Bryological Studies in Kansas: Neosho County

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Abstract. *Previous surveys of Kansas bryophytes have either been regional or statewide in scope. This study is the first systematic survey to be conducted at the county level in Kansas. Collections representing 699 specimens from 51 localities were made from the fall, 1991 through spring, 1992. Seventeen species of hepatics, distributed among 9 genera and 7 families, and 60 species of mosses, distributed among 40 genera and 21 families are reported for the county based on field collections and literature reports. The hepatic* Nowellia curvifolia *(Dicks.) Mitt. and the mosses* Rhizomnium punctatum *(Hedw.) T. Kop. and* Fissidens bushii *(Card. & Ther.) Card. & Ther. are first reports for Kansas. Six species of hepatics and 48 species of mosses are reported for the first time in the county.*

Bryophytes have been collected in Kansas since at least the 1870's, but no systematic inventory of them on a county-by-county basis has been conducted. Major contributions to the Kansas bryoflora have been regional (Smith 1966), statewide (McGregor 1955; Churchill 1985), or scattered (Merrill 1989, 1991a, 1991b) in their scope. McGregor (1955) and Churchill (1985) provide an overview of the literature concerning the bryoflora of Kansas. Most collections have concentrated on the eastern third of Kansas, but even this part of the state has several poorly collected counties. The unevenness of collecting throughout Kansas has resulted in a patchwork that has left many counties undercollected. As far as known, no systematic inventory of bryophytes at the county level has been conducted thus far for the state.

In southeastern Kansas, Neosho county is one of the most poorly collected for bryophytes (fig. 1). Prior to this study, 12 species of mosses (Churchill 1985; Merrill 1991b) and 11 hepatics (McGregor 1955) were reported for Neosho County.

The objectives of this paper are to present a brief overview of Neosho County, Kansas and provide a checklist of bryophyte species known to occur there.

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Location and Description of Study Area

Neosho County is located in southeast Kansas (fig. 1) and has a total area of nearly 152,056 ha (ca. 227 km^2). The county lies in the Cherokee Prairie land resource area of the Osage Cuestas physiographic region of the central lowlands. Elevation ranges from about 252 m to 328 m above sea level. The county is drained by the Neosho River and its tributaries except for the southwest corner, which is drained by a tributary of the Verdigris River.

The climate of Neosho County is continental, with a recorded temperature range from a high of 47° C to a low of -31° C. The average temperature is 13.5° C. The average annual precipitation is 101 cm, but is unevenly distributed throughout the year (U.S. Dept. of Agriculture 1982). As expected, there are years of unusually low or high precipitation.

Surface geology of the county consists primarily of Paleozoic deposits of the Pennsylvanian System. Soils have a parent material of chert, cherty gravel, cherty limestone, limestone, shale, and sandstone. Shallow soils typically are the sandiest or rockiest, containing many rock outcrops and occurring on the higher elevations with steep slopes. Deeper soils are found on more level to gently sloping areas, while alluvial deposits are restricted to the river drainages.

A study of the potential natural vegetation of Neosho County was made by Carter (1967). The county consists primarily of alternating forest and prairie, with forests occurring mostly near streams and on north-facing slopes (Dice 1943). Three natural vegetation types were described by Carter (1967): 1) Cross Timbers (*Quercus-Andropogon*), 2) oak-hickory Forest, and 3) Bluestem Prairie. Approximately 3.0 percent of the county is wooded, consisting mostly of a mixture of oak-hickory and riparian corridor tree species (e.g. *Platanus occidentalis* L., *Acer negundo* L., *Ulmus americana* L., *Celtis occidentalis* L, *Fraxinus pennsylvanica* Marsh, *Quercus muehlenbergii* Engelm., etc.).

Grasslands account for approximately 35 percent of the total vegetation in the county, with most converted to fescue grass. Cultivation, severe erosion or disturbance, and population centers make up more than 60 percent of the county.

