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LIVERWORTS AND HORNWORTS OF LUSK CREEK CANYON NATURE PRESERVE, POPE COUNTY, ILLINOIS

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ABSTRACT

The diverse microhabitats of Lusk Creek Canyon Nature Preserve in Pope County, Illinois support a luxurious hepatic and anthocerote flora comprising 48 taxa. Three of these taxa, namely, Jungermannia fossombronioides Aust., Lejeunea laetivirens Nees & Mont. and Marsupella emarginata (Ehrh.) Dum., are reported for the first time from Illinois and 18 are reported for the first time from the Lusk Creek area. Earlier reports of Frullania brittoniae Evans, Porella platyphylla (L.) Pfeiff., Cephalozia bicuspidata (L.) Dum. and Plectocolea hyalina (Lyell) Mont. in the flora are not verified in this study.

INTRODUCTION

Lusk Creek Canyon Nature Preserve is located in north-central Pope County, approximately 18 miles south of Harrisburg and 4 miles northeast of Eddyville. The 125 acres of the preserve lie in the Greater Shawnee Hills Section of the Interior Low Plateau Province (Flint, 1928) and provide two distinct types of unglaciated, maturely dissected topography. From its origin at an elevation of 250 m, Lusk Creek flows 15 miles southeasterly through erosion-resistant Pennsylvanian strata of Caseyville and Abbott formations (Dyroff, 1972) to easily eroded Mississippian strata of the Chester series in the southern part of the watershed. It merges with the Ohio River at Golconda at 95 m meanpool elevation. The northwestern part of the area is consequently characterized by a deep, narrow gorge, the precipitous walls of which may rise 60 m above the narrow, free-flowing creek. Just below its confluence with Bear Branch, the creek makes a right angle turn and produces bluffs with a moist northern and a drier southern exposure respectively. These extend for approximately 615 m along the stream. A sharp "Hairpin

Meander" returns the flow to a typically southern direction and shaded east-west canyon walls are produced.

From the Bear Branch confluence to the Hairpin, the bluff tops are characterized by typical hill prairie vegetation (Voigt and Mohlenbrock, 1964; Hopkins, 1969), which grades into oak-hickory upland woods. The shaded vertical sandstone conglomerate near the creek supports numerous hepatics and mosses. Approximately 325 m south of the Hairpin, near a shelter bluff known as "Indian Kitchen," the creek bed broadens and rocky, often inundated, soils lie between it and more sloping, bryophyte-covered sandstone outcrops.

Further south, mesic midslope woods, dominated by Acer saccharum Marsh., Fagus grandifolia Ehrh., Liriodendron tulipifera L., Carya cordiformis (Wang.) K. Koch, and Carya ovalis (Wang.) Sarg., extend beyond the silt-covered entrenchment walls of a widening valley. Indeed, Martha's Woods, which lies along Little Lusk Creek one and one-half miles east of the Hairpin area, represents an original, still undisturbed community of this same type. Throughout the forest are huge slump blocks of Caseyville and Abbott sandstone formation (Dyroff, 1972), seemingly produced by the advance of the Illinoian Glacier, which terminated 15 miles north of the Lusk Creek area. Although most exposed rock surfaces in the canyon area are sandstone, occasional shale and limestone exposures may also be encountered, especially from Indian Kitchen south to Rose Ford and Copperous Branch.

Overall, the area is characterized by hot summers, moderate winters and well-distributed rainfall (Ashby, 1968). Heavy, moisture-laden fogs frequently develop in the narrow gorge of the Bear Branch and Hairpin regions; such conditions generate a cool (24° - 26° C), moist microhabitat near the base of the canyon walls, even when summer temperatures on the nearby south-facing, cactus-inhabiting bluff tops reach 38° C.

Thus, within the Lusk Creek watershed are a multitude of microenvironmental regimes, all of which have been more or less devoid of human modification. Diverse organisms occupy these habitats, including 13 species of native orchids (Hopkins, 1969) and a lichen flora of more than 200 taxa (Skorepa, 1966). Other studies have shown that such areas in other locations of Southern Illinois also possess a highly diverse, often relict bryophyte flora (Skorepa, 1968; Stotler, 1976; West and Stotler, 1977).

This study was undertaken as part of The Lusk Creek Biological Investigations of Southern Illinois University to verify the floristic richness of hepatics and anthocerotes in the preserve. Two hundred and eighty collections of liverworts and hornworts were critically examined, including specimens collected by Hatcher in the 1950's, Skorepa, and Sharp and Skorepa in the 1960's, and personal collections made during numerous sampling trips during the 1970's.

