

parents July 24, 1922. Robins have markedly increased here of late years as breeding birds.

*Bluebird (*Sialia sialis sialis*). Twenty nests have been found in the 3 years; 8 of these are known to have succeeded and 2 to have failed. The first broods are started in late March or early April and the second broods from the middle of May till early June. The earliest egg found was on March 24, 1921; the latest brood were still in the nest on June 29, 1922. Two broods left the nest when 16 days old, two when 17 and one when 18 and 19 (there were 6 young in this brood). In one case the young of the first brood helped feed the young of the second.

X. IDENTIFICATION. AND ECOLOGY OF POLYPODIUM (Sw) AN EPIPHYTIC FERN INCLUDED IN THE OKLAHOMA CRYPTOGAMIC FLORA

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Polypodium incanum (Sw.) is one of the rare, if not the only epiphytic fern, recorded in the Oklahoma cryptogamic flora. In March, 1914, while conducting a party in field biology at Blue Falls, Armstrong, Bryan county, Oklahoma, the writer observed a peculiar growth on the high and arched branches of a bur-oak tree (*Quercus macrocarpa*) which resembled a coarse and scurfy moss, or lichen growth. Closer inspection revealed this to be a perching fern.

Among its common names are: "hoary polypody," "scaly polypody," "tree fern," and "resurrection fern." "Tree fern," is from its habit of growing in the tree tops, and "resurrection," refers to its habit of revival after drought.

The growth began about ten feet from the ground, and ascended on the north side of the trunk to a height of some twenty-five feet, passing out on the north sides of the major branches, as well. The running rhizomes were branched and embedded in a substratum of moss which found a symbiotic protection beneath the fronds of the fern. The fronds were thick, scurfy, and about three to six inches in length. Where exposed, they were rolled inward in the desiccated condition, and where shadowed the fronds were practically expanded exposing a mossy green upper surface.

Ecology

Polypodium incanum (Sw.) "the little gray polypody," may be termed a 'straggler' into our territory (Clute) ranging from a warmer region. It is most abundant in the tropics, where it grows

on rocks and trees, walls, and even roofs of houses. In the northern part of its range it is usually found on rocks and about the roots of trees, although in the Gulf states it may be found high up on the trunks and branches of trees. In appearance, it is nearly an exact duplicate of the common polypodium, with the same creeping, scaly rootstocks and leathery pinnatifid or pinnate fronds. It is, however, rather smaller, and further distinguished by having the stipe and under surface of the blade thickly covered with gray, or brownish, peltate scales with darker centers. The upper surface may be slightly scaly, or smooth. The sori are of medium size, and borne near the margins of the pinnules, but are seldom noticeable, owing to the scales by which they are surrounded. Usually they are so deeply sunk in the blade as to form little bosses on the upper surface.

Since this species grows in situations where moisture is a very uncertain quantity, it has acquired the habit of curling up its fronds when drought comes, and remaining in a comatose condition until the next rain, when it again unrolls them, and the vegetative functions proceed as before. During a drouth, fronds have been known to uncurl in a heavy dew. Apparently dead specimens, after weeks of desiccation, have been revived and unfolded in a few hours when placed under warm and moist bell jars in laboratories at the University of Oklahoma.

Range

This species is found as far north as Virginia, Illinois, and Missouri; but it is not common except in the Gulf states. More exactly, the range is confined to the Austro-riparian (eastern area,) Lower Austral, and Tropical Zones of eastern and southern United States. The northern limit of this species may be said to parallel the northern limits of the Austro-riparian zone, which may be characterized as follows:

On the north, by the south shores of the Chesapeake Bay, passing thence in an almost southwesterly direction along the Piedmont belt to Macon, Georgia; turning westward to Columbus, Georgia; thence to Florence, Alabama; northward through Tennessee to Henderson, Kentucky; Evansville, and Shawneetown, Illinois; across the southern tip of that state to the Mississippi river; thence southwestward to Little Rock, Arkansas; northwestward to Galena, Kansas; thence westward to Arkansas City, Kansas. The line then describes a backward curve through Oklahoma, passing through Guthrie, Oklahoma City, and Lawton, extending westward to Amarillo, Texas; thence southward on meridian 101° W. to the

Pecos river valley, with an up-stream excursion as far as Roswell, New Mexico; and to the Rio Grande, with a like excursion as far as El Paso, and Sacorro.