Materials and Methods

Neosho County lies within 15 quadrangles, for which delineations were superimposed onto the county map for easy reference. Within each quadrangle, collection localities were selected for their accessibility and representation of a variety of existing habitats. Criteria deemed important included available surface water, possible outcrops of sandstone and limestone, least disturbed areas with various native vegetation types and soil associations, and disturbed areas undergoing vegetative succession on exposed, homogeneous soils.

Collecting and specimen preparation for accession followed accepted bryological techniques. All collection data were entered into the T. M. Sperry Herbarium data base (HERB). Voucher specimens are deposited in KSP with duplicates sent to MO, UWSP, and IBE. Remaining duplicate material is available. Nomenclature generally follows Schuster (1966, 1969, 1974, 1980, 1992) or Stotler and Crandall-Stotler (1977) for the liverworts and Anderson, Crum and Buck (1990) for the mosses. The below list includes collections by the authors and literature reports.

Results and Discussion

The current study of the bryoflora of Neosho County, Kansas has resulted in the collection of 77 species. The hepatics presently comprise 17 species in nine genera and 7 families, with one new state record and five new county records. Sixty mosses are reported in 40 genera and 21 families, with one new state record and 46 new county records. In comparison to the state, Neosho County has currently yielded about 23 percent (17/70) of the known hepatics and 36 percent (60/162) of the known mosses.

Three species are here first reports for Kansas. *Nowellia curvifolia* (Dicks.) Mitt. (Hepaticae) was collected by the second author off a decaying log in predominantly oak/hickory forest. According to Schuster (1974), this is a widely distributed species ranging in North America from Ontario east, south to Alabama, and west to Missouri, Iowa, and Arkansas. As far as known, the Kansas location represents its most western distribution in North America.

