co.: *Murphy* in 1968 (UWSP). Dane Co.: *Peck 80-743* (MIL). Dunn Co.: *Goessl 6618* (UWL). Eau Claire Co.: *Peck 79-428* (UWL). Grant Co.: *Zeller* in 1964 (UWP). Green Co.: *Iltis 10523* (WIS). Iowa Co.: *Smith 656* (UWL). Jackson Co.: *Grether 6714* (WIS). Juneau Co.: *Smith 76-76* (UWL). La Crosse Co.: *Peck 771001-8* (UWL). Lafayette Co.: *Stickney* in 1959 (WIS). Marquette Co.: *Sorensen 3247* (WIS). Monroe Co.: *Fuller 4153B* (MIL). Pepin Co.: *Peck 79-441* (UWL). Portage Co.: *Smith 648* (UWL). Richland Co.: *Nee 1399* (WIS). Sauk Co.: *Cochrane 5656* (WIS). Trempealeau Co.: *Hartley 3244* (IA). Vernon Co.: *Iltis 8833* (WIS). Waushara Co.: *Waddell* in 1968 (OSH). Wood Co.: *Peck 79-649* (UWL).

71. ***Dryopteris marginalis*** (L.) Gray, Man. ed. 1. 632. 1848. Marginal Wood Fern.

Sandstone and igneous rock outcrops, often dry in character; disjunct, essentially reaches its western limit in Driftless Area.

Iowa: Allamakee Co.: *Peck 81-73* (ISTC). Dubuque Co.: *Shimek* in 1922 (IA).

Minnesota: Houston Co.: *Peck 81-105* (MIN).

Wisconsin: Adams Co.: *Fassett 9941* (WIS). Columbia Co.: *Alberts* in 1945 (WIS). Crawford Co.: *Nee 1992* (WIS). Dane Co.: *Fassett 5533* (WIS). Grant Co.: *MNee 5244* (WIS). Iowa Co.: *Smith 562* (UWL) Juneau Co.: *Hartley 3353* (WIS). Marquette Co.: *Fassett 14942* (WIS). Richland Co.: *Peck 79-24* (UWL). Sauk Co.: *Hartley 3783* (WIS).

71. ***Dryopteris spinulosa*** (O. F. Muell.) Watt, Can. Nat. II. 3:159. 1867. Spinulosa Wood Fern. [*D. austriaca* (Jacq.) Woynar var. *spinulosa* (O. F. Muell.) Fiori].

Wooded slopes, sandstone outcrops, seepages, and moist thickets and low woods; widespread.

Illinois: *Wunderlin 1058* (MWI). Jo Daviess Co.: *Fuller 9428* (ISM). Stephenson Co.: *Peck 78-1252* (UWL).

Iowa: Allamakee Co.: *Roosa 2018* (ISTC). Clayton Co.: *Roosa 3065* (ISTC). Dubuque Co.: *Roosa 1949* (ISTC). Jackson Co.: *Peck 80-606* (ISTC). Winneshiek Co.: *Peck* in 1976 (ISC).

Minnesota: Fillmore Co.: *Peck 78-31* (MIN). Houston Co.: *Rosendahl 7428* (MIN). Wabasha Co.: *Peck 78-343* (UWL). Winona Co.: *Peck 770910-26* (MIN).

Wisconsin: Adams Co.: *Sorensen 1338* (WIS). Buffalo Co.: *Christopherson 16* (WIS). Clark Co.: *Gale & Struik* in 1957 (WIS). Columbia Co.: *Harriman 12901* (OSH). Crawford Co.: *Peck 78-345* (UWL). Dane Co.: *Zimmerman 3044* (WIS). Dunn Co.: *Peck 79-451* (UWL). Eau Claire Co.: *Peck 79-429* (UWL). Grant Co.: *O'Hanlon* in 1918 (WIS). Green Co.: *Fell 58-902* (WIS). Iowa Co.: *Fassett 2602* (WIS). Jackson Co.: *Grether 5239* (WIS). Juneau Co.: *Sorensen 2018* (IA). La Crosse Co.: *Hartley 1068* (WIS). Lafayette Co.: *Peck 79-24* (UWL). Marquette Co.: *Sorensen 3253* (IA). Monroe Co.: *Hartley 2883* (WIS). Pepin Co.: *Peck 79-440* (UWL). Portage Co.: *Smith 649* (UWL). Richland Co.: *Nee 15521* (WIS). Sauk Co.: *Peck 78-347* (UWL). Trempealeau Co.: *Pammel* in 1923 (ISC). Vernon Co.: *Marks* in 1939 (WIS). Waushara Co.: *Sorensen 4439* (IA). Wood Co.: *Lancelle* in 1978 (UWG).

73. ***Dryopteris*** X ***bootii*** (Tuckerm.) Underw., Our Nat. Ferns. 117. 1893. [*D. cristata* X *intermedia*].

With parents in wetlands, bogs, seepages, and sphagnous alder thickets; peripheral, reaches western limit in Driftless Area.

Iowa: Allamakee Co.: *Peck 80-627* (ISTC).

Minnesota: Winona Co.: *Peck 80-629* (MIN).

Wisconsin: Clark Co.: *Peck 80-714* (MIL). Dane Co.: *Peck 80-881* (MIL). Jackson Co.: *Grether 6554* (WIS). Juneau Co.: *Peck 80-722* (MIL). La Crosse Co.: *Peck 80-896* (MIL). Monroe Co.: *Peck 80-725* (MIL). Richland Co.: *Peck 80-891* (MIL). Trempealeau Co.: *Peck 80-685* (MIL). Wood Co.: *Peck 80-717* (MIL).

74. ***Dryopteris*** X ***pittsfordensis*** Slosson, Rhodora 6:75. 1904. [*D. marginalis* X *spinulosa*].

With parents, on north-facing wooded slope with sandstone outcrops; disjunct, reaches western limit in Driftless Area; hybrid rare in North America.

Wisconsin: Grant Co.: *Taylor 4159* (MIL).

75. ***Dryopteris*** X ***triploidea*** Wherry, Am. Fern. J. 50:90. 1960. [*D. intermedia* X *spinulosa*].

With parents, in wetlands, bogs, seepages, and shpagnous alder thickets; peripheral, reaches western limit in Driftless Area.

Iowa: Allamakee Co.: *Peck 79-691* (ISTC). Clayton Co.: *Peck 80-620* (ISTC). Dubuque Co.: *Peck 80-615* (ISTC).

Wisconsin: Buffalo Co.: *Peck 80-698* (MIL). Clark Co.: *Bergseng* in 1941 (WIS). Crawford Co.: *Peck 80-*

666 (MIL). Dane Co.: *Peck 80-882* (MIL). Grant Co.: *Taylor 4160* (MIL). Green Co.: *Copeland* in 1891 (WIS). Iowa Co.: *Peck 80-731* (MIL). Jackson Co.: *Grether 6470* (WIS). La Crosse Co.: *Peck 771003-5* (UWL). Monroe Co.: *Peck 80-724* (MIL). Pepin Co.: *Peck 80-649* (MIL). Richland Co.: *Peck 80-737* (MIL). Sauk Co.: *Zimmerman* in 1955 (WIS). Trempealeau Co.: *Peck 80-677* (MIL). Vernon Co.: *Peck 80-671* (MIL). Waushara Co.: *Taylor 4176* (MIL). Wood Co.: *Peck 80-719* (MIL).

76. ***Dryopteris* X *uliginosa*** (A. Br.) Druce, Index Fil. Suppl. 3:100. 1934. [*D. cristata* X *spinulosa*].

With parents, in wetlands, bogs, seepages, wooded slopes, and sphagnous alder thickets; peripheral, reaches western limit in Driftless Area.

Iowa: Jackson Co.: *Peck 80-694* (ISTC).

Minnesota: Houston Co.: *Peck 80-631* (MIN). Winona Co.: *Peck 80-630* (MIN).

Wisconsin: Clark Co.: *Peck 80-715* (MIL). Dane Co.: *Peck 80-880* (MIL). Jackson Co.: *Peck 80-712* (MIL). Juneau Co.: *Lapham* in 1891 (WIS). La Crosse Co: *Peck 80-897* (MIL). Monroe Co.: *Peck 80-726* (MIL). Richland Co.: *Peck 80-890* (MIL). Trempealeau Co.: *Peck 80-686* (MIL). Wood Co.: *Peck 80-720* (MIL).

77. ***Dryopteris intermedia* X *marginalis***

With parents, on sandstone bluff, Black Hawk Island, in the Wisconsin River; disjunct, reaches southwestern limit in Driftless Area.

Wisconsin: Juneau Co.: *Taylor 3195* (MIL).

78. ***Gymnocarpium dryopteris*** (L.) Newm. Phytologist 4:371. 1851. Oak Fern.

Sandstone ledges, cliffs, and moist sandy slopes; peripheral, essentially reaching southwestern limit in Driftless Area.

Illinois: Carroll Co.: *Peck 78-1306* (UWL). Jo Daviess Co.: *Peck 78-1213* (UWL). Stephenson Co.: *Peck 78-1253* (UWL).

Iowa: Allamakee Co.: *Roosa 873* (ISC). Clayton Co.: *Roosa 1139* (ISC). Dubuque Co.: *Huang 3208* (IA). Winneshiek Co.: *Goddard* in 1896 (IA).

Minnesota: Fillmore Co.: *Peck 80-89* (MIN). Houston Co.: *Moore 26311* (MIN). Wabasha Co.: *Peck 80-47* (MIN). Winona Co.: *Peck 80-98* (MIN).

Wisconsin: Adams Co.: *Fuller 1206* (MIL). Buffalo Co.: *Peck 79-438* (UWL). Clark Co.: *Bergseng* in 1941 (WIS). Columbia Co.: *Harrinan 12902* (OSH). Crawford Co.: *Peck 79-404* (UWL). Dane Co.: *Tryon 3589* (WIS). Dunn Co.: *Goessl9266* (MIL). Eau Claire Co.: *Ellarson* in 1957 (WIS). Grant Co.: *Hanson 2634* (WIS). Green Co.: *Copeland* in 1891 (WIS). Iowa Co.: *Zimmerman 3006* (WIS). Jackson Co.: *Grether 6708* (WIS). Juneau Co.: *Sorensen 2016* (WIS). La Crosse Co.: *Hartley 918* (WIS). Lafayette Co.: *Peck 78-850* (UWL). Marquette Co.: *Peck 80-1000* (MIL). Monroe Co.: *Peck 79-413* (UWL). Pepin Co.: *Peck 79-443* (UWL). Portage Co.: *Freckmann 6411* (UWSP). Richland Co.: *Nee 12138* (WIS). Sauk Co.: *Zimmerman 1160* (WIS). Trempealeau Co.: *Pammel* in 1923 (WIS). Vernon Co.: *Hartley 1460* (IA). Waushara Co.: *Lancelle* in 1978 (UWG). Wood Co.: *Sorensen 1415* (IA).

79. ***Gymnocarpium robertianum*** (Hoffm.) Newm., Phytologist 4:371. 1851. Limestone Oak Fern.

North-facing limestone bluffs or talus, usually moist and often with cool air seepage; also on moist sandstone bluffs; disjunct, reaches southern limit in Driftless Area.

Illinois: Carroll Co.: *Peck 80-572* (SIU).

Iowa: Allamakee Co.: *Hartley 6738* (IA). Clayton Co.: *Hartley 8660* (ISTC). Dubuque Co.: *Thorne 18439* (IA). Winneshiek Co.: *Roosa 1141* (ISTC).

Minnesota: Fillmore Co.: *Moore 15695* (MIN). Winona Co.: *Peck 78-277* (MIN).

Wisconsin: Jackson Co.: *Grether 6433* (IA). La Crosse Co.: *Peck 78-276* (UWL). Lafayette Co.: *Hanson 1204* (WIS).

80. ***Matteuccia struthiopteris*** (L.) Tod. var. ***pensylvanica*** (Willd.) Morton, Am. Fern. J. 40:247. 1950. American Ostrich Fern. [*Pteretis pensylvanica* (Willd.) Fern.; *Matteuccia pensylvanica* (Willd.) Raym.].

Floodplains, alluvial woods, seepages, moist wooded slopes; widespread.

Illinois: Carroll Co.: *Jones 17296* (ILL). Jo Daviess Co.: *Graham 9913* (ISM).

Iowa: Allamakee Co.: *Roosa 1304* (ISTC). Clayton co.: *Roosa 1140* (ISC). Dubuque Co.: *Roosa 1309* (ISTC). Jackson Co.: *Cooperrider 2697* (IA). Winneshiek Co.: *Farrar 1040* (ISC).

Minnesota: Fillmore Co.: *Peck 78-25* (MIN). Houston Co.: *Lyon 208 (MIN). Wabasha Co.: Manning 15* (MIN). Winona Co.,: *Peck 80-94* (MIN).

Wisconsin: Adams Co.: *Fuller 1206* (MIL). Buffalo Co.: *Peck 78-304* (UWL) Clark Co.: *Peck 79-643* (UWL). Columbia Co.: *Peck 79-1162* (UWL). Crawford Co.: *Nee 4524* (WIS). Dane Co.: *Cheney* in 1894 (WIS). Dunn Co.: *Peck 79-450* (UWL). Eau Claire Co.: *Peck 79-430* (UWL). Grant Co.: *Tryon 3481* (WIS). Green Co.: *Mauere 187* (OSH). Iowa Co.: *Tryon 3604* (WIS). Jackson Co.: *Grether 6306* (WIS). Juneau Co.: *Peck 79-659* (UWL). La Crosse Co.: *Peterson 512* (WIS). Lafayette Co.: *Hansen 1088* (WIS). Monroe Co.: *Peck 79-412* (UWL). Pepin Co.: *Peck 79-444* (UWL). Portage Co.: *Freckmann 11232* (UWSP). Richland Co.: *Nee 15358* (WIS). Sauk Co.: *Iltis 13749* (WIS). Trempealeau Co.: *Hartley 1560* (WIS). Vernon Co.: *Hansen 206* (WIS). Wood Co.: *Thomson* in 1938 (WIS).

81. ***Onoclea sensibilis*** L., Sp. Pl. 2:1062. 1753. Sensitive Fern.

Moist wooded slopes, wetlands, marshes, shores, bogs; widespread.

Illinois: Carroll Co.: *Wunderlin 102* (MWI). Jo Daviess Co.: *Peck 78-279* (UWL).

Iowa: Allamakee Co.: *Peck 78-50* (ISTC). Clayton Co.: *Roosa 1939* (ISTC). Dubuque Co.: *Farrar 1033* (ISC). Jackson Co.: *Roosa 3018* (ISTC). Winneshiek Co.: *Peck* in 1976 (ISC).

Minnesota: Fillmore Co.: *Peck 78-28* (MIN). Houston Co.: *Rosendahl 543* (MIN). Wabasha Co.: *Moore 27030* (MIN). Winona Co.: *Peck 80-85* (MIN).

Wisconsin: Adams Co.: *Sorensen 1294* (WIS). Buffalo Co.: *Smith 7050* (WIS). Clark Co.: *Bergseng* in 1941 (WIS). Columbia Co.: *Barnes 315* (WIS). Crawford Co.: *Peck 78-278* (UWL). Dane Co.: *Cottam 11* (WIS). Dunn Co.: *Meyer 62* (WIS). Eau Claire Co.: *Kunz 185* (WIS). Grant Co.: *Fassett 14984* (WIS). Green Co.: *Rice 1277* (UWJ). Iowa Co.: *Peck 78-290* (UWL). Jackson Co.: *Grether 5976* (WIS). Juneau Co.: *Hansen 469* (WIS). La Crosse Co.: *Hansen 614* (WIS). Lafayette Co.: *Hansen 1156* (WIS). Marquette Co.: *Harriman 1160* (OSH). Monroe Co.: *Ugent* in 1961 (WIS). Pepin Co.: *Nee 14983* (WIS). Portage Co.: *Tessene 96* (WIS). Richland Co.: *Nee 863* (WIS). Sauk Co.: *Zimmerman 1381* (WIS). Trempealeau Co.: *Nee 14910* (WIS). Vernon Co.: *Sohmer 7574* (UWL). Waushara Co.: *Harriman 9288* (OSH). Wood Co.: *Thomson* in 1938 (WIS).

82. ***Polystichum acrostichoides*** (Michx.) Schott, Gen. Fil. pl. 9. 1834. Christmas Fern.

Moist sandy, wooded slopes,particularly with some disturbances and bare soil slumps; peripheral, reaches northwestern limit in Driftless Area.

Illinois: Carroll Co.: *Wunderlin 1056* (MWI). Jo Daviess Co.: *Hartley 6356* (IA).

Iowa: Allamakee Co.: *Shimek* in 1927 (IA). Clayton Co.: *Farrar 79-7-25-2* (ISC). Dubuque Co.: *Peck 80-612* (ISTC). Jackson Co.: *Macbride* no date (IA).

Minnesota: Houston Co.: *Peck 7-730* (MIN). Winona Co.: *Peck 79-724* (MIN).

Wisconsin: Buffalo Co.: *Peck 80-613* (MIL). Columbia Co.: *Fassett 20840* (WIS). Crawford Co.: *Peck 80-670* (MIL). Grant Co.: *Nee 5666* (WIS). Iowa Co.: *Peck 80-733* (MIL). La Crosse Co.: *Peck 80-706* (MIL). Sauk Co.: *Taylor 3934* (MIL). Trempealeau Co.: *Peck 80-681* (MIL). Vernon Co.: *Peck 80-675* (MIL).

83. ***Woodsia ilvensis*** (L.) R. Br., Prodr., Fl. Nov. Holl. 1:158. 1810. Rusty Cliff Fern.

Dry, sandstone outcrops and sandy-loam soils, particularly beneath white pine stands; peripheral, reaches southern limit in Driftless Area.

Iowa: Allamakee Co.: *Peck 79-13* (ISTC). Winneshiek Co.: *Grant 11763* (ISTC).

Minnesota: Houston Co.: *Moore 26050a* (MIN). Winona Co.: *Holzinger* in 1902 (MIN).

Wisconsin: Adams Co.: *Hartley 6267* (WIS). Buffalo Co.: *Peck 79-452* (UWL). Clark Co.: *Grether 5820* (WIS). Columbia Co.: *Hartley 3387* (WIS). Crawford Co.: *Peck 79-986* (UWL). Dane Co.: *Fassett 14991* (WIS). Dunn Co.: *Peck 79-523* (UWL) Eau Claire Co.: *Peck 79-487* (UWL). Grant Co.: *Nee 1174* (WIS). Green Co.: *Fell 5899* (WIS). Iowa Co.: *Heddle 367* (WIS). Jackson Co.: *Grether 5686* (WIS). Juneau Co.: *Moffatt 3640* (WIS). La Crosse Co.: *Hartley 1616* (WIS). Monroe Co.: *Hartley 2439* (WIS). Pepin Co.: *Peck 80-650* (MIL). Portage Co.: *Peck 78-1083* (UWL). Richland Co.: *Nee 13139* (WIS). Sauk Co.: *Peters 11* (WIS). Trempealeau Co.: *Pammel* in 1918 (ISC). Vernon Co.: *Peck 79-1034* (UWL). Waushara Co.: *Iltis 12449* (WIS). Wood Co.: *Fassett 14032* (WIS).

84. ***Woodsia obtusa*** (Spreng.) Torr., Geol. Rep. New York Nat. Hist. Sur. 4:195.

Albany. 1840. Blunt-lobed Cliff Fern.

Moist to dry sandstone bluffs and slopes; peripheral, reaches northern limit in Driftless Area.

Illinois: Carroll Co.: *Wunderlin 2688* (MWI). Jo Daviess Co.: *Hartley 9319* (ILL). Stephenson Co.: *Peck 78-1254* (UWL).

Iowa: Allamakee Co.: *Peck 78-37* (ISTC). Clayton Co.: *Peck* in 1976 (ISC). Dubuque Co.: *Roosa 1307* (ISTC). Jackson Co.: *Cooperrider 3443* (IA). Winneshiek Co.: *Peck* in 1976 (ISC).

Minnesota: Fillmore Co.: *Peck 78-349* (MIN). Houston Co.: *Rosendahl 5111* (MIN). Wabasha Co.: *Manning 1892* (MIN). Winona Co.: *Rosendahl 6808* (MIN).

Wisconsin: Adams Co.: *Wadmond 78* (MIN). Buffalo Co.: *Peck 79-739* (UWL). Columbia Co.: *Harriman 4472* (OSH). Crawford Co.: *Peck 78-350* (UWL). Dane Co.: *Hartley 3860* (WIS). Eau Claire Co.: *Peck 80-663* (MIL). Grant Co.: *Freckmann 3304* (USWP). Green Co.: *Fell 58-378* (WIS). Iowa Co.: *Wislinsky 216* (WIS). Jackson Co.: *Hartley 6989* (IA). Juneau Co.: *Sorensen 1997* (WIS). La Crosse Co.: *Hartley 2110* (IA). Lafayette Co.: *Hartley 6465* (WIS). Monroe Co.: *Peck 78-634* (UWL). Pepin Co.: *Peck 80-644* (MIL). Richland Co.: *Nee 2270* (WIS). Sauk Co.: *Zimmerman 1431* (WIS). Trempealeau Co.: *Hartley 360* (WIS). Vernon Co.: *Hartley 7364* (WIS). Wood Co.: *Peck 78-828* (UWL).

85. ***Woodsia oregana*** D. C. Eat., Can. Nat. & Geol. N. S. 2:89. 1864. Western Cliff Fern.

Dry, shaded or exposed, sandstone outcrops, in crevices and ledges; peripheral, reaches southern limit in Driftless Area.

Iowa: Allamakee Co.: *Peck 79-14* (ISTC). Winneshiek Co.: *Hartley 7009* (IA).

Minnesota: Houston Co.: *Hartley 6666a* (MIN). Winona Co.: *Wasko 1203* (MANK).

Wisconsin: Iowa Co.: *Peck 80-742* (MIL). La Crosse Co.: *Hartley 1184* (IA). Richland Co.: *Salamun 2668a* (UWM). Vernon Co.: *Hartley 1033* (IA).

AZOLLACEAE

86. ***Azolla mexicana*** Presl, Abh. Bohm. Ges. Will. 3:150. 1845. Mosquito Fern.

Quiet backwaters of Mississippi and Wisconsin rivers; peripheral, essentially reaches northern limit in Driftless Area.

Illinois: Carroll Co.: *Peck 771016-4* (SIU). Jo Daviess Co.: *Peck 771016-5* (SIU).

Iowa: Allamakee Co.: *Banks 311* (UWL). Clayton Co.: *Peck 771013-2* (ISTC). Dubuque Co.: *Peck 771013-13* (UWL). Jackson Co.: *Peck 771013-4* (ISTC).

Minnesota: Houston Co.: *Rosendahl 61* (MIN). Wabasha Co.: *Peck 770929-3* (MIN). Winona Co.: *Peck 770929-1* (MIN).

Wisconsin: Buffalo Co.: *Cochrane 5311* (WIS). Crawford Co.: *Peck 771001-1* (WIS). Dane Co.: *Hale* no date (WIS). Grant Co.: *Koeppen 495* (WIS). Iowa Co.: *Peck 78-837* (UWL). Jackson Co.: *Peck 81-588* (MIL). La Crosse Co.: *Peterson 402* (WIS). Monroe Co.: *Peck 81-623* (MIL). Pepin Co.: *Peck 770930-7* (WIS). Richland Co.: *Peck 78-712* (UWL). Sauk Co.: *Peck 78-725* (UWL). Trempealeau Co.: *Peck 770930-8* (WIS). Vernon Co.: *Peck 771001-2* (WIS).

Populations at La Crosse were observed for several years. They became conspicuous in September and October, when they turn red in color, making the 10 m diameter colonies easy to locate up to 100 m away. Low water levels in July and August promote formation of large colonies on mud flats. The plants appear to die back each winter, with new colonies being formed by sexual reproduction of overwintering spores. Colonies occurred in the same locations for at least three years in a row, suggesting some degree of permanence.

KEY TO GENERA

1. Leaves small, needle or scale-like, or grass-like, with one vein; sporangia borne on stems, in cones, or in the axils of leaves ---------- 2
1. Leaves broad, with branching veins; sporangia on leaves or in nut-like sporocarps ---------- 5

2. Leaves whorled, scale-like, non-green; stems jointed, grooved; sporangia in cones; spores green ---------- *Equisetum*
2. Leaves spirally arranged, green; stems not jointed or grooved; sporangia in leaf axils, cones, or in leaf bases ---------- 3

3. Leaves long, grass-like; stem corm-like; plant growing in or near water; sporangia borne in the bases of leaves ---------- *Isoetes*
3. Leaves short, scale or needle-like; sporangia in a cone or in leaf axils ---------- 4

4. Cones cylindrical; one size of spore (homosporous); stem diameter often greater than 0.3 cm; if without cones, sporangia borne in the axils of leaves ---------- *Lycopodium*
4. Cones four-sided in cross section; two sizes of spores (heterosporous); stem diameter usually less than 0.3 cm ---------- *Selaginella*

5. Plants moss-like, two sizes of spores (heterosporous); unfern-like appearance; floating or stranded on mudflats ---------- *Azolla*
5. Plants appear like typical ferns; one size of spore (homosporous); various habitats ---------- 6

6. Leaf divided near the base into fertile parts and a photosynthetic part ---------- 7
6. Leaf lacking a distinct erect fertile portion which originates from the leaf base ---------- 8

7. Leaf simple, margin entire; veins netted; sporangia deeply embedded into the fertile part ---------- *Ophioglossum*
7. Leaf dissected; veins free; sporangia stalked to partially embedded; fertile portion greatly to somewhat branched ---------- *Botrychium*

8. Fertile leaf or fertile parts strikingly different than the sterile or photosynthetic leaf ---------- 9
8. Fertile leaf or fertile parts identical or very similar to sterile parts ---------- 12

9. Fertile leaf or pinnae totally lacking leafy tissue; sporangia large, easily distinguished with the unaided eye; sporangia turn brown during and after spore release ---------- *Osmunda*
9. Fertile leaf possessing leafy tissue which bears sporangia; sporangia small, microscopic; fronds brown before spore release ---------- 10

10. Fertile leaf woody, remaining erect in winter ---------- 11

10. Fertile leaf soft, similar to texture of sterile leaf; spores released in summer; fertile leaf senesces in autumn ——— *Cryptogramma*

11. Sterile leaf pinnate-pinnatifid, tapering toward base; veins free ——— *Matteuccia*
11. Sterile leaf pinnatifid, broadest at base; veins netted ——— *Onoclea*

12. Sporangia arranged along the margin of the leaf ——— 13
12. Sporangia on the under surface of the leaf ——— 17

13. Sporangia in marginal, cup-shaped sori ——— *Dennstaedtia*
13. Sporangia marginal, but not in cups; covered by leaf margin ——— 14

14. Leaf segments fan-shaped, without obvious midvein ——— *Adiantum*
14. Leaf segments not fan shaped; obvious midvein present ——— 15

15. Leaf small (2 cm to 0.4 m tall), pinnately compound; segments less than 2 cm long ——— 16
15. Leaf large, usually more than 0.4 m tall; leaf divided into three equal portions (ternate); segments longer than 2 cm long; rhizome long-creeping, usually deep in ground ——— *Pteridium*

16. Leaf blade hairy; leaf 10 cm or smaller; bi- or tripinnate ——— *Cheilanthes*
16. Leaf blade not distinctly hairy; pinnate or bipinnate ——— *Pellaea*

17. Sporangia clustered into a sorus with an indusium ——— 18
17. Sporangia clustered into a sorus, but an indusium lacking ——— 26

18. Sori round in outline ——— 19
18. Sori elongate, following the veins ——— 23

19. Indusium peltate (umbrella-like); leaf segments boot-shaped ——— *Polystichum*
19. Indusium attached beneath the sporangia, laterally, or reniform (kidney bean shaped) ——— 20
20. Indusium reniform, kidney bean shaped ——— 22
20. Indusium attached beneath the sporangia or attached to the side and covering the sporangia like a hood ——— 21

21. Indusium hood-like, attached at one side ——— *Cystopteris*
21. Indusium attached beneath the sporangia, cup-like ——— *Woodsia*

22. Leaf with hairs (needle pointed); 2 vascular bundles in leaf base ——— *Thelypteris*
22. Leaf with scales (glandular-tipped hairs may be present); 3-5 vascular bundles present in leaf base ——— *Dryopteris*

23. Leaf simple, an elongate triangle ——— *Camptosorus*
23. Leaf compound or pinnatifid ——— 24

24. Rhizome scales clathrate (darkened inner cell walls); stipe with one bundle; leaf length 2 cm to 0.4 m ——— 25
24. Rhizome scales not clathrate; stipe with two bundles; leaf length 30 cm to 2 m tall ——— *Athyrium*

25. Leaf pinnatifid ——— *Asplenosorus*

25. Leaf pinnate ---------- *Asplenium*

26. Leaf pinnatifid; sori mammilate and punctate ---------- *Polypodium*
26. Leaf pinnate-pinnatifid to tripinnate ---------- 27

27. Leaf pinnate-pinnatifid or bipinnate; hairs sharp-pointed ----- *Phegopteris*
27. Leaf bipinnate to tripinnate; naked or with glandular hairs --- *Gymnocarpium*

KEY TO SPECIES BY GENUS

Adiantum

1. *Adiantum pedatum*

Asplenium

1. Leaflets auriculate at base ---------- *A. platyneuron*
1. Leaflets not auriculate at base ---------- *A. trichomanes*

Asplenosorus

1. *Asplenosorus pinnatifidus*

Athyrium

1. Leaf pinnate; pinnae entire ---------- *A. pycnocarpon*
1. Leaf pinnate-pinnatifid to bi- or tri-pinnate; pinnae pinnatifid ---------- 2

2. Sori straight; leaf hairy; leaf pinnate-pinnatifid ---------- *A. thelypterioides*
2. Sori curved; leaf not conspicuously hairy; leaf bi- or tri-pinnate ---------- *A. augustum*

Azolla

1. *Azolla mexicana*

Botrychium

1. Sterile leaf parts broadly triangular, tripinnate, segments papery; fertile segment arising from the base of the blade; leaf commonly 25-40 cm tall ---------- *B. virginianum*
1. Sterile leaf parts various composed, usually less than 25 cm tall, broadly triangular to lance-shaped or pinnate-pinnatifid; fertile segment arising from leaf base or blade base; leaf segments fleshy or leathery ---------- 2

2. Blade pinnatifid to pinnate-pinnatifid; fertile stalk arising at or near the base of the blade ---------- 3

2. Blade bipinnate to quadripinnate; fertile segment arising at base of stipe, often below ground level ---------- 6

3. Sterile segment broadly triangular; fertile segment arising at base of blade ---------- *B. lanceolatum*

3. Sterile segment outline oblong or oval; fertile stalk arising slightly down the stipe from the blade, but rarely at the base of the stipe ---------- 4

4. Sterile segment undivided to once pinnate ---------- 5

4. Sterile segment pinnate-pinnatifid to bi-pinnate ------ *B. matricariifolium*

5. Plants fleshy; spores not released until October; sporangia deeply embedded; fertile segment and sterile segment of approximately equal length ---------- *B. mormo*

5. Plants not stout and fleshy; spores released by July; sporangia stipitate to only slightly sessile; fertile segment taller than sterile ---------- *B. simplex*

6. Sterile leaf skeletonized, being reduced to a highly dissected, coarsely lacerate system; turning bronze when overwintering ---------- *B. dissectum f. dissectum*

6. Sterile leaf fully developed; leaf ultimate segments variously rounded, triangular or oblong ---------- 7

7. Sterile blade segments about the same size and shape; terminal segments not larger or distinctly elongated ---------- 8

7. Sterile blade segments differing in size and shape; terminal segments larger and elongate ---------- 9

8. Pinnules rounded to round-angulate, blunt, usually entire or nearly so; pinnules planar in nature; often a large, robust plant ---------- *B. multifidum*

8. Pinnules sharply angular, pointed, strongly toothed; pinnules concave in nature; a smaller, less robust plant ---------- *B. ternatum*

9. Terminal segments pointed at tips, margin finely toothed, turning bronze in color in winter; roots dark brown, thicker, with annular ridges or constrictions ---------- *B. dissectum f. obliquum*

9. Terminal segments rounded, blunt tipped, margin entire to slightly toothed; generally remaining green in winter; roots light tan-gray, thin, lacking ridges or constrictions ---------- *B. oneidense*

Camptosorus

1. *Camptosorus rhizophyllus*

Cheilanthes

1. *Cheilanthes feei*

Cystopteris

1. All veins of ultimate leaf segments run into the sinus; green bulblets borne on rachis; indusium, rachis, and bulblets glandular ---------- *C. bulbifera*
1. Some of all of the veins of ultimate leaf segments run into teeth; if bulblets present, then hairy, scalely or dark in color ---------- 2

2. Rhizome protruding beyond insertion of fronds, densely hairy ---------- *C. protrusa*
2. Rhizome short, not protruding, not hairy, but scalely ---------- 3

3. All veins run into teeth; petiole brown at base ---------- *C. fragilis* var. *fragilis*
3. Some veins run into teeth, some into sinuses; petiole black at base; usually on sandstone rocks ---------- *C. fragilis* var. *mackayi*

Dennstaedtia

1. *Dennstaedtia punctilobula*

Dryopteris

1. Leaf 10-30 cm long; leaf with copious scales beneath; pinnae and sori close-set ---------- *D. fragrans*
1. Leaf 30-100 cm long; scales few beneath; pinnae and sori spaced ---------- 2

2. Leaves dimorphic with sterile leaves smaller, less erect; leaf blade narrow-oblong; pinnae relatively undissected, lower pinna-pair triangular ---------- *D. cristata*
2. Leaves not dimorphic; leaf blade broad ---------- 3

3. Leaf pinnate; indusium glabrous ---------- 4
3. Leaf bi-pinnate; indusium various ---------- 5

4. Sori submarginal; stipe bearing long yellow-brown scales ---- *D. marginalis*
4. Sori close to midribs; scales dark-brown ---------- *D. goldiana*

5. Rachis and indusium strongly glandular; lowest pinna pair usually narrowed at base; pinnae oblong, short-accuminate, at right angles to the rachis ---------- *D. intermedia*
5. Rachis and indusium without glandular hairs or nearly glabrous; lowest pinna pair broad at base; pinnae triangularly-oblong, long acuminate, sloping toward rachis ---------- 6

6. Leaf outline narrow-triangular; innermost bottom pinnule little broadened; teeth incurved ---------- *D. spinulosa*
6. Leaf outline broad-triangular; innermost bottom pinnule broad as 2 top ones; teeth spreading ---------- *D. expansa*

Equisetum

1. Sterile and fertile stems uniform ---------- 2

1. Stems dimorphic, sterile stems branched and green; fertile stem unbranched and green ---------- 6
2. Branching regular, whorls at nodes ---------- 3
2. Branching variable if present; resulting from damage ---------- 4
3. Stem ridges 10 to 20; teeth 3 mm or smaller, brown; central canal occupying more than 80% of stem diameter ---------- *E. fluviatile*
3. Stem ridges fewer than 10; teeth 5 mm or longer, brown with distinct pale margins; central canal occupying less than 20% of stem diameter ---------- *E. palustre*
4. Plant 5-10 cm tall; stem diameter 0.5-1.5 mm; stem ridges 3 with deep grooves; central canal absent ---------- *E. scirpoides*
4. Plant 30 cm tall or taller; stem diameter 5 mm or more; stem ridges more than 5 ---------- 5
5. Cone sharp-pointed; stem rough, often evergreen; stem nodal sheath as long as wide; teeth persistent ---------- *E. hyemale*
5. Cone blunt pointed; stem smooth, deciduous; stem nodal sheath longer than wide; teeth deciduous ---------- *E. laevigatum*
6. First segment of lateral branches longer than adjacent stem sheath; teeth 1-2 mm long, black ---------- *E. arvense*
6. First segment of lateral branches as long or shorter than the adjacent stem sheath; teeth reddish brown and longer than 2 mm or teeth whitish with a medial brown stripe and less than 1 mm in length ---------- 7
7. Branches simple; teeth whitish with a medial brown stripe and less than 1 mm in length; first segment of lateral branches shorter than the adjacent stem sheath ---------- *E. pratense*
7. Branches rebranched; teeth reddish-brown and longer than 3 mm; first segment of lateral branches as long as the adjacent sheath ---------- *E. sylvaticum*

Gymnocarpium

1. Stipe and axes glandular; lowest and next pinna pair stalked -- *G. robertianum*
1. Stipe and axes glandless; only lowest pinna stalked -------- *G. dryopteris*

Isoetes

1. Megaspores 0.5 mm in diameter; covered with conspicuous spines ---------- *I. echinospora*
1. Megaspores 0.8-1 mm in diameter; ridged surface, spines absent ---------- *I. macrospora*

Lycopodium

1. Sporangia borne in zones on leafy stems ---------- 2
1. Sporangia borne in cones ---------- 3

2. Leaf broadest at middle or above, conspicuously serrately toothed ---------- *L. lucidulum*
2. Leaf broadest below middle, entire and sharp pointed ---------- *L. porophilum*

3. Sterile stems creeping; plants of wet places ---------- *L. inundatum*
3. Sterile stems erect; plants of various habitats ---------- 4

4. Leaves in 4-5 rows; stem flattened dorsiventrally ---------- 5
4. Leaves in 6-10 rows; stem not compressed, although the leaves may be arranged in a flattened manner ---------- 9

5. Leaves arranged in 6 rows; plant tree-like; cones on short, leafy peduncles ---------- 6
5. Leaves arranged in more than 6 rows; plant not tree-like, being less branched ---------- 8

6. Leaves of the lower portion of the main aerial stem diverging at angles of 30-90°; leaves arranged into 2 dorsal, 2 ventral, and 2 lateral rows ---------- *L. dendroideum*
6. Leaves of the lower portion of the main aerial stem diverging from the stem at angles less than 30°; leaves arranged into 1 dorsal, 1 ventral, and 4 lateral rows ---------- 7

7. Leaves all linear-attenuate and of equal size, diverging equally from the stem branches ---------- *L. obscurum* var. *isophyllum*
7. Leaves differing in size, shape, and angle of divergence; ventral row leaves smaller and linear-attenuate to long-triangular, appressed; leaves of dorsal and lateral rows linear-accuminate to linear-acute; dorsal leaves appressed, only lateral leaves divergent; leaves of all rows in parallel planes ---------- *L. obscurum* var. *obscurum*

8. Cones sessile, solitary ---------- *L. annotinum*
8. Cones on peduncles, multiple or solitary; leaves usually with a long bristle at the tip ---------- *L. clavatum*

9. Branches slightly flattened, blue-green to glaucus coloration; leaf-blades beneath only slightly shorter than adjacent lateral leaves; aerial stem with conspicuous annual constrictions; lateral stems buried ---------- *L. tristachyum*
9. Branches strongly flattened; leaf-blades beneath much shorter than adjacent lateral leaves ---------- 10

10. Annual constrictions of branchlets obscure; branchlets in regular fan-like groups; cones clustered, 2.5-4.5 cm long; lateral stem surficial ---------- *L. digitatum*
10. Annual constrictions prominent; branchlets irregular; cones few to solitary, 1.5-2.5 cm long; stem buried ---------- *L. complanatum*

Matteuccia

1. *Matteuccia struthiopteris*

Onoclea

1. *Onoclea sensibilis*

Ophioglossum

1. *Ophioglossum vulgatum*

Osmunda

1. Sporangia borne on upper half of leaf; leaves bipinnate ---------- *O. regalis*
1. Sporangia borne on separate leaf or centrally on leaf; leaf always pinnate-pinnatifidd ---------- 2
2. Sporangia borne on separate fertile leaf ---------- *O. cinnamomea*
2. Sporangia borne centrally between sterile pinnae ---------- *O. claytoniana*

Pellaea

1. Fertile pinnules much narrower than sterile ones; petiole and rachis pubescent to scurfy throughout ---------- *P. atropurpurea*
1. Fertile pinnules similar to sterile; petiole and rachis glaborous to only slightly pubescent ---------- *P. glabella*

Phegopteris

1. Stipe and rachis scaly; lowest pinnae smaller than those above and separated from them (not connected by a pinnatifid wing) ---------- *P. connectilis*
1. Stipe and rachis hairy; lowest pinnae larger than those above and connected to them by a pinnatifid wing along the rachis ---------- *P. hexagonoptera*

Polystichum

1. *Polystichum acrostichoides*

Polypodium

1. *Polypodium virginianum*

Pteridium

1. *Pteridium aquilinum*

Selaginella

1. Stems soft, green, herbaceous; leaves 4-ranked, flaccid, obtuse to acute; occurring in wet to moist areas ---------- *S. eclipes*
1. Stems tough, wiry, evergreen; leaves spirally arranged, stiff, tipped with white hair; occurring in xeric habitats ---------- *S. rupestris*

Thelypteris

1. Pinnae tending to be narrow-based; fertile lobes flat; veins of sterile pinnules simple; lower pinna pair tend to fold upwards --- *T. simulata*
1. Pinnae tending to be broad-based; fertile lobes concave and pointed; veins of sterile pinnules once-forked; lower pinna pair similar to other pinnae in position ---------- *T. palustris*

Woodsia

1. Stipe jointed above base, stipe stubble uniform ---------- *W. ilvensis*
1. Stipe not jointed, stipe stubble not uniform ---------- 2

2. Indusium splitting into narrow segments, resembling a string of beads ---------- *W. oregana*
2. Indusium splitting into broad segments ---------- *W. obtusa*

REFERENCES

Beitel, J.M. 1979. Clubmosses *(Lycopodium)* in North America. Fiddlehead Forum 6(5):1-8.

