

Bryophytes of Big Oak Tree State Park, Mississippi County, Missouri

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ABSTRACT. — An inventory of the bryophytes of Big Oak Tree State Park in southeastern Missouri documented 70 species (60 mosses, 9 liverworts, and 1 hornwort). About half of these species are new distribution records for Mississippi County or are newly documented for the Mississippi Lowlands Natural Division in Missouri. *Fissidens hallianus* is newly documented for the state. Four mosses (*Gemmabryum klinggraeffii* [S1], *Pylaisiadelphina tenuirostris* [S2], *Rosulabryum flaccidum* [S2], and *Trematodon longicollis* [S2]) and a hornwort (*Phaeoceros oreganus* [S1]), are of conservation concern in Missouri.

INTRODUCTION

The Mississippi alluvial embayment extends from southeastern Missouri to the Gulf of Mexico along the floodplain of the Mississippi River. The area is comprised mostly of agricultural fields and wet irrigation ditches, swampy lowland forests, as well as sand prairies and savannas. At the northern edge of this broad basin is Big Oak Tree State Park in Mississippi County (Figure 1). It contains remnants of dense bottomland forest that covered Missouri's southeastern-most counties from pre-settlement until the early 20th century. By the 1920s, more than half of this forest had been logged, with additional logging, expanded agricultural interests, and government assisted drainage projects continuing deforestation through the proceeding decades (Doolen 1984; Korte and Fredrickson 1977). By the 1930s, statewide public outcry about the disappearing forest resulted in a campaign to save a particularly large burr oak (*Quercus macrocarpa* Michx.), as well as 80 acres of surrounding old growth forest. Donations from citizens and local school children helped the state purchase the land, along with an additional 920 acres of adjoining bottomland forest. In 1938, Big Oak Tree State Park was established, with most of the park later designated a state Natural Area in 1977. The park was also designated a National Natural Landmark in 1986. Big Oak Tree State Park is known for its state champion trees, such as persimmon (*Diospyros virginiana* L.), as well as its massive remnants of former state champions like burr oak.

The park contains a swamp community that extends diagonally through the center of the park, from the southeastern boundary to roughly the drainage channel leading to St. John's Diversion Ditch; a shrub swamp community that occupies the southwestern margin of the man-made Big Oak Lake; a wet bottomland forest that surrounds the swamp in the remaining southern

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and central portions; and a wet-mesic bottomland forest that occupies the remaining eastern and northernmost sections of the park. Big Oak Tree's vascular plant flora contains more than 230 species (Doolen 1984), several of which have affinities with the Atlantic and Gulf Coastal Plains, including *Trepocarpus aethusae* Nutt. ex DC. Few bryophytes have been reported from the park. Gier (1955) documented nine mosses and four liverworts from Mississippi County based on specimens collected at Big Oak Tree State Park. Doolen (1984) added six additional mosses, as well as three liverworts and a hornwort, bringing the total number of bryophytes reported from the park to 23 species. An additional 12 bryophyte species have since been collected from Big Oak Tree State Park, based on herbarium specimens in the Consortium of North America Bryophyte Herbaria's online database (CNABH 2015). These specimens, however, have not been reported in the literature. Most of these specimens are deposited in the herbarium at the Missouri Botanical Garden (MO), while a few are located at the New York Botanical Garden's herbarium (NY).