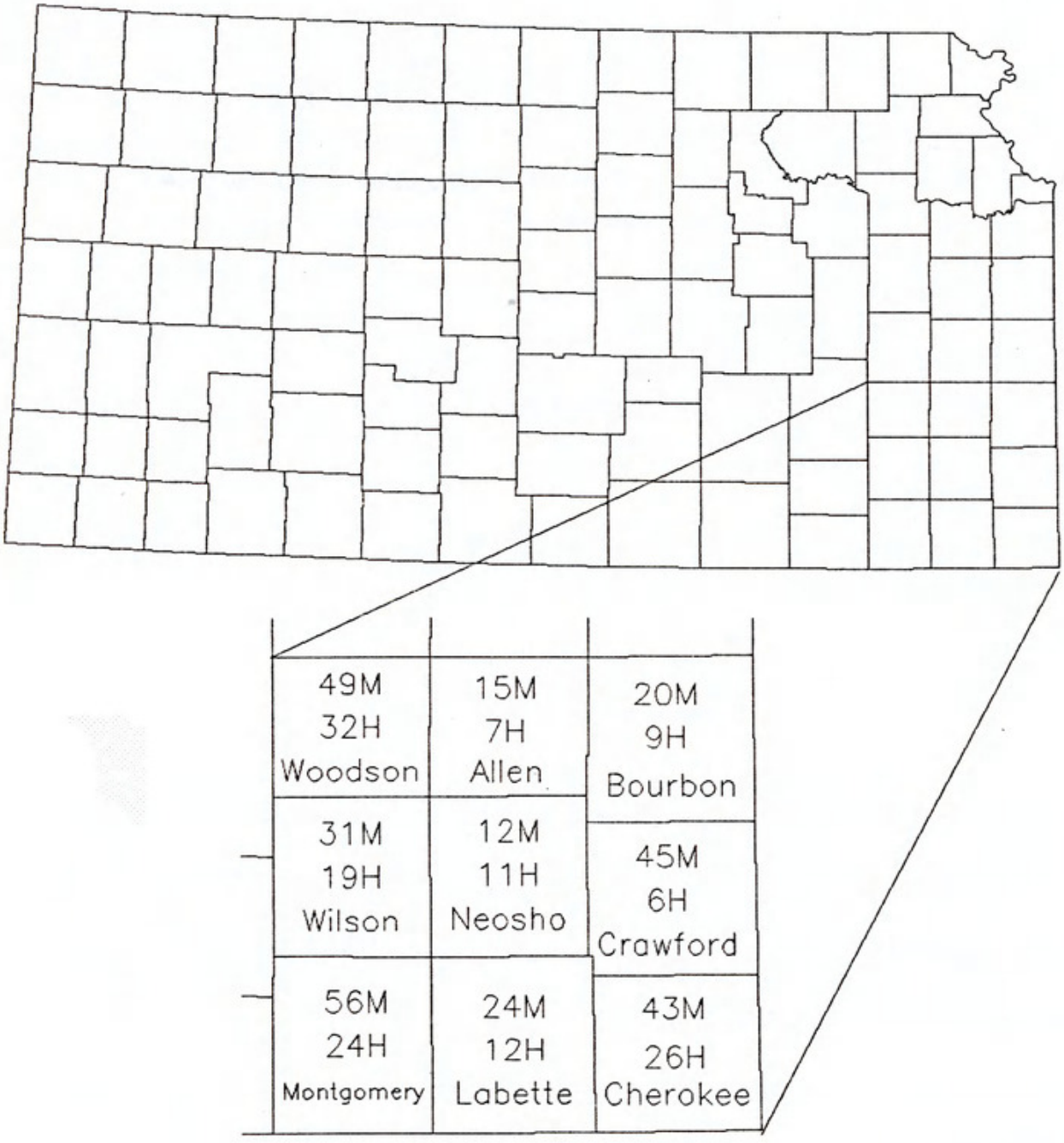

Fig. 1. Number of reported bryophyte taxa for southeast Kansas by county. M = mosses, H = hepatics.

Rhizomnium punctatum (Hedw.) T. Kop. was collected by the first author off soil in riparian woodlands. In North America, it is distributed from eastern Canada south into Alabama and Arkansas (Crum and Anderson, 1981) It is widely distributed in western Missouri, eastern Oklahoma, and northern Arkansas. Although expected to be in Kansas, it is thus far known only from collections made during this study.

Fissidens bushii (Card. & Ther.) Card. & Ther. is previously known from eastern North America west to Michigan, south to Missouri, Oklahoma, and Texas (Crum and Anderson 1981; Redfearn 1992). In Neosho County it was collected by the first author from soil of creek banks and native prairie.

Two species have interesting distributions in Kansas. *Orthotrichum diaphanum* Brid. is known from the central part of the state and as far west as Ness County. Although reported from a few counties in southwest Missouri and northwest Arkansas (Redfearn 1992), it has not been reported from the first four vertical tiers of counties in Kansas. The closest Kansas location from Neosho County is HarveyCounty, some 290 km to the west. It was collected from the bark of *Ulmus sp.* in a dry wooded area of a steep hillside with heavy undergrowth and exposed sandstone.

Fontinalis missourica Card. was previously reported in Kansas from Franklin County by Grace Meeker in 1900 (Churchill 1985). Welch (1960) gave the range for the species to be midwestern, reaching as far south as Arkansas. Redfearn (1992) indicates collections from two southeastern counties in Oklahoma. This species was attached to submerged tree roots in a small creek.

All of the localities studied showed evidence of human impact, in some cases quite recently after the initial collecting. Some of the study areas in which collections were made no longer exist. For example, *Orthotrichum diaphanum* Brid. was collected at Neosho State Lake from the bark of *Ulmus sp.*, which was marked for removal due to disease. *Thelia lescurii* Sull. was collected from the base of an unidentified tree; the area was burned and the woodland nearly scraped clean of trees within a week after the specimen was collected. Although these two species are not endangered, the scenario does reflect the recurring theme of habitat destruction with little or no regard to the organisms that may also be eliminated.

