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Neviusia alabamensis: A Phytogeographic Analysis

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Neviusia alabamensis: A PHYTOGEOGRAPHIC ANALYSIS

Neviusia alabamensis is an extremely rare plant endemic to only a few southeastern states. Arkansas has representative populations in three counties: Conway, Pope, and Newton (Fig.). Other identified populations are located in Alabama, where the species was first recognized, and in Missouri, Tennessee, and Mississippi. In three states, Alabama, Arkansas, and Missouri, the genus is listed as an endangered species (Ayensu and Defilips, 1978) and in the two remaining states it has just recently been discovered. The purpose of this paper are to describe the distribution of *Neviusia alabamensis* in Arkansas and to examine the physical environments in which the Arkansas species are found.

To develop a plant description of *Neviusia alabamensis,* 16 herbarium specimens were measured and published information was examined (Chapman, 1897; Dean et al., 1973; Dean, 1961; Greene and Blomquist, 1953; Small, 1903; Lounsberry, 1901; Moldenke, 1949; Small, 1933; Steyermark, 1975). The physical environment was described in terms of soil, slope direction, slope percentage, solar exposure, and dominant vegetation. Soil samples were taken from each of the ecosystems in Arkansas in which *Neviusia alabamensis* is found and soil nutrient, soil texture, and pH tests were conducted. The soil was gathered from depths of 4 to 10cm at three different areas within each population and mixed before testing.

Neviusia alabamensis is a perennial shrub with numerous slender primary stems and short lateral branches. The bright green leaves (approximately 3cm X 4cm) are simple and alternating. The flowers are odorless and lack petals, however, the stamens are numerous (usually over 100) and showy. Flowering may occur between March and May.

Neviusia alabamensis seems to be able to exist on relatively dry sites. Two of the populations, Conway and Newton Counties, are located on southeast facing slopes, whereas the population in Pope County is located on a northwest facing slope (Table). The percentage of the slope varied a great deal among the populations. The slope in Conway County was the greatest, 80%, and the slope in Newton County was the least, 35%. It would seem that the Conway County population would be much drier as a result of the steeper slope. However, the soil at Newton County was very sandy. These two populations may be approximately equal in what seems to be the most critical factor, soil moisture.

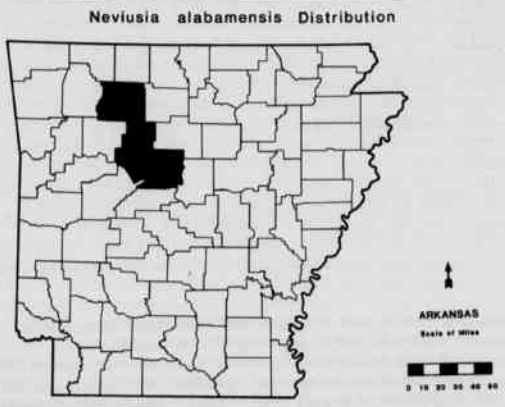

Figure. The three Arkansas counties in which *Neviusia alabamensis* is found.

Table. Comparison of the physical environments in which *Neviusia alabamensis* exists. The soil nutrients are given in kilograms per hectare.

	Conway County	Pope County	Newton County
Slope Direction	155° SE	325° NW	120-135° SE
Slope Percentage	80%	65%	35%
Size of Population	80m X 10m	15m X 40m	270m X 15m
Nitrogen	0	0	0
Phosphorus	34-45	34-45	5
Potassium	135	135	90-100
pH	6.0	6.2	6.8
Texture	Loamy sand	Loamy sand Sandy loam	Sandy grit

General Notes

In Pope County there was a semi-closed canopy, whereas the other two sites had a few scattered trees, mainly at the edges of the population. This population received more moisture than the other two populations because of a cliff which drips water down onto it after rainfalls. It would also seem to have reduced evaporation rates due to less soil radiation because of slope location. At this site *Callicarpa americana* was competing with the *Neviusia alabamensis* and was expanding more rapidly. This population of *Neviusia alabamensis* appeared to be in more danger of being overrun than the other two populations. It was also the smallest of the three populations and the least dense.