All specimens, with appropriate annotations, are deposited in the herbarium of Southern Illinois University [SIU-C].

RESULTS AND DISCUSSION

In this manner, 47 species of hepatics and 1 hornwort taxon have been identified in the Lusk Creek Canyon flora. This compares to 32 species occurring in Little Grand Canyon, Jackson County (Stotler, 1976), 21 species found in Panther's Den, Union County (West and Stotler, 1977) and 34 species reported by Skorepa (1968) for Lusk Creek in his treatment of liverworts of Southern Illinois. It should be noted that 4 species reported by Skorepa, namely, Frullania brittoniae Evans, Porella platyphylla (L.) Pfeiff., Cephalozia bicuspidata (L.) Dum., and Plectocolea hyalina (Lyell) Mitt. [= Jungermannia hyalina Lyell], were based on misidentified specimens and consequently have been deleted from the flora.

Of the 48 taxa presently recognized in the canyon, 18 are reported for the first time from Lusk Creek and three are reported for the first time from Illinois. In the checklist which follows, taxa which are reported for the first time from the Lusk Creek region are designated by *, while those being reported for the first time from Illinois are designated by * *. Nomenclature utilized in the following list is as described in the most recent checklist of American liverworts and hornworts (Stotler and Crandall-Stotler, 1977).

Checklist of Taxa in Lusk Creek Nature Preserve, Arranged Alphabetically

Division Anthocerotophyta (Hornworts)

1. Phaeoceros laevis (L.) Prosk. - Common on soil along creek; *Skorepa 3417.*

Division Hepatophyta (Liverworts)

2. Asterella tenella (L.) Beauv. - Common on soil mixed with sedges, on the xeric sandstone bluff tops, or on sandy soil at the base of the west-facing canyon walls; *Skorepa 2177; Stotler 1191.*

3. Bazzania trilobata (L.) S. Gray - Locally abundant on soil at the base of moist and shaded sandstone outcrops in mesic woods; *Skorepa 3775.*

* 4. Calypogeja muelleriana (Schiffn.) K. Müll. - Common in moist crevices or along the base of the vertical sandstone bluffs in the canyon; the most widespread species of Calypogeja in southern Illinois; *Skorepa 2184; Stotler 1192, 1194, 1196, 1203, 1217, 1225, 1505, 2400, 2401,*

2402, 2403, 3243, 3244, 3245, 3246, 3278.

This species may be difficult to distinguish from Calypogeja trichomanis (L.) Corda [= C. fissa auct., non C. trichomanis auct. (Stotler and Crotz, 1979)]. In general, it may be recognized by its broadly ovate to suborbicular leaves and orbicular, simply bifid underleaves, as compared to the narrowly ovate, usually emarginate leaves and marginally angulated underleaves of C. trichomanis (L.) Corda. In southern Illinois, C. muelleriana is frequently mixed with Scapania nemorosa (L.) Dum. and Diplophyllum apiculatum (Evans) Steph.

* 5. Calypogeja sullivantii Aust. - Occasional in protected overhangs, mixed with Calypogeja muelleriana, on vertical sandstone in the narrow parts of the canyon; *Stotler 1195, 1207.*

This essentially Appalachian species is distinguished by its bisbifid underleaves and delicate verruculae on the leaf cell surfaces.

6. Calypogeja trichomanis (L.) Corda [= Calypogeja fissa auct. and Calypogeja fissa (L.) Raddi subsp. neogaea Schust., non Calypogeja trichomanis auct. (Stotler and Crotz, 1979)] - Rare, at the base of sandstone outcrops in mesic woods, frequently covered by leaf litter; *Skorepa 3381.*

Often confused with C. muelleriana, this species may be distinguished by its more elongate leaves and its angulated underleaves.

7. Cephalozia catenulata (Hüb.) Lindb. - Rare on sandstone bluff near shale overhang; *Stotler 1218.*

8. Cephalozia connivens (Dicks.) Lindb. - Rare, on vertical shaded sandstone; *Skorepa and Sharp 4031.*

9. Cephalozia lunulifolia (Dum.) Dum. - Fairly common on moist sandstone, mixed with Kurzia sylvatica (Evans) Grolle, Odontoschisma prostratum (Sw.) Trev., Calypogeja muelleriana (Schiffn.) K. Müll., and Scapania nemorosa (L.) Dum.; *Hatcher 852; Skorepa 3312; Sharp and Skorepa 3779; Stotler 1500, 1501, 1502, 1503, 1523, 1524, 1526, 1527, 2403, 3258, 3259, 3262, 3276.*

10. Cephalozia pleniceps (Aust.) Lindb. - Occasional in small mats on wet, shaded vertical sandstone; *Hatcher 821, Sharp and Skorepa 3780.*

* 11. Cephaloziella divaricata (Sm.) Schiffn. - Rare, in sparse populations on small sandstone rocks near the creek just below Indian Kitchen; *Sharp and Skorepa 3368; Stotler*

1208, 3251.