Blasdell, R. 1963. A monographic study of the fern genus *Cystopteris*. Mem. Torrey Bot. Club 21(4):1-102.

Black, R.F., N.K. Bleuer, F.D. Hole, N.P. Lasca, and L.J. Maher. 1970. Pleistocene geology of Southern Wisconsin. Inf. Circ. 15, Geol. Nat. Hist. Surv., Univ. Wisconsin, Madison, WI.

Brown, D.F.M. 1964. A monographic study of the fern genus *Woodsia*. Nova Hedwigia Beih. 16:1-154.

Buck, W.R. 1977. A new species of *Selaginella* in the *S. apoda* complex. Can. J. Bot. 55:366-371.

Butters, F.K. 1917. Taxonomic and geographic studies in North American ferns. I. The genus *Athyrium* and the North American ferns allied to *Athyrium filix-femina*. Rhodora 19:170-207.

Clausen, R.T. 1938. A monograph of Ophioglossaceae. Mem. Torrey Bot. Club 19(2):1-177.

Cooperrider, T.S. 1959. The ferns and other pteridophytes of Iowa. St. Univ. Iowa Stud. Nat. Hist. 20(1):1-62.

Crabbe, J.A., Jermy, A.C., and J.T. Mickel. 1975. A new generic sequence for the pteridophyte herbarium. Fern Gaz. 11:141-162.

Cushing, E.J. 1965. Problems in Quaternary phytogeography of the Great Lakes region. pp. 403-416, *in* H.E. Wright, and D.J. Frey. Quaternary of the United States. Princeton Univ. Press, Princeton.

Duckett, J.G., and A.R. Duckett. 1980. Reproductive biology and population dynamics of wild gametophytes of *Equisetum*. Bot. J. Linnean Soc. 80:1-40.

Ellen, S.M. 1924. Some ferns of southwestern Wisconsin. Trans. Wis. Acad. Sci., Arts, Lett. 21:249-250.

Emanuel, J.P. 1977. Checklist of seed plants, ferns, and fern allies for Winona County, Minnesota. Dept. Biology, Winona State Univ., Winona. 23 pp.

Fernald, M.L. 1922. *Polypodium virginianum* and *P. vulgare*. Rhodora 24:125-142.

Fitzpatrick, T.J. 1918. The fern flora of northeastern Iowa. Amer. Fern J. 8:97-103.

Fraser-Jenkins, C.R., and A.C. Jermy. 1977. Nomenclatural notes on *Dryopteris*. Fern Gaz. 25:378-379.

Fuller, G.D. 1945. A checklist of the vascular plants of Jo Daviess County, Illinois. Trans. Ill. Acad. Sci. 38:51-63.

Graves, E.W. 1931. *Botrychium dissectum* from Minnesota. Amer. Fern J. 21:21-24.

Hanson, M.G. 1970. Lobed spleenwort in Wisconsin. Bull. Bot. Club Wis. 2(4):1-2.

_____, and R.P. Hanson. 1979. The northernmost station for *Asplenium pinnatifidum*. Trans. Wis. Acad. Sci. Arts & Lett. 67:165-170.

Hartley, T.G. 1957. A comparison of the floras of southwestern Wisconsin and northeastern Iowa. Proc. Iowa Acad. Sci. 74:199-204.

_____. 1960. Plant communities of the La Crosse area in western Wisconsin. Proc. Iowa Acad. Sci. 67:174-188.

_____. 1962. The flora of the driftless area. Ph.D. dissertation, University of Iowa, Iowa City, IA.

_____. 1965. Discovery of the Massachusetts fern in Wisconsin. Rhodora 67:399-404.

_____. 1966. The flora of the Driftless Area. Stud. Nat. Hist. Univ. Iowa 21:1-174.

Hauke, R.L. 1963. A taxonomic monograph of the genus *Equisetum*, subgenus *Hippochaete*. Nova Hedwigia Beih. 8:1-163.

_____. 1965. Preliminary reports on the flora of Wisconsin, No. 54. Equisetaceae. Trans. Wis. Acad. Sci., Arts & Lett. 54:331-346.

_____. 1978. A taxonomic monograph of *Equisetum* subgenus *Equisetum*. Nova Hedwigia 30:385-455.

Hickey, R.J. 1977. The *Lycopodium obscurum* complex in North America. Amer. Fern J. 67:45-48.

_____, and J.M. Beitel. 1979. A name change for *Lycopodium flabelliforme*. Rhodora 81:137-140.

Hill, E.J. 1911. *Lycopodium porophilum* in the Dells of the Wisconsin. Fern. Bull. 19:1-3.

Holltum, R.E. 1969. Studies in the family Thelypteridaceae. The genera *Phegopteris, Pseudophegopteris,* and *Macrothelypteris*. Blumea 17(1):5-32.

Holmgren, P.K., and W. Keuken. 1974. Index Herbariorum. Part I. The Herbaria of the world. 6th ed. Oosthoek, Scheltema, and Holkema, Utrecht, Netherlands.

Holub, J. 1972. On the taxonomy and nomenclature of the European Marsh Fern. Taxon 21:331-332.

Knox, J.C., and D.M. Mickelson. 1974. Late Quaternary environments in Wisconsin. Wisconsin Geol. Nat. Hist. Surv., Univ. Wisconsin, Madison, WI.

Lange, K.I. 1979. Fragrant fern in Wisconsin, especially in the Wisconsin Dells area. Bull. Bot. Club Wis. 11:27-29.

Lellinger, D.B. 1981. Notes on North American ferns. Amer. Fern J. 71:90-94.

Liew, F.S. 1972. Numerical taxonomic studies on North American lady ferns and their allies. Taiwania 17:190-216.

Lloyd, R.M. 1971. Systematics of the onocleoid ferns. Univ. California Pub. Bot. 61:1-86.

Löve, A. 1962. Cytotaxonomy of the *Isoetes echinospora* complex. Amer. Fern J. 52:113-123.

Lyon, H.L. 1903. The pteridophytes of Minnesota. Minn. Bot. Stud. 3:245-255.

Mahaney, W.C. 1976. Quaternary stratigraphy of North America. Dowden, Hutchinson, and Ross, Inc., Stroudsburg, Pennsylvania.

Marshall, R. 1910. Ferns of the Dells of the Wisconsin River. Lawrence Press, Madison, WI. 61 pp.

Martin, L. 1932. The physical geography of Wisconsin. Wis. Geol. Nat. Hist. Surv. Bull. 36: Ed. Ser. 4. 608 pp. [Reprinted, 3rd ed., Univ. Wis. Press, Madison, WI 1965].

Mickel, J.T. 1974. The status and composition of *Asplenosorus*. Amer. Fern J. 64:119.

_____. 1979a. How to know the ferns and fern allies. W.C. Brown, Dubuque, Iowa.

_____. 1979b. The fern genus *Cheilanthes* in the continental United States. Phytologia 41:431-437.

Mohlenbrock, R.H. 1967. The illustrated flora of Illinois. Ferns. Southern Illinois Univ. Press, Carbondale. 191 pp.

_____, and D.M. Ladd. 1978. Distributions of Illinois vascular plants. Southern Illinois Univ. Press, Carbondale. 282 pp.

_____, and _____. In press. Additions to the illustrated flora of Illinois. II. Ferns. Trans. Ill. Acad. Sci.

Montgomery, J.D., and E.M. Paulton. 1981. *Dryopteris* in North America. Fiddlehead Forum 8:25-31.

Moore, J.W. 1968. A provisional list of the flowering plants, ferns, and fern allies of Houston County, Minnesota. Dept. Botany, Univ. Minnesota, St. Paul. 22 pp.

Moran, R.C. 1980. Sandstone rock crevices — an exceptional new habitat for *Thelypteris simulata*. Amer. Fern J. 70:136-137.

_____. 1981. A major range extension for *Thelypteris simulata* in the southern Appalachians. Amer. Fern J. 71:121.

_____. 1982a. The *Asplenium trichomanes* complex in the United States and Canada. Amer. Fern J. 72:5-11.

_____. 1982b. *Cystopteris* X *illinoensis*: a new natural hybrid fern. Amer. Fern J. 72:41-44.

Mulligan, G.A., L. Cinq-Mars, & W.J. Cody. 1972. Natural interspecific hybridization between sexual and apogamous species of the beech fern *Phegopteris* Fée. Can. J. Bot. 50:1295-1300.

Nee, M. 1970. Preliminary checklist of the vascular flora of Richland County, Wisconsin. Herbarium, Univ. Wisconsin-Madison, WI. 35 pp.

Nontelle, D.M. 1972. The flora of La Crosse County. M.S. thesis, University Wisconsin-La Crosse, La Crosse, WI. 135 pp.

Pammel, L.H. 1905. A comparative study of the vegetation of the swamp, clay, and sandstone areas in western Wisconsin, southeastern Minnesota, and northern, central and southeastern Iowa. Proc. Davenport Acad. Sci. 10:32-126.

_____, and C.M. King. 1902. The vascular cryptogams of Iowa and the adjoining parts of southeastern Minnesota and western Wisconsin. Proc. Iowa. Acad. Sci. 9:134-151.

Peck, J.H. 1976a. An annotated bibliography to the literature on pteridophytes in Iowa. Proc. Iowa Acad. Sci. 82:203-208.

_____. 1976b. The pteridophyte flora of Iowa. Proc. Iowa Acad. Sci. 83:143-160.

_____. 1980a. Additions to the pteridophyte flora of Iowa. Proc. Iowa Acad. Sci. 87:39-40.

_____. 1980b. Discovery of the goblin fern in Wisconsin. Bull. Wis. Bot. Club. 12(2):2-4.

_____. 1980c. *Equisetum* X *litorale* in Illinois, Iowa, Minnesota, and Wisconsin. Amer. Fern J. 70:33-38.

_____, D.M. Roosa, and L.J. Eilers. 1980. A checklist of the vascular flora of Allamakee County, Iowa. Proc. Iowa Acad. Sci. 87:62-75.

_____, and W.C. Taylor. 1980. Checklist and distributions of Wisconsin ferns and fern allies. Michigan Botanist 19:251-268.

Pepoon, H.S. 1909. The cliff flora of Jo Daviess County. Trans. Ill. Acad. Sci. 2:32-37.

Pfeiffer, N. 1922. Monograph of the Isoetaceae. Annals Missouri Bot. Gard. 9:79-232.

Rosendahl, C.O. 1903. An addition to the knowledge of the flora of southeastern Minnesota. Minnesota Bot. Stud. 3:257-269.

_____, and F.K. Butters. 1909. Guide to the ferns and fern allies of Minnesota. 22 pp.

_____, and J.W. Moore. 1947. A new variety of *Sedum rosea* from southeastern Minnesota and additional notes on the flora of the region. Rhodora 49:197-202.

Sarvela, J. 1978. A synopsis of the fern genus *Gymnocarpium*. Ann. Bot. Fennici 15:101-106.

Schuster, R.M. 1957. Boreal Hepaticae, a manual of the liverworts of Minnesota and adjacent regions. II. Ecology. Amer. Midl. Nat. 57:203-299.

_____. 1958. Boreal Hepaticae, a manual of the liverworts of Minnesota and adjacent regions. III. Phytogeography. Amer. Midl. Nat. 257:332.

Shimek, B. 1901. The Iowa pteridophyta in the herbarium of the State University of Iowa. Bull. Lab. Nat. Hist. St. Univ. Iowa 5:145-170, 213-215.

_____. 1905. Flora of Winneshiek County, Iowa. Iowa Geol. Survey Ann. Rept. 16:147-211.

Steil, W.N., and A.M. Fuller. 1928. Ferns and fern allies in Wisconsin. I. Amer. Fern J. 18:105-115.

_____, and _____. 1929. Ferns and fern allies in Wisconsin. II. Amer. Fern J. 19:1-10.

Swenson, H.K. 1944. The New World species of *Azolla*. Amer. Fern J. 34:69-84.

Swezey, G.D. 1883. Catalogue of the phanerogamous and vascular cryptogams of Wisconsin. pp. 376-395 *in*

T.C. Chamberlin. Geology of Wisconsin, Vol. 1. (pp. 394-395 treat ferns and fern allies.)

Thomson, O. 1978. New records for *Asplenium platyneuron*. Bull. Bot. Club Wis. 10(1):3.

Threlfall, M.H. 1979. Hayscented fern. Bull. Bot. Club Wis. 11:60-63.

Tolstead, W.L. 1938. A flora of Winneshiek and Allamakee counties and Clayton County in the vicinity of McGregor. Iowa St. Coll. J. Sci. 12:321-384.

Tryon, A.F. 1957. A revision of the genus *Pellaea* section *Pellaea*. Ann. Missouri Bot. Gard. 44:125-193.

_____. 1971. Structure and variation in spores of *Thelypteris palustris*. Rhodora 73:444-460.

_____, and R.M. Tryon. 1973. *Thelypteris* in northeastern North America. Amer. Fern J. 63:65-76.

_____, _____, and F. Badre. 1980. Classification, spores, and nomenclature of the Marsh Fern. Rhodora 82:77-86.

Tryon, R.M. 1939. Notes on the ferns of Wisconsin. Amer. Fern J. 29:1-9.

_____. 1941. Revision of the genus *Pteridium*. Contr. Gray Herb. 134:1-70.

_____. 1954. Ferns and fern allies of Minnesota. Univ. Minn. Press, Minneapolis, MN.

_____. 1955. *Selaginella rupestris* and its allies. Ann. Missouri Bot. Gard. 42:1-99.

_____. 1960. A review of the genus *Dennstaedtia* in America. Contr. Gray Herb. 187:23-52.

_____. 1980. Ferns of Minnesota. [2nd ed. of Tryon (1954)]. Univ. Minn. Press, Minneapolis, MN.

_____, N.C. Fassett, D.W. Dunlop, and M.E. Diemer. 1939. The ferns and fern allies of Wisconsin. Dept. Botany, University of Wisconsin, Madison, WI.

_____, _____, _____, _____. 1953. The ferns and fern allies of Wisconsin. Univ. Wis. Press, Madison, WI.

Wagner, W.H., Jr. 1954. Reticulate evolution in the Appalachian Aspleniums. Evolution 8:103-118.

_____. 1959. American grapefern resembling *Botrychium ternatum*: a preliminary report. Amer. Fern J. 49:97-103.

_____. 1960. Evergreen grapeferns and the meanings of interspecific categories used in North American pteridophytes. Amer. Fern J. 50:32-45.

_____. 1961. Roots and the taxonomic differences between *Botrychium oneidense* and *B. dissectum*. Rhodora 63:164-175.

_____. 1966. New data on North American oak ferns, *Gymnocarpium*. Rhodora 68:121-138.

_____. 1971. Evolution of *Dryopteris* in relation to the Appalachians. pp. 147-192 *in* P.C. Holt. The distributional history of the biota of the southern Appalachians. Part II. Flora. Res. Monog. II, Virginia Polytechnic Inst., Blacksburg, VA.

_____. 1972. Disjunctions in homosporous vascular plants. Ann. Missouri Bot. Gard. 59:203-217.

_____, and D.M. Johnson. 1981. Natural history of the ebony spleenwort fern, *Asplenium platyneuron* (Aspleniaceae), in the Upper Great Lakes area. Can. Field-Nat. 95:156-166.

_____, and F.S. Wagner. 1981. New species of Moonworts, *Botrychium* subg. *Botrychium* (Ophioglosscaea), from North America. Amer. Fern J. 71:20-30.

Waterway, M.J. 1977. Population studies of *Lycopodium lucidulum* and *Lycopodium porophilum* and their hybrids. M.S. thesis, Univ. Wisconsin, Madison, WI.

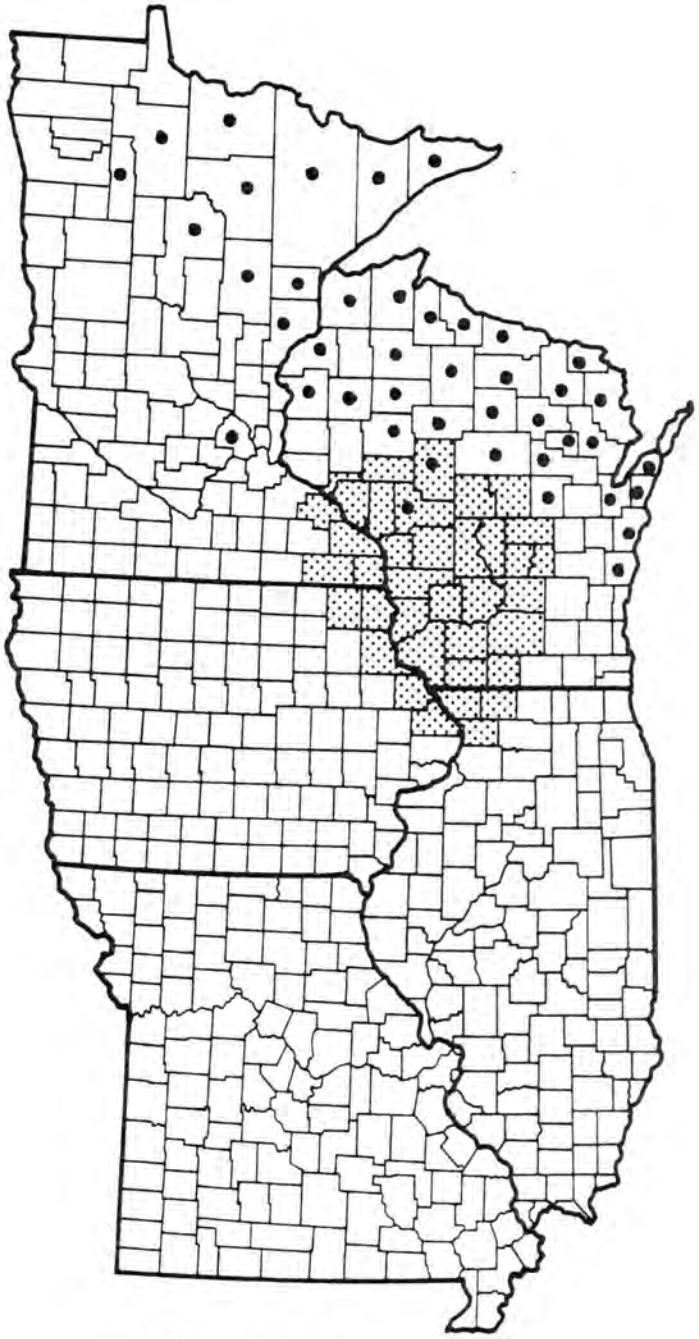
Wheeler, W.A. 1900. A contribution to the knowledge of the flora of southeastern Minnesota. Minnesota Bot. Stud. 2:353-416.

Wherry, E.T. 1961. The fern guide. Doubleday, NY.

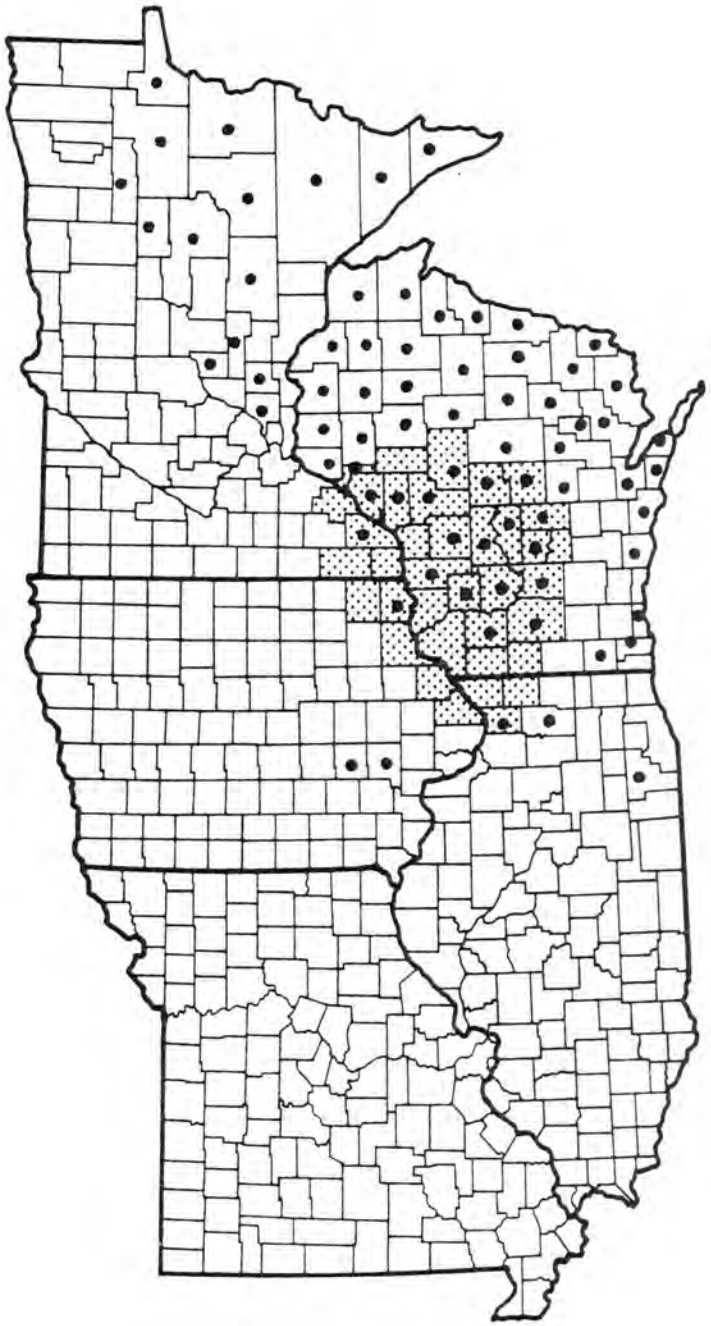
Wilce, J.H. 1965. The section *Complanata* of genus *Lycopodium*. Nova Hedwigia Beih. 19:1-233.

Wilson, L.R. 1932. The identity of *Lycopodium porophilum*. Rhodora 34:169-172.

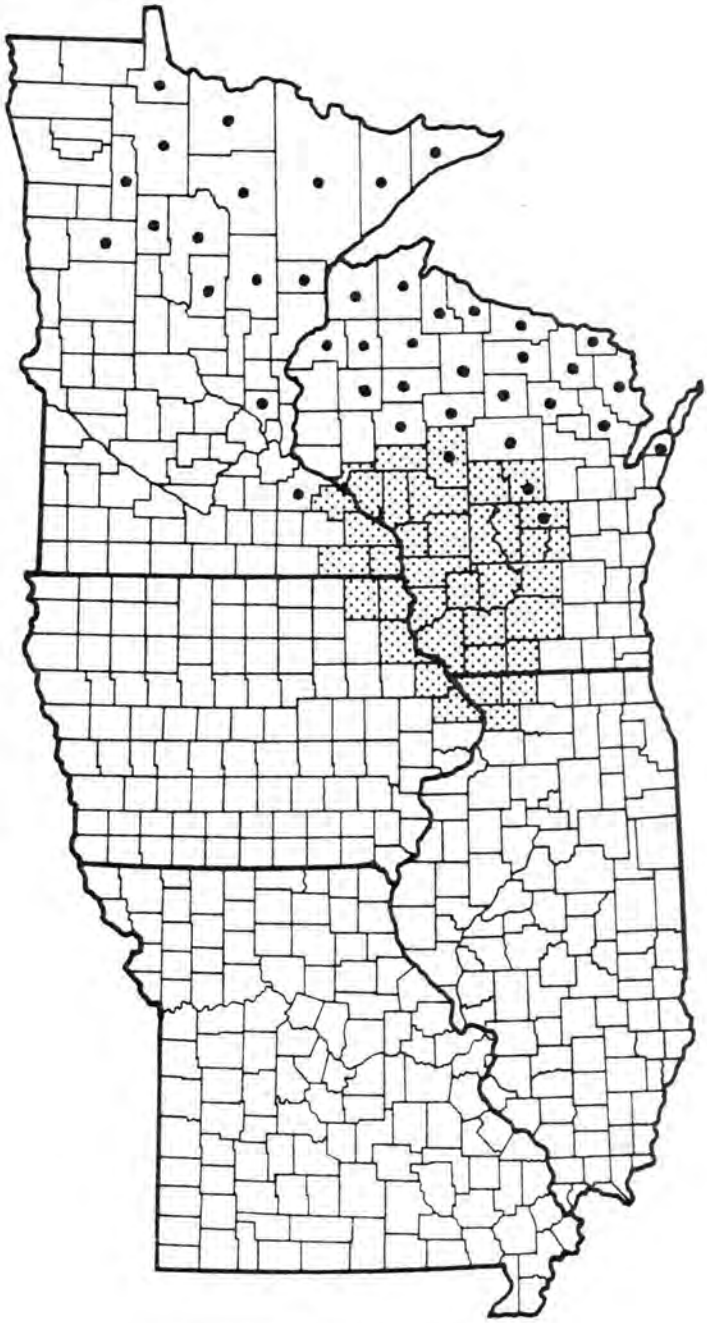
Wunderlin, R.P. 1966. The vascular flora of the Mississippi Palisades State Park, Carroll County, Illinois. Trans. Ill. St. Acad. Sci. 59:134-148.