The population in Newton County was located next to a small stream one to two meters wide. This largest Arkansas population of *Neviusia alabamensis* was found growing along the southeast side of a stream, but no plants were found on the adjacent bank. This could be a result of the difference of north and south slopes and that there was more moisture on the north slope. If the species was capable of reproducing by seeds, a small stream would not be a barrier. If, however, the species was only capable of reproducing by root sprouts, the stream could halt its spreading.

The soils when tested showed no available nitrates, indicating that any nitrates had been incorporated into the biomass. Most soils, especially uncultivated soils, usually contain very small amounts of available nitrates (LaMotte, 1977). Therefore, these results could have been expected and may not be a limiting factor to the *Neviusia alabamensis* population.

The populations located at Pope and Conway Counties contained approximately 34-45kg of phosphorus per hectare, while the population at Newton County contained only 5kg per hectare. This difference correlates with the limestone substrate at the Newton County site in that on limestone soil phosphorus is generally limited. The other two populations contained an adequate supply of phosphorus, and growth may not be limited, but the Newton County site is low in this nutrient (Table).

The soils obtained from the Pope and Conway County populations were found to contain approximately 135kg of potassium per hectare, whereas, the Newton County population contained between 90 and 100kg per hectare. The plants in these areas should not vary due to the difference in the amount of potassium because normally plants cannot utilize more than 90kg of potassium per hectare (LaMotte, 1977).

The Conway and Pope County populations were growing on soil that had the optimum pH for nutrient absorption. The pH of the soil at Newton County was slightly higher due to the fact that it was on limestone, however, it would likely have an adequate absorption rate because it is still close to the optimum range.

The soils at Conway and Pope Counties were loamy sand and loamy sand to sandy loam respectively. The soil at Newton County, however, was a sandy grit and, therefore, much coarser than the other two soils. The soil would be expected to be drier than the other populations and contain smaller quantities of the soil nutrients due to the greater amount of leaching and lack of clay. Further testing would be required before it could be determined if there is a deficiency of phosphorus or potassium at any of the study sites.

The populations of *Neviusia alabamensis* were found to be growing in three distinguishable habitats. At least two out of three of the habitats were similar for each of the factors which were examined in the paper, however, the same two were not consistently similar. In general, there were more discrepancies than one might have expected.

The three populations are isolated from each other and probably have been for a number of years. They are separated from each other by a number of kilometers and physical barriers such as separate water sheds and dissected foothills in the Ozark Mountains. Since the gene pool of one population is not mixed with the gene pools of the other populations it would be possible for the species to accumulate different genetic changes. Whether there has been enough time for genetically different populations to arise cannot be determined by this study, but this could be one explanation for the ability of the *Neviusia* to exist in differing sites.

Further research is required to determine if there is inter-site variation not only in the Arkansas populations, but in all of the populations of *Neviusia alabamensis*. Research should be conducted on the physical environments of all of the populations in order to determine the best physical environment for the species. At present, there are only a few general assumptions which could be made about the most favorable ecosystem for the species. It seems to only be found above stream banks in generally dry soils. It is not possible from the research in this paper to describe the optimum physical environment for *Neviusia alabamensis* or make any definite conclusions of the effect of the physical environment upon the species.

EXSICCATAE

The following herbarium specimens were used in obtaining information for the species description. The specimens are all from Arkansas and selected from sixteen sheets:

Arkansas:	Conway Co:	*DeMaree 20, 30* (UARK)
		Moore 55-26, 56-26, 55-63 (UARK): *63-047* (ATU)
		Rettig 365 (UARK)
		Tucker 63-047 (ATU)
	Newton Co:	*Smith 3116* (UARK)
	Pope Co:	*Field 010461* (ATU)
		Lewis 010459 (ATU)
	Washington Co:	*Moore 55-72* (UARK)

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BRYOPHYTE-LICHEN COMMUNITIES WITHIN HOT SPRINGS NATIONAL PARK, ARKANSAS I.

