

BRYOPHYTES AND PTERIDOPHYTES OF SOME WEST
CENTRAL OKLAHOMA CANYONSElbert L. Little, Jr., *Globe Arizona*

The greatest display of bryophytes in western Oklahoma is found in a series of sandstone canyons centering in northern Caddo County and portions of adjacent counties. These canyons have a better than average representation of pteroidphytes also. In poorly cemented sandstone bed-rock, the Whitehorse formation of the Permian "Red Beds," smaller streams and tributaries along the divide between the South Canadian and Washita river watersheds have carved deep channels with vertical cliffs 30 to 70 feet or more in height. The largest and best known of these west central Oklahoma canyons are located near the town of Hinton and include Devils Canyon, which originates in southwestern Canadian County, and South Canyon in Caddo County. Short, deeper canyons cut back from the south bank of the South Canadian River in Blaine County, and smaller canyons occur in several nearby counties.

With an annual rainfall of about 30 in., this section has as its dominant vegetation the *Andropogon* tall grass prairie but contains limited patches of dwarf oaks (*Quercus marilandica* and *Q. stellata*) comprising the western limit of the oak-hickory forest of eastern Oklahoma. Because of their spring-fed permanent streams, rich organic soil, and protection from drying winds and exposure, the larger canyon bottoms support a forest of tall deciduous trees. Of about twenty tree species represented here, the commonest are *Acer saccharum*, *Juglans nigra*, *Quercus muhlenbergii*, *Q. shumardii*, *Celtis laevigata*, and *Acer neugndo*.

Certain species of these canyon bottom forests are regarded as relics of a more humid climate in the past, when the eastern deciduous forest may have extended this far west. The commonest tree and most conspicuous relic is *Acer saccharum*, the eastern sugar maple. Disjunct patches in these canyons 100 mi. from the nearest sugar maples in eastern Oklahoma forests, mark the extreme western point or limit of distribution of this species for its entire natural range in eastern United States and Canada. In the undergrowth *Phryma leptostachya* is the outstanding relic. Other eastern flowering plants of the canyons probably are disjunct also, but ranges of most species within the State are not well known.

Besides flowering plants of a more humid eastern forest, these canyons support relatively more liverworts, mosses, and ferns, some of which are rare or unknown elsewhere in western Oklahoma. No bryophytes can be cited as relics, however, because the distribution of bryophytes in Oklahoma is imperfectly known and because many of these wind-disseminated spore-bearing plants are widely distributed or cosmopolitan.

The larger sandstone canyons present a great variety of habitats for bryophytes and pteridophytes from dry, exposed rock outcrops at the tops for xerophytes, such as *Weisia viridula*, *Tortula ruralis*, and *Selaginella*

sheldoni, down to water and permanently moist, shaded walls at the bases for hydrophytes, such as *Conocephalum conicum*, *Philonotis marchica*, and *Equisetum praealtum*. The dense trees furnish shade and humus on the forest floor for mesophytes, such as *Mnium cuspidatum*, and contribute trunks and logs for a few epiphytes, such as *Frullania* and *Orthotrichum*.

Away from the canyons bryophytes and pteridophytes are rare. Broader valleys without rock walls usually have a forest border of cottonwoods, elms, and other trees, in which bryophytes and ferns are scarce or absent. A few species, such as *Bryum argenteum* and *Welsia viridula*, grow on exposed ground, such as in prairie pastures. Scattered buttes with caps of sandstone or other rock have xerophytic species similar to those of the dry canyon walls.

This paper is based upon specimens obtained by the writer in west central Oklahoma mainly in 1930 but with some additions in the three following years, while he was a member of the faculty of Southwestern State Teachers College at Weatherford. Detailed collections were made in Devils Canyon and in smaller canyons near Weatherford in southeastern Custer County, about 30 mi, west of Devils Canyon. Additional records from other canyons, rock outcrops, and exposed soil are included. Ten species of liverworts, 54 species of mosses, and 9 species of pteridophytes are listed with habitat and distribution notes. Four mosses, indicated by an asterisk (*), are state records, according to lists compiled by Sharp³ and Little¹. Records of west central Oklahoma liverworts, including Devils Canyon and Custer County, have been mentioned in the state list by Little².