12. Cephaloziella hampeana (Nees) Schiffn. - Rare on moist, shaded vertical sandstone, mixed with Odontoschisma prostratum (Sw.) Trev.; *Hatcher 817.*

13. Cololejeunea biddlecomiae (Aust.) Evans - Occasional in scattered locales; on small roots of beech and juniper and on shaded shale; *Sharp and Skorepa 3781; Stotler 1204, 1209, 1504.*

14. Conocephalum conicum (L.) Lindb. - Very common along the base of moist sandstone bluffs throughout the canyon; *Skorepa 2183, 3554; Stotler 1192, 1193, 1211.*

15. Diplophyllum apiculatum (Evans) Steph. - Common on moist protected sandstone throughout the canyon; usually mixed with Odontoschisma prostratum (Sw.) Trev., Calypogeja muelleriana (Schiffn.) K. Müll. and Scapania nemorosa (L.) Dum.; *Hatcher 833; Stotler 1192, 1194, 1201, 1215, 1217, 1500, 1505, 1506, 1507, 3244, 3258.*

16. Frullania eboracensis Gott. - Common on tree bark in mesic woods, especially on juniper bark; *Hatcher 802; Skorepa 2178, 2180, 2181, 2191, 2195, 2988, 4825.*

17. Frullania ericoides (Nees) Mont. [= Frullania squarrosa (Reinw. et al.) Dum. (Grolle, 1968)] - Rare on bark of hardwoods, xeric habitat in upland woods; *Hatcher 837; Stotler 1155.*

18. Frullania inflata Gott. - Common in dry woods and on exposed rock near abandoned lead mine; *Hatcher 836, 855; Skorepa 4739, s.n.; Stotler 1153, 1193, 1222, 1223, 1224.*

19. Frullania tamarisci (L.) Dum. ssp. asagrayana (Mont.) Hatt. - Common on moist sandstone both in the mesic woods and in the canyon proper; rarely on the bark of beech trees; *Hatcher 816, 820; Skorepa 1895, 3174, 3628; Stotler 1509, 3247, 3249.*

20. Jamesoniella autumnalis (DC.) Steph. - Rare, on shaded sandstone boulders in mesic woods; *Skorepa 3299, 4073.*

21. Jubula pennsylvanica (Steph.) Evans - Common on moist, protected, highly shaded vertical sandstone near the Hairpin Meander; *Hatcher 806, 807; Skorepa 3379, 4803, 4816; Stotler 1508, 1510, 3273.*

22. Jungermannia crenuliformis Aust. - Of sporadic occurrence on moist, vertical sandstone in shaded, mesic woods; *Skorepa 3277, 4816; Stotler 3267, 3268.*

This species, which in earlier studies was misidentified as Plectocolea hyalina (Lyell) Mitt. [= Jungermannia hyalina Lyell], can be distinguished by its distinctly bordered leaves and deep red pigmentation in both leaves and rhizoids.

* * 23. Jungermannia fossombronioides Aust. - Very common on moist rocks and sandstone overhangs all along the creek; frequently mixed with Pellia epiphylla (L.) Corda and Scapania nemorosa (L.) Dum.; *Sharp and Skorepa 3778; Stotler 1191, 1199, 1202, 3269, 3270, 3280.*

J. fossombronioides has a characteristic Appalachian distribution, and hence, is not an unexpected addition to the flora of southern Illinois. It differs from J. crenuliformis in lacking a border of swollen cells along the leaf margins, and from J. hyalina in the possession of very thin-walled leaf cells, which lack distinct trigones.

* 24. Kurzia sylvatica (Evans) Grolle - Of sporadic occurrence along moist, shaded sandstone, often mixed with Odontoschisma prostratum (Sw.) Trev. and Cephalozia lunulifolia (Dum.) Dum.; *Hatcher 821; Stotler 1500, 1501, 1506, 1523, 1524, 3258, 3259.*

* * 25. Lejeunea laetivirens Nees et Mont. - Rare, on moist vertical sandstone, mixed with Leucolejeunea clypeata (Schwein.) Evans and Radula obconica Sull.; *Stotler 1194, 3252.*

This is essentially a Coastal Plain species which occurs abundantly from North Carolina to Louisiana. It is, however, also known from disjunct regions of the Appalachians and Interior Highlands, where it is thought to represent remnants of a wider Tertiary distribution (Schuster, 1962). The populations at Lusk Creek are likely of this latter type.