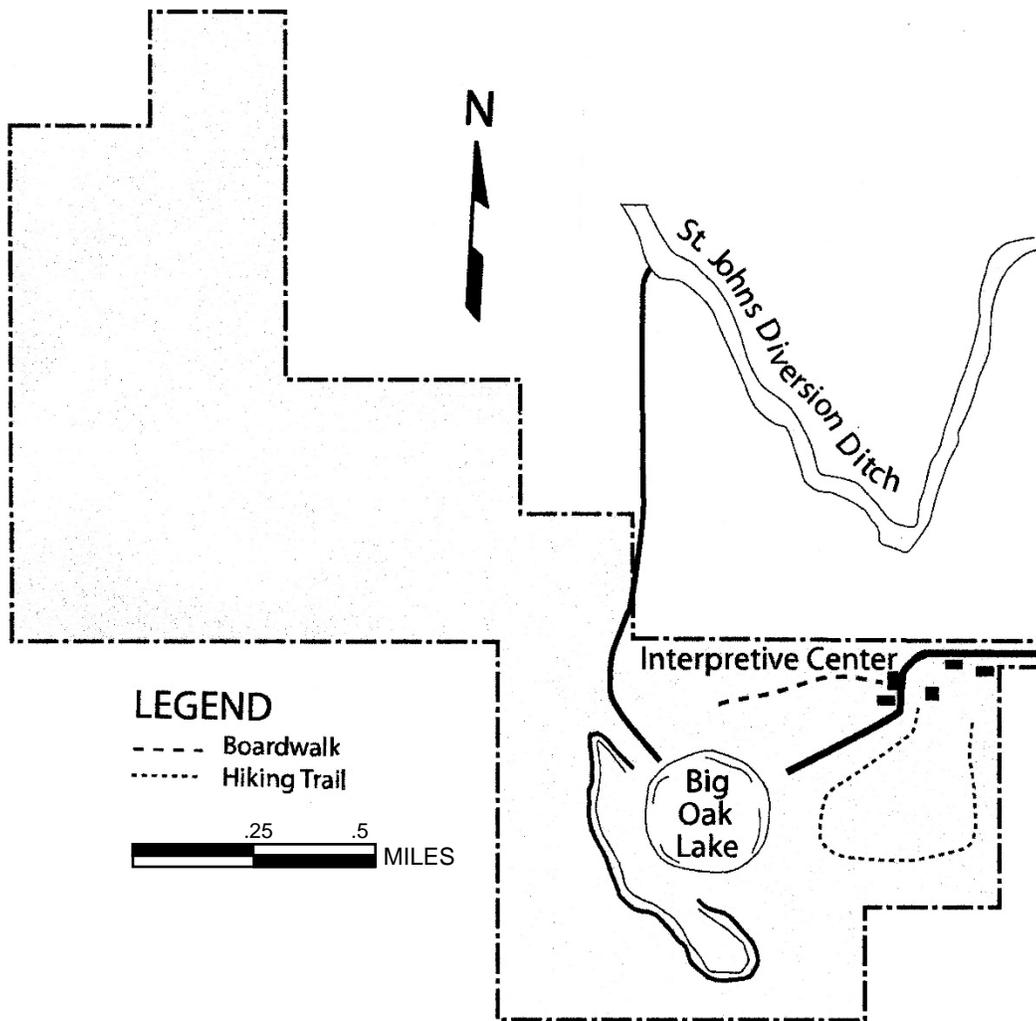


Figure 1. Boundary map of Big Oak Tree State Park.

The purpose of this survey was to document the bryophyte diversity within Big Oak Tree State Park and to establish a reference list of taxa for other floristic evaluations in the Mississippi Lowlands Natural Division (Thom & Wilson 1980). Big Oak Tree State Park is the only Missouri state park in the Mississippi Lowlands, and has the only *Taxodium* swamp within the state parks system. Bryophytes have historically been under-collected in the Mississippi Lowlands. Significantly fewer species have been reported from this natural division than any other natural division in the state (Atwood 2014; Darigo 2015).

METHODS

A bryophyte survey of Big Oak Tree State Park was conducted from December 2015 to March 2017. Seven collecting excursions were made within the park's boundaries. Most of these excursions began at the Boardwalk or trailhead of the Hiking Trail (Bottomland Trail), except for one excursion that accessed the northwest corner of the park through private property. Bryophytes were collected into individual paper envelopes, with their habitat and locality recorded. Representative voucher specimens from the park are deposited in the herbarium at Missouri Botanical Garden (MO). The complete habitat and locality data can be accessed through the Garden's online herbarium database (Tropicos: <http://www.tropicos.org>). Additional specimens previously collected at Big Oak Tree State Park and deposited at MO and NY were also re-examined. Historical specimens are cited in the checklist only when the species was not re-collected during this study, or for those species whose determinations have changed. The following checklist is arranged alphabetically by genus, followed by species and infra-specific taxa. Classification of the mosses follows *Flora of North America* (2007, 2014) except for deviations from recent publications. Classification of liverworts follows Stotler and Crandall-Stotler (2017), and hornworts follows Stotler and Crandall-Stotler (2005), with some deviations. Relevant literature citations are provided for some taxa.