The writer is indebted to several specialists for assistance in making determinations. Drs. A. W. Evans and M. A. Howe have checked the liverworts. A. J. Sharp has kindly checked the author's determinations of mosses, and a few difficult specimens have been named by E. B. Bartram, Dr. A. J. Grout, and Dr. G. N. Jones. Dr. J. H. Schaffner has determined two species of *Equisetum*.

In addition to the writer's set of specimens, duplicate sets of the west central Oklahoma mosses have been deposited in the herbaria of the University of Oklahoma, the University of Tennessee, and the New York Botanical Garden. A set of the liverworts has been placed in the Herbarium of Yale University.

HEPATICAE

SPHAEROCARPACEAE

Sphaerocarpos texanus Aust. Rare on moist, shaded soil, Devils Canyon.

RICCIACEAE

Riccia frostii Aust. On soil, Water Canyon, Canadian Co.

Riccia sorocarpa Bisch. Moist, shaded soil, Devils Canyon.

REBOULIACEAE

Grimmia fragrans (Balbis) Cordia. On dry sandstone and sandy soil, top of Devils Canyon. The only Oklahoma record of this species.

Plagiochasma wrightii Sull. Dry sandstone cliff, South Canyon. Sterile material probably this species was found also in Devils Canyon.

Reboukia hemisphaerica (L.) Raddi. Common on dry sandstone outcrops and rocky soil in Devils Canyon, South Canyon, and canyons in Custer and Blaine Cos. Collected on gypsum in Custer and Washita Cos.

MARCHANTIACEAE

Conocephalum conicum (L.) Dum. Common on permanently moist, shaded bases of sandstone canyon walls up to 3 or 4 ft. above springs

and water, Devils Canyon, South Canyon, and other canyons in Canadian, Caddo and Blaine Cos.

Marchantia paleacea Bertol. Moist, shaded bases of sandstone bluffs along streams near Weatherford, Custer Co. Not found in the larger canyons 15 to 30 mi. eastward, where *Conocephalum conticum* occupies similar habitats in the absence of this species.

LEJEUNEACEAE

Frullantia inflata Lehm. & Lindeb. Rare on tree trunks, mainly *Ulmus americana*, along valleys and canyons. Collected in Custer, Dewey, and Woodward Cos.

Frullantia riparia Hampe. On dry, shaded sandstone cliffs and on bark of trees, Devils Canyon and South Canyon.

ANTHOCEROTACEAE

Anthoceros sp. Rare, sterile plants were found on moist, shaded base of a sandstone bluff and on moist, shaded soil, Devils Canyon.

MUSCI

FISSIDENTACEAE

Fissidens incurvus Stark. On shaded sandy soil and gypsum, canyon near Weatherford.

Fissidens subbasilaris Hedw. Shaded sandstone cliffs and boulders. Devils Canyon.

DITRICHACEAE

Ceratodon purpureus (L.) Brid. Dry soil, top of Devils Canyon.

DICRANACEAE

Anisothecium rubra (Huds.) Lindb. Forming mats on moist, shaded sandstone walls and soil banks of canyons near Weatherford.

POTTIACEAE

Barbula unguiculata (Huds.) Hedw. Sandstone outcrops of canyons near Weatherford.

Didymodon tophaceus (Brid.) Jur. or *Dactylhymenium pringlei* Card. On continually moist canyon walls of sandstone, gypsum, and soil, where there is seepage or spring water, canyons near Weatherford. Sterile material could not be referred definitely to either of the foregoing species, both of which have been collected in Oklahoma by Sharp³.

Eucladium verticillatum (Lindb.) Bryol. Eur. Shaded sandstone ledges, Devils Canyon.

Gymnostomum calcareum Bryol. Germ. Sandstone bluff, Caddo Co. Buttes, 15 mi. S. E. of Weatherford.

**Husnotella revoluta* Card. var. *palmeri* (Card.) Will. On shaded sandstone outcrop, ravine above Devils Canyon. This Mexican and southwestern moss thus meets the eastern disjuncts here.

Phascum cuspidatum Schreb. var. *piliferum* (Schreb.) Hook & Taylor. On soil, prairie and under trees, near Weatherford.

**Pterogoneurum subsessile* (Brid.) Jur. Rare as a pioneer with other mosses and lichens on gypsum outcrop, prairie near Weatherford.