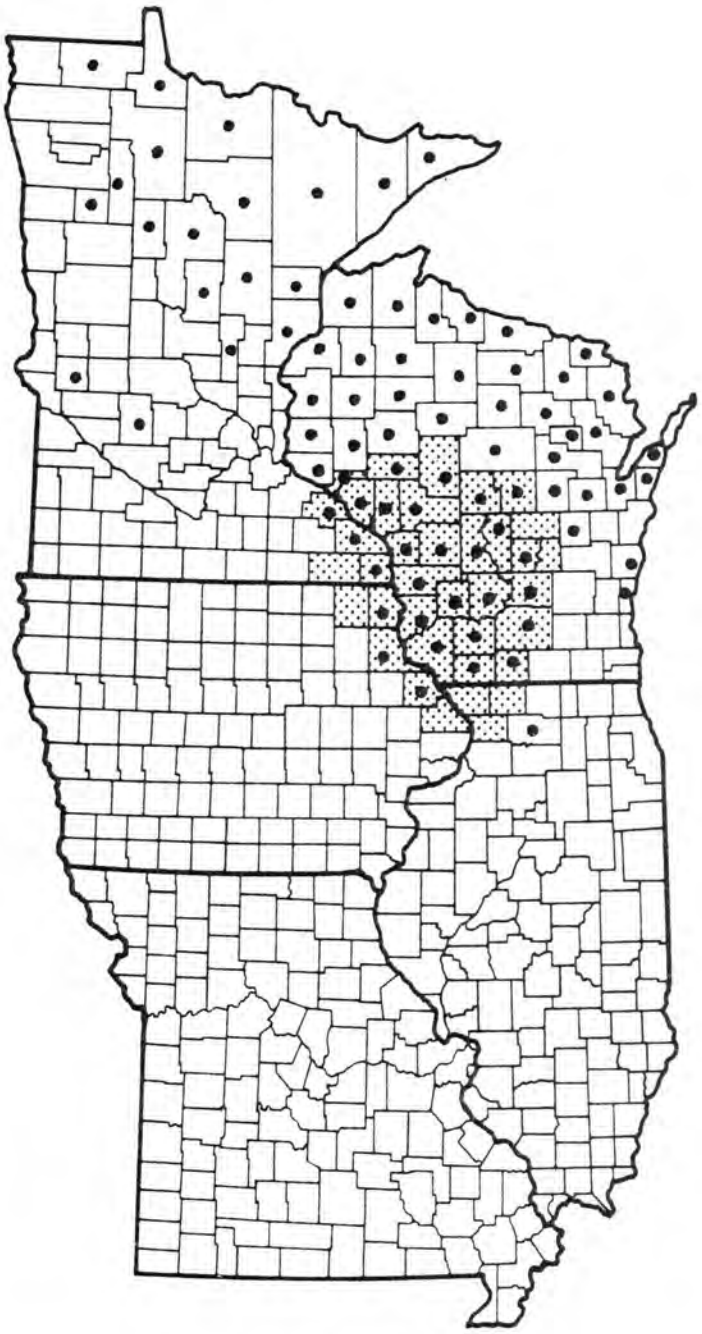
MAP 1. Lycopodium annotinum



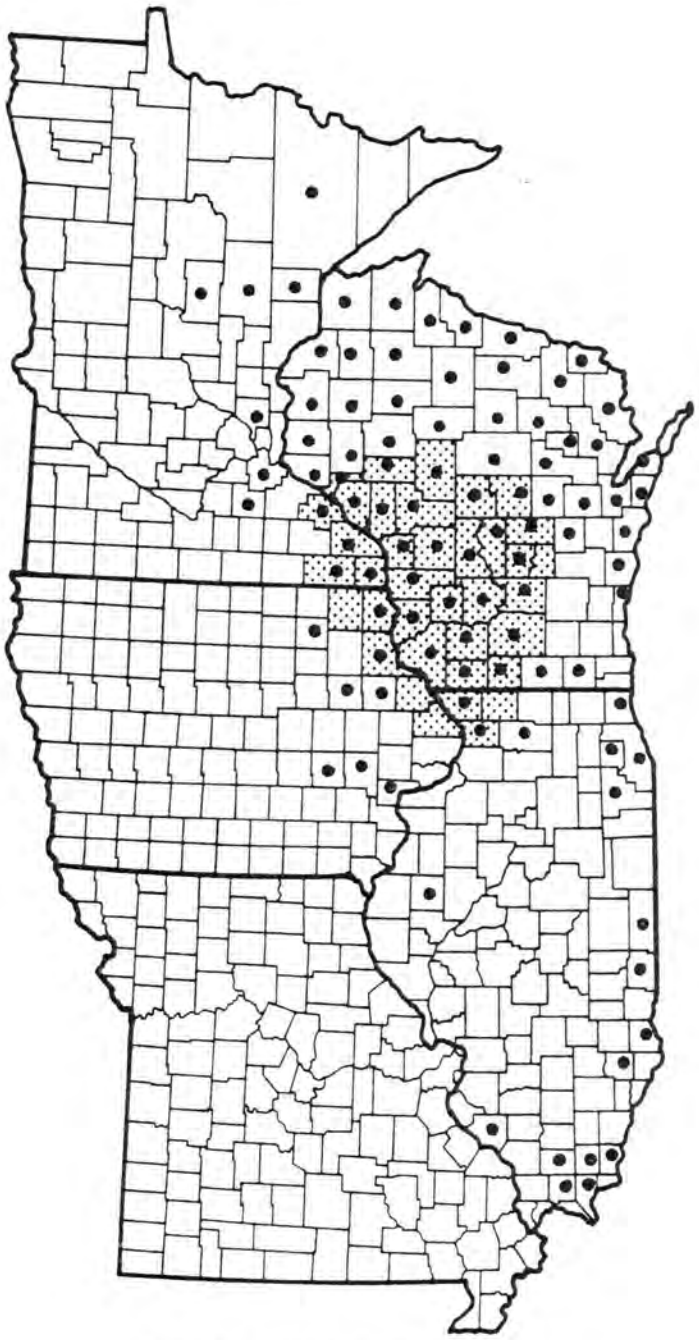
MAP 2. Lycopodium clavatum



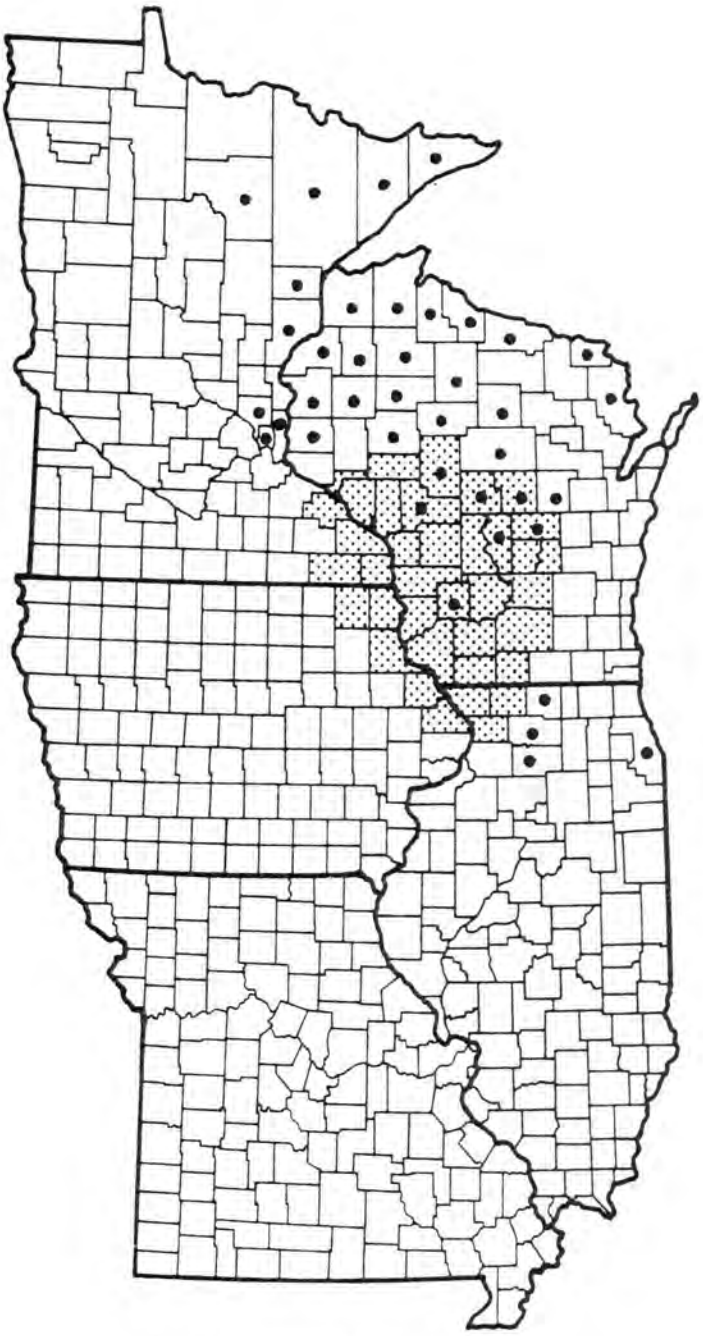
MAP 3. Lycopodium complanatum



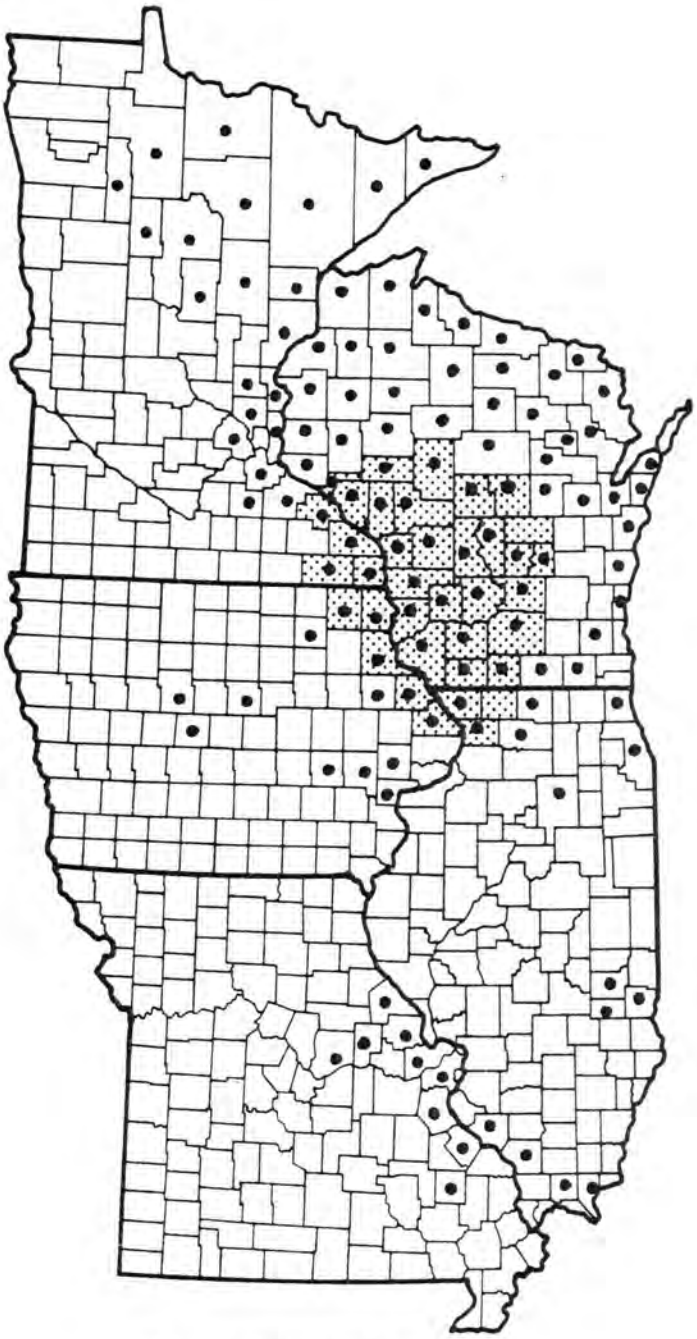
MAP 4. Lycopodium dendroideum



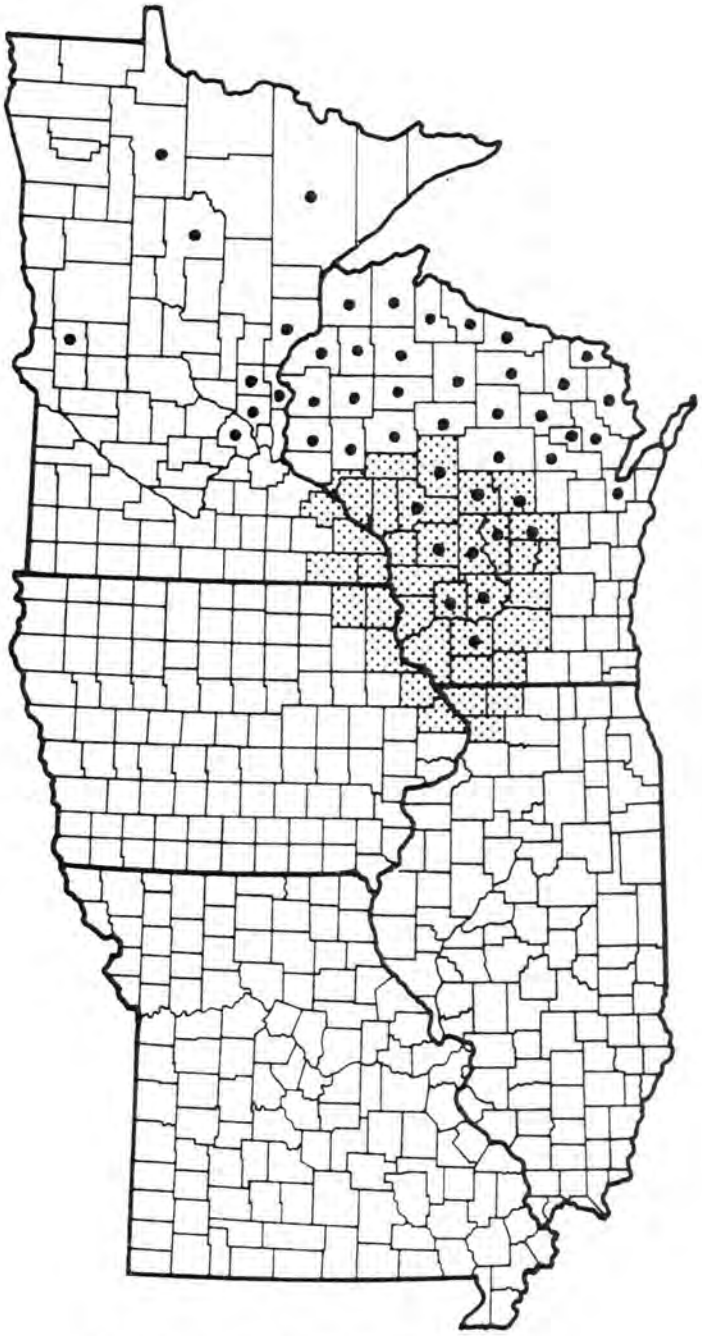
MAP 5. Lycopodium digitatum



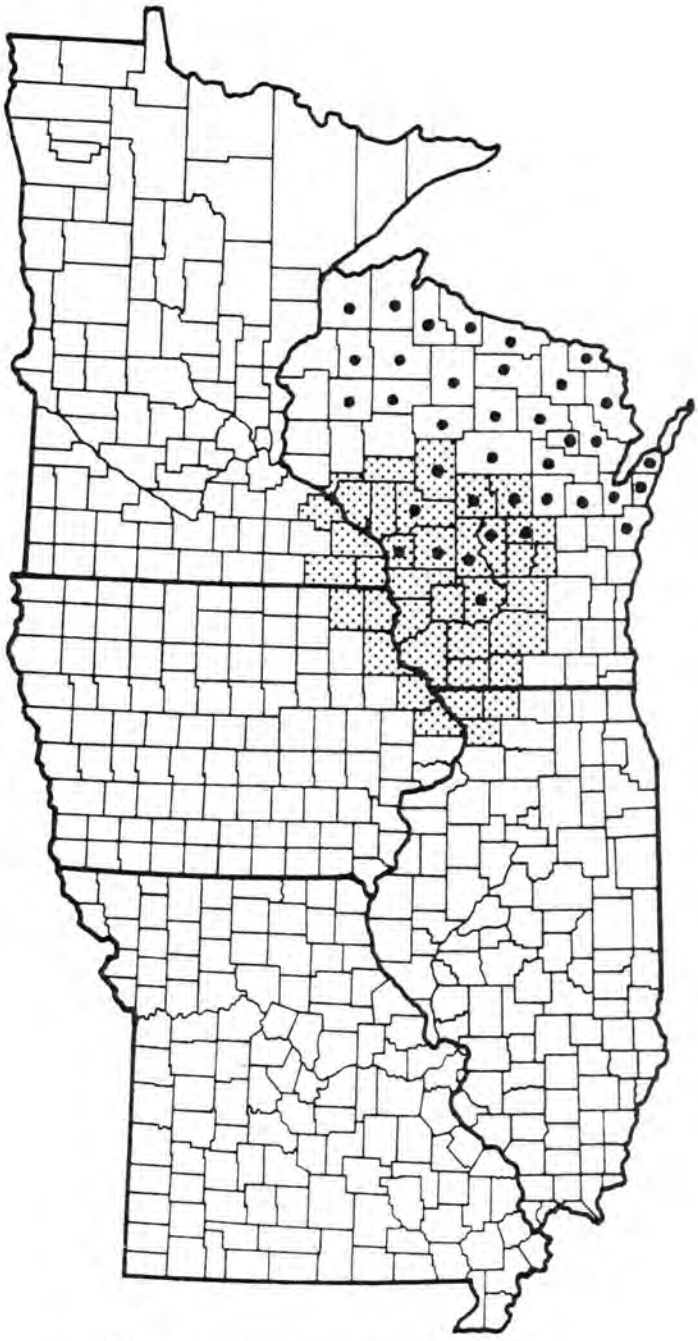
MAP 6. Lycopoodium inundatum



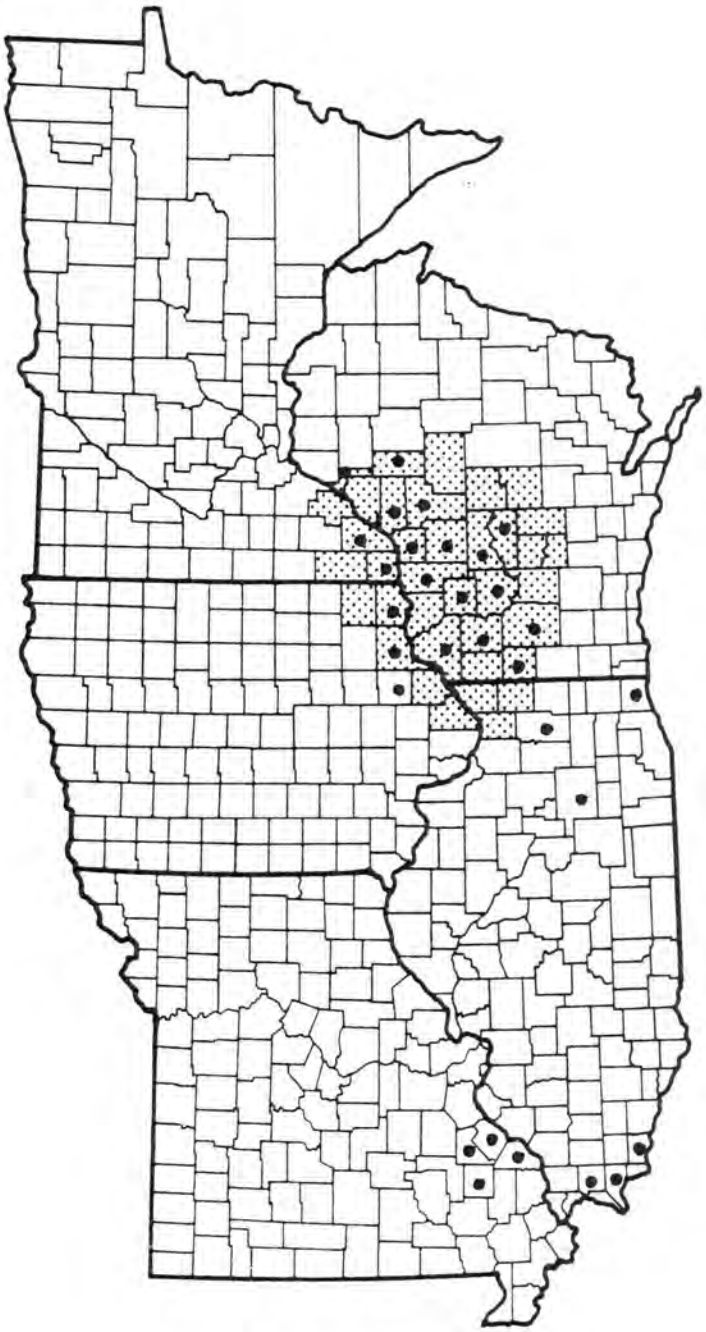
MAP 7. Lycopodium lucidulum



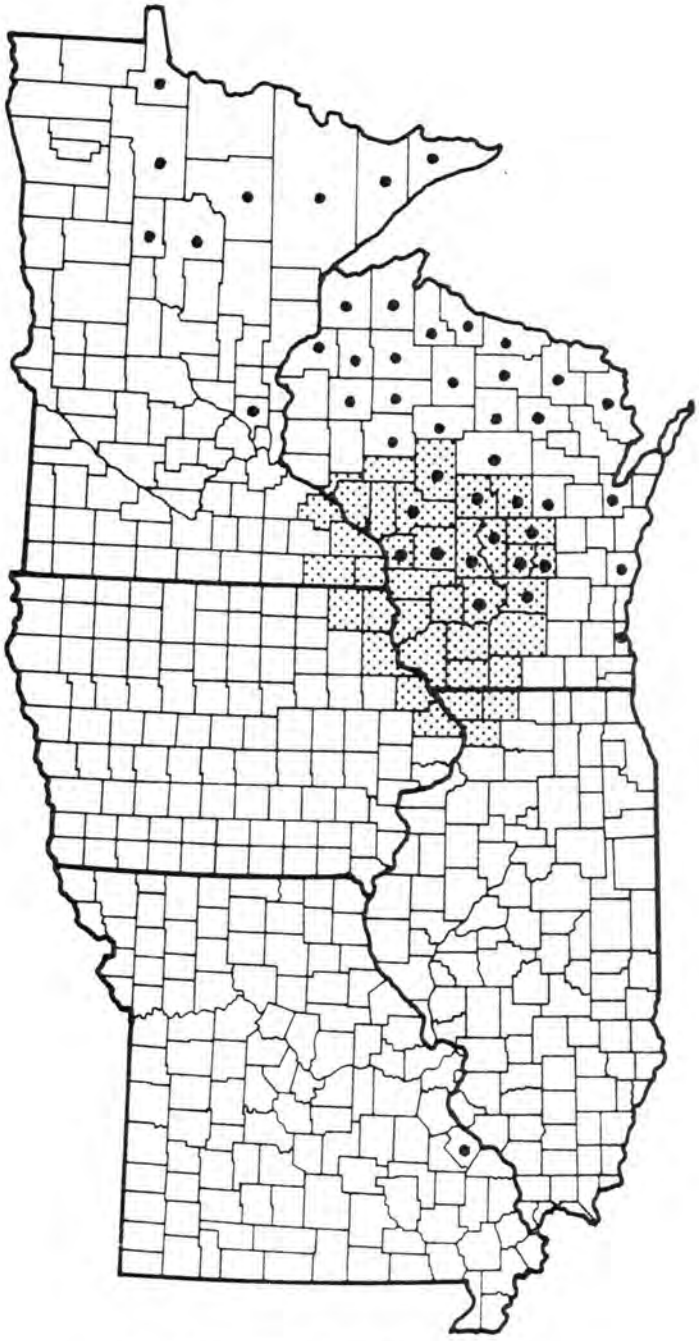
MAP 8a. Lycopodium obscurum isophyllum



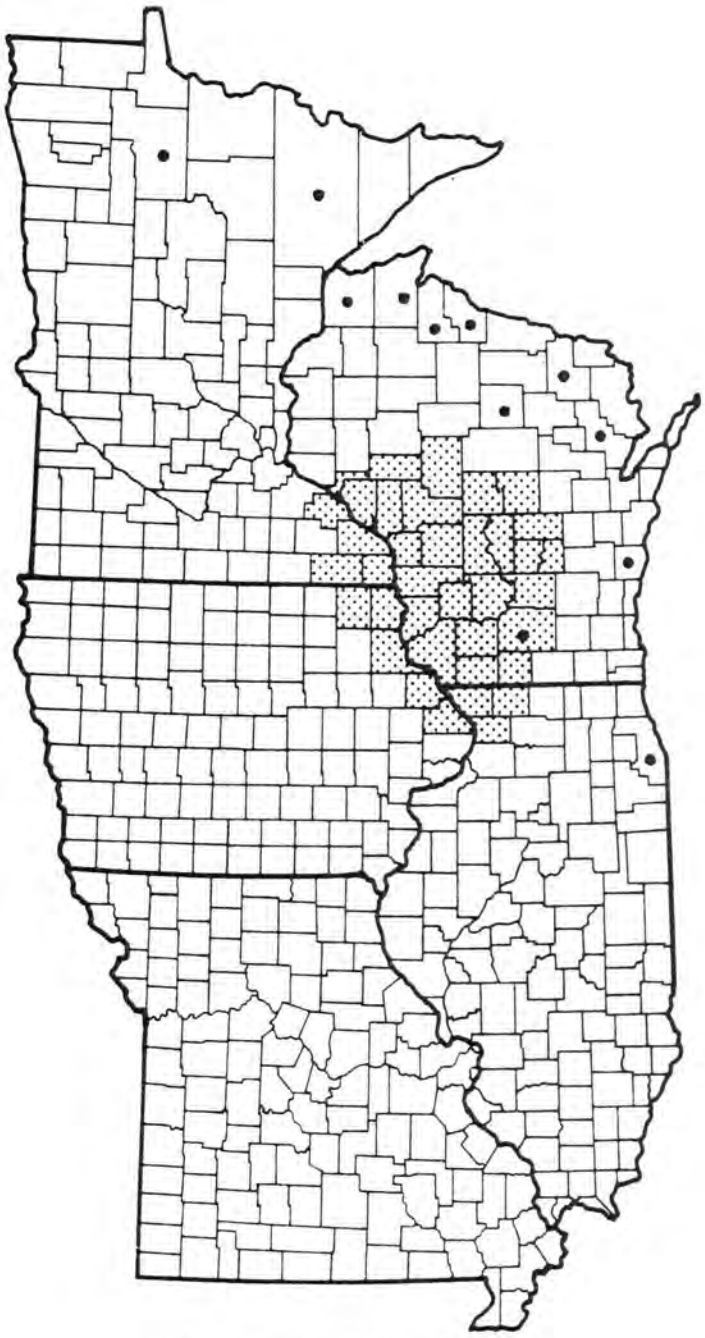
MAP 8b. Lycopodium obscurum obscurum



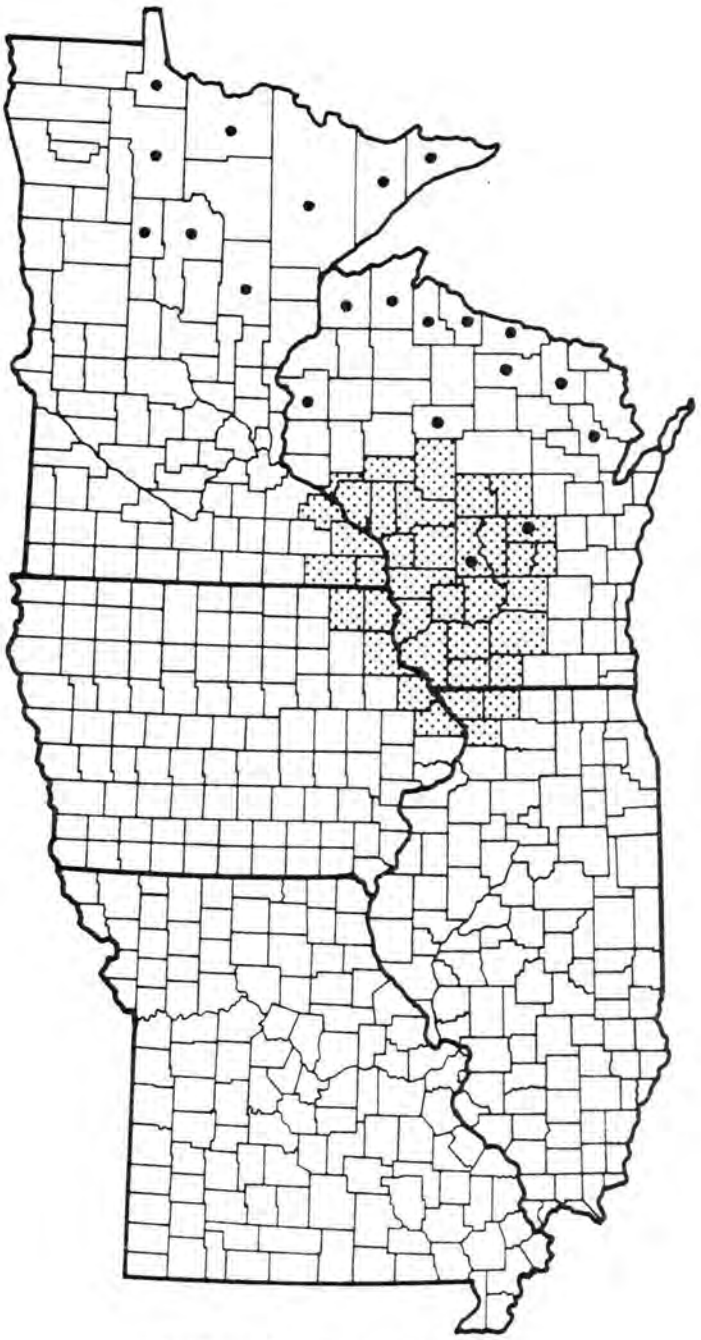
MAP 9. Lycopodium porophilum



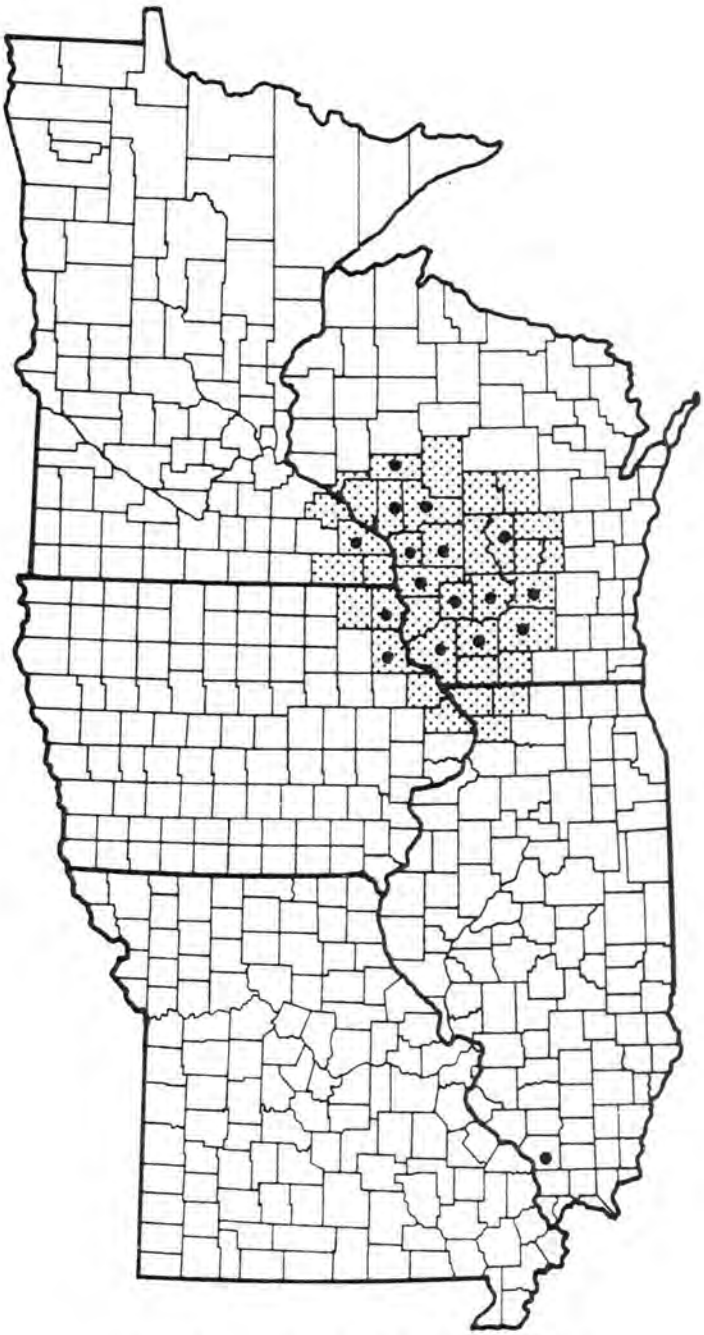
MAP 10. Lycopodium tristachyum



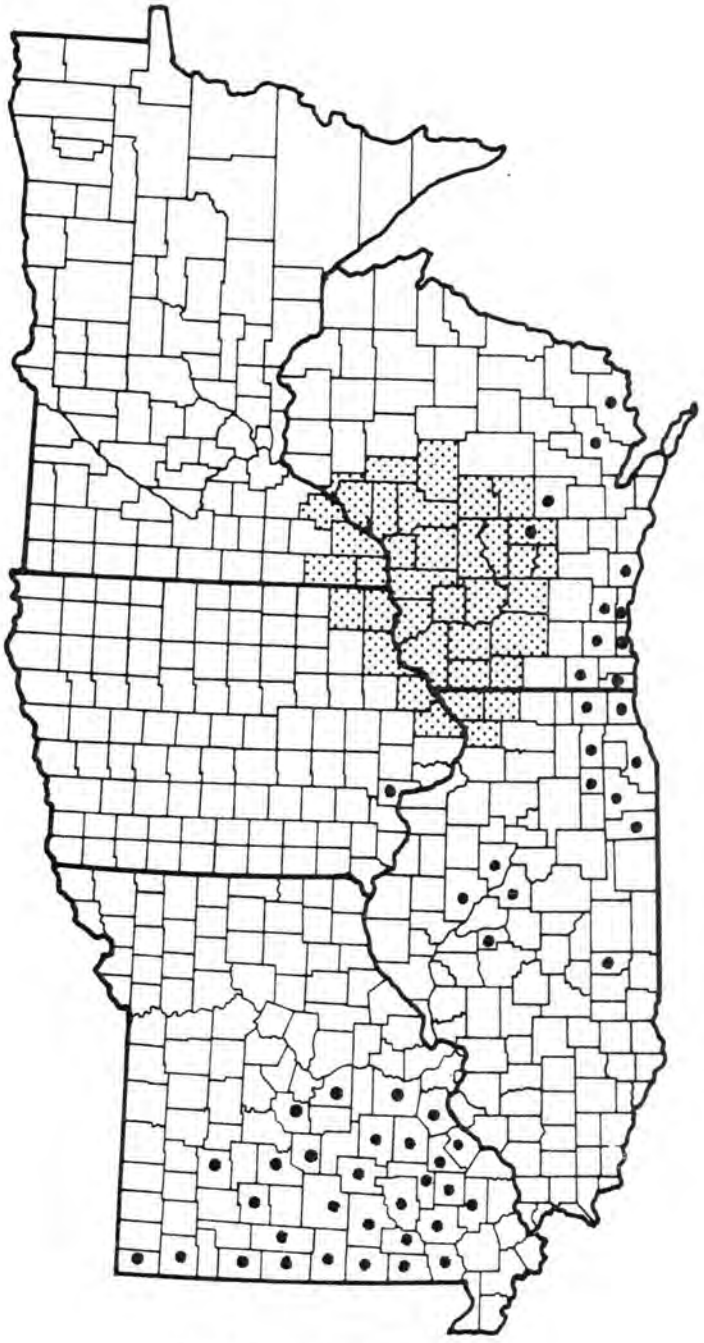
MAP 11. Lycopodium X habereri



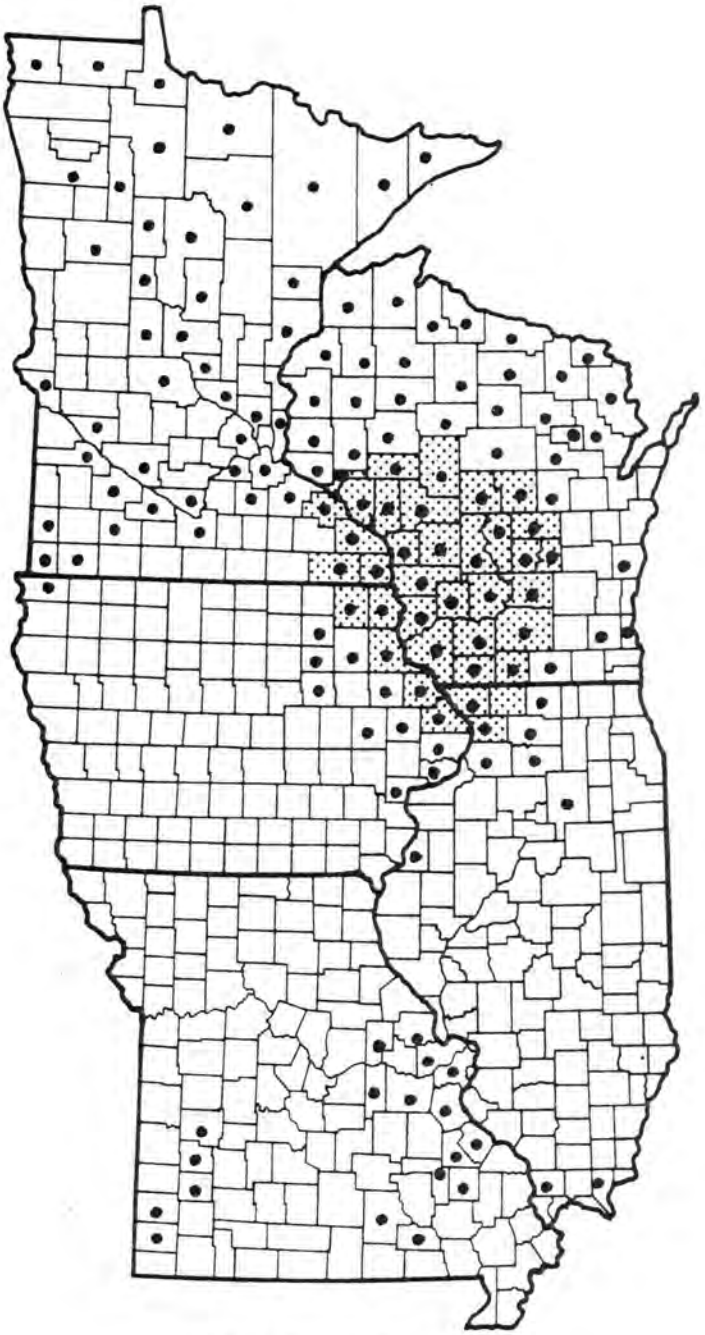
MAP 12. Lycopodium X zeilleri



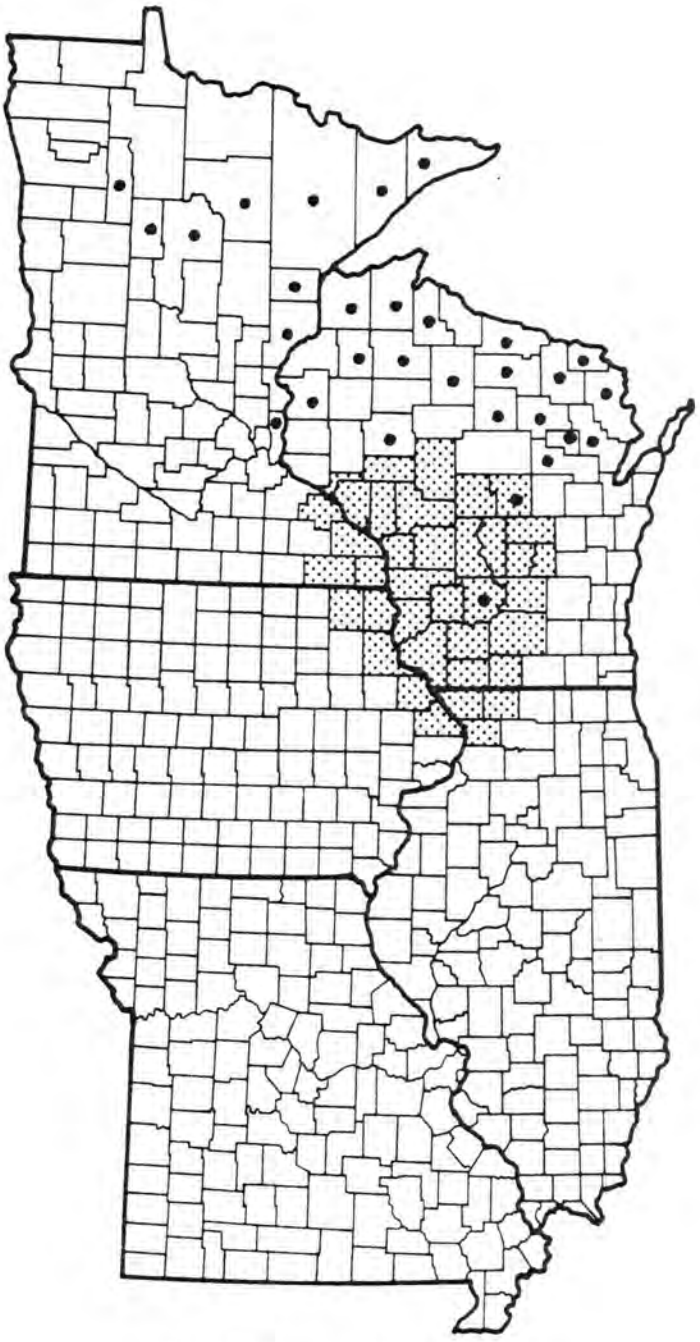
MAP 13. Lycopodium lucidulum X porophilum



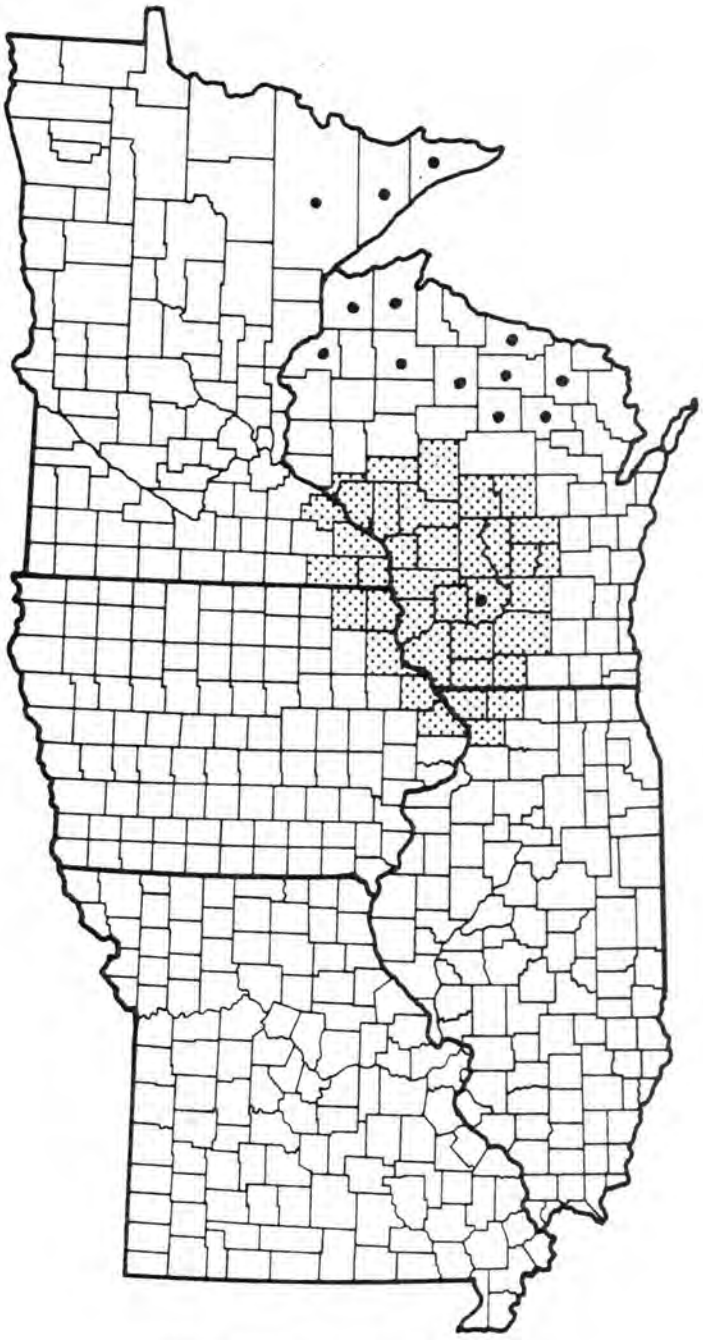
MAP 14. Selaginella eclipes



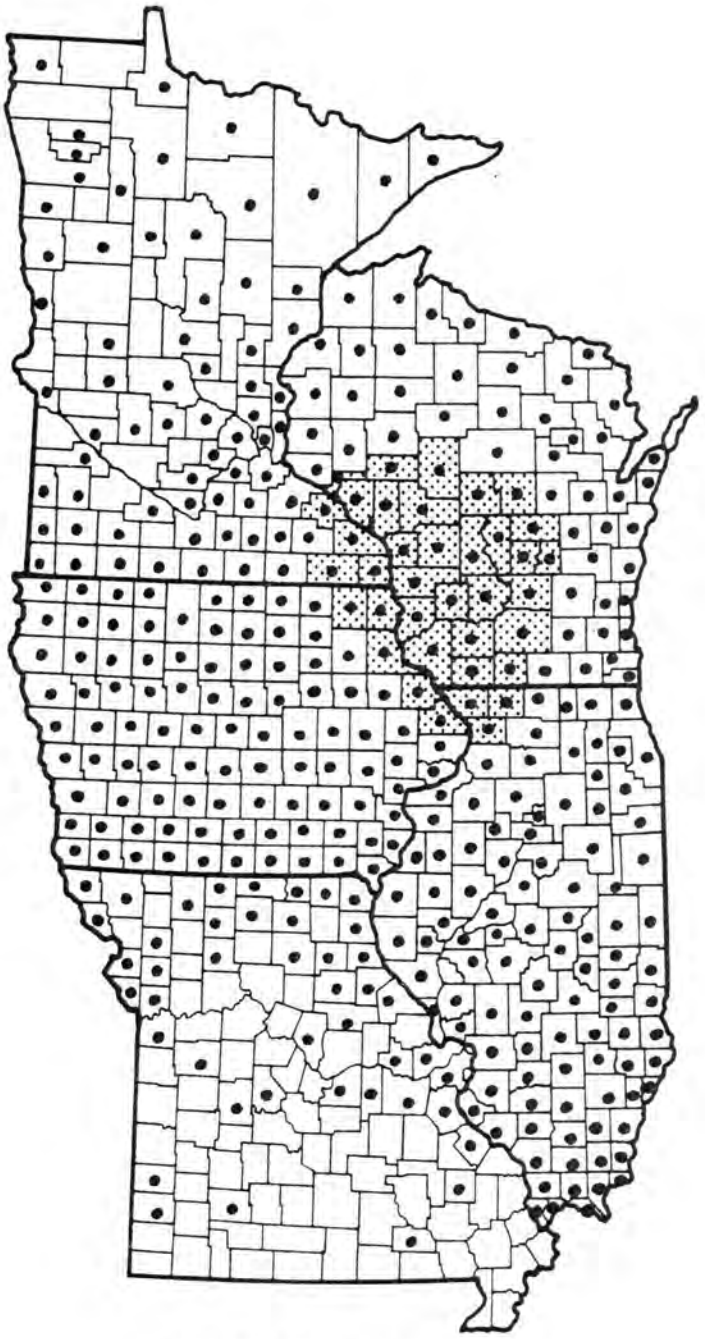
MAP 15. Selaginella rupestris



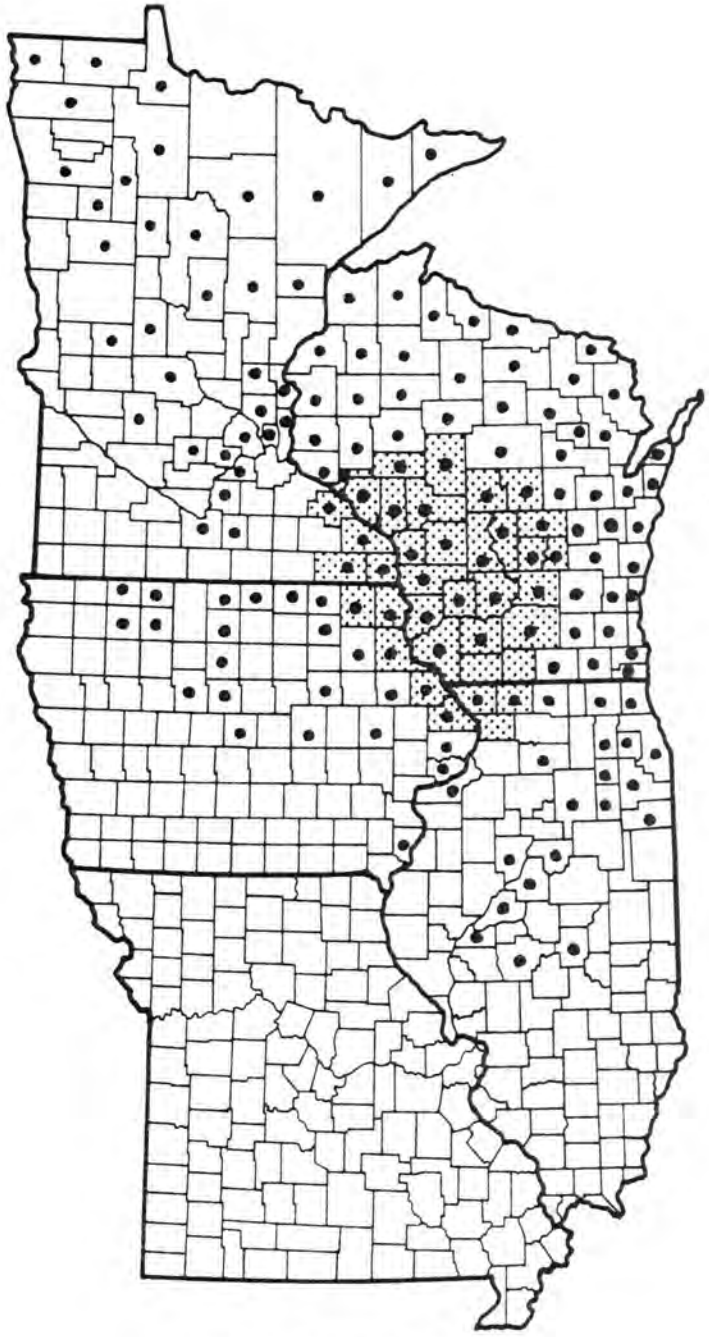
MAP 16. Isoetes echinospora



MAP 17. Isoetes macrospora



MAP 18. Equisetum arvense



MAP 19. Equisetum fluviatile

MILWAUKEE PUBLIC MUSEUM

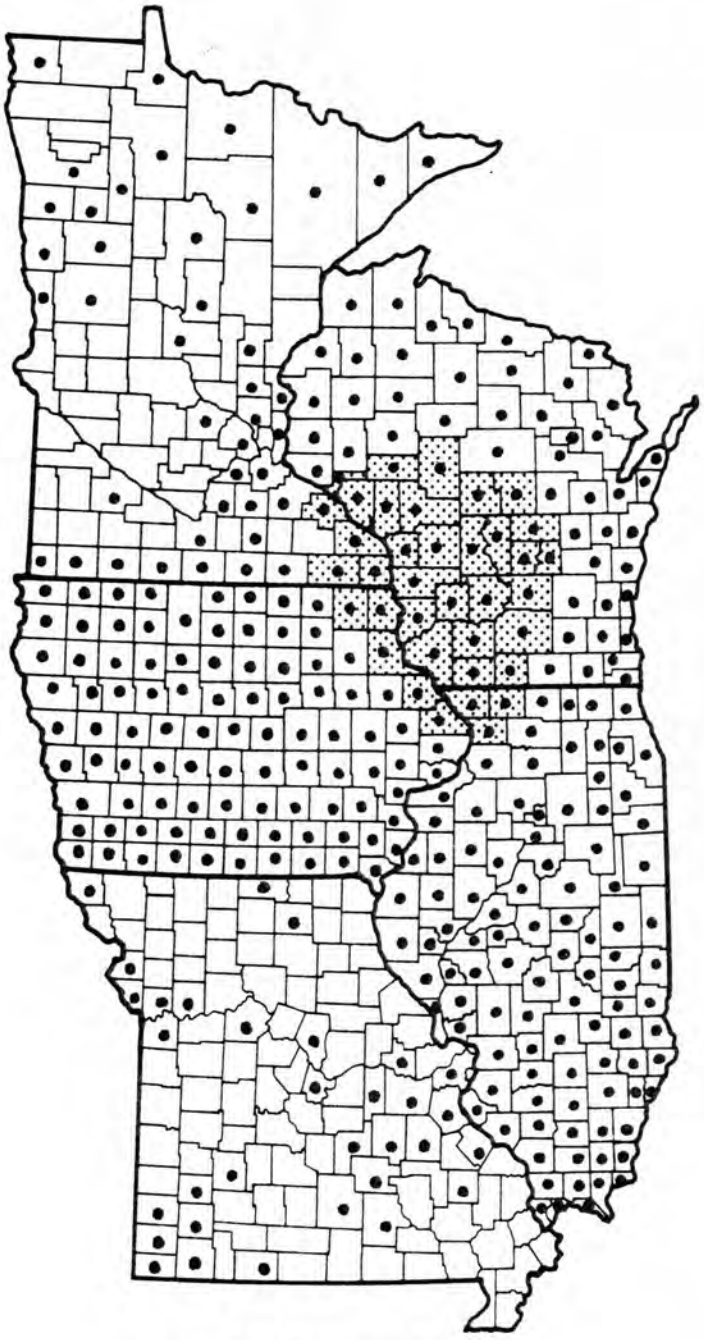
Contributions

in
BIOLOGY
and
GEOLOGY

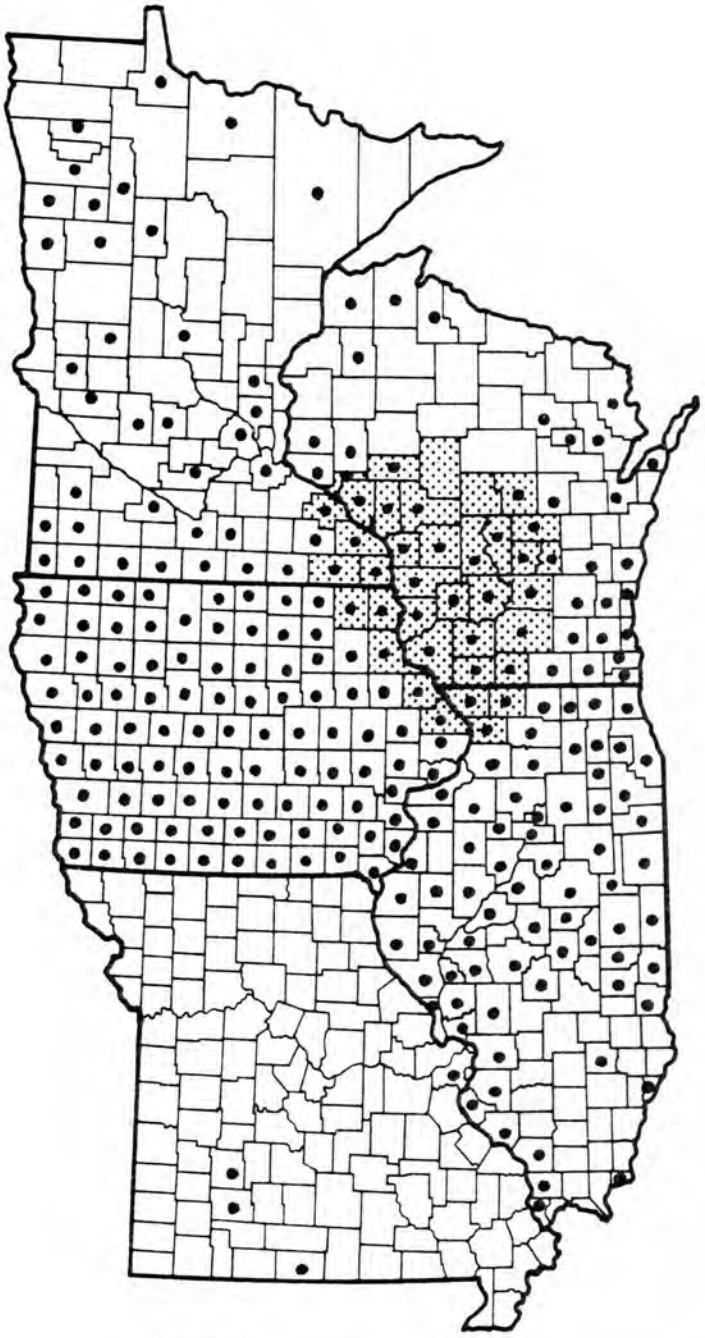
Number 53 **November 5, 1982**

Ferns and Fern Allies of the Driftless Area of Illinois, Iowa, Minnesota and Wisconsin

