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## Discovery of Lycopodium Communities in the Gulf Coastal Plain Region of Arkansas

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## General Notes

STATUS REPORT ON THE FERN *WOODSIA SCOPULINA* IN ARKANSAS

*Woodsia scopulina* D. C. Eat. var. *appalachiana* (Taylor) Morton (Polypodiophyta: Woodsiaceae) is one of the rarest ferns in the state's flora, occurring in Arkansas only on Mt. Magazine, Logan Co. (Taylor, 1984; Taylor and Demaree, 1979). The Arkansas population is disjunct over 740 km from the nearest populations to the east in eastern Kentucky and Tennessee (Cranfill, 1980) and to the west in the Rocky Mountains of Colorado (Lellinger, 1985). The Arkansas plants have a pronounced morphological affinity with plants in the Southern Appalachian Mountains, which Taylor (1948) recognized at the varietal rank. In 1985, a field study, supported by the Arkansas Nongame Preservation Committee, was conducted at Mt. Magazine to determine the field status of this fern in Arkansas.

The occurrence of *W. scopulina* was highly restricted, being present in a single location near the summit. The Arkansas population consists of approximately 700 sporophytes, only 2% of which were juvenile plants; no gametophyte plants were observed. This contrasts markedly with the situation for the species in Montana, wherein recruitment was quite conspicuous (Watson and Vazquez, 1981). Although little evidence of successful sporophyte recruitment from sexual reproduction was observed, the sporophyte plants demonstrated strong vegetative vigor (# fronds per plant) and strong reproductive vitality (# spores per plant).

Approximately 80% of the population occurs on the cliff-face, with the remainder within 10 m on the talus below. In both habitats, over 90% of the sporophytes were reproductively fertile (producing spores). Sporophytes on the cliff-face averaged 18 fronds per plant, while plants on the talus averaged 11 fronds per plant. Sporophytes on the cliff-face averaged 11 fertile fronds, while plants of the talus averaged 7 fertile fronds per plant. Cliff-face plants averaged 674 sori per frond, while talus plants averaged 439 sori per frond.

These and other reproductive and ecologic differences between plants on the cliff-face and those on the talus result in a disproportionate contribution by cliff-face plants to the total annual spore production of this population. The entire population produces an estimated 22 billion spores each year, of which 20 billion are produced by cliff-face plants. Their 10:1 advantage in spore production is greater than their 4:1 advantage in number of plants. For this reason, maintenance of plants on the cliff-face may be an extremely important factor to consider in the development of any management plan or recovery plan that is dedicated to the protection of this population.

In that the present population seems to have minimal recruitment from sexual reproduction, even though it is most certainly saturating the local environment with spores, the population should be considered extremely fragile. Based on the line of inquiry presented here, we suggest that any future forest management or recreational development plans of the summit of Mt. Magazine should preclude alterations in the vicinity of this population.

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DISCOVERY OF *LYCOPodium* COMMUNITIES IN THE GULF COASTAL PLAIN REGION OF ARKANSAS

Until recently, the pteridophytes in the genus *Lycopodium* were represented in Arkansas by two species (Taylor, 1984; Taylor and Demaree, 1979). A few, small populations of the Shinin Clubmoss (*L. lucidulum* Michx.) occur in the Ozark Region, representing extreme southwestern disjuncts of this species. Widely dispersed populations of the Appressed Clubmoss (*L. appressum* [Chapm.] Lloyd & Underw.) occur in the Gulf Coastal Plain Region, representing extreme northwestern populations of this species. Over the last three collecting seasons (1985-1987), the authors have added appreciably to the floristic knowledge about *Lycopodium* in Arkansas. Amason noted the widespread occurrence and large local abundance of *Lycopodium* in Calhoun Co., AR. Orzell and Bridges detected that the populations were mixed, and included taxa not previously reported from Arkansas. Peck and Peck expanded the field survey, added additional populations with unreported taxa, and compared Arkansas material with that of plants from across Southeastern United States held at Missouri Botanical Garden (MO).