26. Lejeunea lamacerina (Steph.) Schiffn. ssp. gemminata Schust. - Rare, on rocks and bluffs along the creek; usually in small, compressed mats; *Sharp and Skorepa 3765, 3775; Stotler 1197, 1206, 3255.*

27. Leucolejeunea clypeata (Schwein.) Evans - Common on moist, shaded sandstone, usually forming extensive mats; also rarely on bark of beech trees; *Hatcher 827, 877; Skorepa 2744, 3411, 4793, 4698; Stotler 1190, 1197, 1198, 1204, 1206, 1508, 1517, 1519, 1521, 1522, 3249, 3250, 3251, 3252, 3253, 3273, 3278.*

* 28. Leucolejeunea unciloba (Lindenb.) Evans - Rare, on moist, vertical sandstone in the Hairpin area; *Stotler 1518.*

* 29. Lophocolea bidentata (L.) Dum. - Rare, mixed with other bryophytes, on vertical sandstone; *Stotler 1206.*

* 30. Lophocolea cuspidata (Nees) Limpr. - Rare, occurring on moist shale in hollow just below Indian Kitchen; *Skorepa 4803.*

* 31. Lophocolea heterophylla (Schrad.) Dum. - Common on tree bases and sandy soil in mesic woods and along creek; often mixed with Jungermannia crenuliformis Aust. and Calypogeja muelleriana (Schiffn.) K. Müll.; *Stotler 1196, 1225, 1520, 1521, 1522, 3255, 3256, 3257.*

* 32. Lophocolea minor Nees - Rare on moist and shaded sandstone; usually mixed with other bryophytes including Leucolejeunea clypeata (Schwein.) Evans and Radula obconica Sull.; *Stotler 1519.*

* 33. Mannia fragrans (Balbis) Frye & Clark - Rare, occurring on soil under sedges on dry, exposed bluffs; *Stotler 1219, 1220, 1221.*

* * 34. Marsupella emarginata (Ehrh.) Dum. - Extremely rare, on moist sandstone where it is mixed with Polytrichum and lichens; *Hatcher 818.*

This is primarily a montane-submontane species. Its occurrence in Lusk Creek represents a considerable disjunction from Escarpment Gorges of Tennessee and West Virginia (Schuster, 1974).

* 35. Metzgeria conjugata Lindb. - Of occasional occurrence, on moist, shaded vertical sandstone, mixed with Odontoschisma prostratum (Sw.) Trev. and Diplophyllum apiculatum (Evans) Steph.; *Skorepa 4803, Sharp and Skorepa 3784.*

36. Metzgeria furcata (L.) Dum. - Rare, occurring on the bark of trees along creek; mixed with Frullania eboracensis Gott. and Leucolejeunea clypeata (Schwein.) Evans; *Stotler 1197.*

37. Nowellia curvifolia (Dicks.) Mitt. - Extremely rare, occurring on decorticated log in mesic woods near the canyon; *Skorepa 3740.*

38. Odontoschisma prostratum (Sw.) Trev. - Common on moist

shale and protected crevices on sandstone, usually mixed with Diplophyllum apiculatum (Evans) Steph. and Cephalozia lunulifolia (Dum.) Dum.; *Hatcher 817, 821, 845; Stotler 1214, 1215, 1218, 1500, 1502, 1505, 1506, 1523, 1526, 1527, 1528, 2403, 3258, 3259, 3274, 3276.*

39. Pallavicinia lyellii (Hook.) Carruth. - Of sporadic occurrence on moist soil along the creek; *Sharp and Skorepa 3416.*

40. Pellia epiphylla (L.) Corda - Extremely common on moist, shaded soil and rocks all along both sides of the creek; probably the most abundant species in the canyon; *Hatcher 809; Stotler 1192, 1196, 1200, 1214, 3260, 3261, 3262, 3263.*

41. Plagiochila porelloides (Torrey ex Nees) Lindenb. - Common on moist vertical sandstone as well as on loose rock along creek; *Hatcher 806, 807; Sharp and Skorepa 3324; Stotler 1213, 3264, 3265, 3266.*

* 42. Porella pinnata L. - Of sporadic occurrence on outcrops or tree roots along the creek, in mesic to xeric habitats; *Stotler 1153, 1198, 1204, 1216.*

* 43. Porella platyphylloidea (Schwein.) Lindb. - Of sporadic occurrence on tree bases in xeric upland and mesic, midslope woods; *Skorepa 3629, 4079, 4825; Stotler 1193, 3270.*

In earlier studies this species had been misidentified as Porella platyphylla (L.) Pfeiff. It can be distinguished from this species, however, by its crispate leaf bases and the equal size of lobules and underleaves. All populations in Lusk Creek possess this assemblage of characters and hence have been relegated to P. platyphylloidea rather than P. platyphylla.