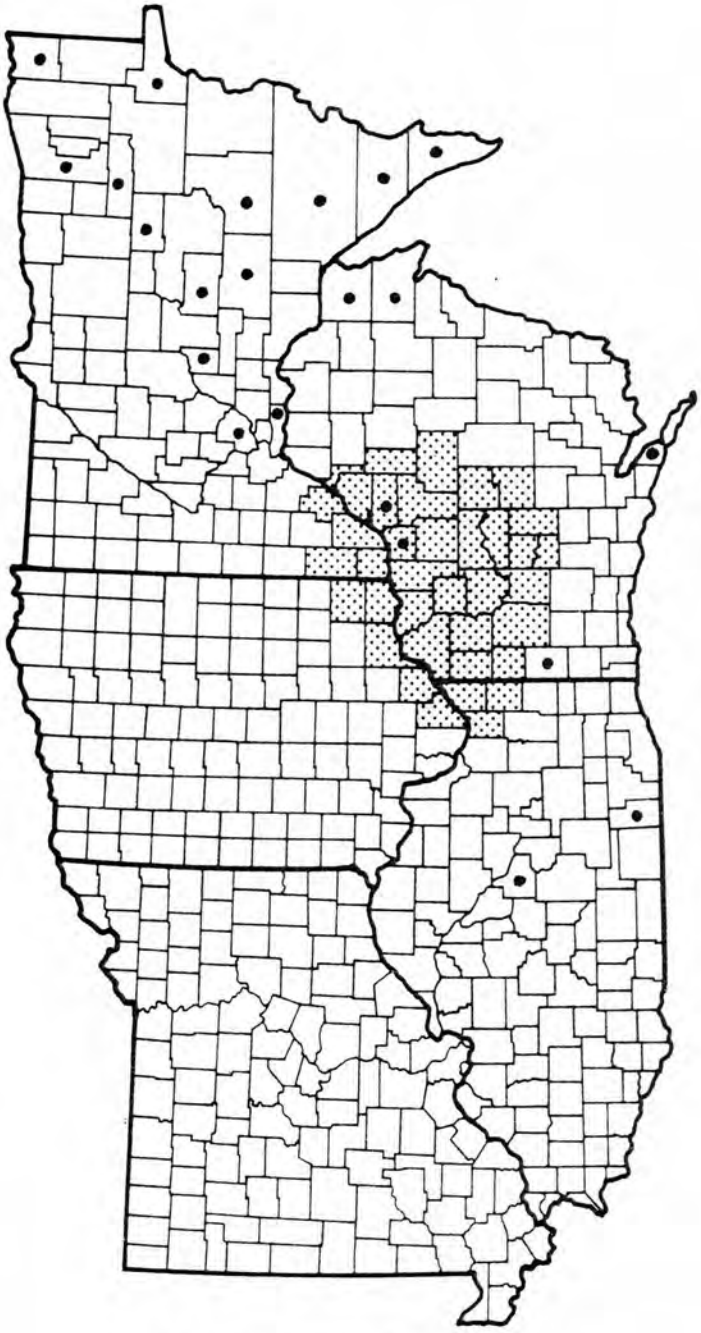
James H. Peck



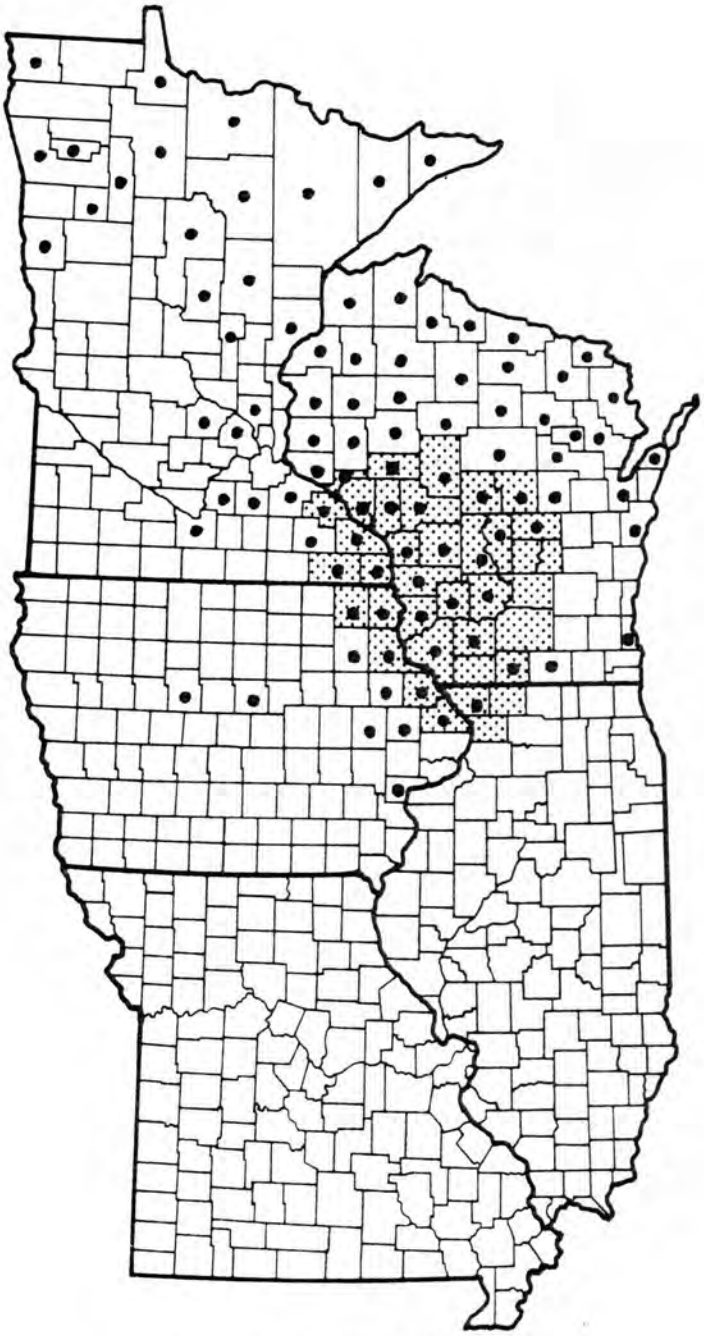
MAP 20. Equisetum hyemale



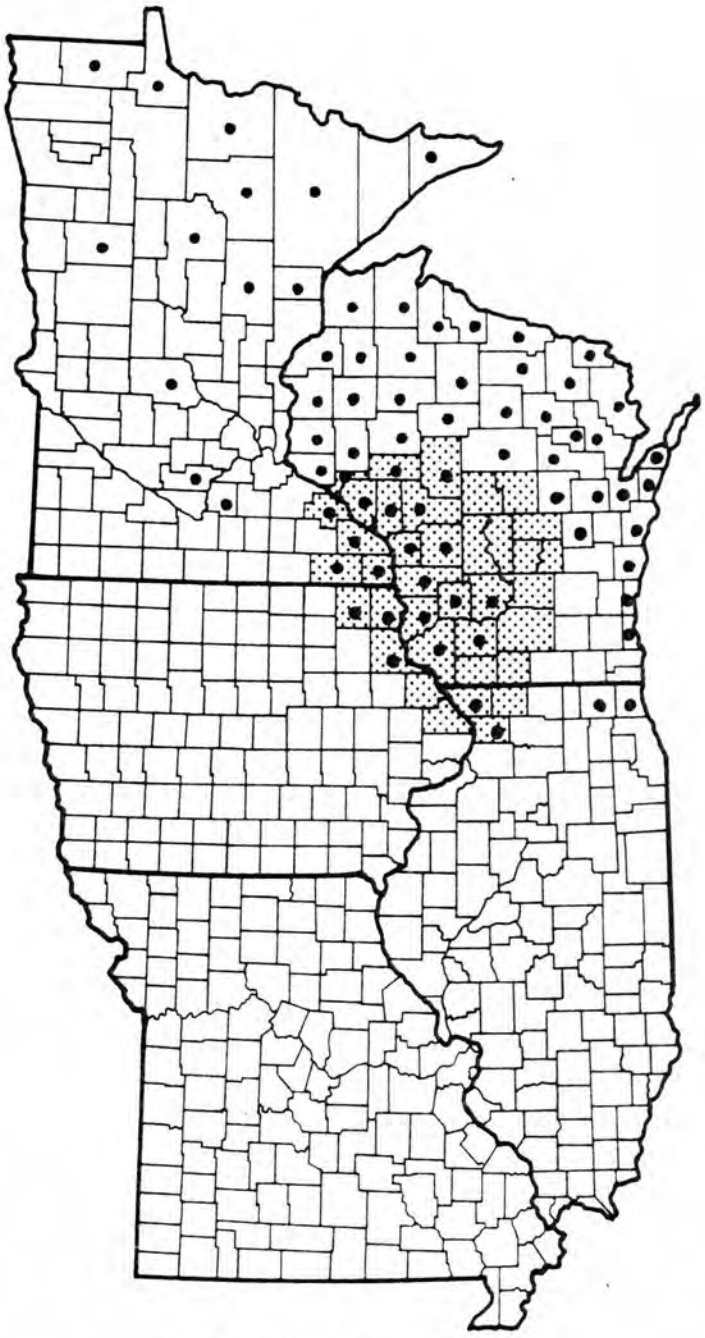
MAP 21. Equisetum laeviagatum



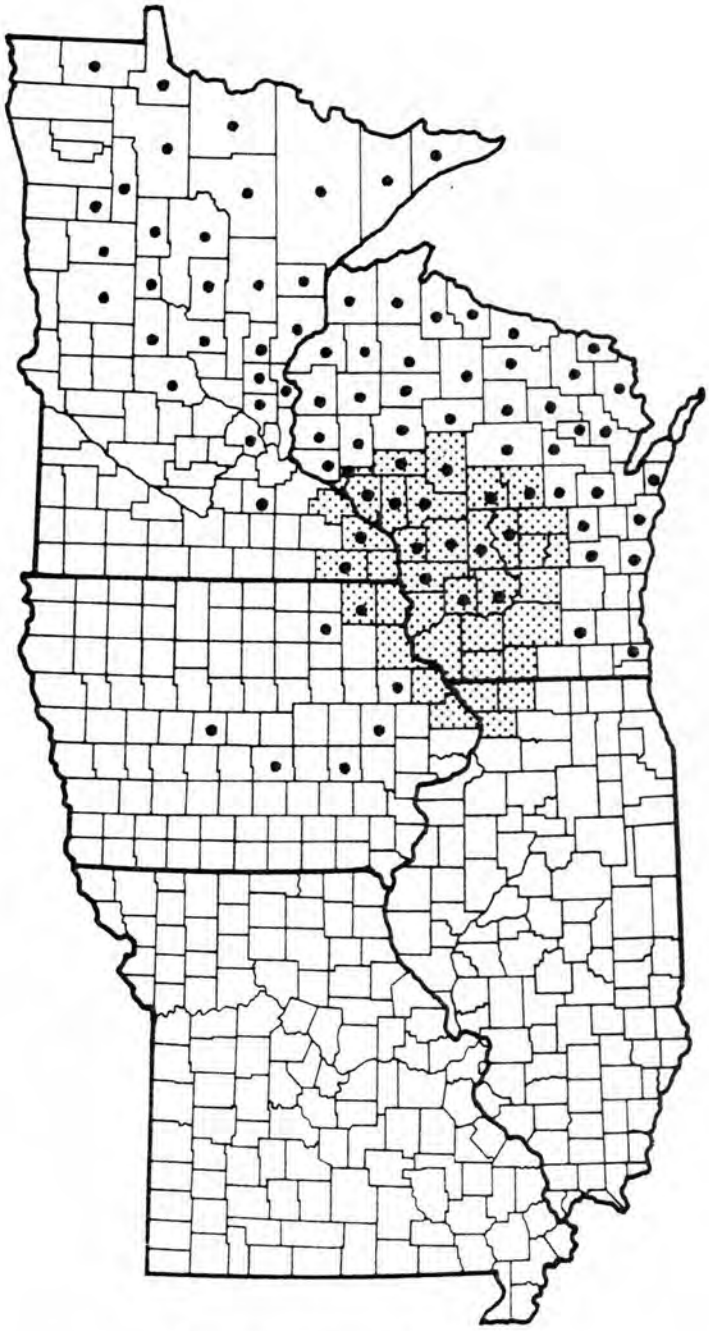
MAP 22. Equisetum palustre



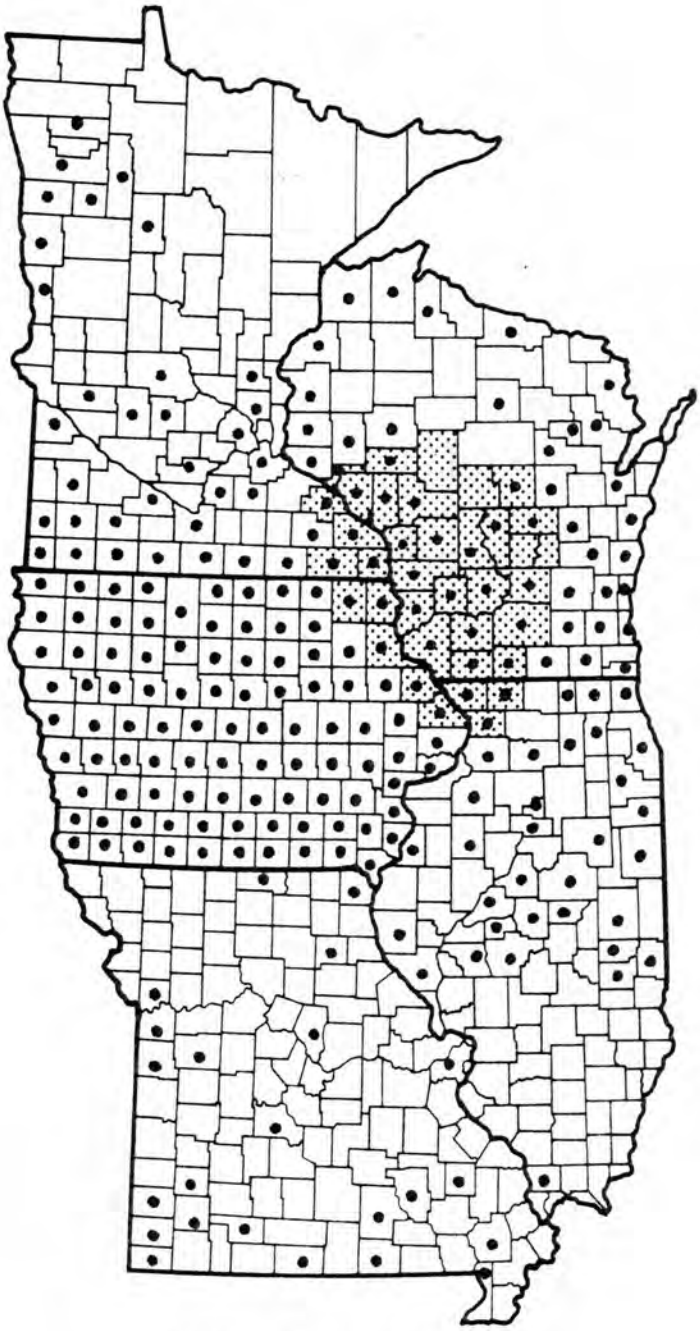
MAP 23. Equisetum pratense



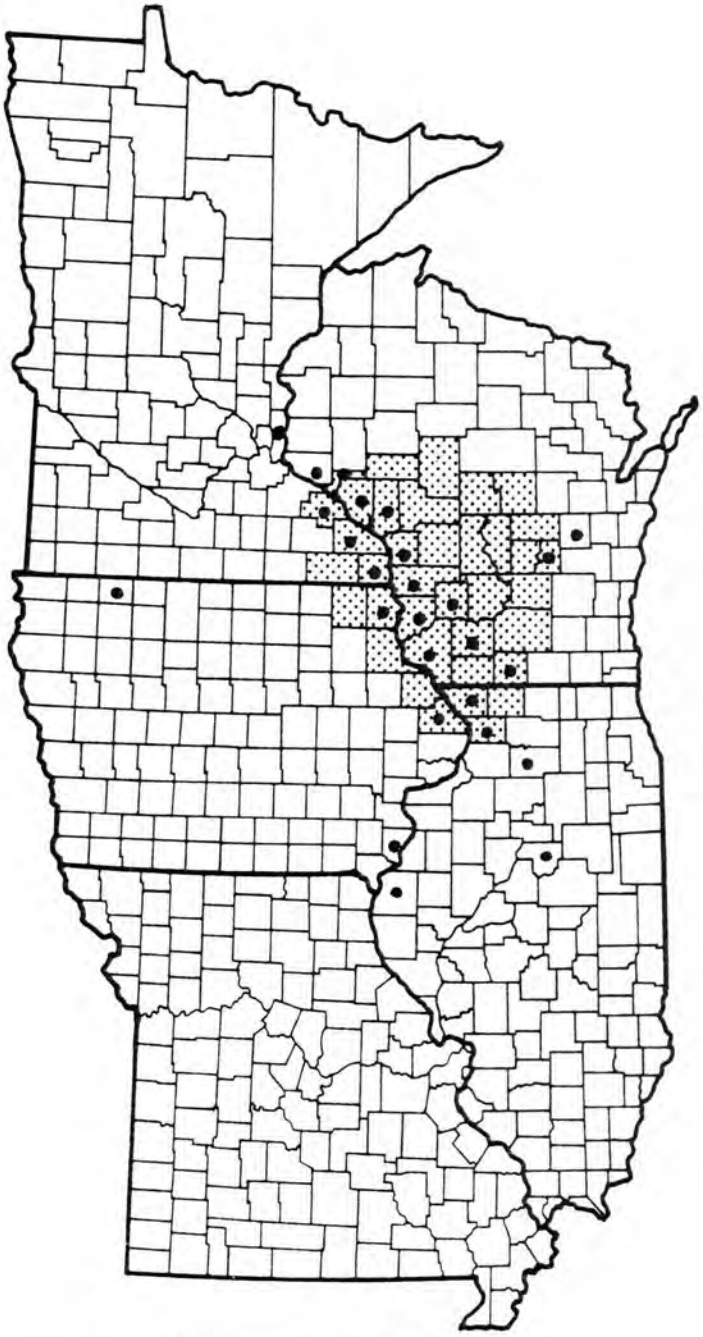
MAP 24. Equisetum scirpoides



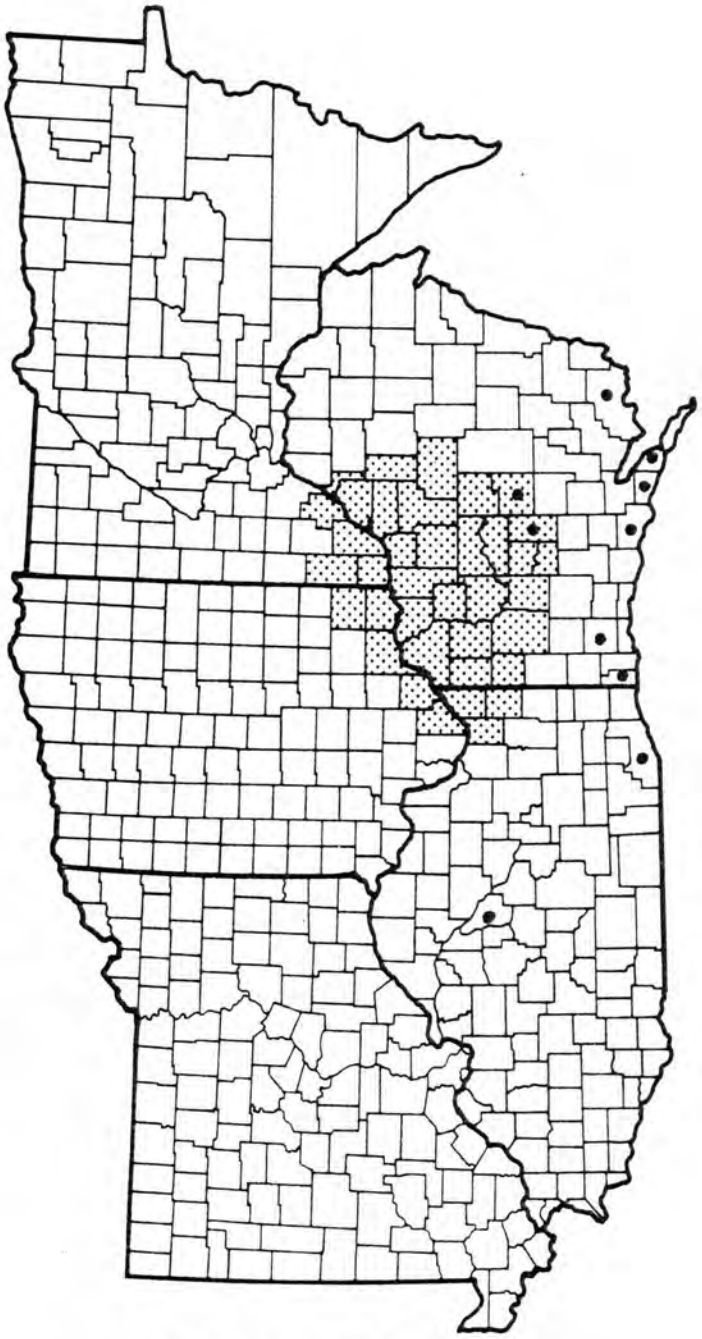
MAP 25. Equisetum sylvaticum



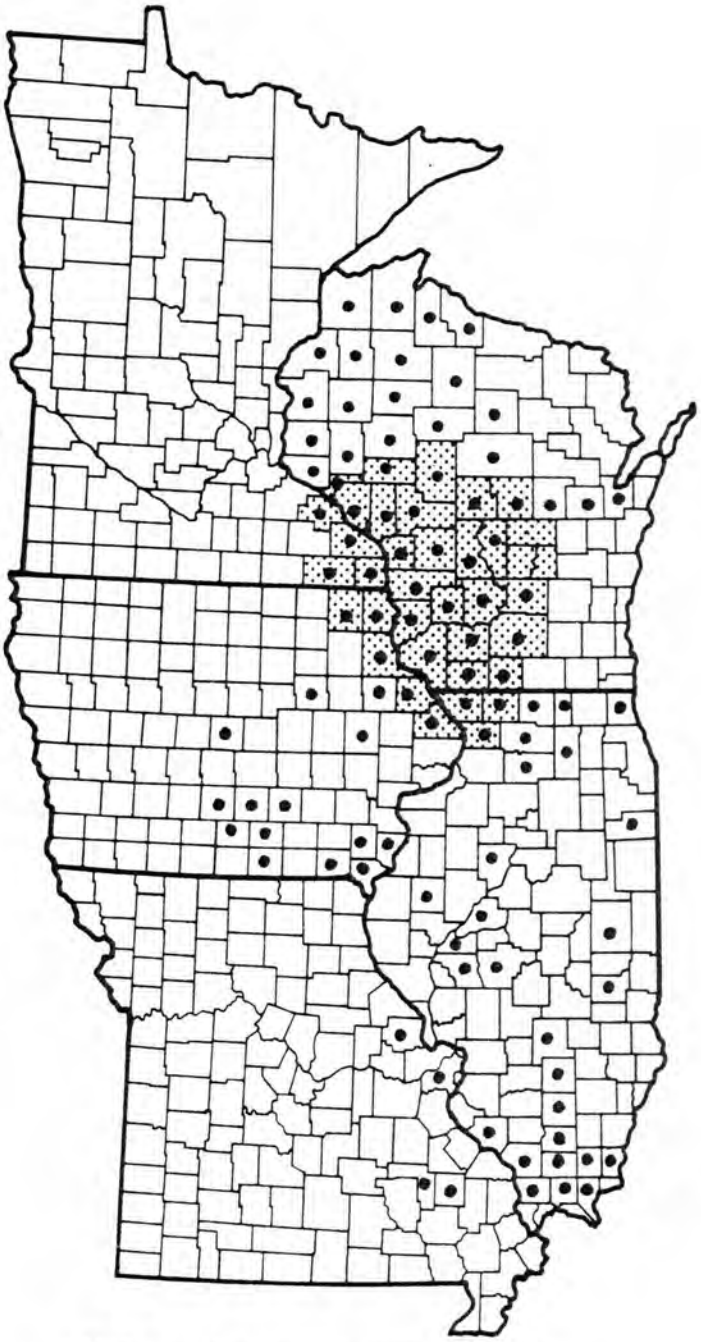
MAP 26. Equisetum X ferrissii



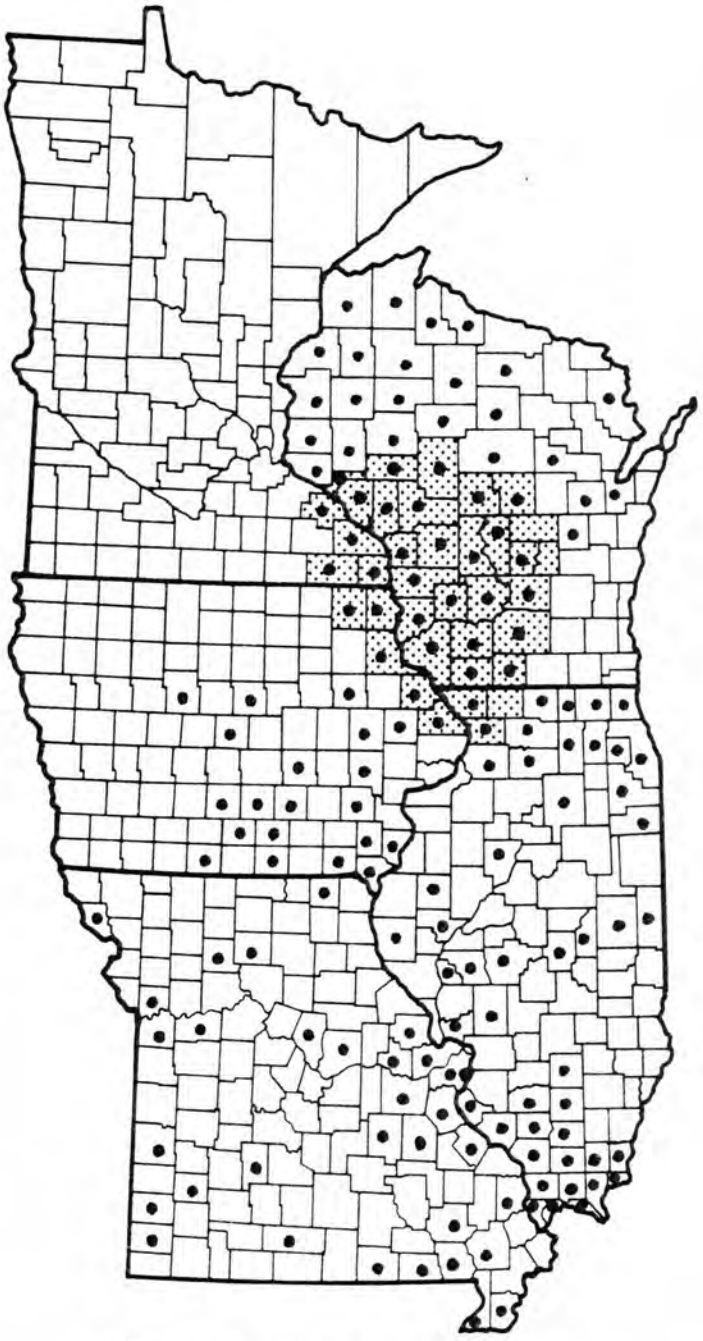
MAP 27. Equisetum X litorale



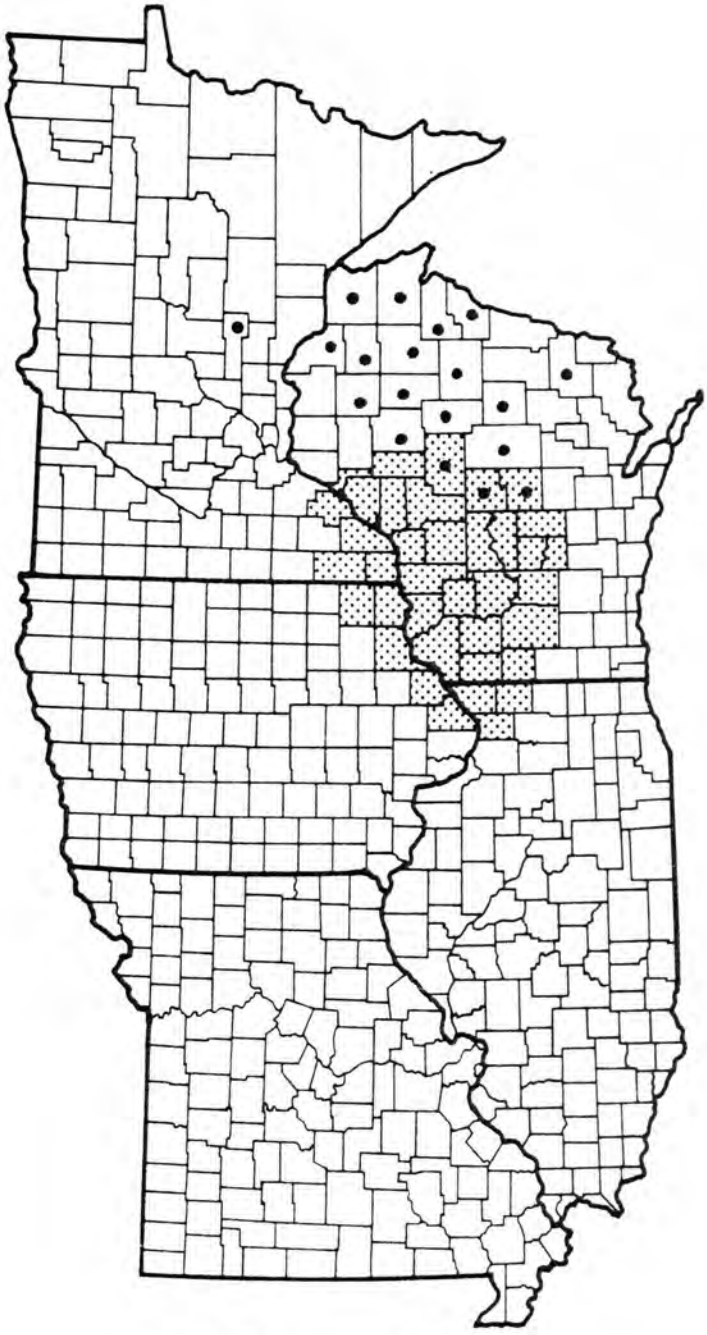
MAP 28. Equisetum X trachyodon



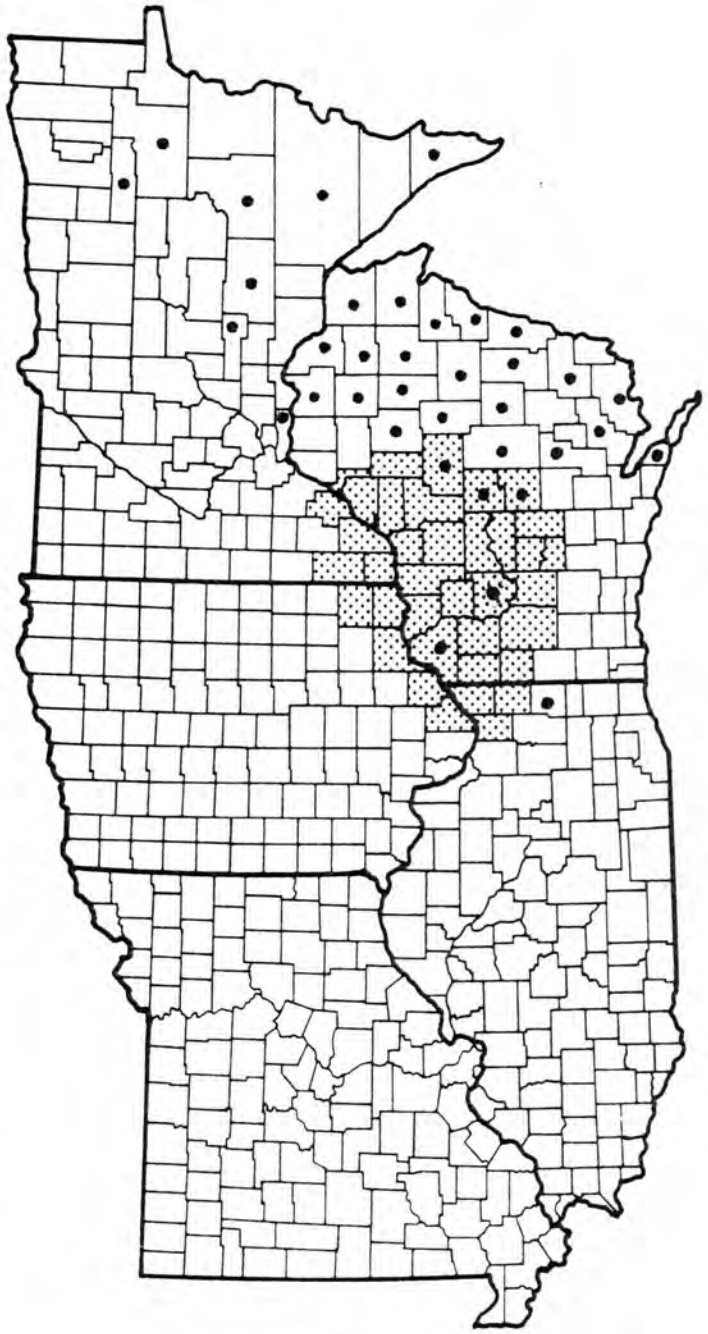
MAP 29A. Botrychium dissectum dissectum



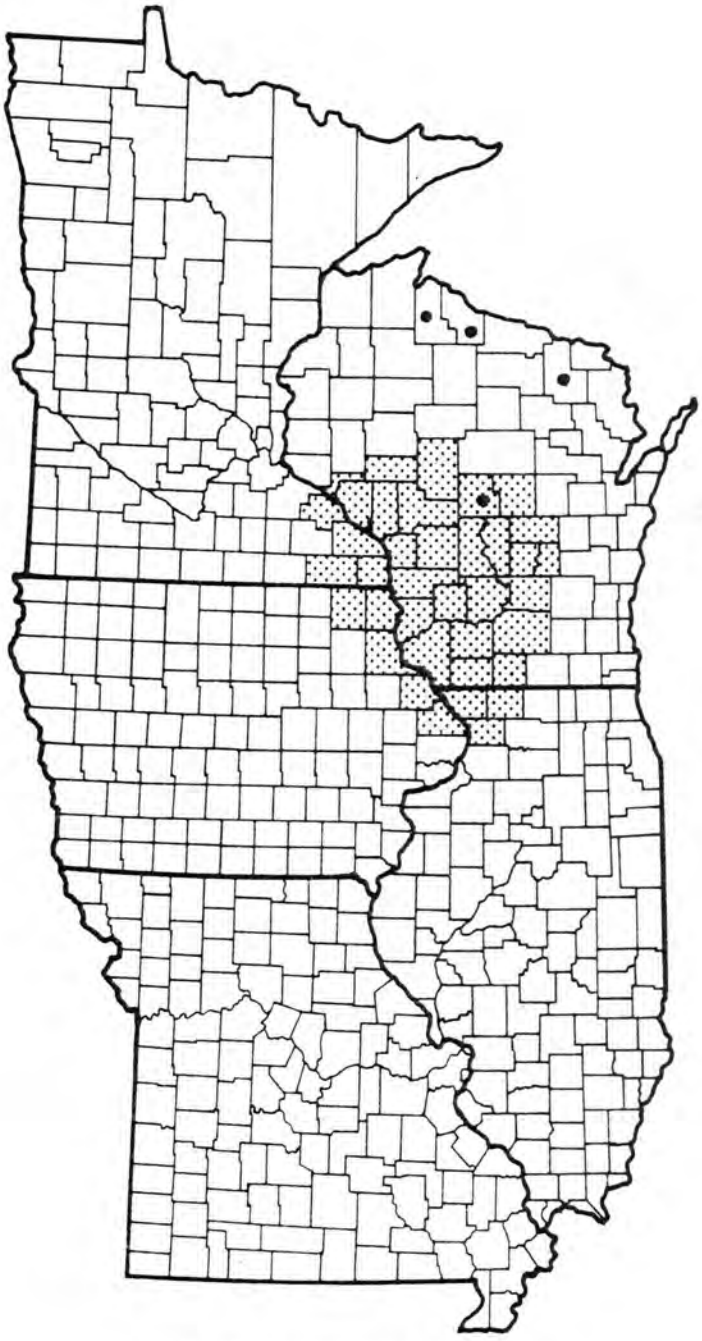
MAP 29B. Botrychium dissectum obliquum



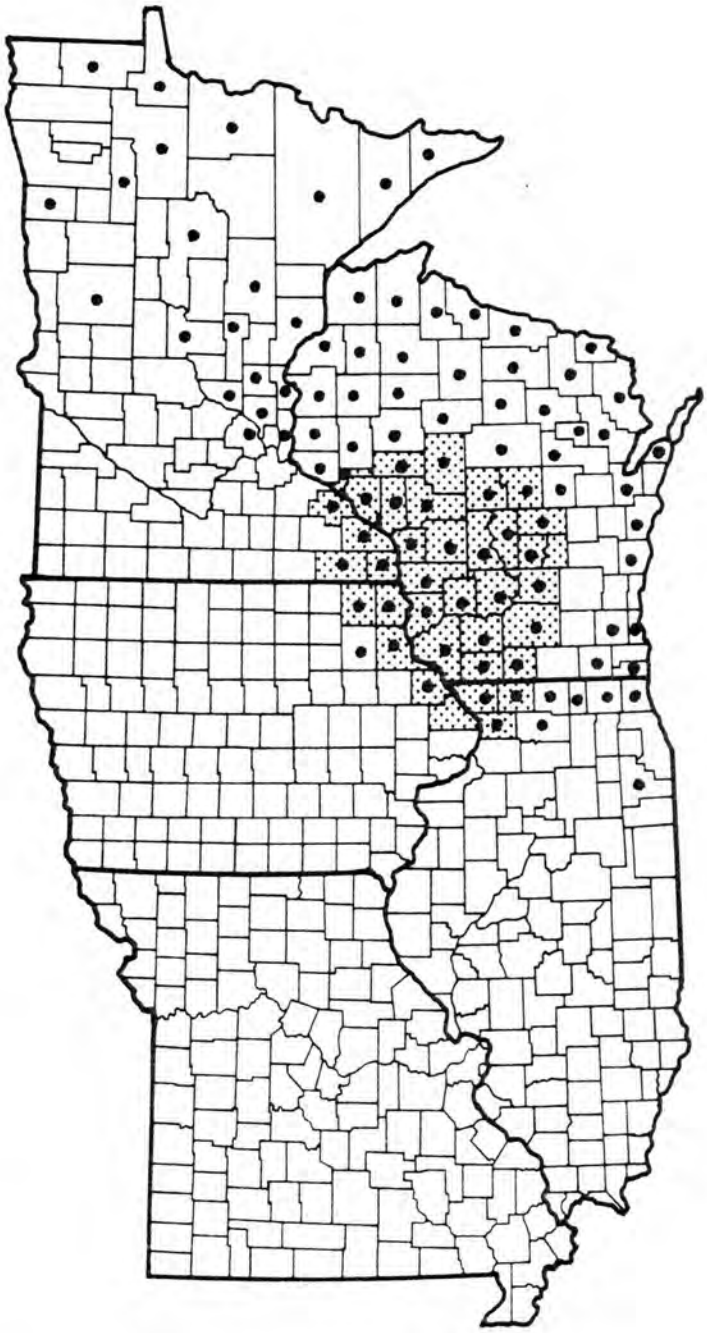
MAP 30. Botrychium lanceolatum



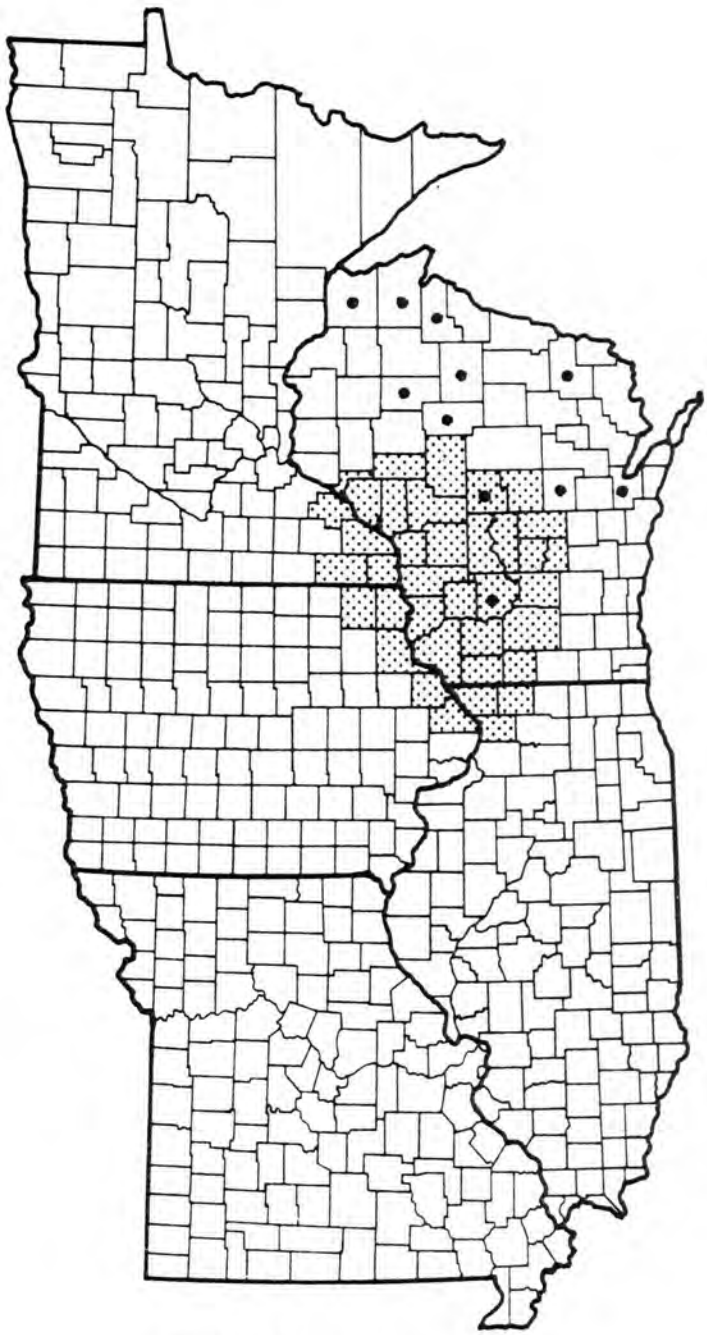
MAP 31. Botrychium matricariifolium