Bryophytes usually are given little or no attention by those modifying natural habitat, and are often not taken into consideration by those concerned with preservation and/or conservation. Should this lack of consideration and habitat degradation continue, the future of even some common bryophytes may be in jeopardy. Many bryophyte communities could disappear overnight due to one day's clearing or plowing, or some other form of habitat disturbance. It is unknown how many members of a local bryophyte flora may have been lost before they were ever documented. For example, in Kansas how easy would it be to lose *Aschisma kansanum* Ander. or the recently discovered *Ozobryum ogalalense* Merrill, both endemic to the state, to agriculture or development? One might make the analogy that the bryophytes of some regions of North America are the "tropical rainforests" of the temperate zone. The ecological role of bryophyte communities, whether dominant or not, has been little studied and is, consequently, poorly understood relative to vascular plant communities. Much more data are needed to appreciate the dynamic interactions between bryophytes and their associated organisms, as well as the effect bryophytes have on ambient abiotic factors. Even in regions where bryophytes appear to have a limited role, their presence should not be discounted. Most floristic studies exclude the bryophytes as part of the plant community, apparently considering them insignificant as compared to vascular plants. If we cannot take seriously the advantages of sustaining earth's ecosystems, which includes recognizable organisms such as the spotted owl or the Florida panther, how can anyone consider a bryophyte to be important. The answer, as echoed by others, is that we must preserve, study, and understand the role of bryophytes in an ecosystem or a local habitat, and their value to other organisms, including humans.

The results of this study point to the need for further bryofloristic surveys in the state at the county level. The numerous common species being reported as new county records indicate how sparse is our knowledge of the distribution of the bryophytes of Kansas. Many species are still not well documented; their distributions statewide are incompletely known and their current status remains in question. Until more floristic studies are completed, the bryophytes of Kansas will continue to undergo further environmental impact without proper ecological research or conservation efforts.

Below is a systematic arrangement of the bryophytes occurring in Neosho County. One asterisk indicates a new county record and two asterisks indicate a new state record. Second or third reports for Kansas are indicated in

parenthesis. Collection numbers follow and are those of the first author unless otherwise indicated parenthetically.

HEPATOPHYTA

Cephaloziaceae
****Nowellia curvifolia** (Dicks.) Mitt. (Timme 10269a)

Geocalycaceae
Chiloscyphus profundus (Nees) Eng. & Schust. 92-207

Scapaniaceae
***Scapania nemorosa** (L.) Dum. 91-236

Jubulaceae
***Frullania brittoniae** Raddi (third report for state) 91-262
F. eboracensis Gott. 91-498
***F. ericoides** (Nees) Nees 91-499
***F. inflata** Gott. 91-199

Sphaerocarpaceae
Sphaerocarpos texanus Aust. (McGregor, 1955: M1259)

Aytoniaceae
Reboulia hemisphaerica (L.) Raddi 91-234
Mannia fragrans P. Beauv. (McGregor, 1955: M1257)
Asterella tenella (L.) P. Beauv. (McGregor, 1955: M1066)

Ricciaceae
Riccia lamellosa Raddi (McGregor, 1955: M1140)
***R. beyrichiana** Hampe ex Lehm. 92-108
R. campbelliana M. A. Howe (McGregor, 1955: M1260)
R. dictyospora M. A. Howe (McGregor, 1955: M1262)
R. hirta (Aust.) Underw. (McGregor, 1955: M2684)
R. sorocarpa Bisch. (R. H. Thompson s.n. in McGregor, 1955)

BRYOPHYTA

Ditrichaceae
**Ditrichum pallidum* (Hedw.) Hampe 91-220

Leucobryaceae
**Leucobryum glaucum* (Hedw.) Angstr. *in* Fries 91-227

Fissidentaceae
**Fissidens bryoides* Hedw. 91-191
***F. bushii* (Card. & Ther.) Card. & Ther. 91-125
**F. fontanus* (B. Pyl.) Steud. 91-176
**F. obtusifolius* Wils. 91-174
**F. taxifolius* Hedw. 91-526