Polypodium Incanum (Sw.) in Oklahoma

Three instances of the finding of this fern in Oklahoma, are cited in this paper. First: Bryan county, March, 1914, forming an extensive growth on the north sides of a bur-oak tree. Second: Pittsburg county, April 23, 1921, found perching on a huge granite boulder, ("Belle Starr" Cave Expedition, Proceedings of the Oklahoma Academy of Science, University of Oklahoma Bulletin, New Series No. 247, University Studies, No. 15, October 1, 1922). Third: McCurtain county, December, 1922, found extensively along the bottoms of Norwood creek, near its confluence with Red river.

The first instance, located by the writer, was subjected to careful annual study for eight years, transported specimens being studied under a variety of conditions established in the laboratory; chief attention being given to the habit behavior of the field culture. In 1917, a damaging tornado visiting this region and playing havoc in the timberlands along Blue river, swept away the crown of the bur-oak tree, the bole and lower branches dying completely the following summer. The epiphytic fern escaped unscathed and continued to flourish upon the dead oak, and sloughing bark. This culture was visited December 2, 1922, by Prof. M. P. Hatchett, biologist, East Central State Teachers' College, and the writer, who found it in a flourishing condition, comparable to its condition in 1914. Specimens of the culture were collected for presentation before the Academy of Science, February 10, 1923. A pen sketch of a habit study is submitted herewith by the author. Figure No. 1.

The second instance, located by the writer, afforded specimens which were collected and vegetated under bell jars for comparison with the Bryan county specimens.

The third instance, was located by Dean L. A. Turley, of the Medical School of the University, while on a hunting expedition near Bokhoma, McCurtain county. Dr. Turley states that along Norwood Creek the forest trees reach huge proportions, and that he found this fern extensively mantling the trunks and branches of the trees as high as sixty and seventy feet from the ground.

These three locations of *P. incanum* (Sw.) in Oklahoma, (Bryan county, 1914; Pittsburg county, 1921; McCurtain county, 1922; and the continuous study of the Bryan county culture from 1914 to 1922, indicate that this species should be listed in the Oklahoma cryptogamic flora, and that its presence in Oklahoma is to

be considered as a marginal limit of its northern range in the Austro-riparian zone (eastern area,) crossing, and confined to, the extreme southeastern counties of the state in its Deciduous Forest, and Transition Forest belts.

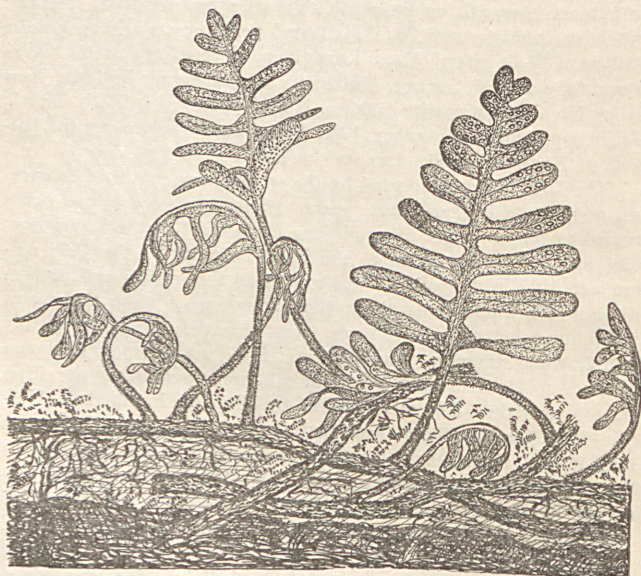


Figure 1

An epiphytic fern, originally identified in the Oklahoma cryptogamic flora March, 1914, Blue Falls, Bryan county. The pen study is from specimens of this culture taken after eight years observation, December 2, 1922, and shows fully expanded, and partially desiccated fronds, branching root-stocks, and mossy sub-stratum superposed upon the bark of the bur-oak (*Quercus macrocarpa*).