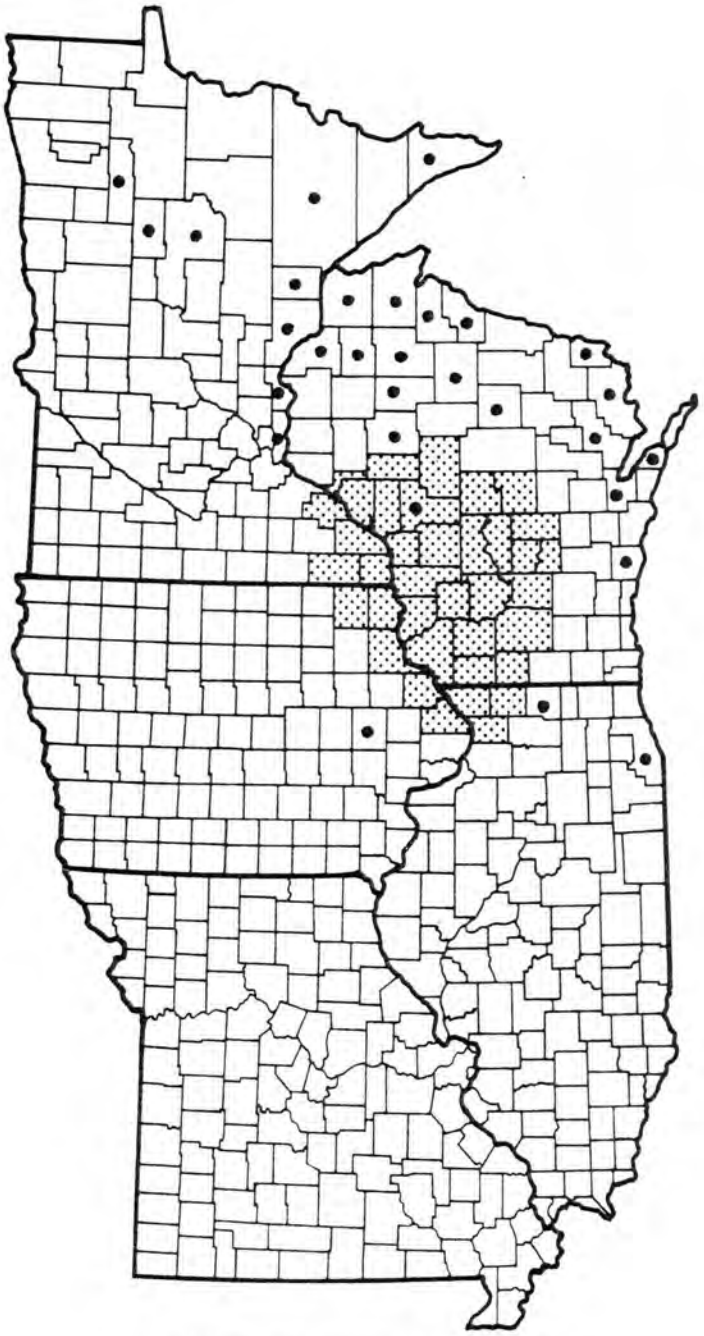
MAP 32. Botrychium mormo



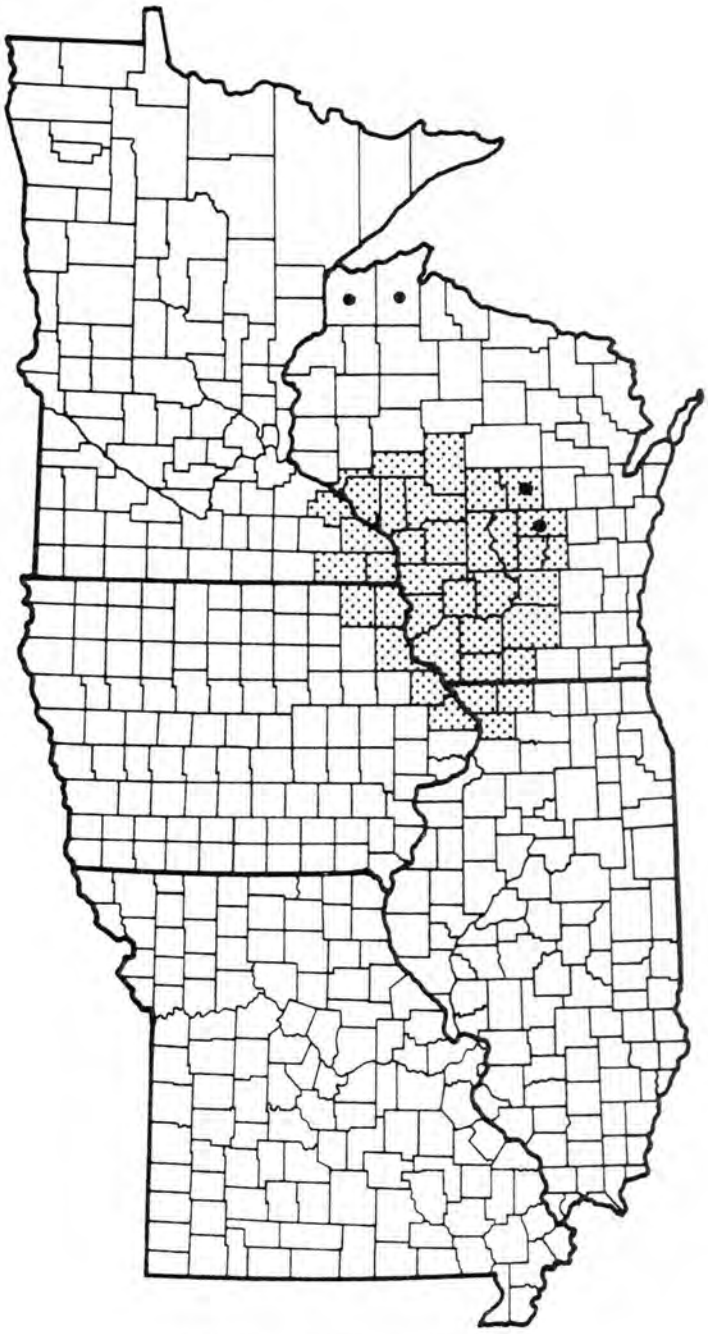
MAP 33. Botrychium multifidum



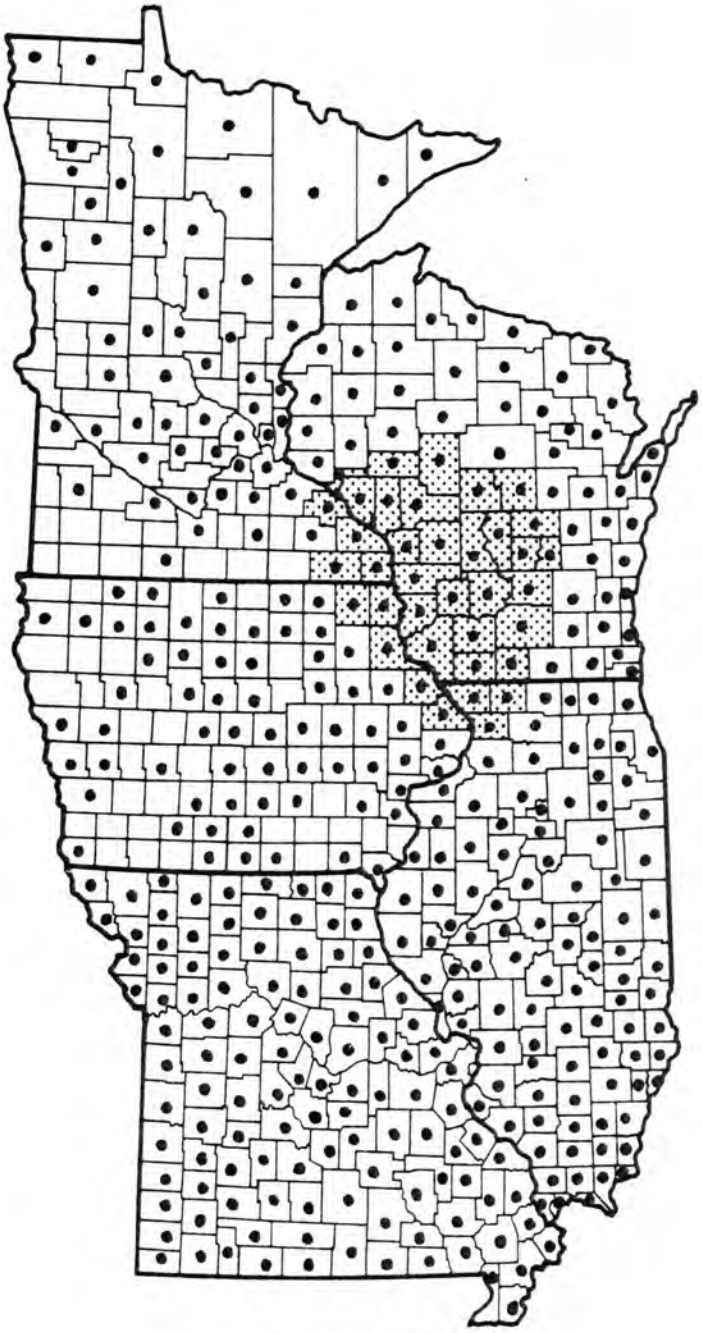
MAP 34. Botrychium oneidense



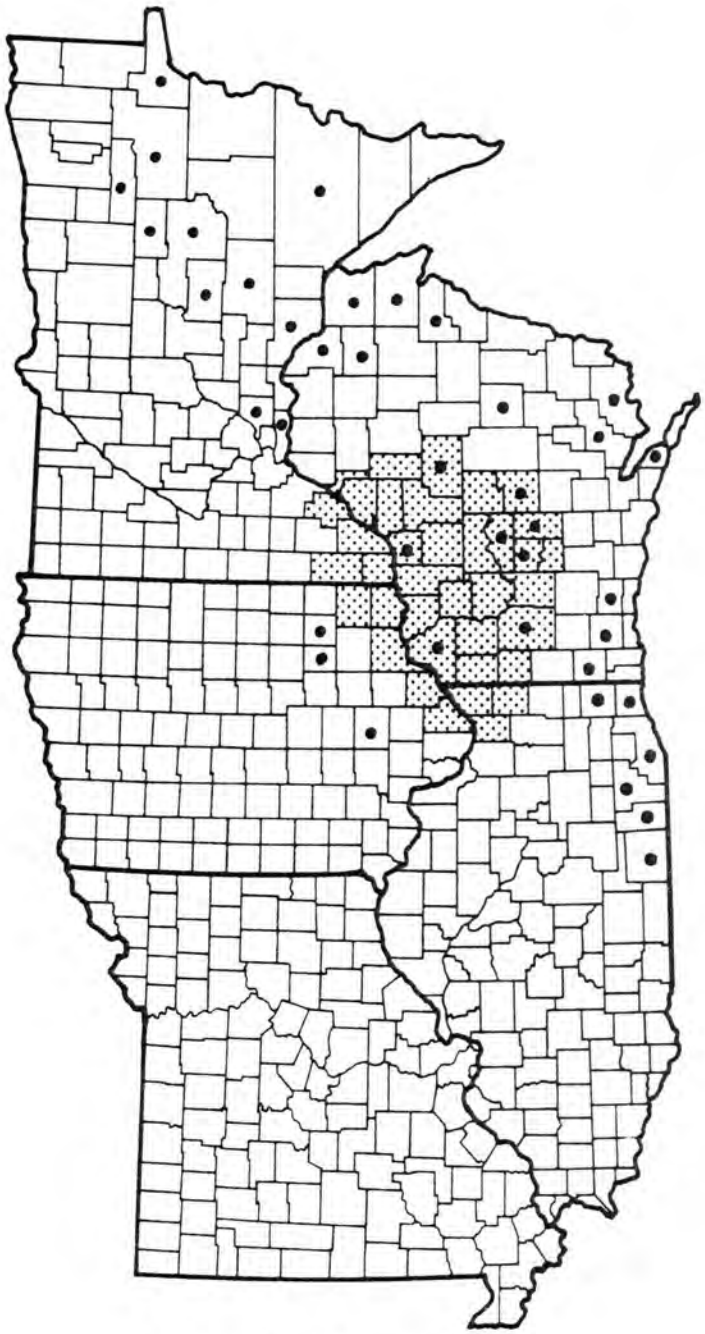
MAP 35. Botrychium simplex



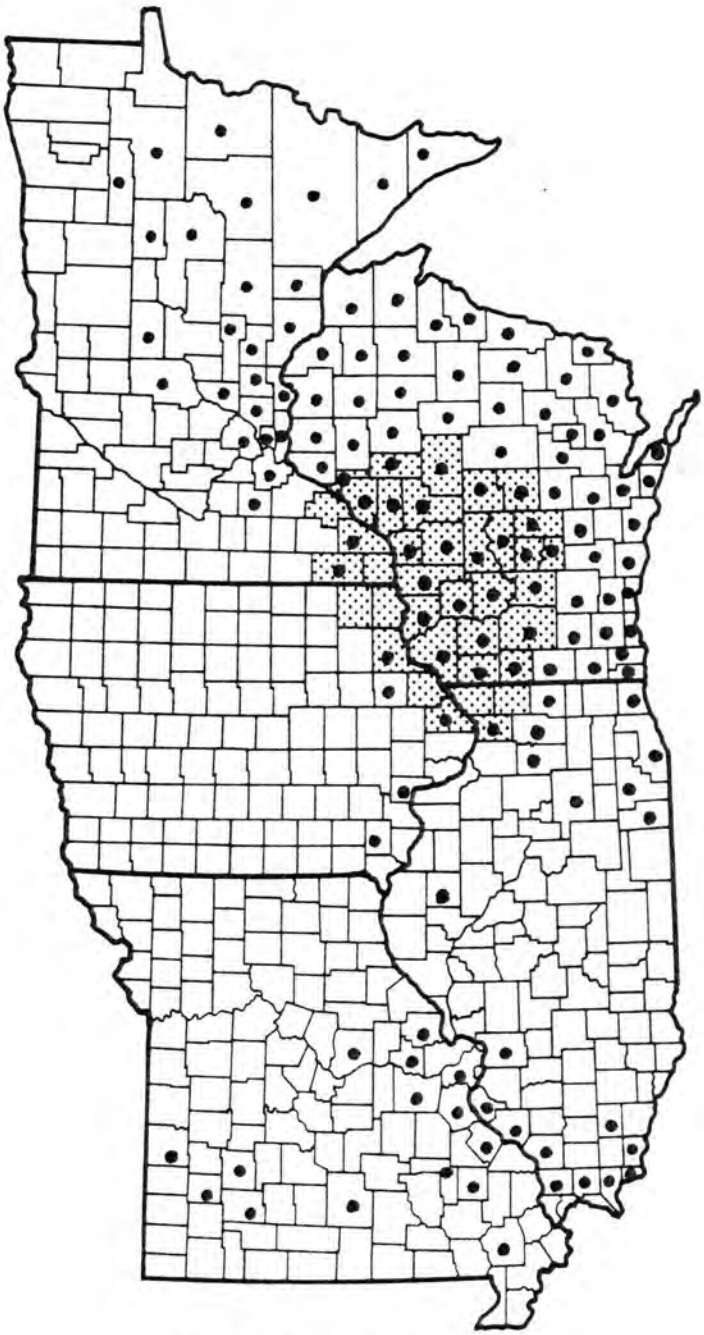
MAP 36. Botrychium ternatum



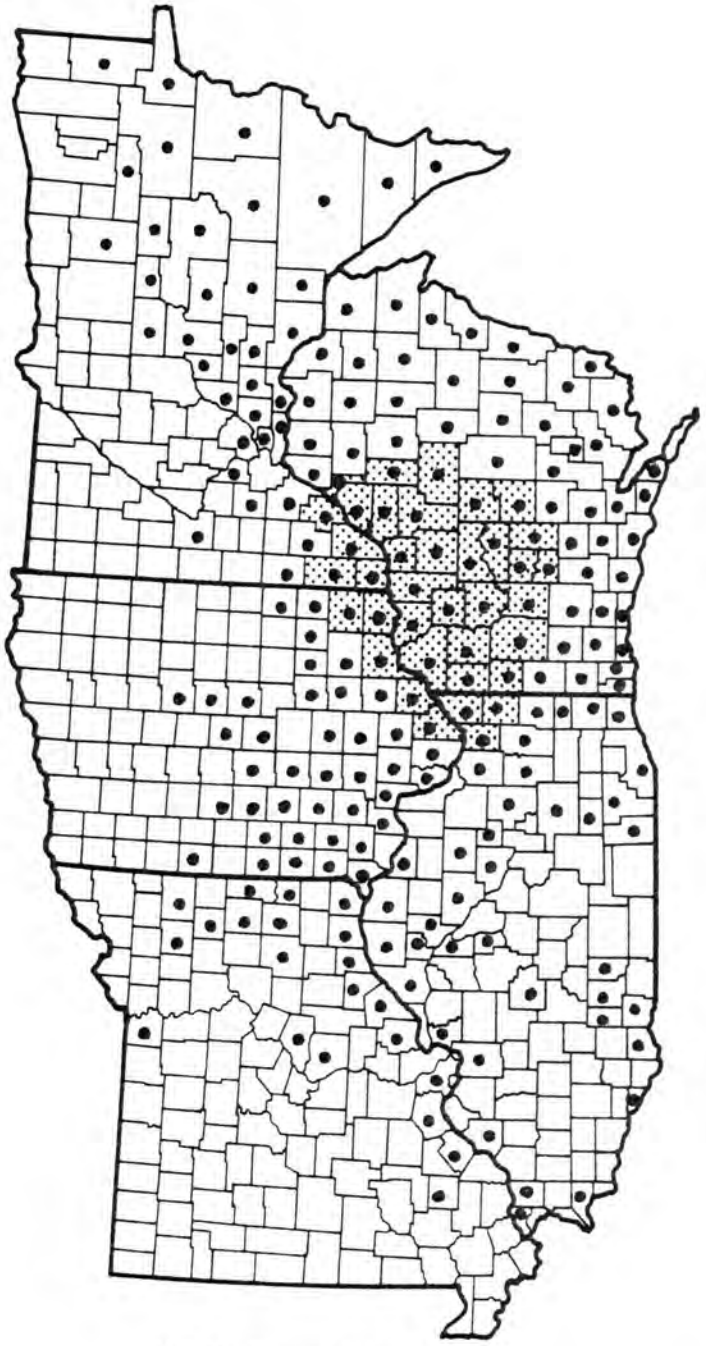
MAP 37. Botrychium virginianum



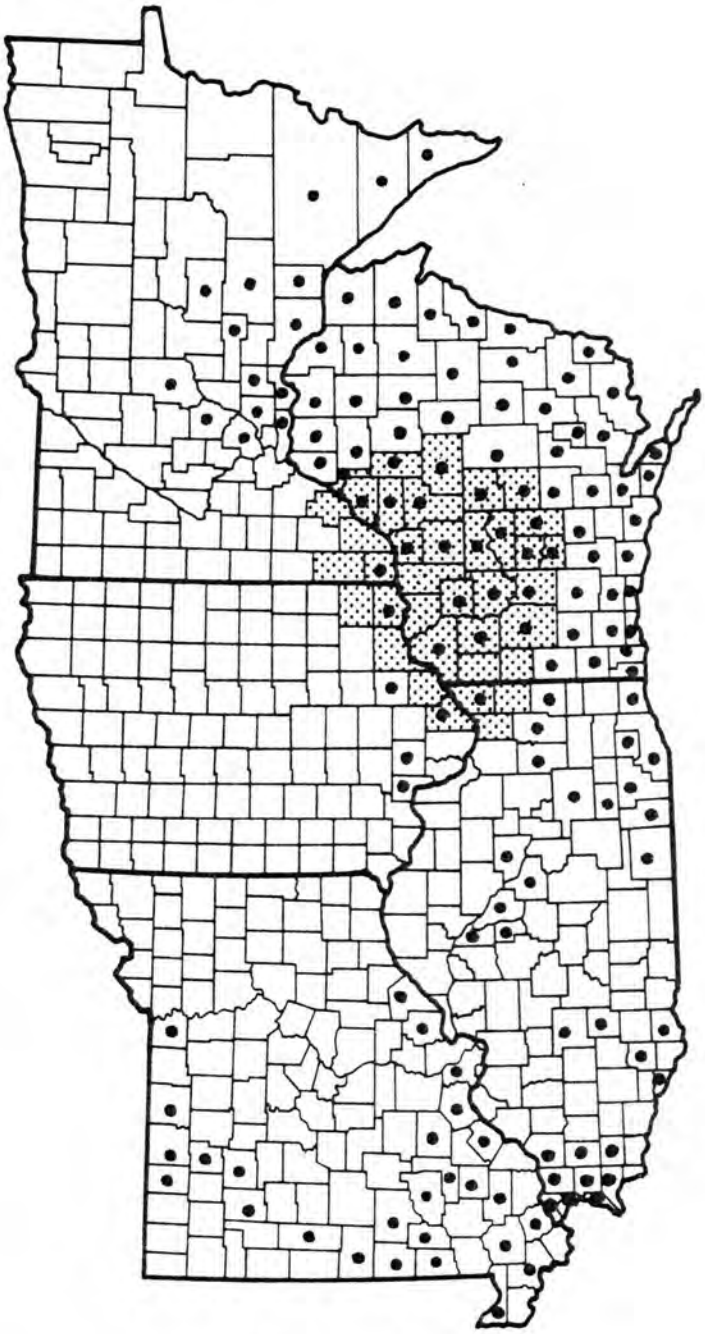
MAP 38. Ophioglossum vulgatum



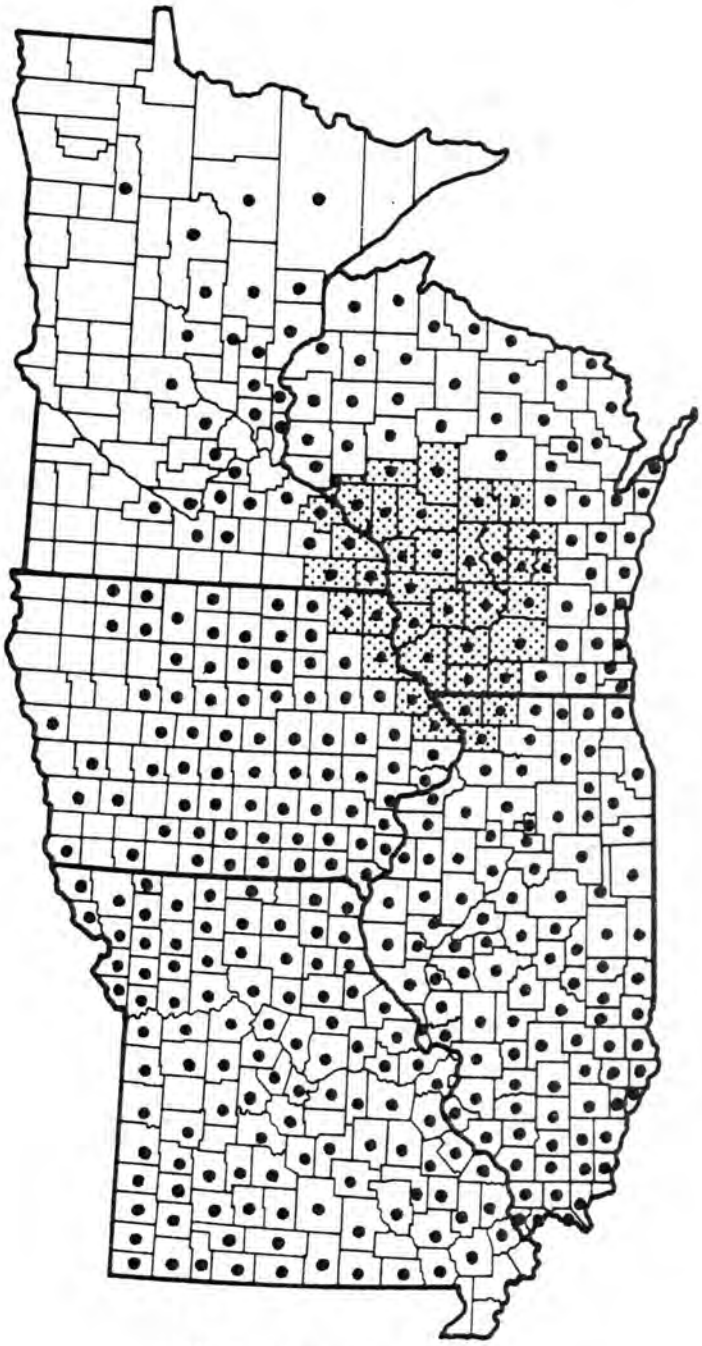
MAP 39. Osmunda cinnamomea



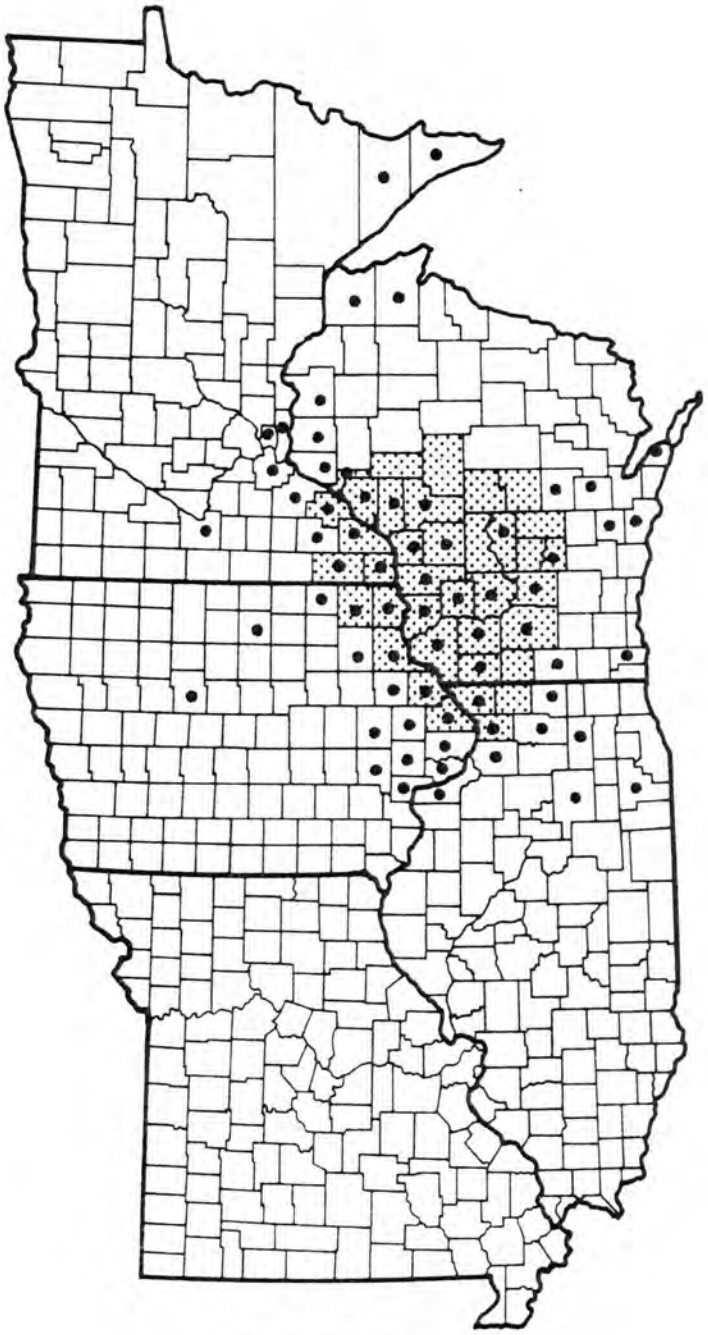
MAP 40. Osmunda claytoniana



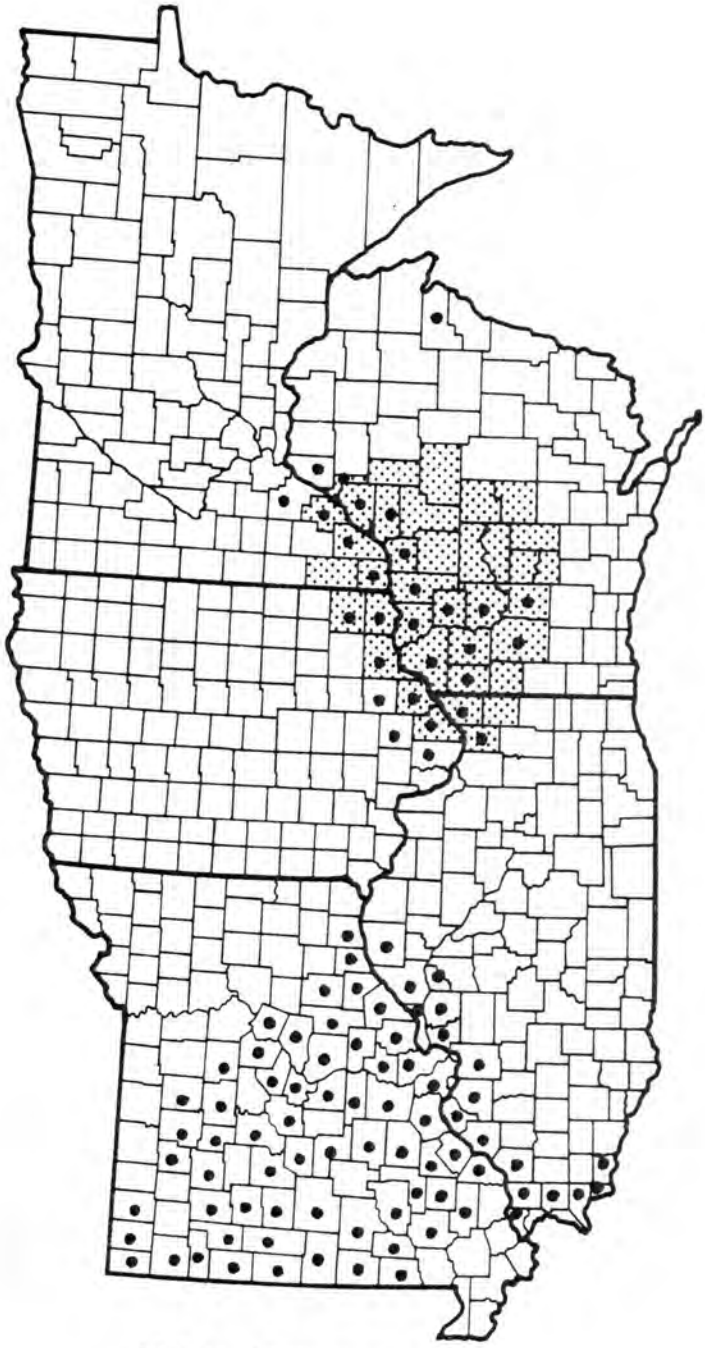
MAP 41. Osmunda regalis



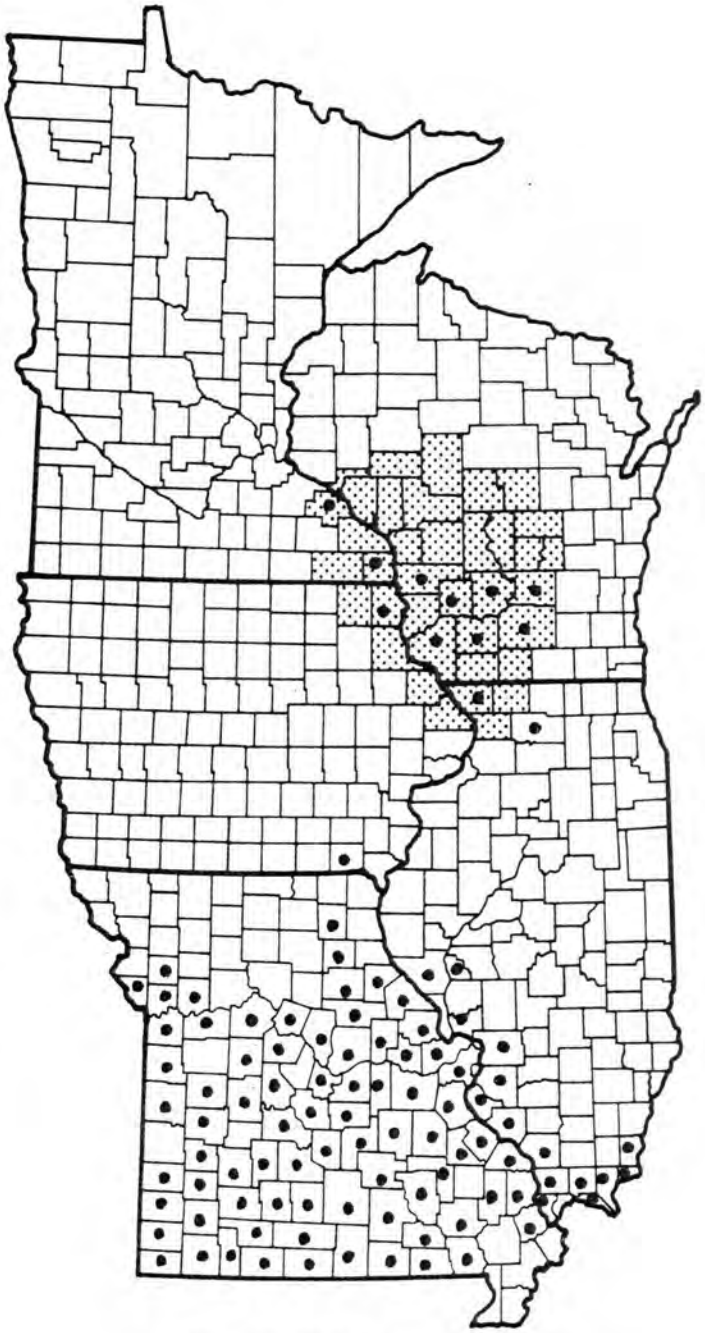
MAP 42. Adiantum pedatum



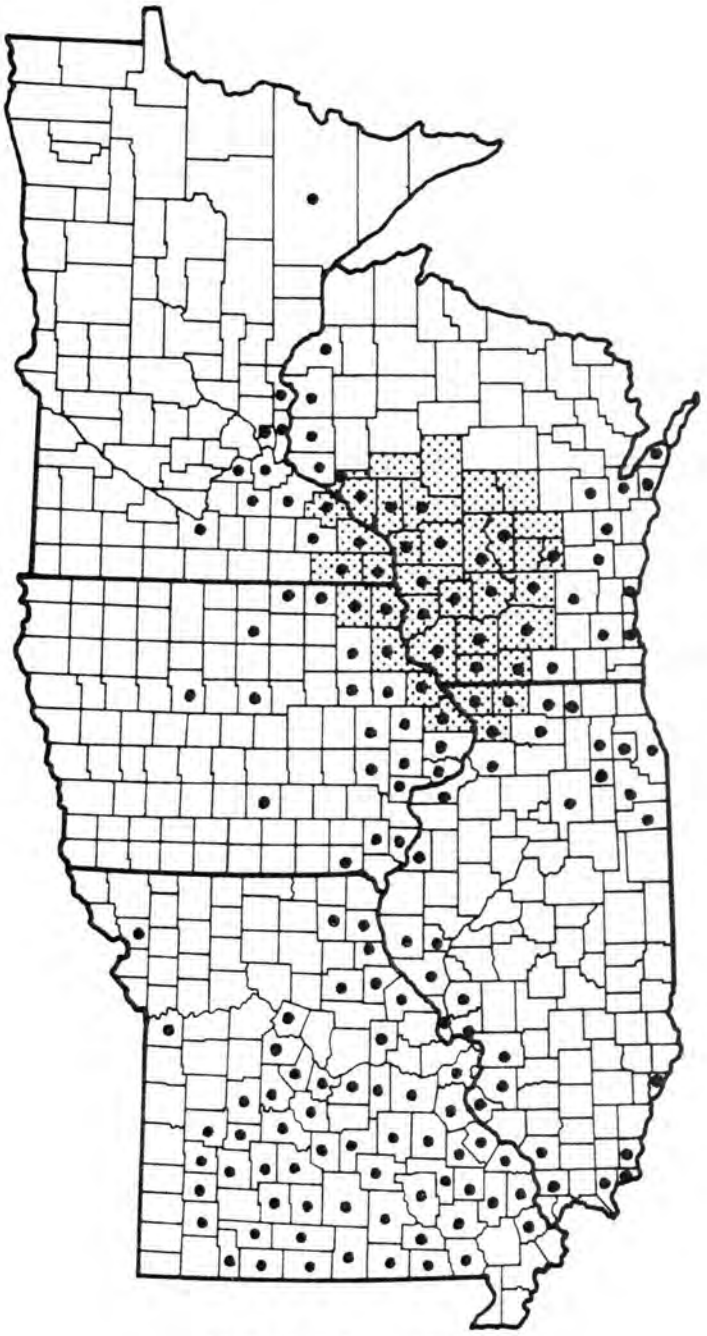
MAP 43. Cheilanthes feei



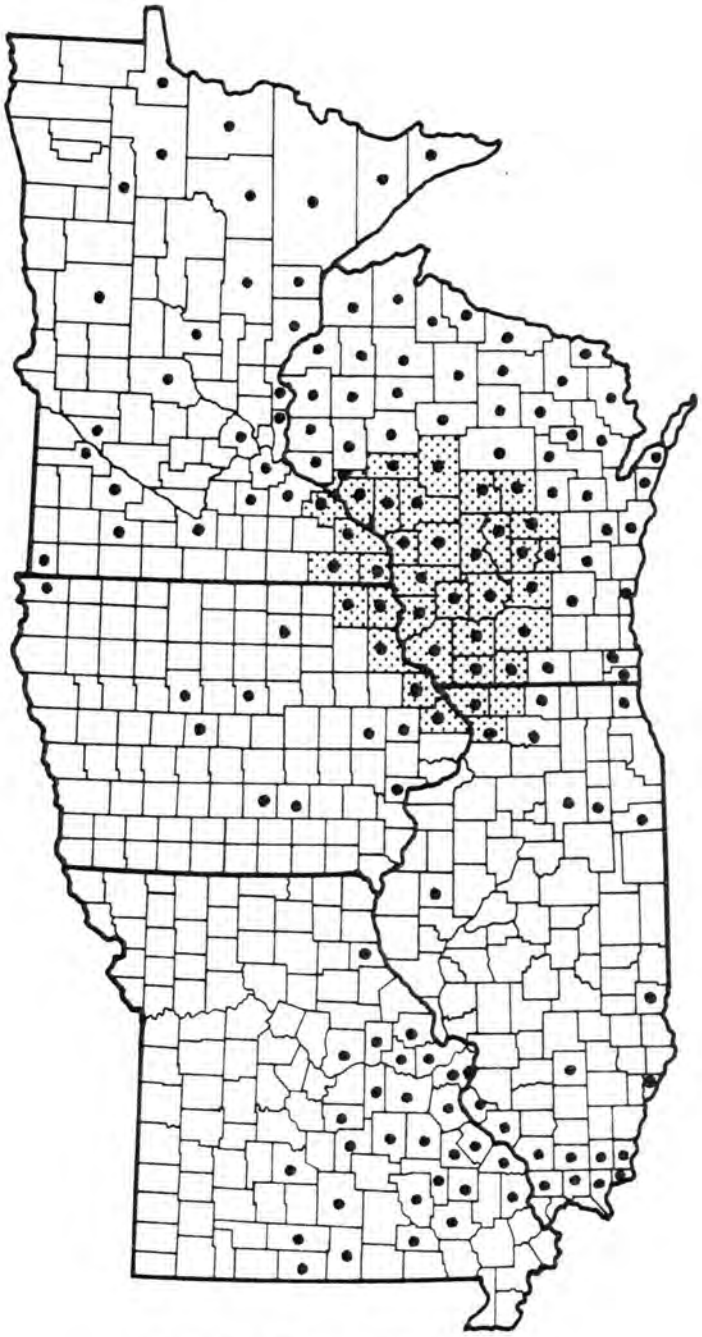
MAP 44. Cryptogramma stelleri



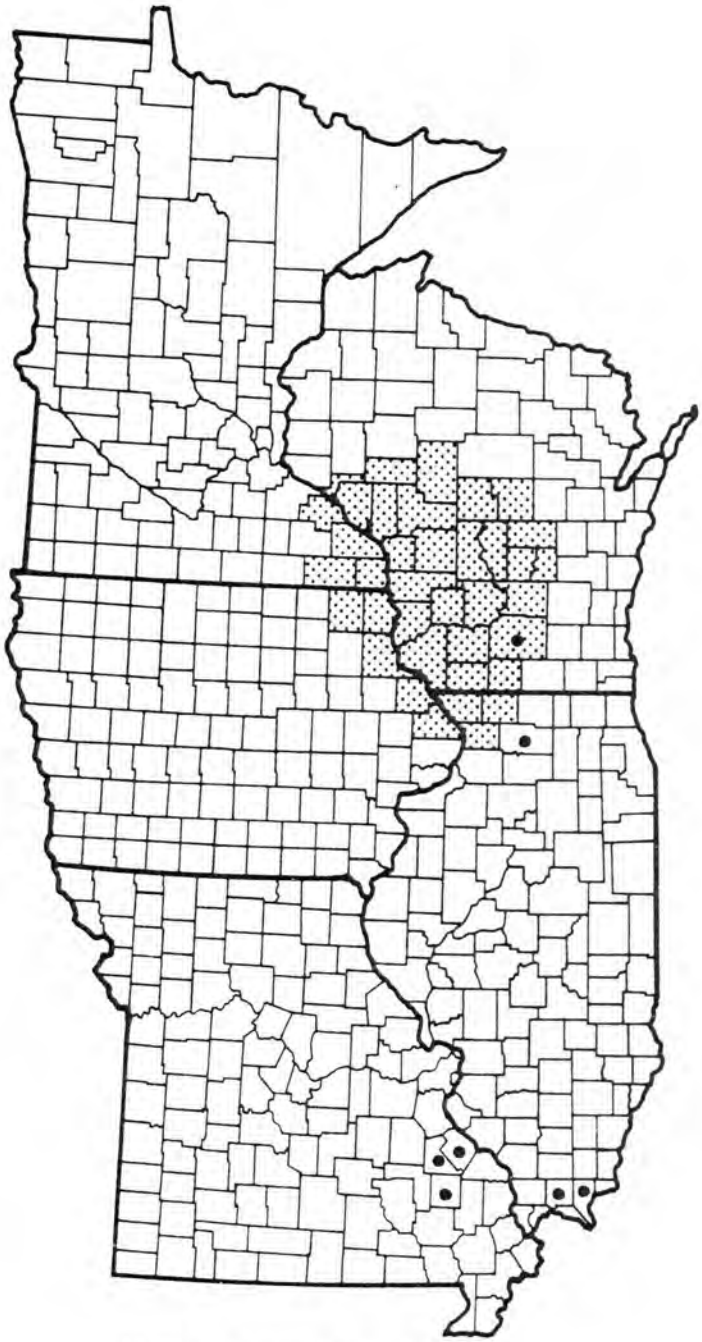
MAP 45. Pellaea atropurpurea