These efforts resulted in the discovery of additional populations of *L. appressum* in Calhoun and Garland counties, previously thought to be quite restricted in its Arkansas occurrence. We report as new to Arkansas three clubmoss species: *L. carolinianum* L., *L. alopecuroides* L., and *L. prostratum* Harper. We also report as new to Arkansas three clubmoss hybrids: *L. X bruceii* Lellinger (*L. appressum* X *L. prostratum*), *L. X copelandii* (*L. alopecuroides* X *L. appressum*), and *L. alopecuroides* X *L. prostratum*.

These *Lycopodium* taxa range along the Atlantic Coastal Plain from Florida to Massachusetts and along the Gulf Coastal Plain from Florida westward to Texas (Bruce, 1965; Synder and Bruce, 1986). They have the ability to survive, at least for a while, in interior continental areas far northward from the Gulf of Mexico, in that they were located in southern Kentucky (Johnson and McCoy, 1975; Cranfill, 1980; 1981).

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These taxa are part of the *Lycopodium inundatum*-complex, a group of species plus their hybrids which are cryptic, difficult to tell apart morphologically (Bruce, 1975; Beitel, 1979; Lellinger, 1985). They maintain their distinctness across their range, in spite of their co-occurrence as a genus community and their propensity to hybridize. The use of pteridophyte genus communities (communities of many species of one genus) to expand the recognition of taxonomically useful characteristics (such as comparisons of vegetative and reproductive phenology) for cryptic species of pteridophytes was summarized by Wagner and Wagner (1983), who noted that much comparative data which validates the distinctness of species can only be ascertained when the taxa co-occur.

All of these newly reported *Lycopodium* taxa were found occurring in genus communities across Calhoun Co., at locations where disturbance was pronounced, including barrow pits, gravel/sand quarries, roadside ditches, cleared pine plantations, and in the midst of refuse of a landfill operation. The permanence of these populations is open to study; Amason showed us one location where a large stand once flourished, but where only a few stems were presently evident, apparently having been invaded and replaced by various grasses and sedges. Although presently known in Arkansas from one county, we fully expect that additional search will establish that they occur throughout the Gulf Coastal Plain in Arkansas.

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## ARKANSAS PTERIDOPHYTE FLORA UPDATE: A NEW CHECKLIST AND ADDITIONAL COUNTY-LEVEL OCCURRENCE RECORDS

This note announces the publication of a new state checklist of pteridophytes (Peck, Peck, and Taylor, 1987) and of a compilation of county occurrence record from specimens deposited at the UALR Herbarium (Peck and Peck, 1986). Over the last 152 years, 14 checklists or floras of the Arkansas pteridophytes (ferns plus fern allies) were published (Taylor, 1984). Our new checklist of 85 taxa (species plus hybrids) provides a timely update, summarizing the numerous changes in Arkansas pteridophyte floristic information that have developed through the efforts of several workers over the last 10 years. As part of his doctoral studies on the Arkansas pteridophyte flora, Taylor (1976) inspected herbarium material and conducted numerous field trips with D. Demaree to relocate populations of taxa rare in Arkansas (Taylor and Demaree, 1979). Various staff members of the Arkansas Natural Heritage Commission and Arkansas Nature Conservancy have continued to relocate rare pteridophyte populations and have located taxa previously unknown to Arkansas (Peck, Orzell, Sundell, and Peck, 1985; Peck, Peacock, and Shepherd, 1985; Peck, Peck, Orzell, Bridges, and Amason, 1987). Over the last six years, two of us (JHP and CJP) have conducted research on the reproductive biology of disjunct fern populations (Peck, 1985; Peck, 1986; Peck and Peck, 1987) and have encouraged our students to collect ferns, resulting in additions of county records from under-collected areas of the state. The summary (Peck and Peck, 1986) of county-occurrence records was compiled from a 1986 inventory of pteridophyte collections deposited at the UALR Herbarium (LRU). A total of 287 new county records belonging to 48 taxa were added to the distributional data presented in the atlas of the Arkansas flora (Smith, 1978). The authors welcome notification of other additions to the pteridophyte flora of Arkansas.

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