44. Radula obconica Sull. - Common on moist sandstone, where it is often mixed with species of Leucolejeunea; *Hatcher 806; Sharp and Skorepa 3325; Stotler 1190, 1204, 1518, 1519, 1522, 3252, 3253, 3255, 3257, 3266, 3271, 3273.*

45. Reboulia hemisphaerica (L.) Raddi - Common on soil or rocks in xeric to hydric habitats, on both bluffs and shaded vertical sandstone; sometimes mixed with Mannia fragrans (Balbis) Frye and Clark; *Sharp and Skorepa 3170; Stotler 1195, 1210, 1220, 1221.*

46. Scapania nemorosa (L.) Dum. - Extremely common, found on moist soil, rocks, and vertical sandstone through-

out the canyon; *Stotler 1194, 1195, 1205, 1214, 1215, 1217, 1502, 1506, 1519, 1521, 1522, 2400, 2401, 3244, 3250, 3251, 3255, 3256, 3259, 3274, 3275, 3276, 3277, 3278, 3279, 3280.*

* 47. Scapania undulata (L.) Dum. - Rare, on sandy soil or rocks along creek, mixed with Calypogeja muelleriana (Schiffn.) K. Müll.; *Stotler 1203, 1213.*

48. Trichocolea tomentella (Ehrh.) Dum. - Extremely rare, on rocks in the creek bed, north of the Hairpin area; *Skorepa 3720.*

CONCLUSION

The hepatic and anthocerote flora of Lusk Creek Canyon Nature Preserve is extremely diversified; indeed, the floristic richness of the area surpasses that of any other Southern Illinois canyon area investigated to date. Overall, the flora appears to show closest affinity to floras of the Southern Appalachian Escarpment gorges. The presence of disjunct populations of Calypogeja sullivantii Aust., Jungermannia fossombronioides Aust., Lejeunea laetivirens Nees et Mont., and Marsupella emarginata (Ehrh.) Dum. suggest that Lusk Creek has served as a refugium for floristic elements which were more widespread in earlier geologic times.

LITERATURE CITED

Ashby, W. C. 1968. Forest types of Lusk Creek in Pope County, Illinois. Trans. Ill. Acad. Science 61: 438-455.

Dyroff, T. L. 1972. Areal geology of the Lusk Creek area, Pope County, Illinois. Thesis (M. S.) Southern Illinois University - Carbondale.

Flint, R. F. 1928. Natural boundaries in the interior low plateau physiographic province. Jour. Geol. 36: 451-457.

Grolle, R. 1968. Miscellanea hepaticologica (81 - 90). Trans. Brit. Bryol. Soc. 5: 541-547.

Hopkins, W. E. 1969. The vascular flora of Lusk Creek Canyon, Pope County, Illinois. Castanea 34: 1-56.

Schuster, R. M. 1962. North American Lejeuneaceae VIII. Lejeunea, Subgenera Microlejeunea and Chaetolejeunea. Jour. Hattori Bot. Lab. 25: 1-80.

_____. 1974. The Hepaticae and Anthocerotae of North America. Vol. III. Columbia Univ. Press, New York.

Skorepa, A. C. 1966. The lichen flora of Southern Illinois. Thesis (M. S.) Southern Illinois University - Carbondale.

_____. 1968. Liverworts from Southern Illinois. The Bryologist 71: 129-133.

Stotler, R. E. 1976. Saxicolous bryophyte and macrolichen associations in Southern Illinois. I. Little Grand Canyon, Jackson County. The Bryologist 79: 1-15.

_____ and B. Crandall-Stotler. 1977. A checklist of the liverworts and hornworts of North America. The Bryologist 80: 405-428.

_____ and D. K. Crotz. 1979. On Mnium trichomanis Linnaeus. Manuscript submitted to Systematic Botany.

West, V. and R. E. Stotler. 1977. Saxicolous bryophyte and macrolichen associations in Southern Illinois. II. Panther's Den, Union County. The Bryologist 80: 612-618.