RESULTS & DISCUSSION

A total of 349 bryophyte collections were made from Big Oak Tree State Park during the survey, including 286 mosses, 62 liverworts, and 1 hornwort. From these, 60 moss taxa, nine liverwort taxa, and one hornwort were determined. Figure 2 depicts the total number of bryophytes collected at the park in the order in which newly documented taxa were recorded. The cumulative taxonomic diversity suggests that the majority of the bryoflora at Big Oak Tree State Park has been documented, and that the probability of adding many new taxa to the park with further collecting is low. However, Big Oak Tree State Park historical specimens of three species — *Frullania eboracensis* subsp. *eboracensis*, *Gemmabryum dichotomum* and *Orthotrichum diaphanum* — were located at MO, but not found during this survey. Furthermore, a report of the hornwort *Notothylas orbicularis* from the park could not be substantiated during the survey. These four species are discussed further in the checklist and bring the total number of bryophytes in the park to 74 taxa.

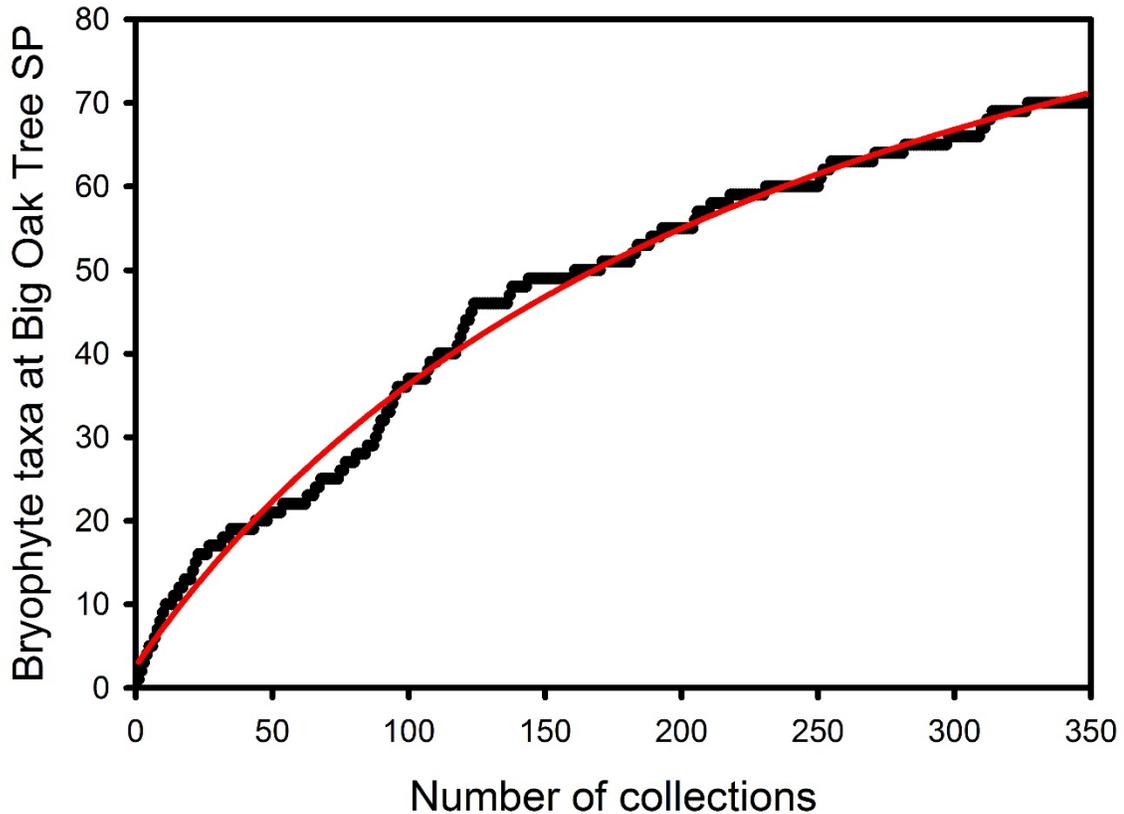


Figure 2. Cumulative number of bryophyte taxa collected at Big Oak Tree State Park and the order in which new taxa were documented during the survey.