The vegetation within Hot Springs National Park consists of varied forest communities (Dale, E. E., Jr., and M. R. Watts 1980. Vegetation of Hot Springs National Park, Arkansas. Prep. for S.W. Region National Park Service, U.S. Dept. Interior). These communities include mesic stands of upland hardwood, xeric pine-oak-hickory stands, oak-hickory-pine stands which are subtypes on the xeric side, and short-leaf pine-white oak stands which are subtypes on the mesic side. The most mesic types within the park, however, are the mixed forest types in the upland ravines. In this study, field work included variable-point sampling of these forest stands along the forest trails within the park so that the stands could be compared with the work done by Dale and Watts.

Sampling techniques for the microcommunities of lichens and bryophytes varied among sites, but always included collections from rocks, soil, fallen logs, and standing trees. A total of almost 1800 collections was made during the summer and fall of 1981. Identification of these samples is nearing completion.

The present study has identified 49 mosses and 66 lichens from within the boundaries of Hot Springs National Park. Previous studies within the park had included only species of mosses (Lowe, R. L. 1919. Collecting in Arkansas. The Bryologist 22[1]:14-15; Scully, F. J. 1941. The Mosses of Hot Springs National Park and Vicinity. The Bryologist 44[5]:125-128). New state records from this study include two liverworts: *Jamesoniella autumnalis* in the Jungermanniaceae and *Calypogeja muelleriana* in the Calypogejaceae; one moss: *Anacamptodon splachnoides* in the Fabroniaceae; and one lichen: *Coccocarpia palmicola* in Coccocarpiaceae.

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CURATORIAL NOTES FROM THE CRYPTOGAMIC HERBARIUM AT THE UNIVERSITY OF CENTRAL ARKANSAS

The Cryptogamic Herbarium at the University of Central Arkansas, Conway, is used for teaching and research and has been selected by officers of the Arkansas Mycological Society to house voucher specimens for Arkansas mushrooms collected by A M S members. These fungi are thoroughly dried and placed in clear plastic, zip-lock bags which can easily be sealed and reopened; complete labels for each are placed in/on the bags. These have been filed in the herbarium according to the checklist of mushrooms being published in Arkansas Biota, 1983 (No.37). It has been helpful to eliminate larvae and adult beetles found in some of the persistent fungi and fleshy mushrooms by a short treatment in the microwave oven before the drying is completed in the conventional laboratory oven. The microwave oven treatment usually kills the larvae and the adults will leave the specimen.

Lichens and bryophytes are often packaged in clear, plastic packets and are fastened to herbarium sheets, with the label immediately under the plastic packet. Others are packaged in the traditional manner, with complete label on the outside of the paper packet. Packets are then glued to standard herbarium sheets and placed in folders for protection. Still other specimens are housed in the conventional small boxes. The Flora A. Haas liverwort-hornwort collection remains in the box in which she kept it. Her collection does not contain any Arkansas specimens but is still a vaulable addition to the herbarium. Collections she had of Arkansas bryophytes were discarded (due to no identification label being placed on the large box in which it had been stored) in a clean-up of the department about 1955. The Haas collection includes specimens collected by L. W. Underwood, W. A. Evans, C. C. Hayes, and Nellie Fosdick dating from 1888 to 1919. However, the earliest collection was a leafy liverwort collected in Cuba in 1879. Places of collection include Puerto Rico, Hawaii, Cuba, Jamaica, California, Florida, New Hampshire, and several other states.

An important addition to the vascular cryptogam section of the herbarium is the collection of Pteridophyta made by the late Aileen McWilliam of Mena, Arkansas. Some of her specimen sheets of Arkansas ferns indicate sites where the ferns can no longer be found, because the habitats have been so thoroughly changed (Moore, J. E. 1982).

In addition to the storage of specimens for study, it is part of the function of the herbarium curator to publish checklists of plants for the region served. In this respect, checklists of Arkansas lichens (1981), hornworts and liverworts (1983), and mushrooms (1983) have been published in the Arkansas Biota under the auspices of the UCA Cryptogamic Herbarium (Nos. 30, 36, and 37). The checklist of Arkansas mosses will be published in 1984. The checklist of Arkansas Peridophytes by Dwight M. Moore was published in the Arkansas Biota in 1977 (No. 1).

Distribution maps for specimens in the herbarium are placed within each folder. Reprints of articles dealing with the Arkansas plants are available in the herbarium library.

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