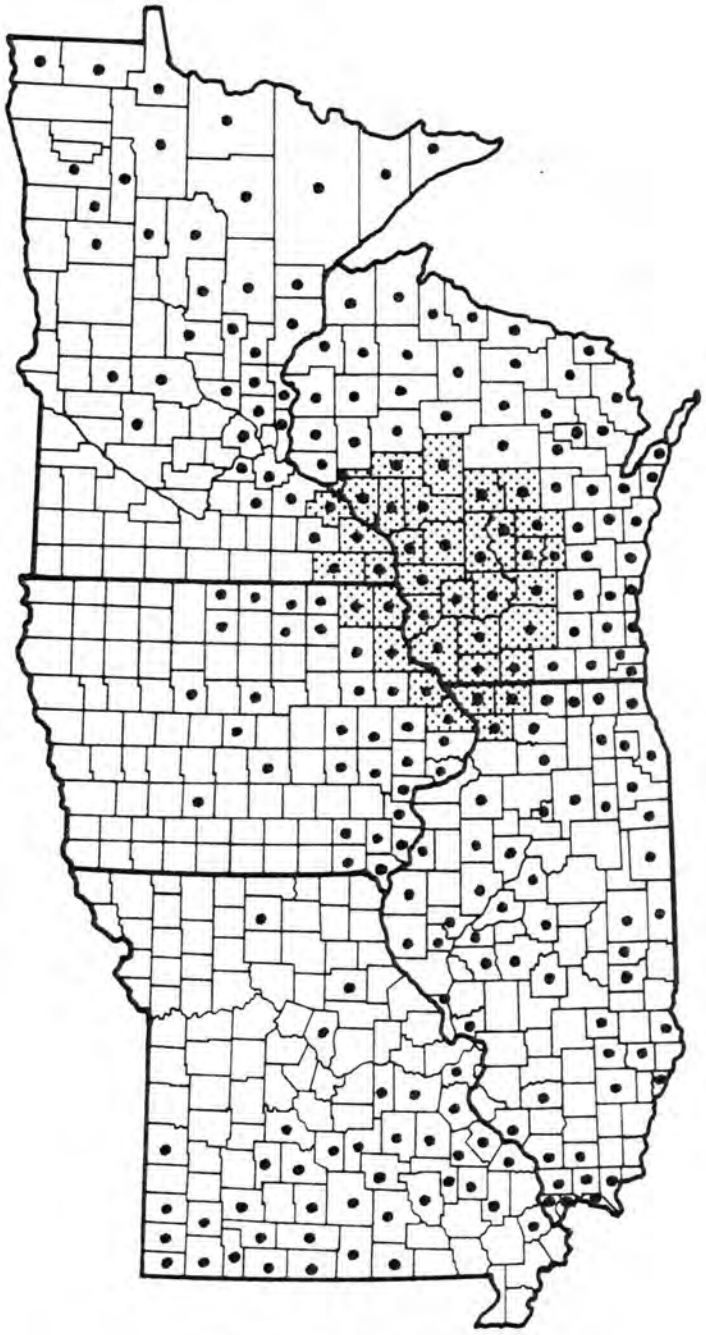
MAP 46. Pellaea glabella



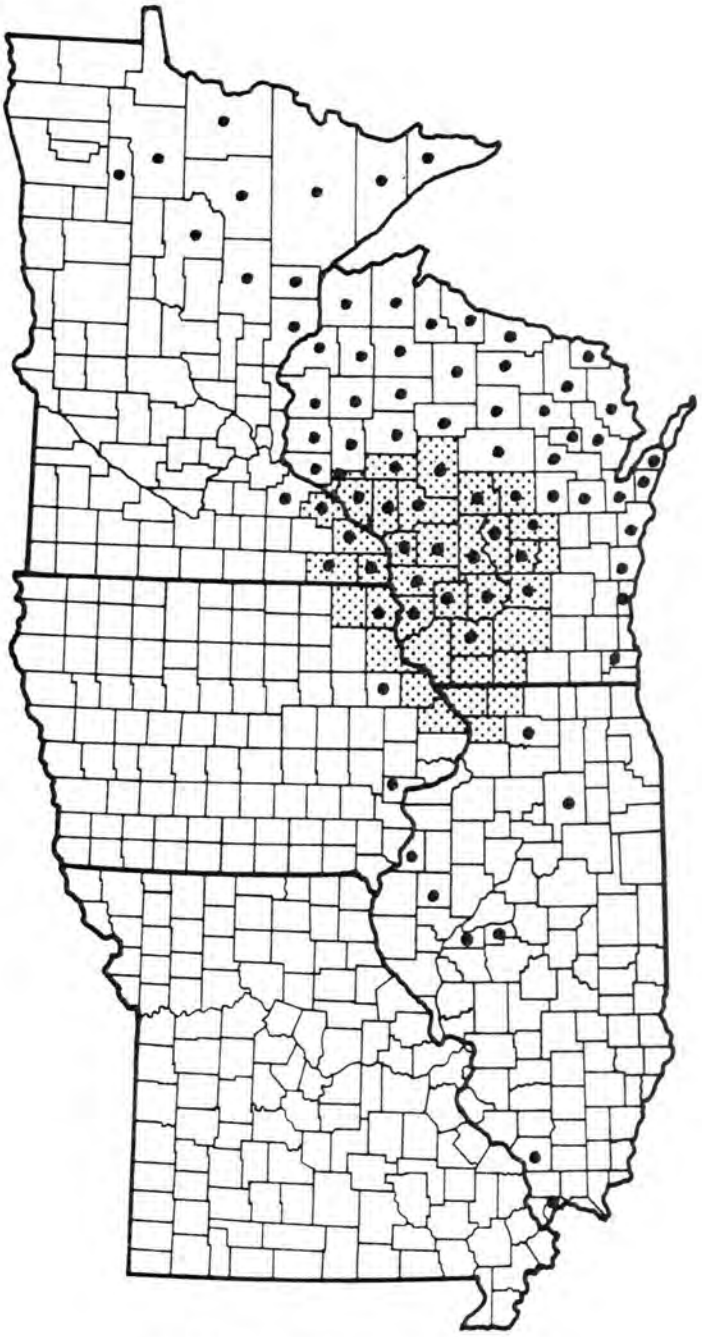
MAP 47. Polypodium virginianum



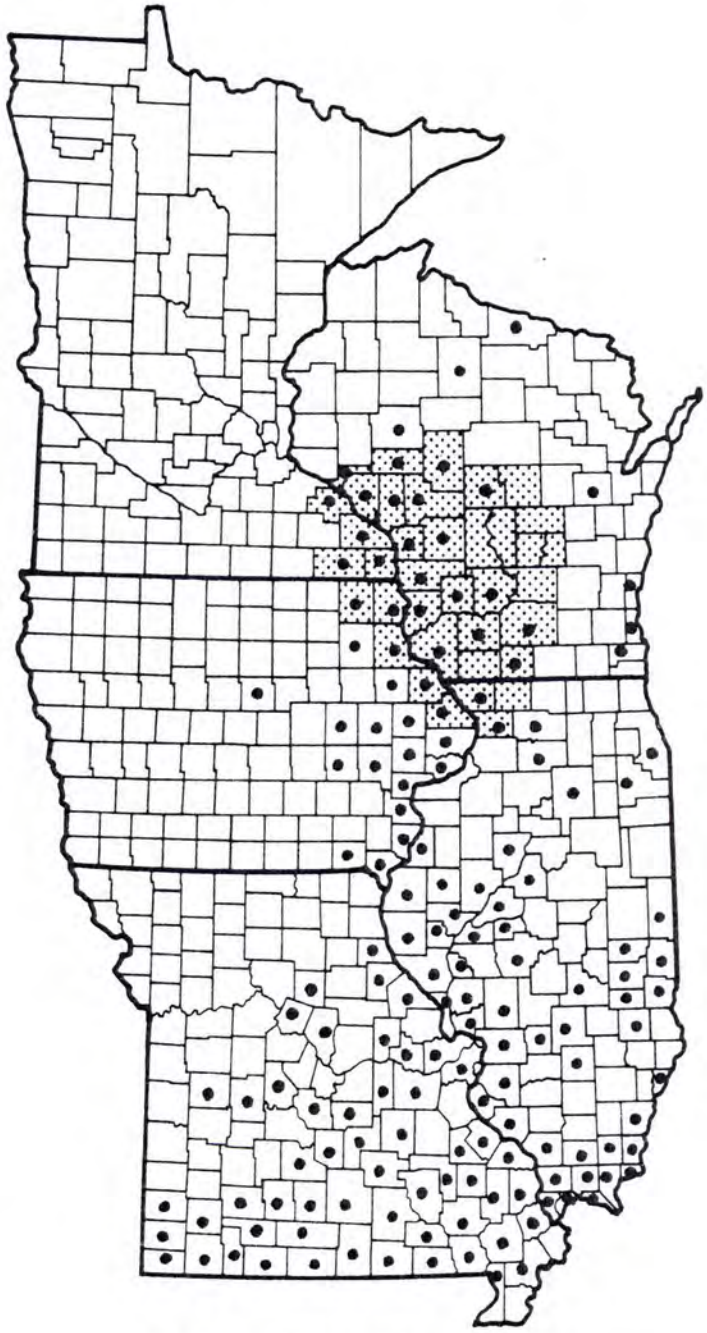
MAP 48. Dennstaedtia punctilobula



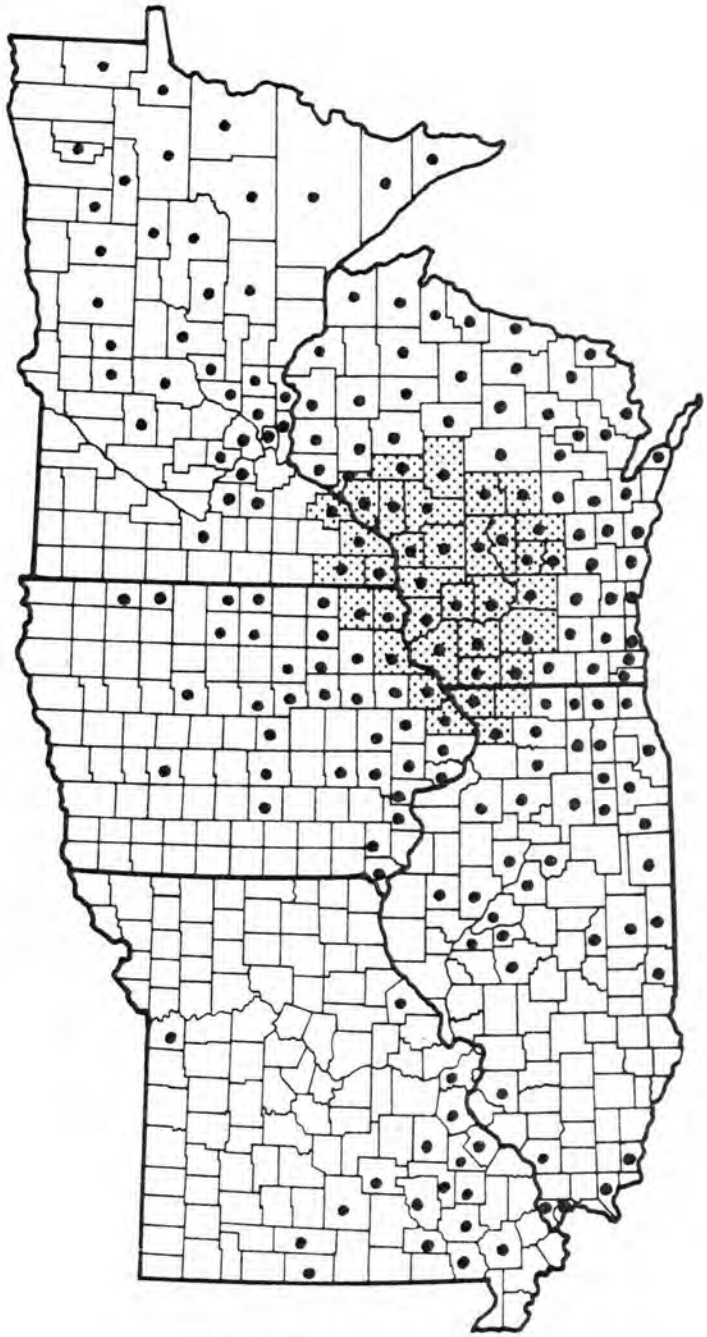
MAP 49. Pteridium aquilinum



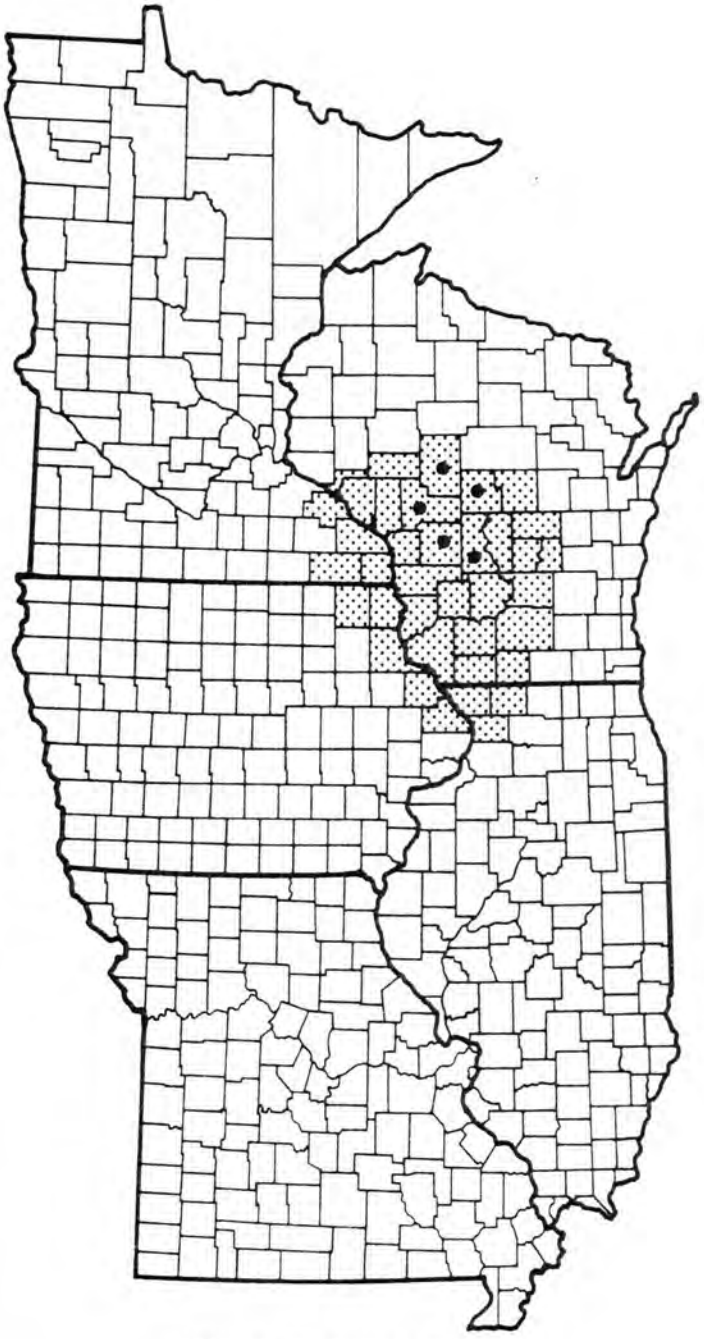
MAP 50. Phegopteris connectilis



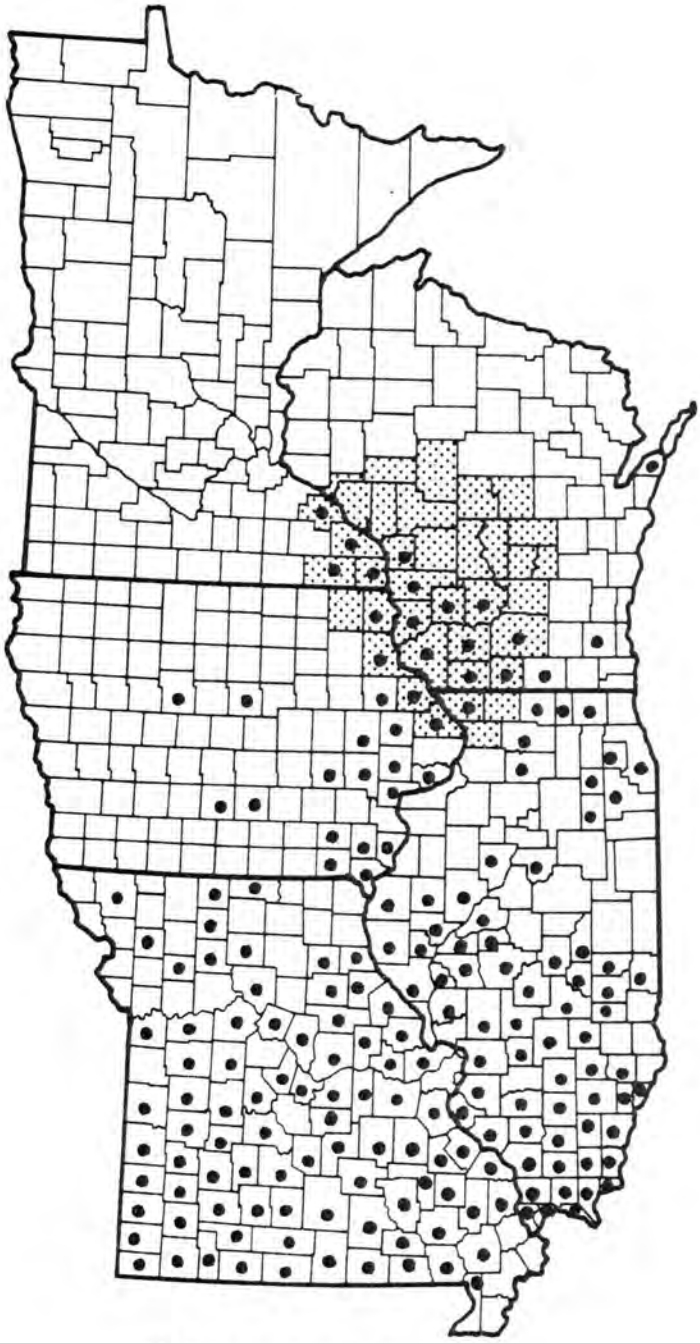
MAP 51. Phegopteris hexagonoptera



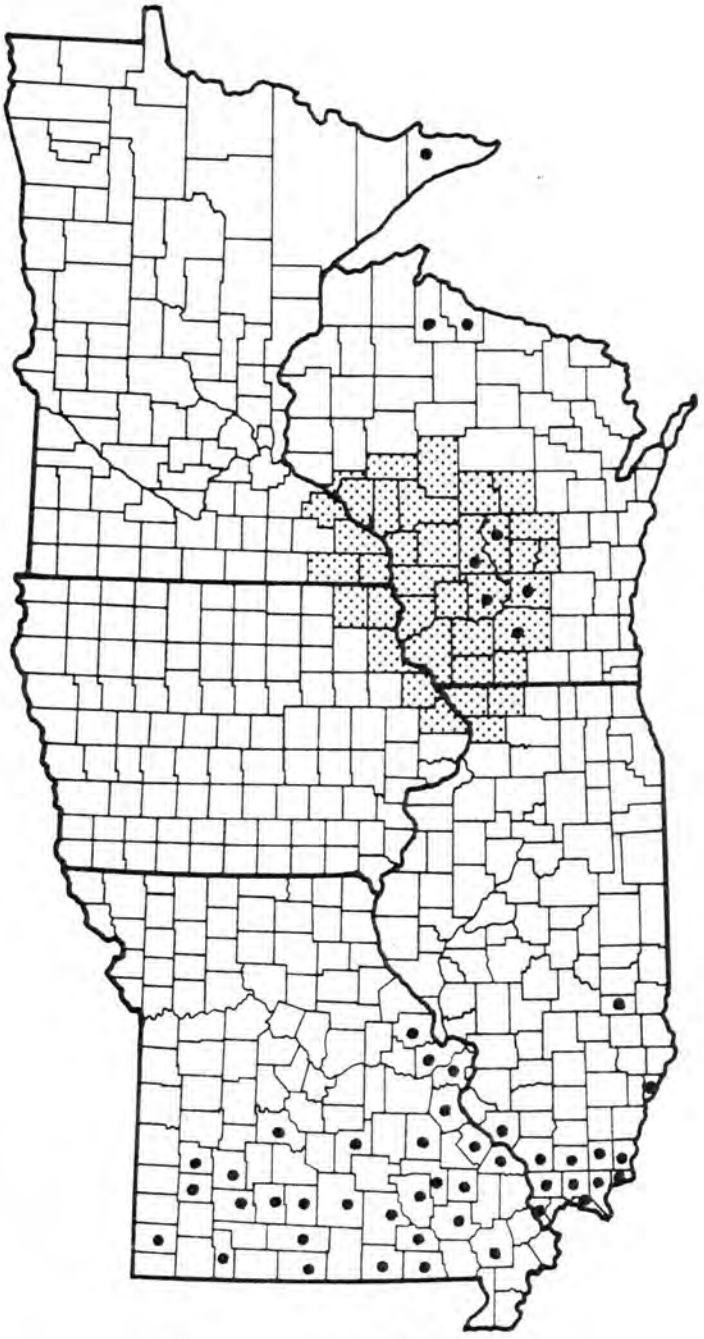
MAP 52. Thelypteris palustris



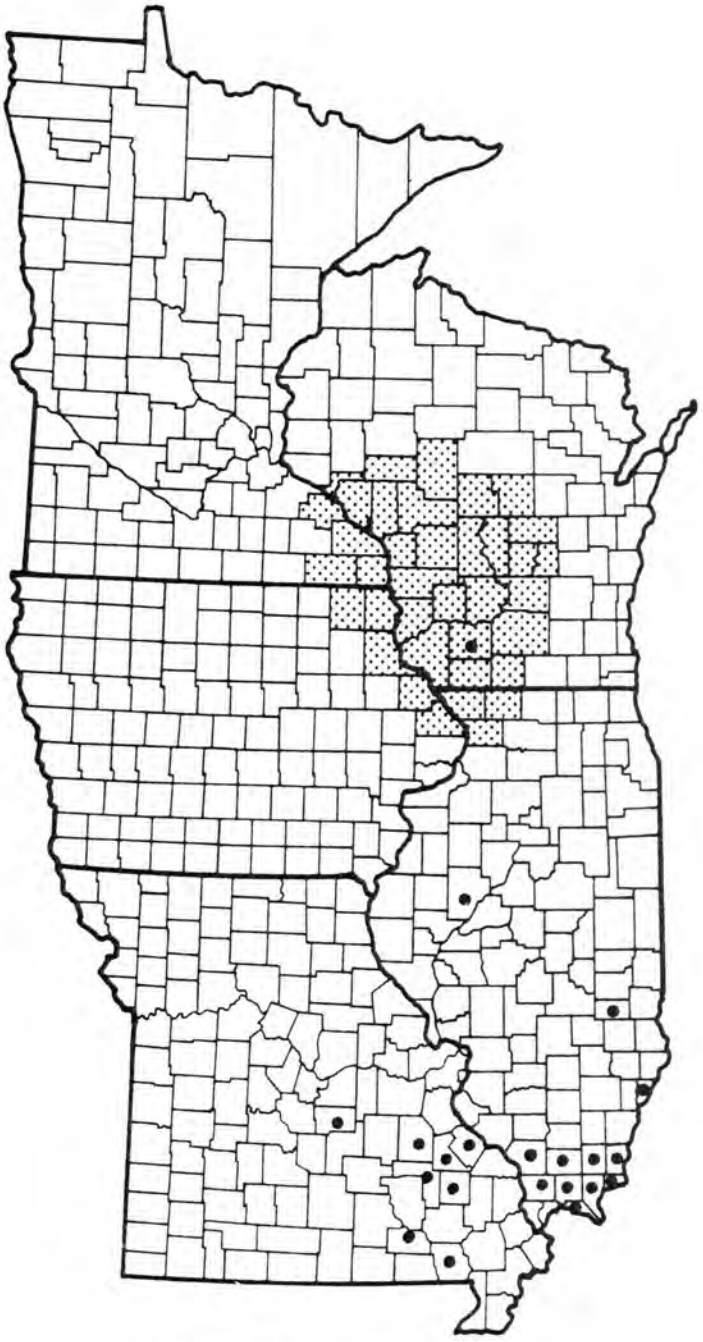
MAP 53. Thelypteris simulata



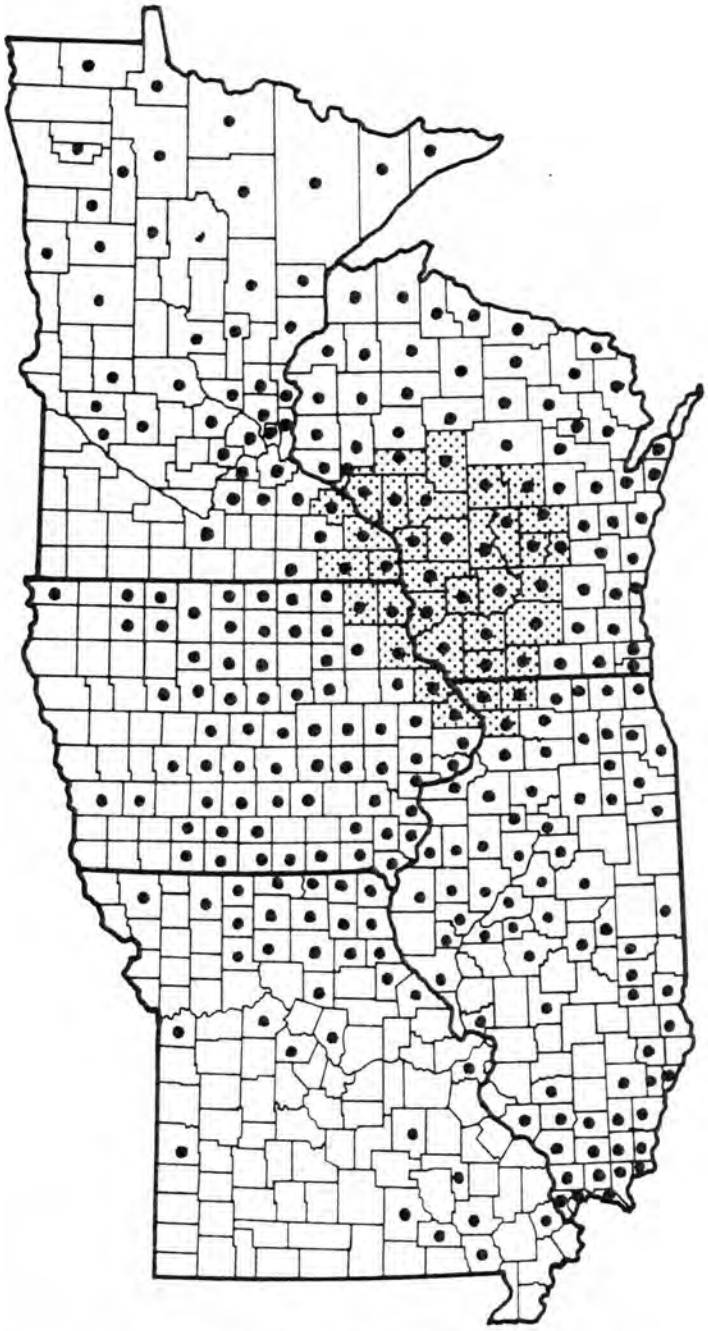
MAP 54. Asplenium platyneuron



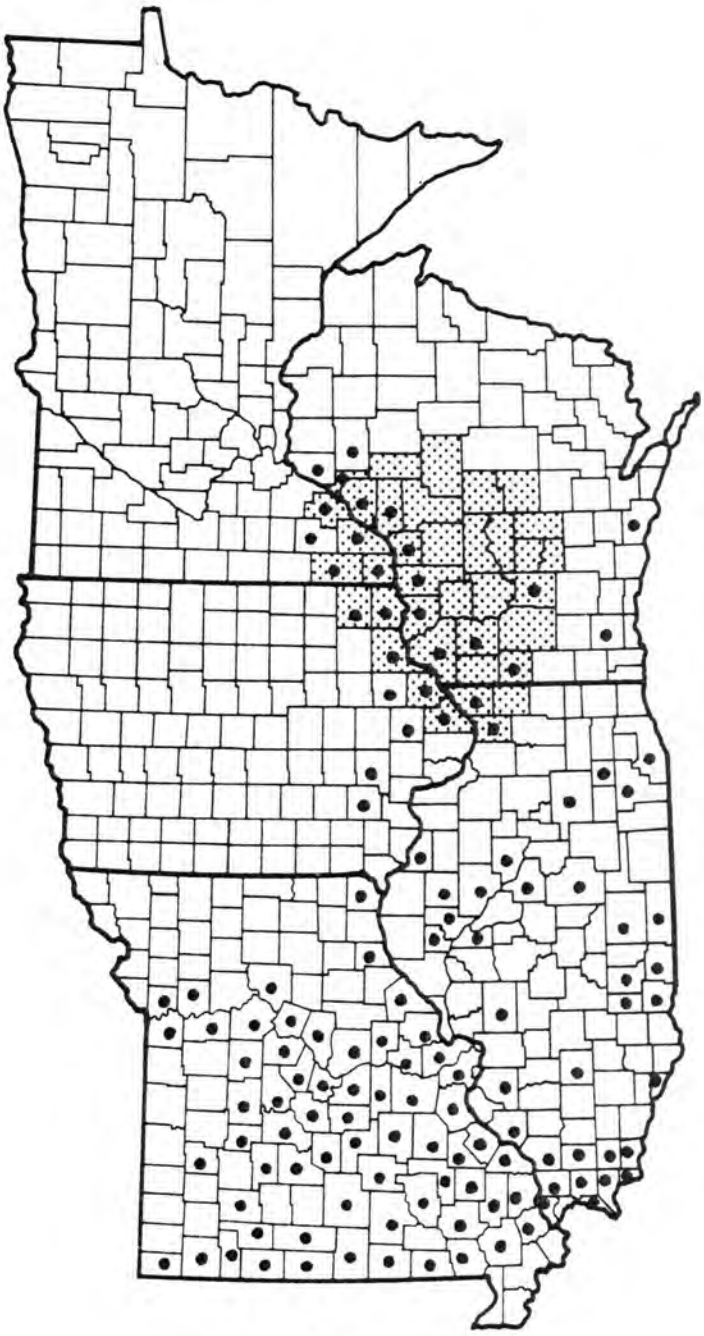
MAP 55. Asplenium trichomanes



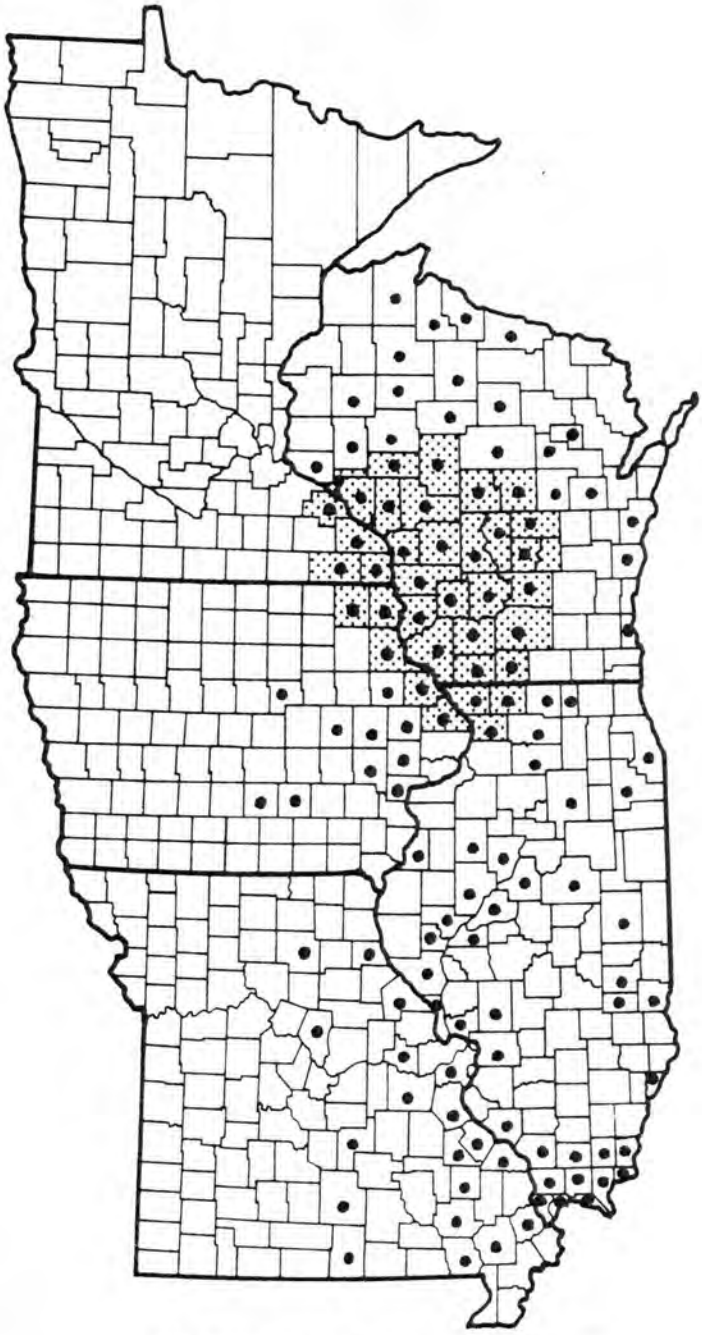
MAP 56. Asplenosorus rhizophyllus



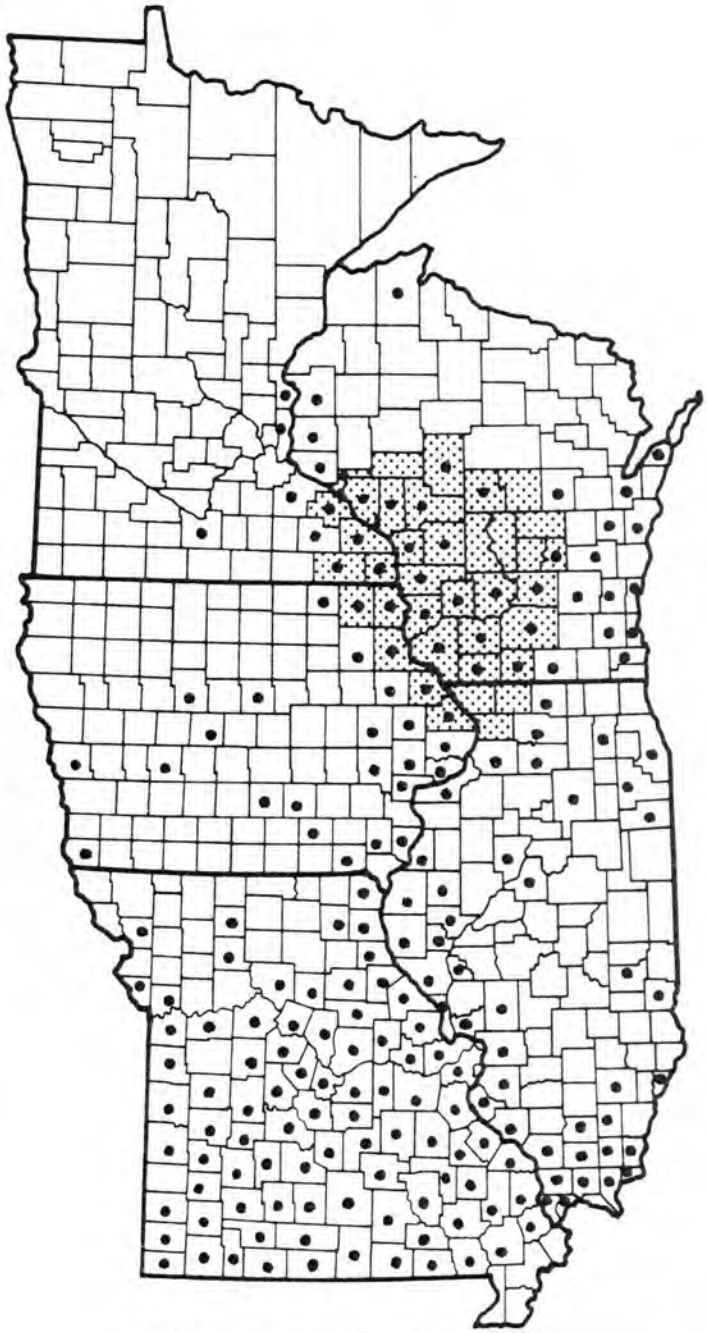
MAP 57. Athyrium angustum



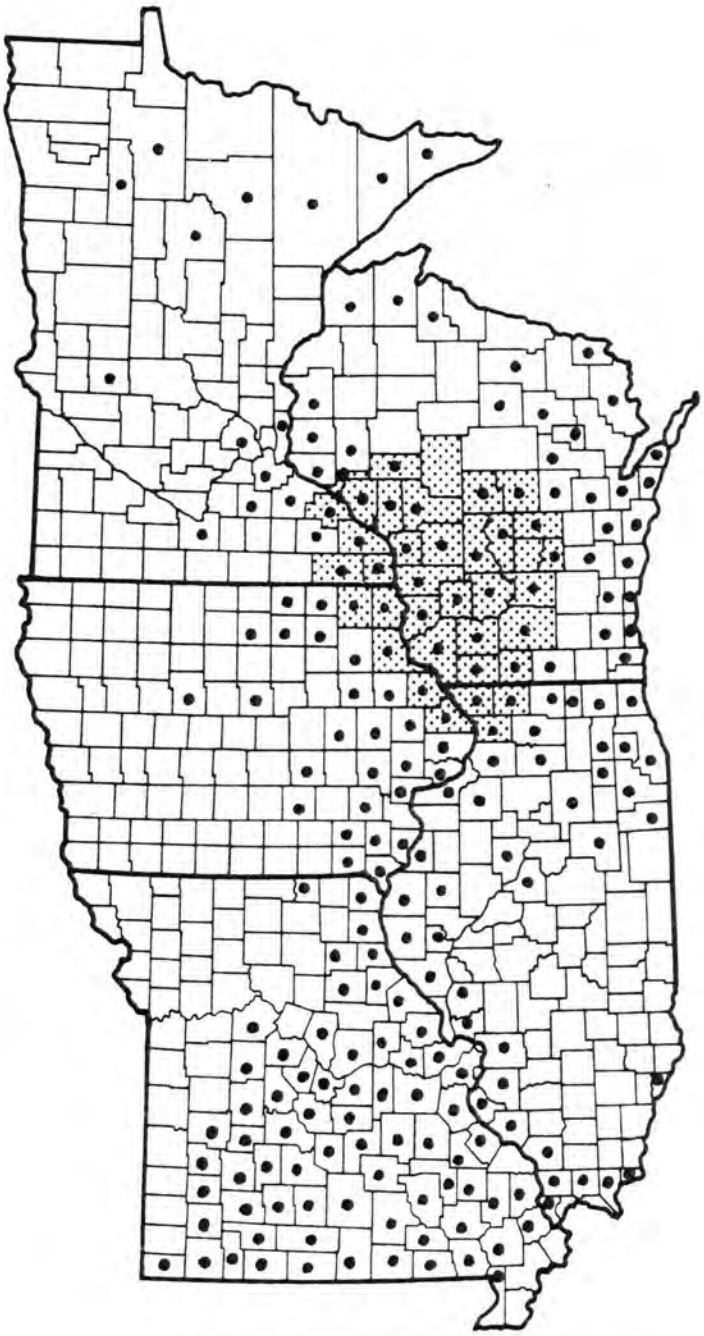
MAP 58. Athyrium pycnocarpon



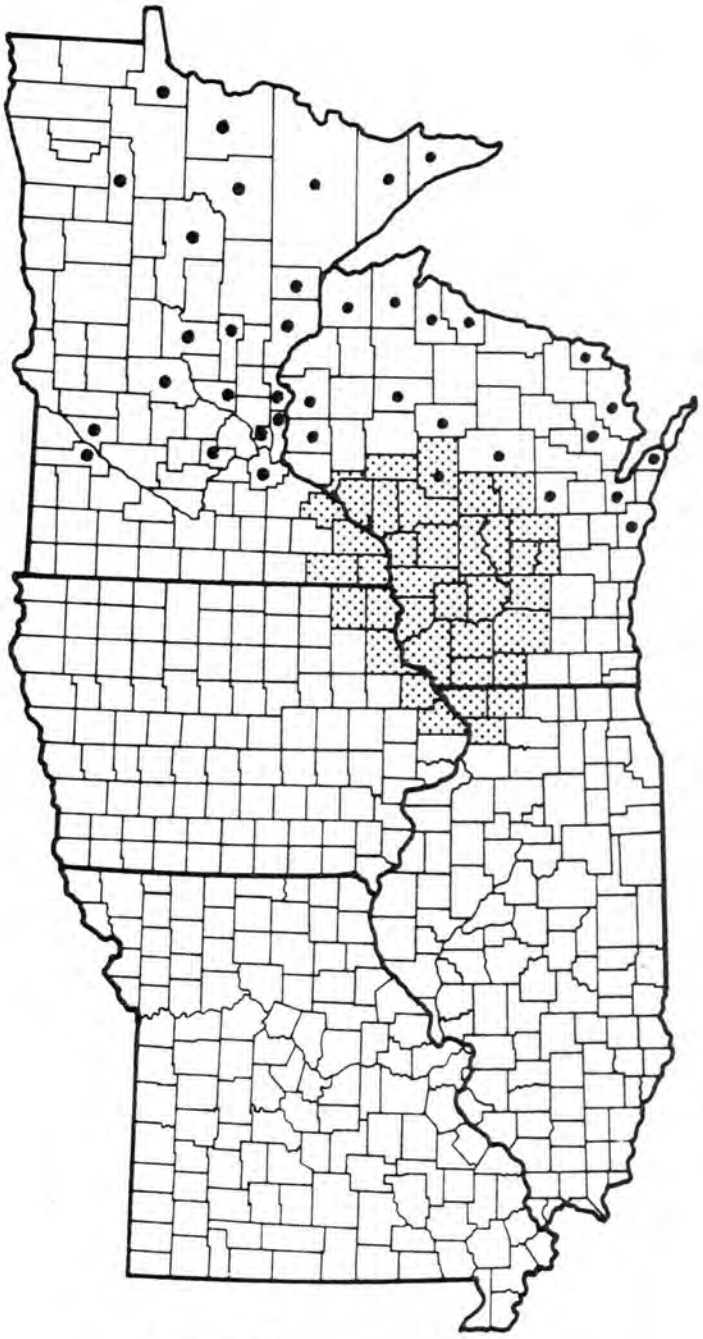
MAP 59. Athyrium thelypterioides