Approximately half (34 of 70 species) of the bryophytes collected at Big Oak Tree State Park are new records for Mississippi County. Among these are 13 mosses (*Calliergonella curvifolia*, *Calliergonella lindbergii*, *Dicranum flagellare*, *Dicranum montanum*, *Ephemerum spinulosum*, *Fissidens subbasillaris*, *Gemmabryum klinggraeffii*, *Isopterygium tenerum*, *Ptychostomum pseudotriquetrum*, *Pylaisiadelphina tenuirostris*, *Rosulabryum flaccidum*, *Trematodon longicollis*, and *Weissia muhlenbergiana*) and one hornwort (*Phaeoceros oreganus*) that are newly reported for the Mississippi Lowlands Natural Division in Missouri. Four mosses (*Gemmabryum klinggraeffii* [S1], *Pylaisiadelphina tenuirostris* [S2], *Rosulabryum flaccidum* [S2], and *Trematodon longicollis* [S2]) and the hornwort *Phaeoceros oreganus* (S1) are of conservation concern in Missouri (Missouri Department of Conservation 2017). The discovery of these species at Big Oak Tree State Park adds new information about their habitat and distribution in the state.

Fissidens hallianus is newly documented for Missouri. The species was found growing on the bases of maple trees, as well as on submerged knees and bases of bald cypress (*Taxodium distichum*). *Fissidens hallianus* is otherwise known in eastern North America from Florida,

Illinois, Louisiana, Massachusetts, Mississippi, New Jersey, North Carolina, and Texas (Pursell, 2007). In these states, the species is largely confined to *Taxodium* swamps in the Atlantic and Gulf Coastal Plains. Another Missouri station of *F. hallianus* was found growing on *Taxodium* knees in the Wolf Bayou Unit of Black Island Conservation Area, Pemiscot County (Holmberg & Atwood 5871, MO). The combined Missouri stations for this species suggest that, in Missouri, *F. hallianus* is restricted to *Taxodium* swamps in the Mississippi Lowlands Natural Division. However, another Missouri specimen, collected in 2014 but previously unreported (Brinda 5655, MO), was made on wet rocks in the Mudlick Mountain Natural Area of Sam A. Baker State Park. This locality is in Wayne County, within the Ozarks Natural Division at the border of the Mississippi Lowlands. Despite the different substrate, the specimen is morphologically similar to the Mississippi County and Pemiscot County specimens. *Fissidens hallianus* is superficially similar to *F. fontanus* in its size, aquatic habitat, and flaccid, long, narrow leaves that become brittle when dry. The two species have likely been confused throughout their range. *Fissidens fontanus* is a relatively common species in slow moving creeks and in stagnant pools throughout the state. Morphologically, the two species differ in the length of their costae, position of their sporophytes, and length of their setae. While *F. hallianus* has a subpercurrent costae that ends 15–35 cells below the leaf apices, the costae of *F. fontanus* is percurrent and terminates 5–15 cells below the leaf apices. Additionally, *F. hallianus* has lateral sporophytes with somewhat short, 0.5–0.6 mm setae. The sporophytes of *F. fontanus* are terminal and have setae that are 0.7–1.5 mm long.

Compared to the number of bryophytes documented from other state parks, the overall bryophyte diversity at Big Oak Tree State Park is relatively low. Eighty-six bryophyte taxa have been reported from Ha Ha Tonka State Park in Camden County (Fuller 1986), 123 bryophyte taxa have been reported from Taum Sauk State Park in Iron and Reynolds counties (Holmberg & Atwood 2014), and 126 bryophyte taxa were reported from Roaring River State Park in Barry County (Hilton 1986). While Big Oak Tree State Park has the smallest acreage of these four parks, the finding of fewer bryophytes is likely the result of the homogenous bryophyte habitat, and a lack of generally different substrates within the park. Rock substrates in the park are scarce and include the man-made cement supports beneath the boardwalk, and the paved asphalt road. The majority of the bryophytes collected during this survey were found on the bases or trunks of trees, as well as on logs. Almost all of the remaining collections were made on soil.

CHECKLIST OF BIG OAK TREE STATE PARK BRYOPHYTES

New records for Mississippi County are indicated with an asterisk (*); a double asterisk (**) indicates a new record for Missouri.

Mosses

Amblystegium serpens (Hedw.) Schimp., on bark of large tree in mown area, Holmberg & Atwood 5752.

Anomodon attenuatus (Hedw.) Hübener, on base of large oak, Atwood & Holmberg 3301, 3451; decayed log, Holmberg 5547.