Pottiaceae
**Astomum muehlenbergianum* (Sw.) Grout 91-326
**Weissia controversa* Hedw. 91-108
**Tortella humilis* (Hedw.) Jenn. 91-124
**Barbula indica* (Hook.) Spreng. *in* Steud. 91-107
**B. unguiculata* Hedw. 92-099
**Phascum cuspidatum* Hedw. 92-085
Desmatodon obtusifolius (Schwaegr.) Schimp. 91-387
**D. plinthobius* Sull. & Lesq. *in* Sull. 91-136
**D. porteri* James *in* Aust. 91-269
**Tortula pagorum* (Milde) De Not 92-072

Grimmiaceae
**Schistidium agassizii* Sull. & Lesq. *in* Sull. 91-116

Funariaceae
Physcomitrium pyriforme (Hedw.) Hampe 91-164
Funaria flavicans Michx. (Holland 5227 in Merrill, 1991b)
**F. hygrometrica* Hedw. 92-208

Bryaceae
Bryum argenteum Hedw. 91-178
**B. caespiticium* Hedw. 91-112

**B. pseudotriquetrium* (Hedw.) Gaertn. et al. 91-217

Mniaceae
***Rhizomnium punctatum* (Hedw.) T. Kop. 91-426
**Plagiomnium cuspidatum* (Hedw.) T. Kop. 91-142

Aulacomniaceae
**Aulacomnium heterostichum* (Hedw.) Bruch & Schimp. *in* B. S. G. 91-351

Orthotrichaceae
**Orthotrichum diaphanum* Brid. 92-203
**O. pumilum* Sw. 91-381
**O. pusillum* Mitt. 91-173

Fontinalaceae
**Fontinalis missourica* Card. (second report for Kansas) 91-453

Anomodontaceae
**Anomodon minor* (Hedw.) Furnr. 91-120
**A. rostratus* (Hedw.) Schimp. 91-319

Leucodontaceae
**Leucodon julaceus* (Hedw.) Sull. 91-224

Theliaceae
Thelia asperella Sull. *in* Sull. & Lesq. 92-176
**T. lescurii* Sull. *in* Sull. & Lesq. (Holland 6155d in Merrill, 1991)

Fabroniaceae
**Fabronia ciliaris* (Brid.) Brid. 92-074

Leskeaceae
Leskea gracilescens Hedw. 91-115
**Bryohaplocladium microphyllum* (Hedw.) Wat. & Iwats. 91-113
Lindbergia brachyptera (Mitt.) Kindb.92-264

Amblystegiaceae
Campylium chrysophyllum (Brid.) J. Lange 91-213
**C. hispidulum* (Brid.) Mitt. 91-109

**Hygroamblystegium tenax* (Hedw.) Jenn. var. *tenax* 91-185
H. tenax var. *spinifolium* (Schimp.) Jenn. 91-158
**Amblystegium serpens* var. *juratzkanum* (Schimp.) Rau & Herv. 91-156
**A. varium* (Hedw.) Lindb. 91-126
**Leptodictyum humile* (P. Beauv.) Ochyra 91-169
**L. riparium* (Hedw.) Warnst.91-151

Brachytheciaceae
**B. oxycladon* (Brid.) Jaeg. 91-123
**Steerecleus serrulatus* (Hedw.) Robins. 91-129
**Eurhynchium hians* (Hedw.) Sande Lac. 91-159

Entodontaceae
Entodon cladorrhizans (Hedw.) C. Mull. (Holland 6155b in Merrill, 1991)
**E. compressus* (Hedw.) C. Mull. 91-366
**E. seductrix* (Hedw.) C. Mull. 91-114

Hypnaceae
Pylaisiella selwynii Crum et al. 91-210
**Homomallium adnatum* (Hedw.) Broth. 91-237
**Taxiphyllum taxirameum* (Mitt.) Fleisch. 91-276

Polytrichaceae
Atrichum angustatum (Brid.) Bruch & Schimp *in* B.S.G. 91-223
Pogonatum brachyphyllum (Michx.) P. Beauv. (Churchill, 1985)
**Polytrichum juniperinum* Hedw. 91-232

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