Tortula obtusifolia Schleich. (*Desmatodon arenaceus* Sull. & Lesq.) Exposed sandy soil and sandstone along canyon near Weatherford.

Tortula pagorum (Mild.) De Not. On tree trunks and logs, valley and canyon near Weatherford.

Tortula plinthobia (Sull.) Broth. On sandstone, Caddo Co. Buttes, and on dry rock, valley near Weatherford.

Tortula ruralis (L.) Ehrh. Dry sandy soil and sandstone ledges, top of Devils Canyon and Caddo Co. Buttes.

Weisia viridula (L.) Hedw. On sandy soil and sandstone, canyons near Weatherford and top of Devils Canyon. Also on soil and a pioneer on gypsum, prairie near Weatherford. The commonest moss in this region.

GRIMMIACEAE

Grimmia apocarpa (L.) Hedw. Dry, exposed rock outcrops, Caddo Co. Buttes and Antelope Hills, Roger Mills Co., and a pioneer on gypsum outcrop, prairie near Weatherford.

Grimmia rau Aust. Dry, exposed sandstone outcrops, canyons near Weatherford and Caddo Co. Buttes.

**Grimmia wrightii* Aust. Dry, exposed rock, Antelope Hills, Roger Mills Co. This is a state record, as Sharp's³ specimen from Cleveland Co. cited as *Coscinodon wrightii* is now referred to *Grimmia rau*.

FUNARIACEAE

Funaria americana Lindb. Shaded sandy soil and sandstone outcrops along canyons near Weatherford and Devils Canyon.

Funaria hygrometrica (L.) Sibth. Moist soil, on cinders, Weatherford.

Physcomitrium turbinatum (Michx.) Brid. Moist, shaded soil where seepage, canyon near Weatherford and Devils Canyon.

BRYACEAE

Bryum argenteum L. Exposed soil, prairie, and sandstone bluff of canyon near Weatherford.

Bryum caespiticium L. Exposed soil, prairie, and base of tree, valley near Weatherford; and shaded sandy bank of ravine above Devils Canyon.

MNIACEAE

Mnium cuspidatum (L.) Leyss. Forms large mats under trees on shaded sandy soil and sometimes on sandstone, Devils Canyon and canyons near Weatherford.

BARTRAMIACEAE

Philonotis marchica (Willd.) Brid. In water and moist, shaded soil around springs at base of sandstone walls in Devils Canyon.

ORTHOTRICHACEAE

Orthotrichum diaphanum (Gmel.) Schrad. On bark of *Ulmus americana*, valleys near Weatherford.

Orthotrichum pusillum Mitt. On bark of *Ulmus americana*, valleys near Weatherford.

LEUCODONTACEAE

**Leucodon brachypus* Brid. On sandstone cliff, Devils Canyon.

THELIACEAE

Thelia lescurii Sull. Shaded sandy soil, Devil's Canyon.

FABRONIACEAE

Fabronia ciliaris (Brid.) Brid. Rare on tree trunk, valley near Weatherford.

LESKEACEAE

Leskea gracilescens Hedw. On bark at base of tree, Devils Canyon.

Leskea obscura Hedw. On bark and at base of trees, valleys near Weatherford.

THUIDIACEAE

Anomodon attenuatus (Schreb.) Huben. Shaded sandstone outcrops, Devils Canyon.

Anomodon minor (Pall.) Furrn. On bark and at base of trees and on shaded sandstone bluffs, Devils Canyon.

Anomodon rostratus (Hedw.) Schimp. Shaded sandstone cliff and boulders, Devils Canyon

AMBLYSTEGIACEAE

Amblystegium serpens (L.) Bryol. Eur. On shaded soil banks and bark at base of tree, ravines near Weatherford.

Amblystegium varium (Hedw.) Lindb. On bark at base of tree, Devils Canyon.

Campyllum chrysophyllum (Brid.) Bryhn. Shaded soil, canyon near Weatherford.

Campyllum hispidulum (Brid.) Mitt. Shaded soil banks and bark at base of tree, ravines near Weatherford.