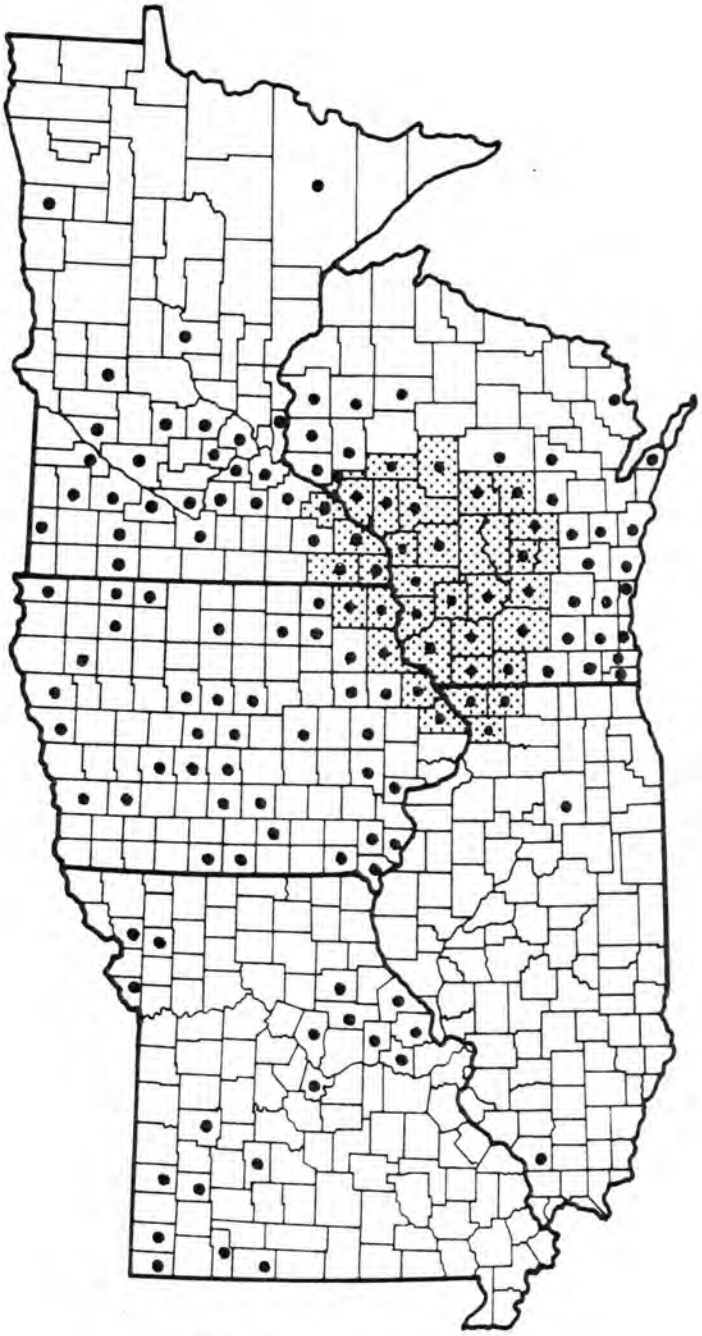
MAP 60. Camptosorus rhizophyllus



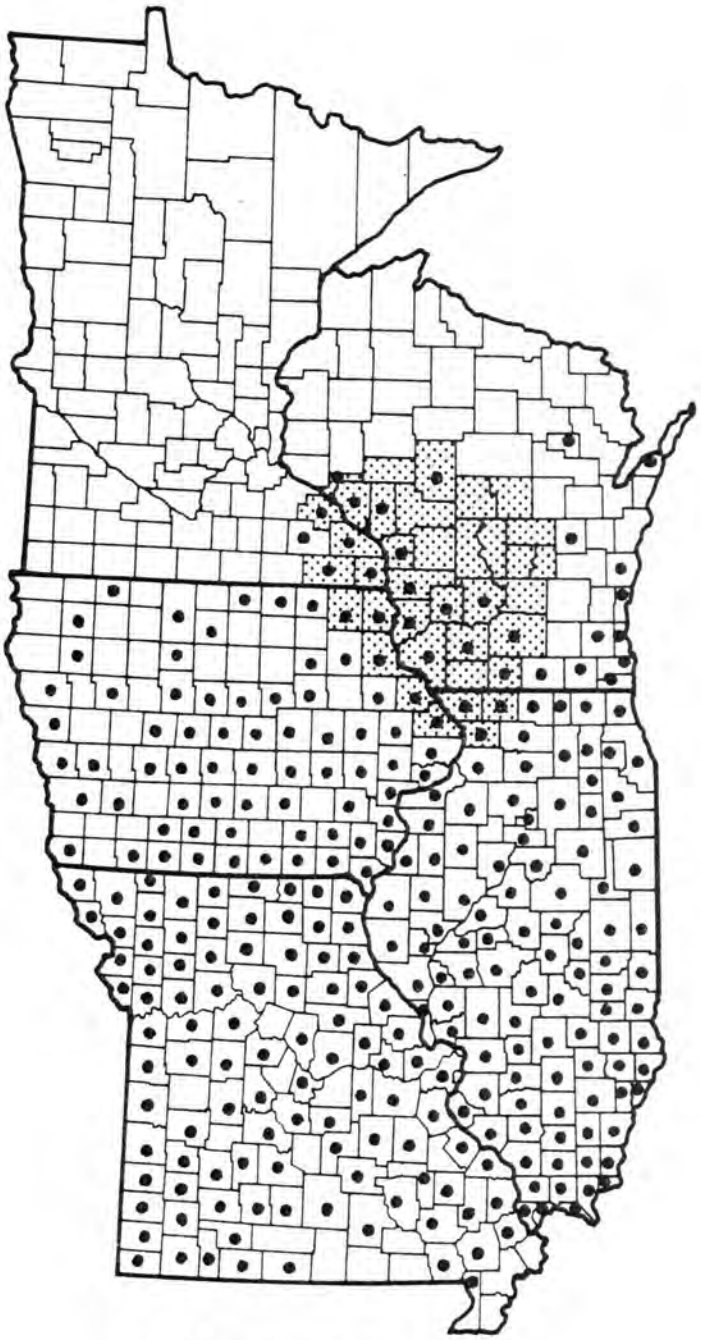
MAP 61. Cystopteris bulbifera



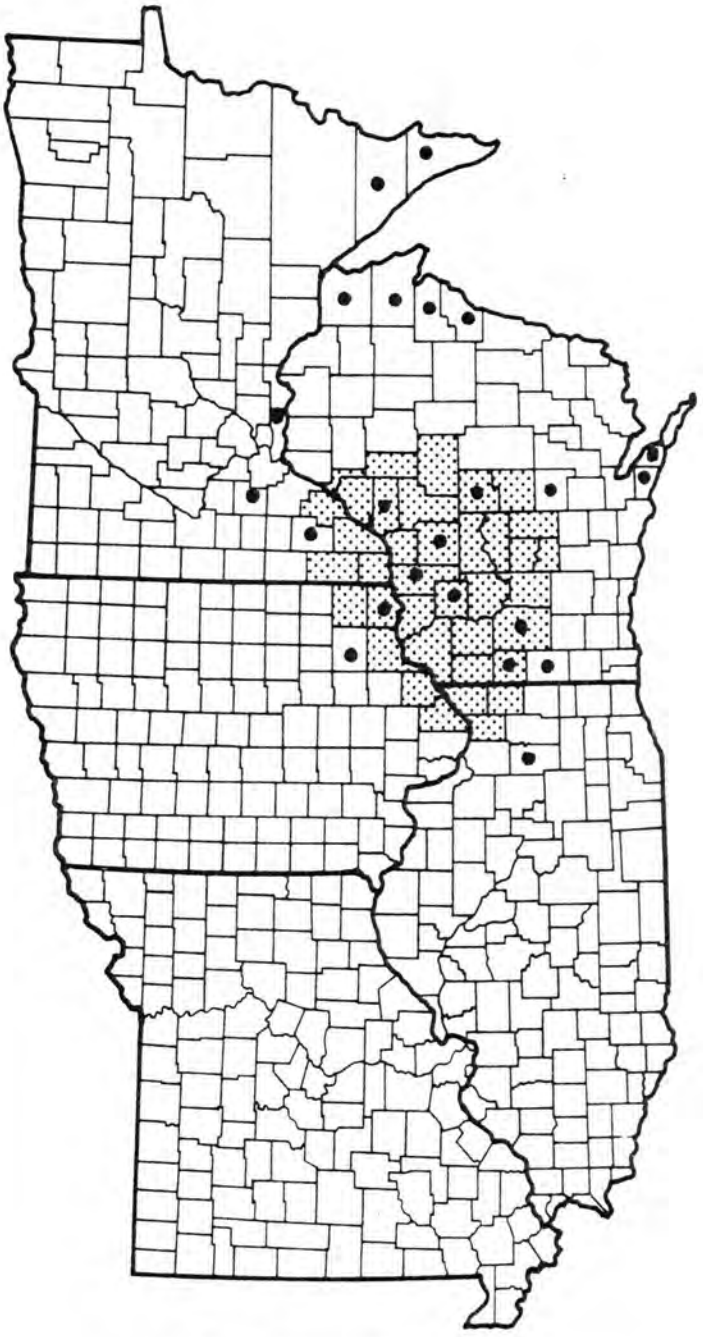
MAP 62A. Cystopteris fragilis fragilis



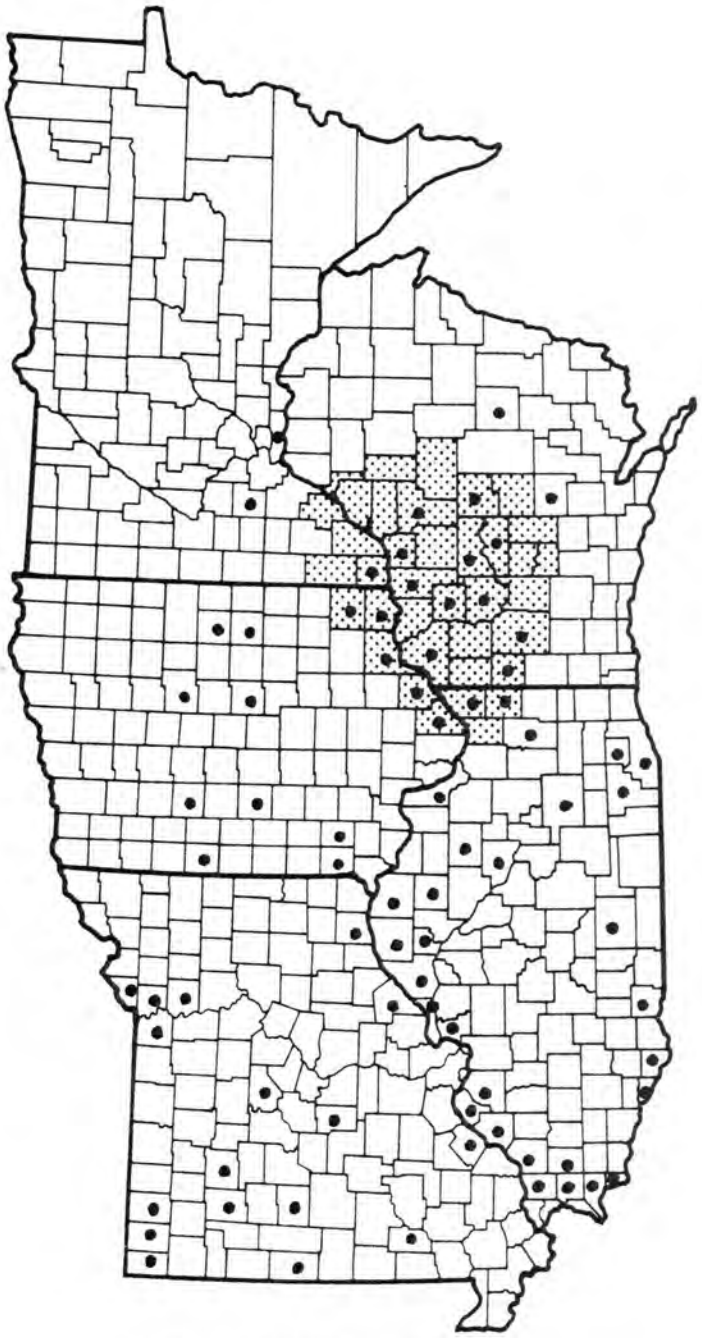
MAP 62B. Cystopteris fragilis mackayi



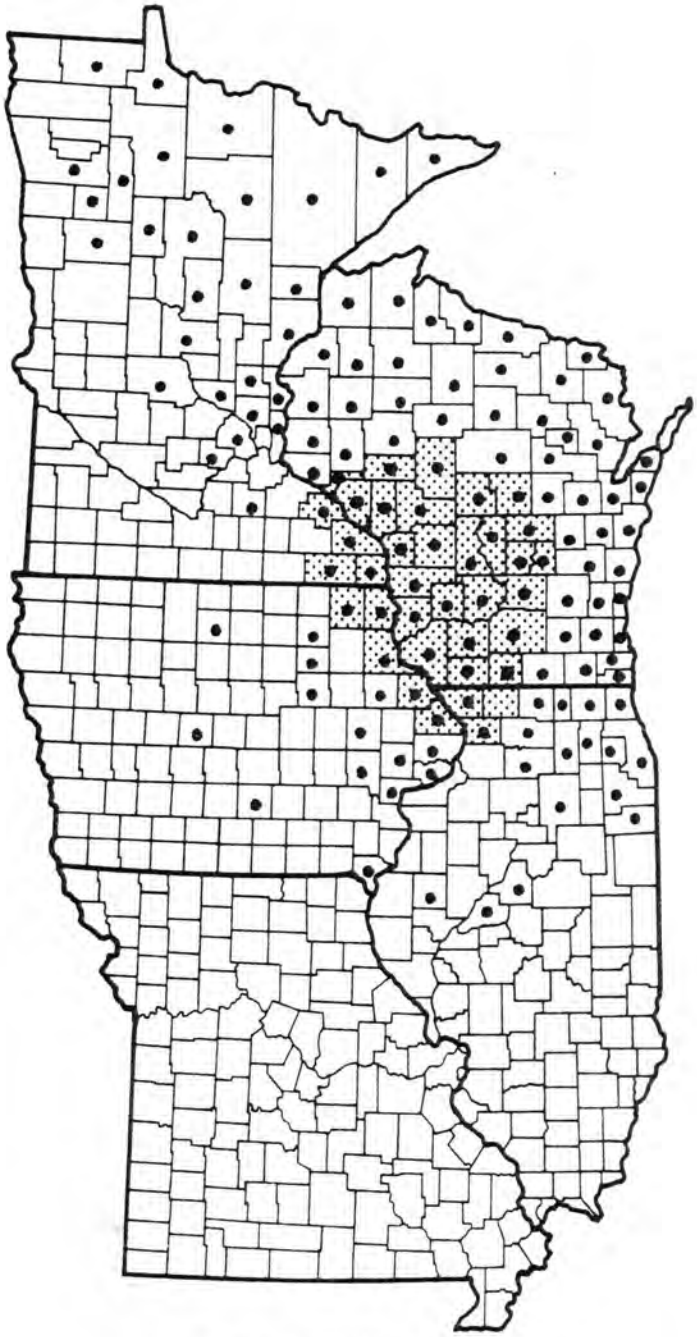
MAP 63. Cystopteris protrusa



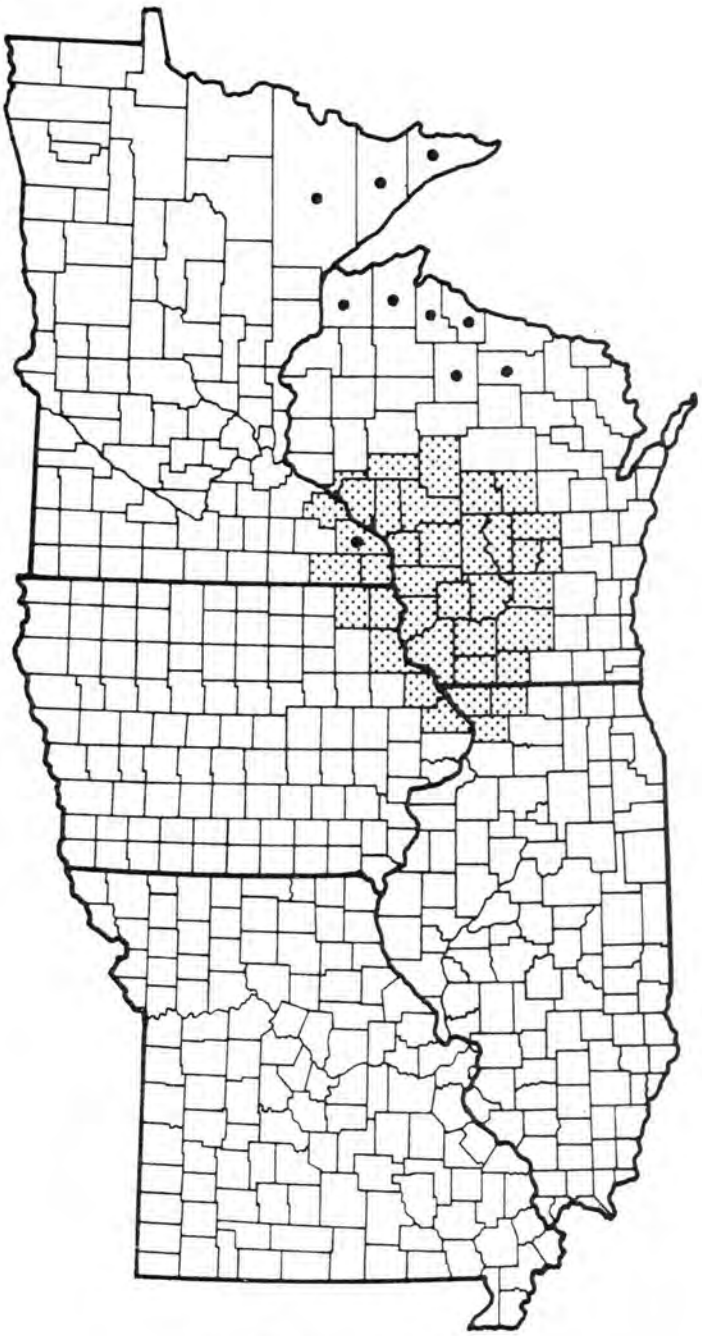
MAP 64. Cystopteris X laurentiana



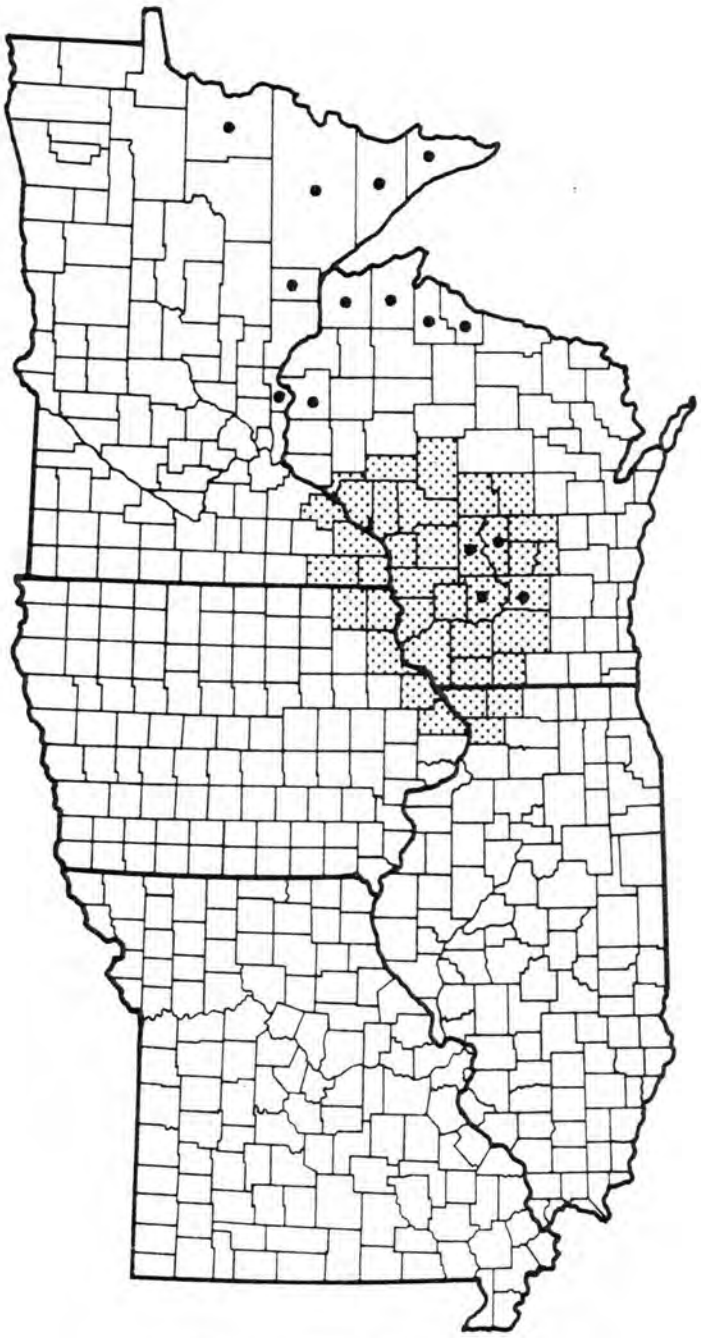
MAP 65. Cystopteris X tennesseensis



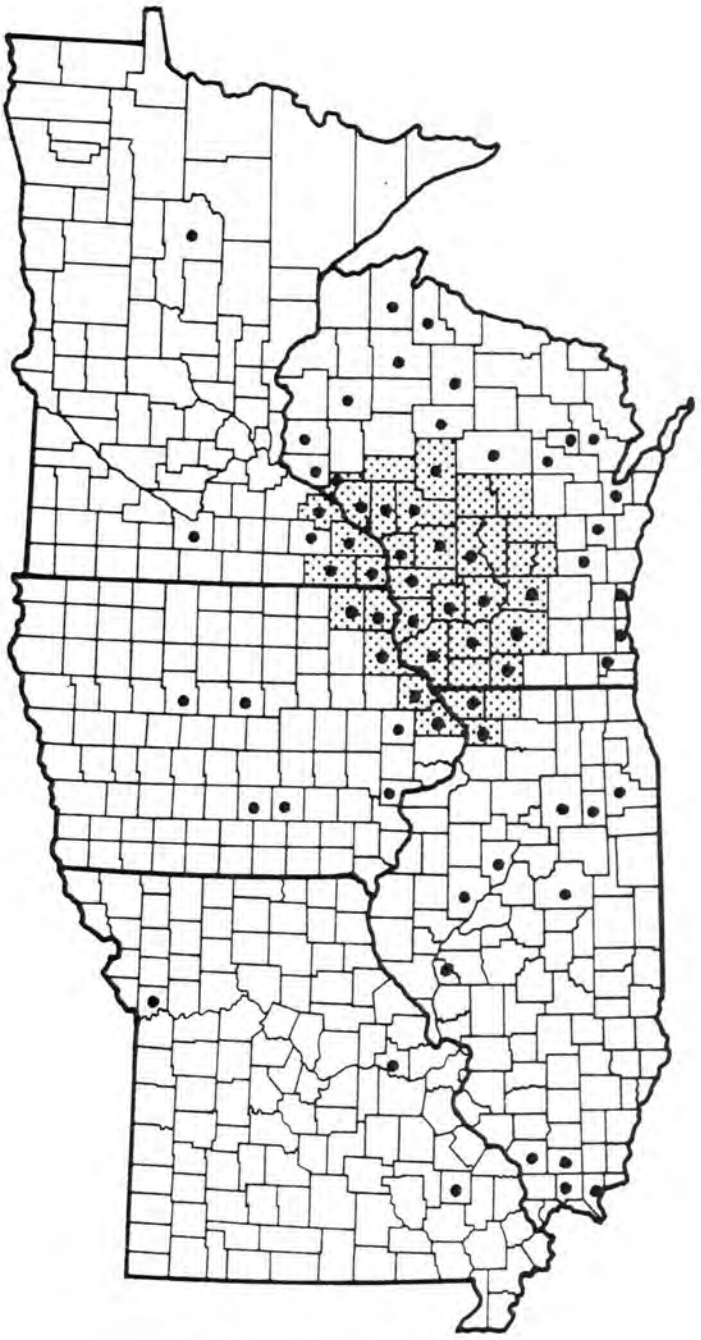
MAP 66. Dryopteris cristata



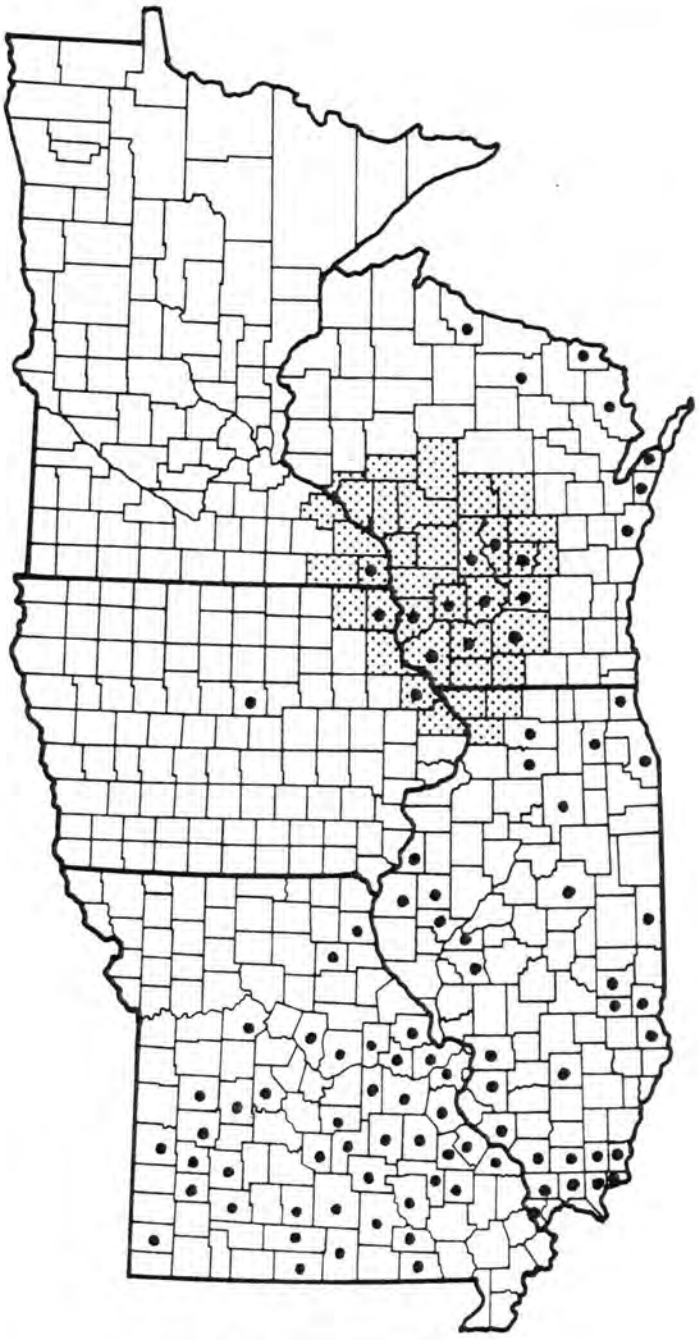
MAP 67. Dryopteris expansa



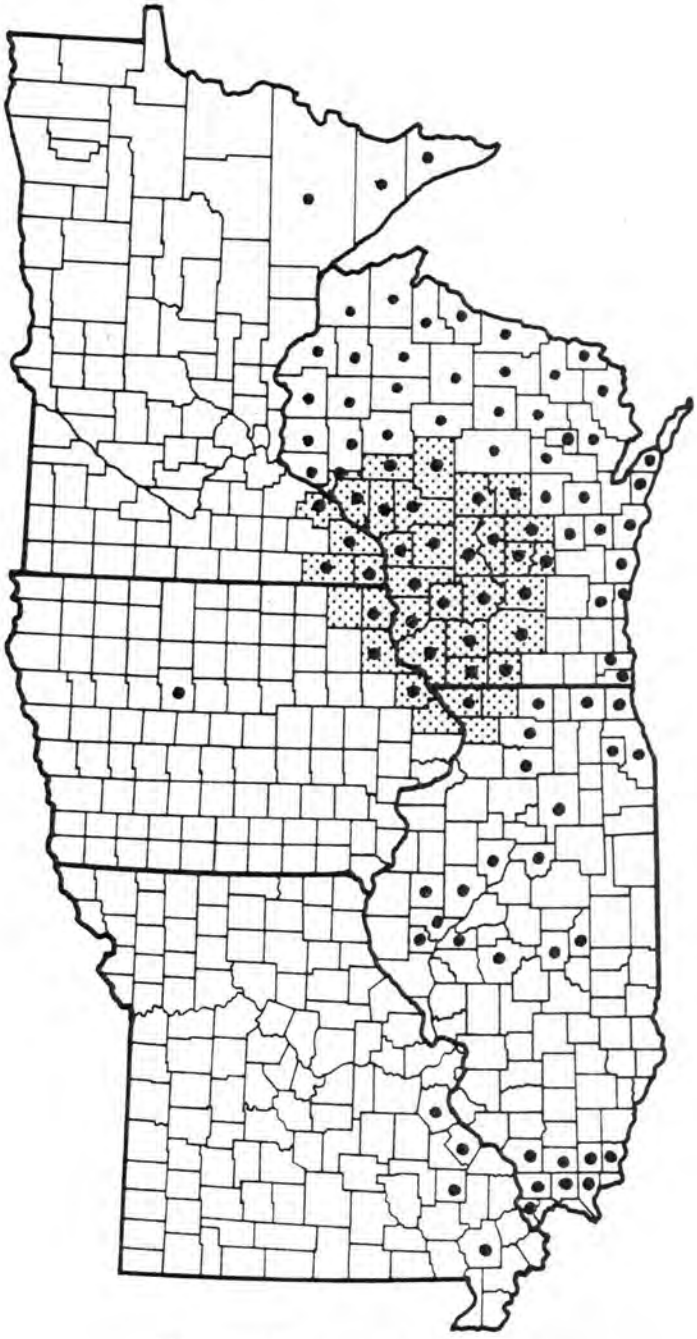
MAP 68. Dryopteris fragrans



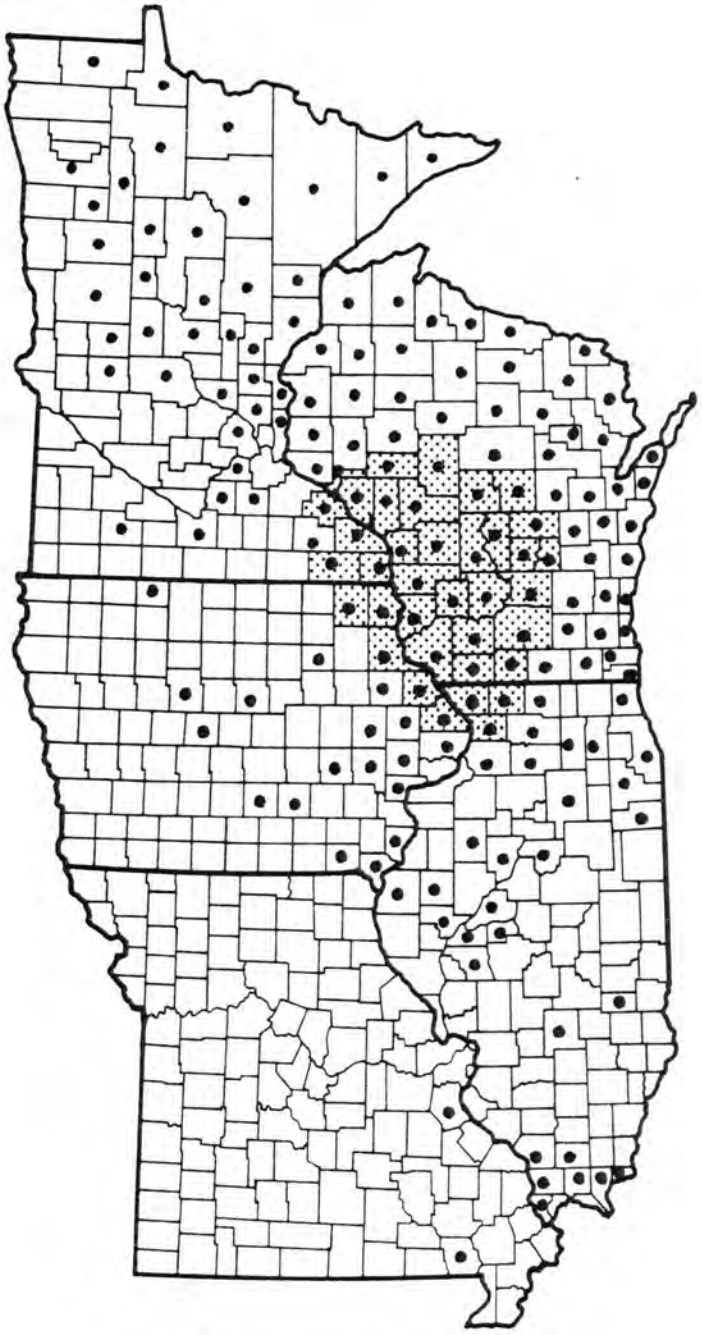
MAP 69. Dryopteris goldiana



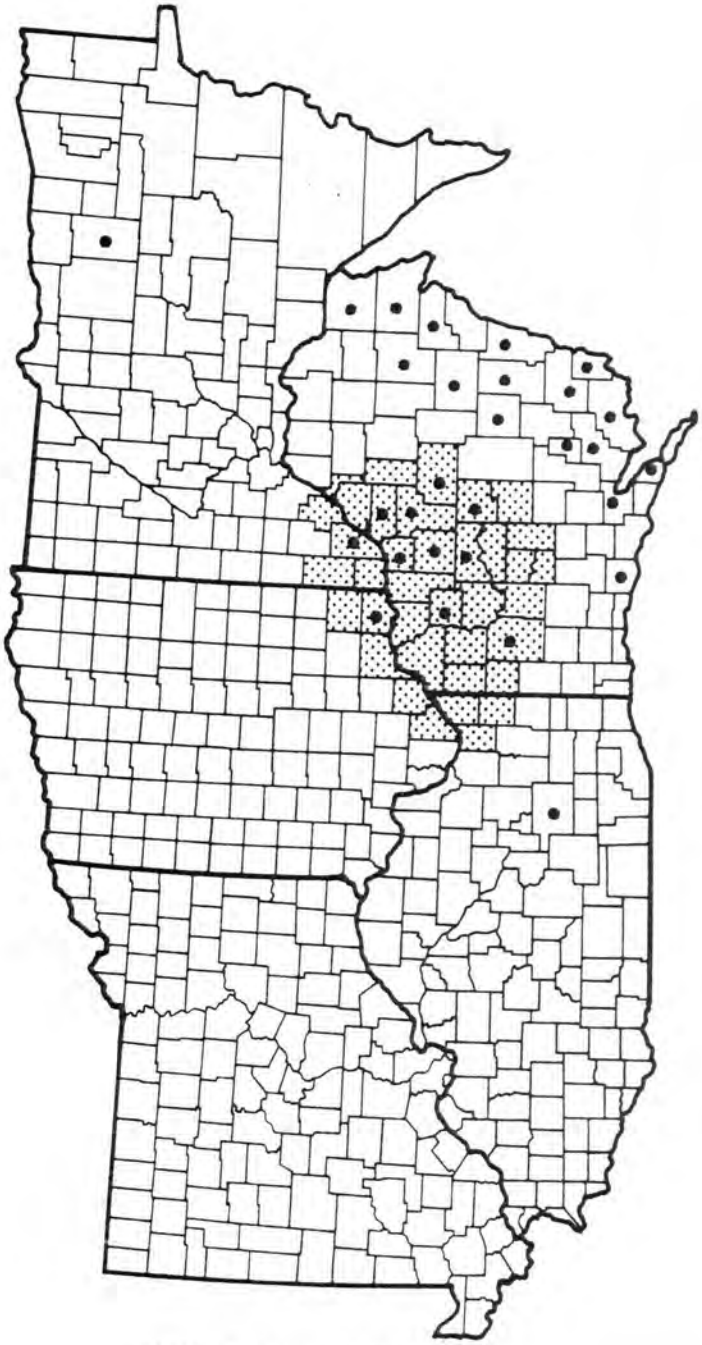
MAP 70. Dryopteris intermedia



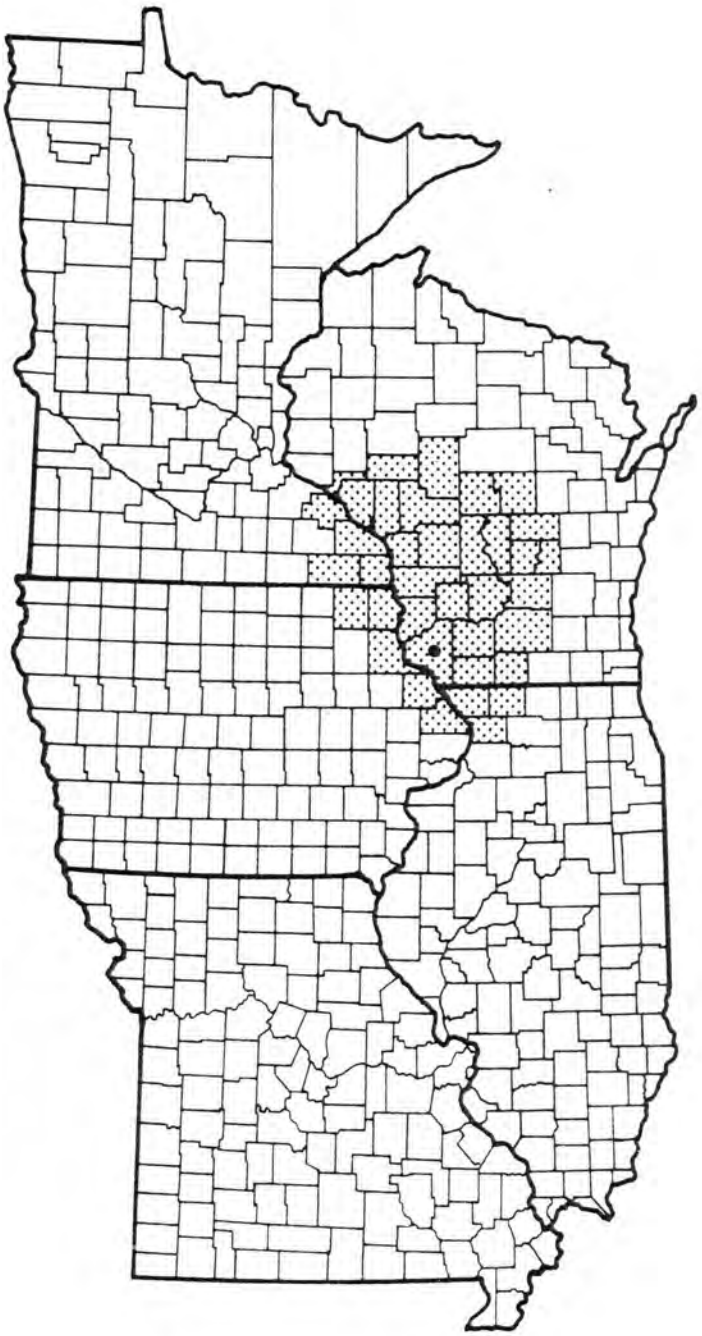
MAP 71. Dryopteris marginalis



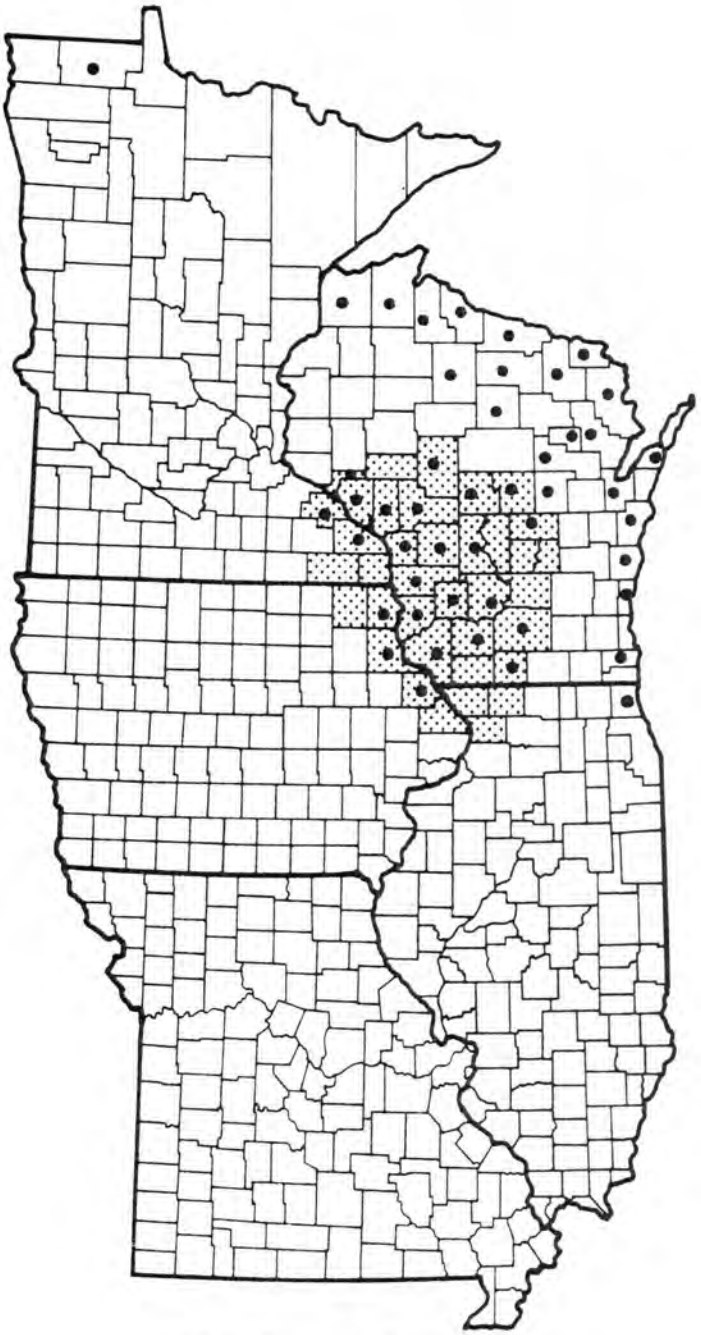
MAP 72. Dryopteris spinulosa



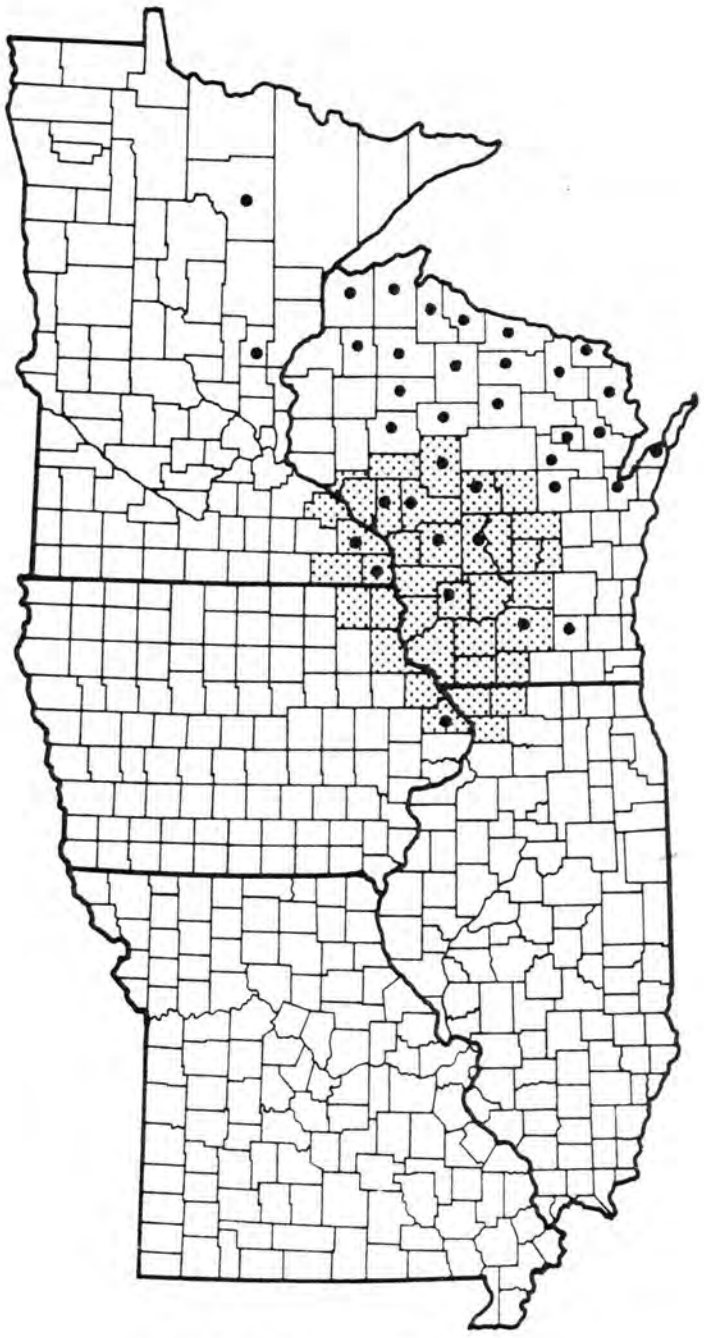
MAP 73. Dryopteris X bootii



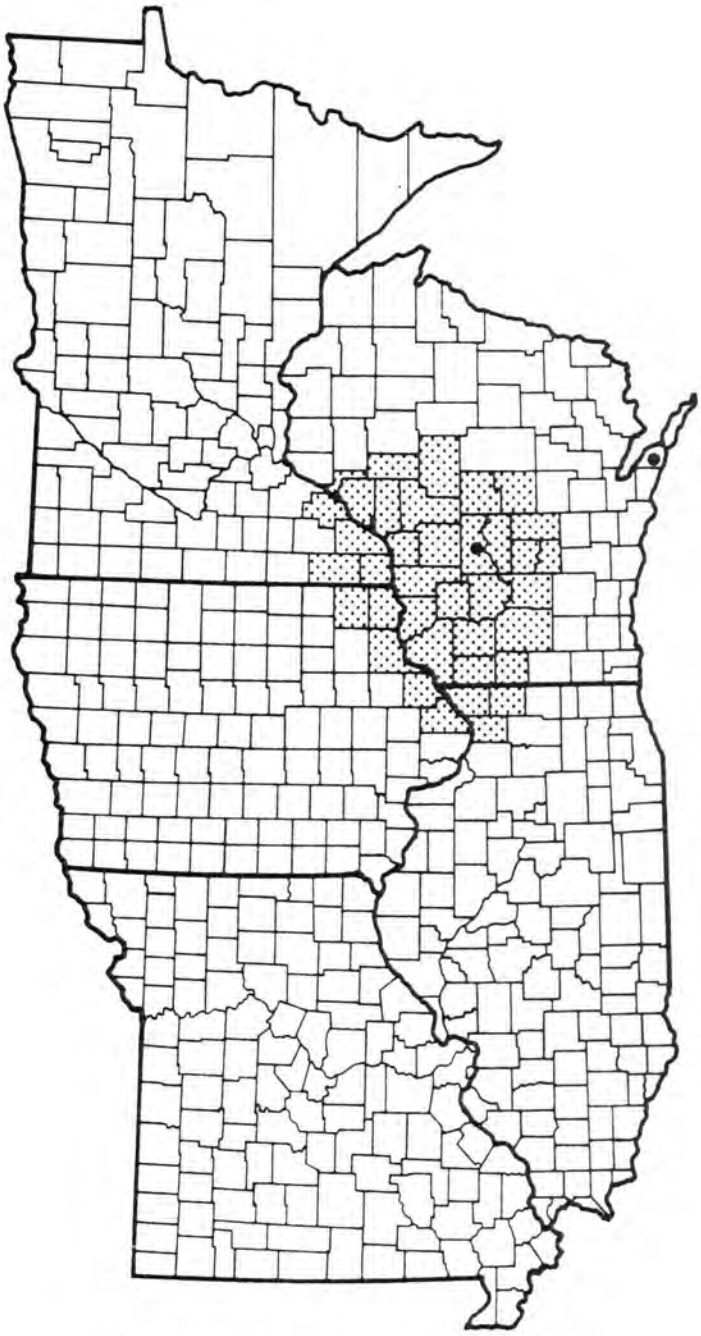
MAP 74. Dryopteris X pittsfordensis



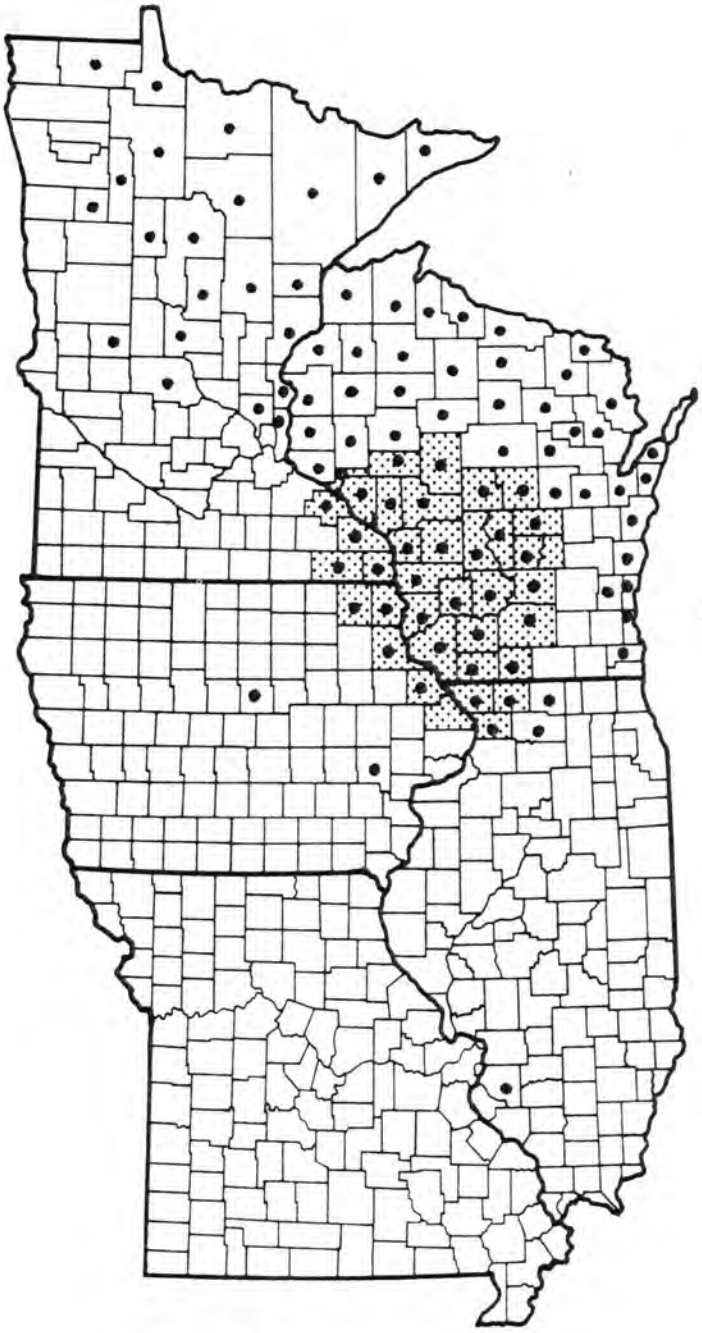
MAP 75. Dryopteris X triploidea



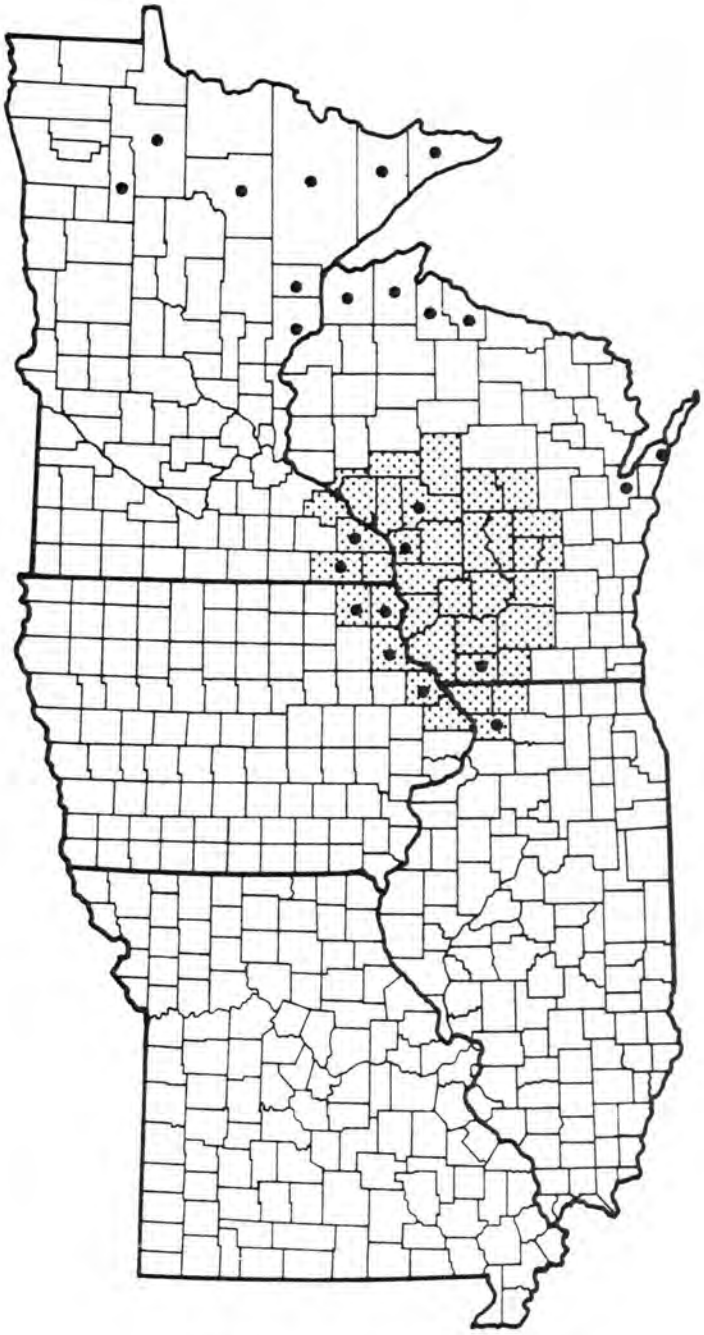
MAP 76. Dryopteris X uliginosa



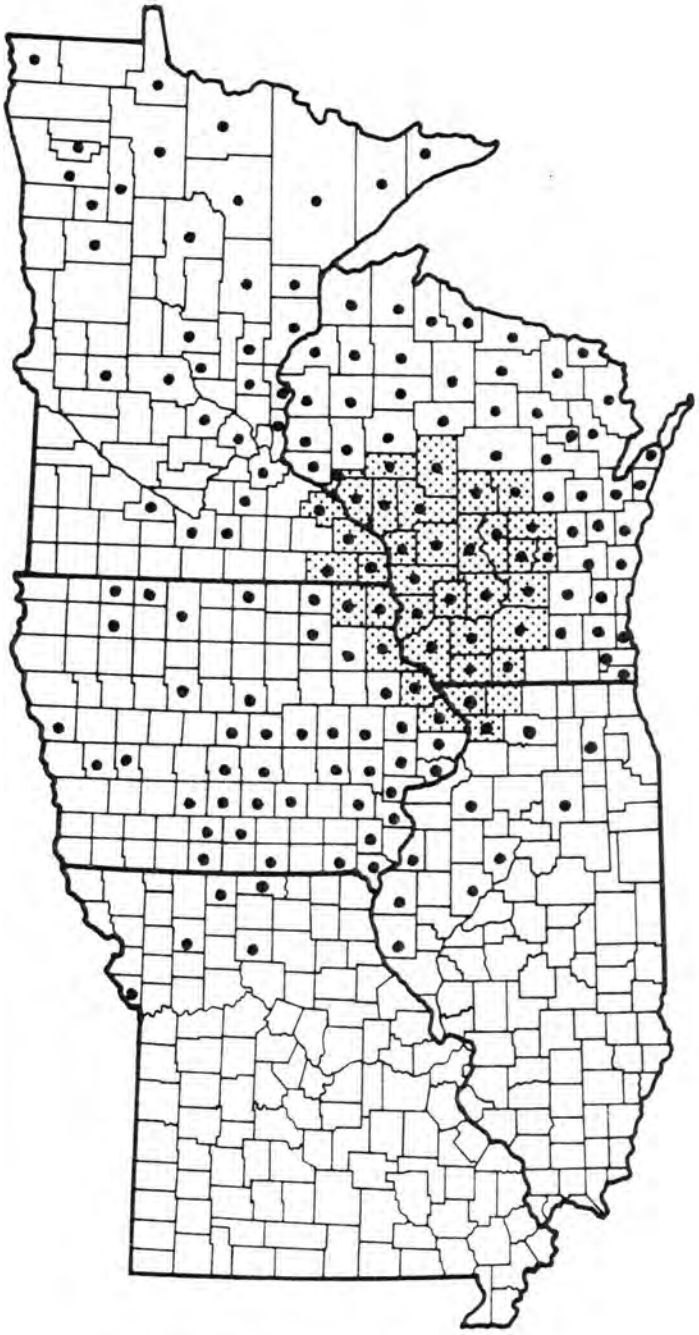
MAP 77. Dryopteris intermedia X marginalis



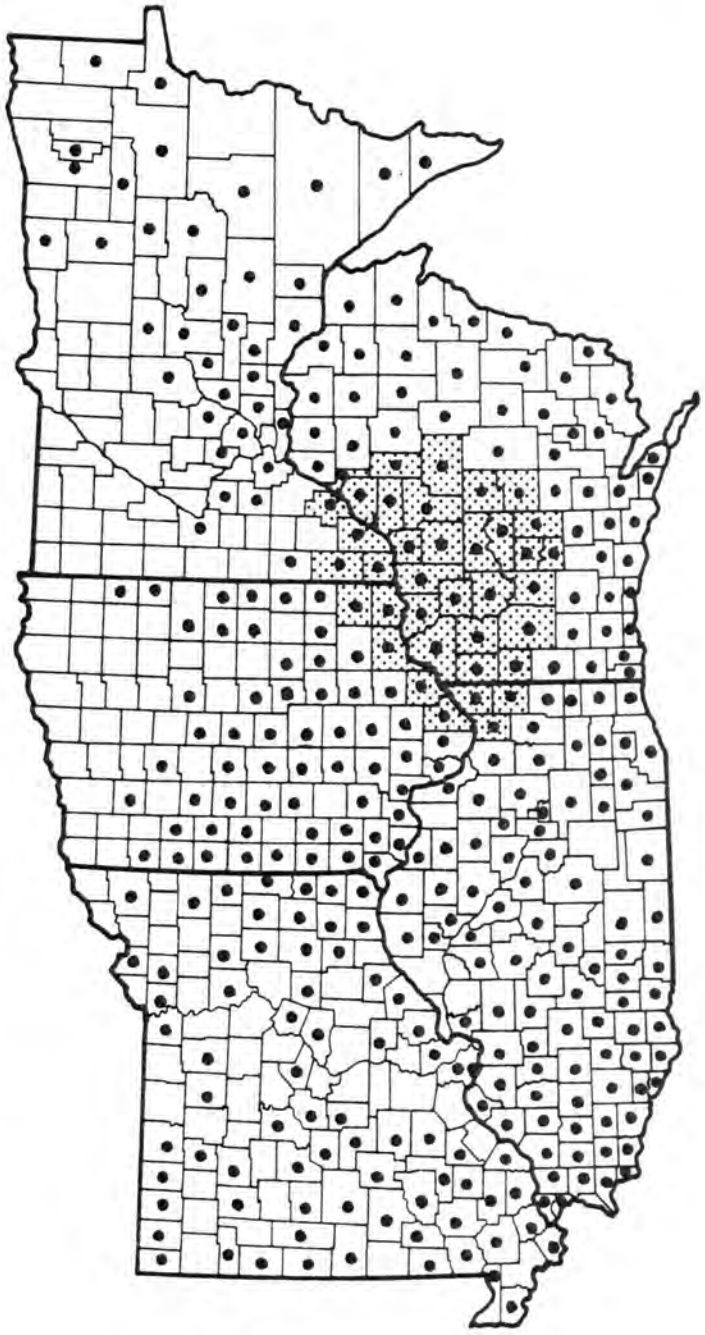
MAP 78. Gymnocarpium dryopteris



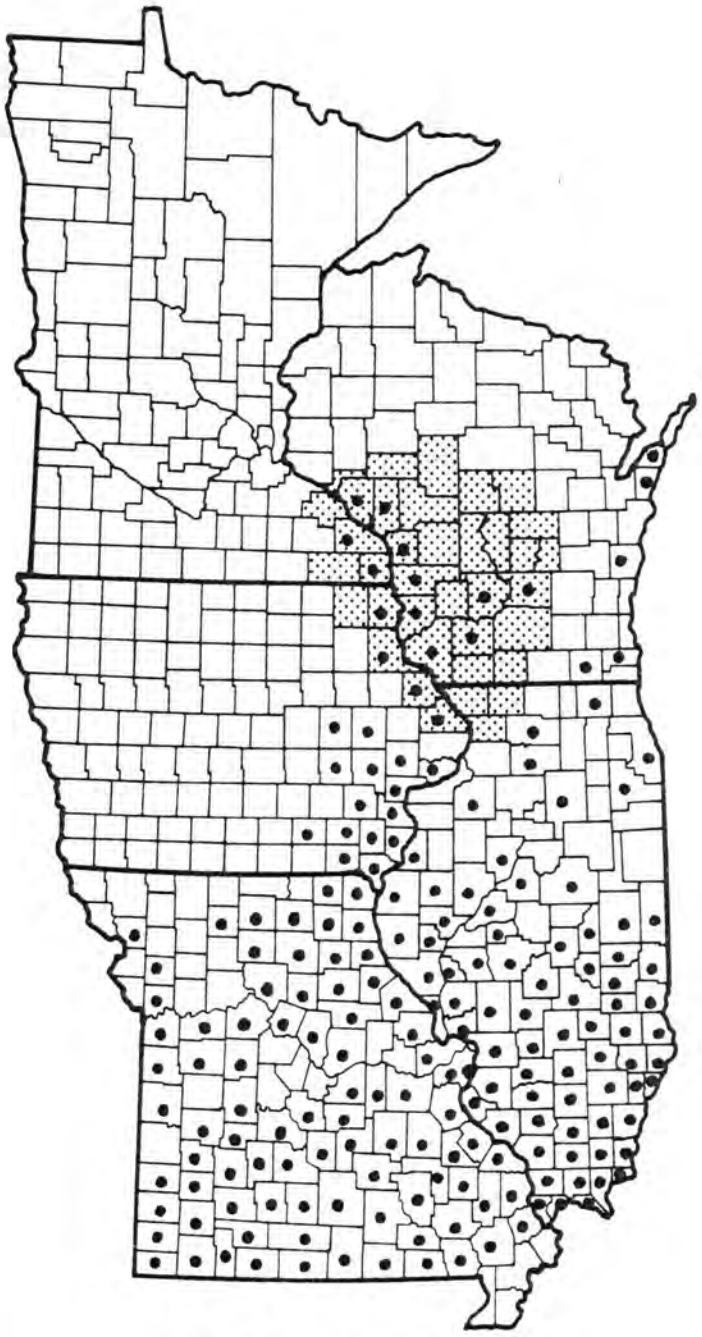
MAP 79. Gymnocarpium robertianum



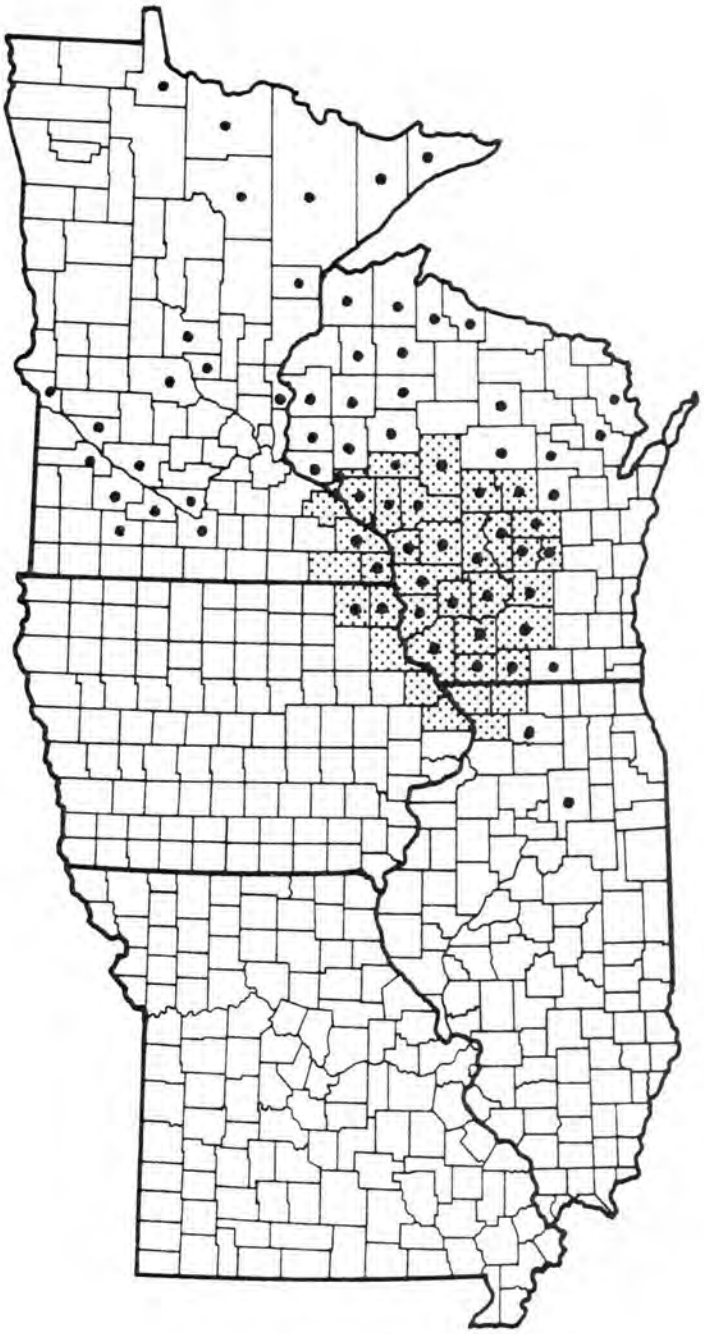
MAP 80. Matteuccia struthiopteris



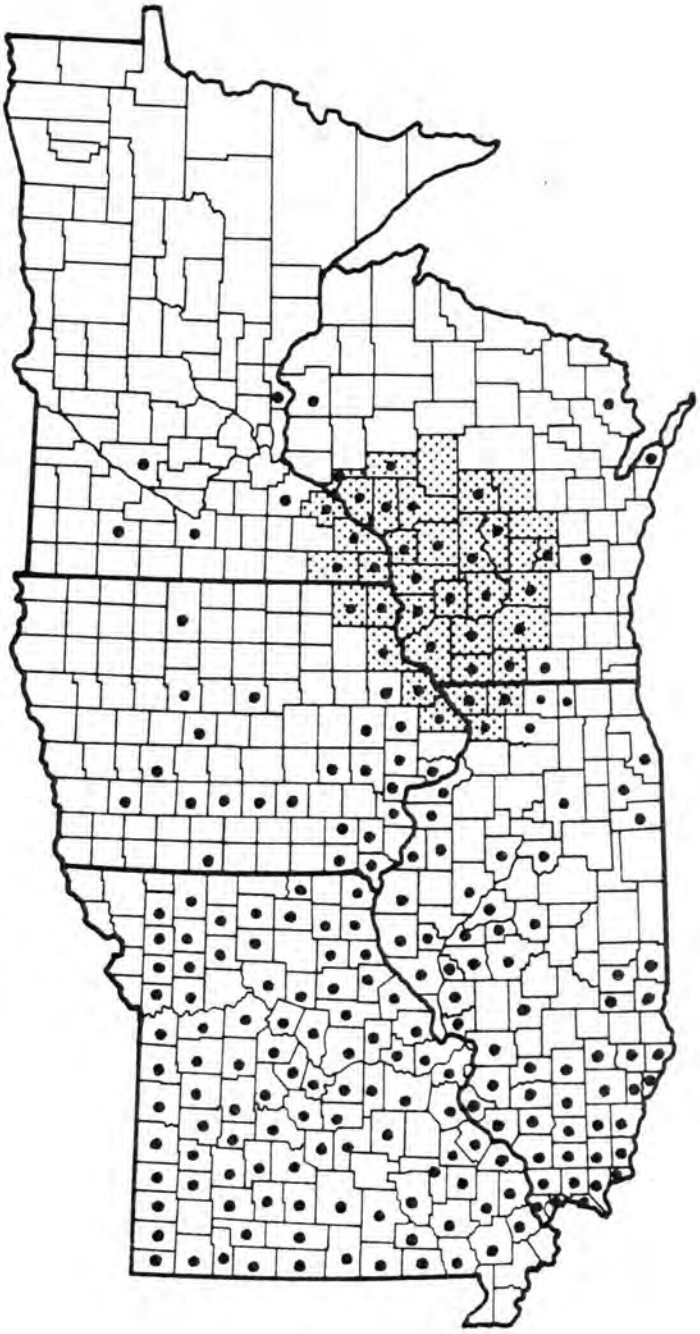
MAP 81. Onoclea sensibilis



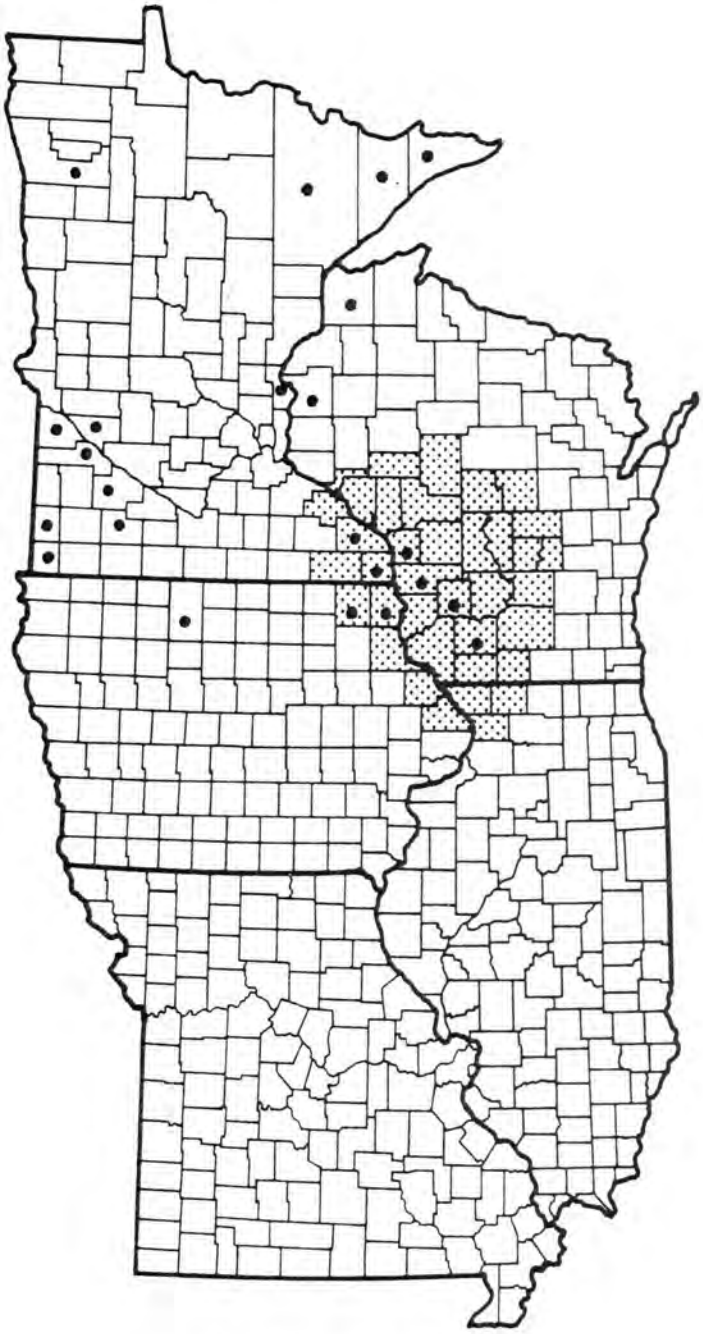
MAP 82. Polystichum acrostichoides



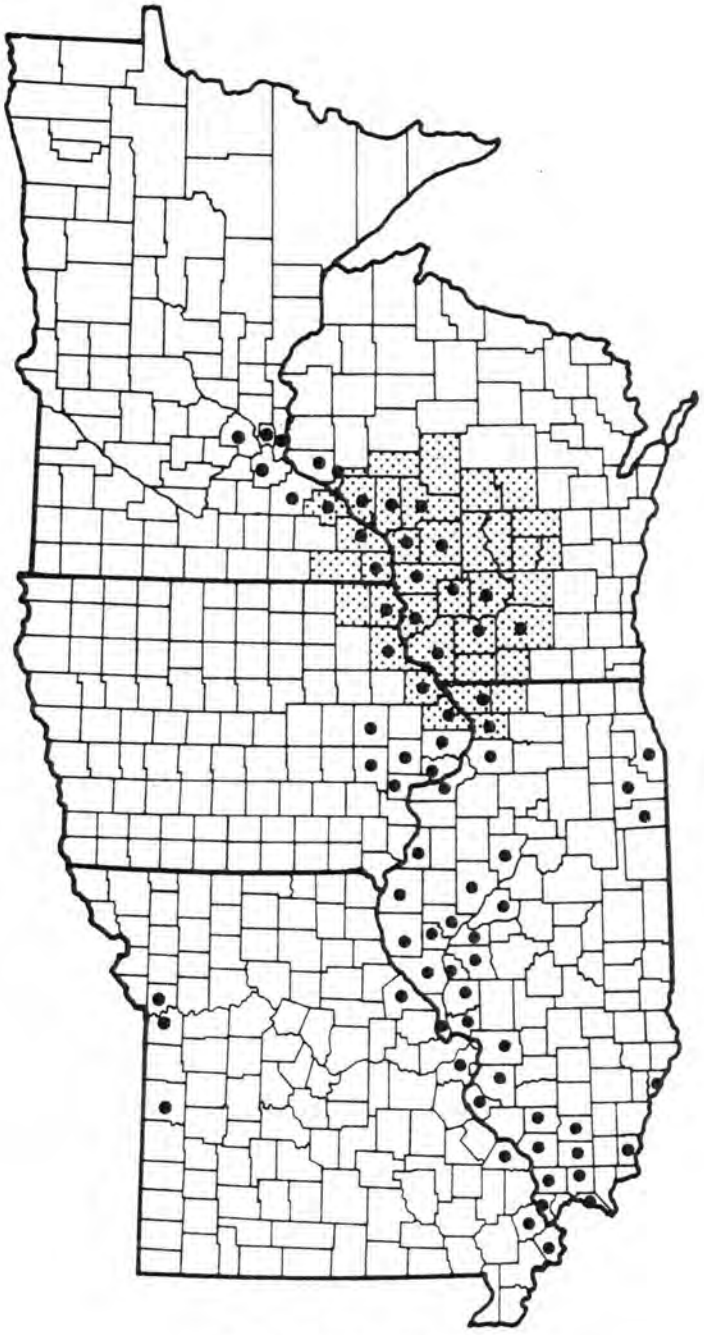
MAP 83. Woodsia ilvensis



MAP 84. Woodsia obtusa



MAP 85. Woodsia oregana



MAP 86. Azolla mexicana

INDEX[1] AND CHECKLIST

[1]Numeral refers to map number and taxon number in text.