Hygroamblystegium irriguum (Wils.) Loeske. Common locally on moist, shaded soil, bases of trees, rotten wood, and moist, shaded bases of sandstone canyon walls where there is seepage, and at edge of springs and streams, Devils Canyon and canyons near Weatherford.

Leptodictyum trichopodium (Schultz) Warnst. var. *kochii* (Bryol., Eur.) Broth. On rotten wood, shade, Devils Canyon, and on soil bank of canyon near Weatherford.

BRACHYTHECIACEAE

Brachythecium acuminatum (Hedw.) Lind., probably. Shaded sandstone outcrop, Caddo Co. Buttes.

Brachythecium flexicaule R. & S. Shaded, sandy soil bank of ravine above Devils Canyon.

Brachythecium oxycladon (Brid.) J. & S. Forming mats on shaded sandy soil banks of canyons near Weatherford.

Brachythecium rutabulum (L.) Byrol. Eur. Moist, shaded soil at base of sandstone bluff, Devils Canyon.

Eurhynchium strigosum (Hoffm.) Byrol. Eur. Shaded sandy soil, Devils Canyon and canyon near Weatherford.

Oxyrrhynchium hians (Hedw.) Loeske. Moist soil near water, Water Canyon, Canadian Co.

Rhynchostegium serrulatum (Hedw.) Jaegr. On bark at base of tree, Devils Canyon.

ENTODONTACEAE

Entodon seductrix (Hedw.) C. Mull. On shaded sandy soil, sandstone, and decaying wood, Devils Canyon.

HYPNACEAE

Homomallium adnatum (Hedw.) Broth. On shaded sandstone boulder, Devils Canyon.

Platygyrium repens (Brid.) Byrol. Eur. Shaded base of tree, Devils Canyon.

Taxiphyllum geophilum (Aust.) Fleisch. Shaded sandy soil, Devils Canyon.

POLYTRICHACEAE

Catharinaea angustata Brid. On shaded sandstone cliff, boulders, and sandy soil, Devils Canyon.

PTERIDOPHYTA

OPHIOGLOSSACEAE

Botrychium virginianum (L.) Sw. A single, sterile plant was found along Cedar Creek, 1 mi. S E. of Weatherford.

POLYPODIACEAE

Adiantum capillus-veneris L. Rare on moist soil at base of sandstone cliff, South Canyon.

Asplenium platyneuron (L.) Oakes. Shaded sandstone cliffs, Devils Canyon.

Asplenium resiliens Kunze. On shaded crevices, sandstone bluffs, Devils Canyon.

Cheilanthes tomentosa Link. Shaded sandstone cliffs, Devils Canyon.

Filix fragilis (L.) Gillib. Rare on moist shaded sandstone bluffs near springs, Devils Canyon.

Pellaea atropurpurea (L.) Link. Relatively common on shaded sandy soil and sandstone bluffs, Devils Canyon and canyons near Weatherford.

Woodsia obtusa (Spreng.) Torr. Relatively common on shaded soil and crevices of sandstone cliffs. Devils Canyon and canyons near Weatherford.

EQUISETACEAE

Equisetum kansanum Schaffn. Moist, exposed soil near spring, canyon near Weatherford, and edge of pond near Weatherford.

Equisetum praealtum Raf. The common horsetail at borders of streams, Devil's Canyon and canyons near Weatherford.

SELAGINELLACEAE

Selaginella sheldoni Maxon. A common pioneer on dry, exposed sandstone outcrops and shallow sandy soil, where it forms mats, Devils Canyon and South Canyon. At Devils Canyon it is typical of rock ledges at the top of the vertical walls and is rare in the shaded canyon bottom.

SUMMARY

1. This paper lists 10 species of liverworts, 54 species of mosses and 11 species of pteridophytes from west central Oklahoma, based upon collections made by the writer, principally in Devils Canyon, Canadian Co. and near Weatherford, Custer Co.

2. Four of the species of mosses are state records.

LITERATURE CITED

1. Little, Elbert L., Jr., "The bryophytes of Muskogee County, Oklahoma," Bryologist 39, 8-16, (1936).

2. Little, Elbert L., Jr., "The Liverworts of Oklahoma," Bryologist 39, (In press).

3. Sharp, Aaron J., "Bryophytes of southeastern Oklahoma I. A preliminary list with notes," Bryologist 33, 45-55 (1930).