- Anomodon minor* (Hedw.) Lindb., on trunk of oak, *Atwood & Holmberg 3319, 3442*; on trunk of *Populus deltoidea*, *Holmberg 5610*; on bark of fallen tree, *Holmberg 5510*.
- Anomodon triste* (Ces.) Sull. & Lesq., on large fallen hackberry, with *Forsstroemia*, *Atwood et al. 3356*
- Brachythecium acuminatum* (Hedw.) Austin, on rotted log, *Atwood 3387, Atwood & Holmberg 3318, Atwood et al. 3341, Holmberg 5546, 5606*; on trunk of large fallen tree, *Atwood & Holmberg 3313*; on lower trunk of oak, *Atwood 3431, Holmberg 5525*.
- **Brachythecium acutum* (Mitt.) Sull., on well-rotted log, *Atwood & Holmberg 3455*; on small decayed limb in association with *Haplocladium sp.*, *Holmberg 5627*.
- **Brachythecium laetum* (Brid.) Schimp., on soil in mown lawn, *Atwood & Holmberg 3306, Holmberg & Atwood 5861*.
- Brachythecium rotaeanum* De Not., on decayed log with *Plagiomnium cuspidatum*, *Holmberg & Atwood 5856, 5859*.
- **Bryum argenteum* Hedw., on exposed, gravelly soil, *Atwood & Holmberg 3311*.
- **Calliergonella curvifolia* (Hedw.) B. H. Allen, on rotted log, *Atwood & Holmberg 3317*.
- **Calliergonella lindbergii* (Mitt.) Hedenäs, on decayed log, *Holmberg 5733*.
- Clasmatodon parvulus* (Hampe) Sull., on trunk of maple, *Atwood & Holmberg 3450, Holmberg & Atwood 5854*; on bark of oak, *Atwood & Holmberg 3331*; common on tree trunk, *Holmberg 5607*; common on *Ulmus sp.* trunk, *Holmberg 5615*.
- Climacium americanum* Brid., on rotted stump, *Atwood 3379*; on wet soil and well-rotted log, *Atwood & Holmberg 3467, Holmberg 5537*; on buttressed base of bald cypress, *Atwood & Holmberg 3416, Holmberg 5532, 5734*.
- **Dicranum flagellare* Hedw., on buttressed base of bald cypress, *Atwood & Holmberg 3419*; abundant on large fallen log, *Holmberg & Atwood 5858*.
- **Dicranum montanum* Hedw., on buttressed sides of bald cypress, with *Lophocolea*, *Atwood et al. 3352*.
- Drummondia prorepens* (Hedw.) E. Britton, on fallen burr oak limb in parking lot, *Atwood & Holmberg 3477*.
- Entodon cladorrhizans* (Hedw.) Müll. Hal., on rotted log, *Atwood 3392, Holmberg 5506, 5520*; on buttressed base of bald cypress, *Atwood & Holmberg 3417*.
- Entodon seductrix* (Hedw.) Müll. Hal., on base of oak with *Platygyrium*, *Atwood & Holmberg 3304*; on well-rotted log, *Atwood & Holmberg 3464, Holmberg 5518, 5543*; on small decayed branch, *Holmberg 5508*.
- Ephemerum crassinervium* (Schwägr.) Hampe, sparse in mown lawn area, *Holmberg & Atwood 5750*.
- **Ephemerum spinulosum* Bruch & Schimp., on open, bare soil of ditch near road, *Atwood & Holmberg 3303*; on semi-shaded soil, *Atwood & Holmberg 3310*.
- **Fissidens bryoides* Hedw., on wet bank along moat surrounding park, *Atwood & Holmberg 3475*.
- ***Fissidens hallianus* (Sull. & Lesq.) Mitt., on partially submerged knees of bald cypress, *Atwood 3388, Atwood & Holmberg 3410, Holmberg 5732*; on buttressed base of bald cypress, *Atwood 3390, Atwood & Holmberg 3411*; on base of maple, *Atwood 3434*, [Also newly reported for Pemiscot County: Black Island Conservation Area, Wolf Bayou Unit, 6 km southeast of

- Stanley, east of parking lot, sparse on bald cypress roots and knees at edge of bayou, *Holmberg & Atwood 5871*; Wayne County: Sam A. Baker State Park, Mudlick Mountain Natural Area, along the Mudlick Hiking Trail, northeast slopes, on wet rock, *Brinda 5655*.]
- **Fissidens subbasilaris* Hedw., mixed with *Anomodon*, on base of oak trunk, *Atwood & Holmberg 3316*.
- Fissidens taxifolius* Hedw., on soil beneath boardwalk observation platform, *Atwood 3366*, *Holmberg & Atwood 5860B*; on well-shaded soil, *Atwood & Holmberg 3329*; on soil of grassy path, *Holmberg 5727*; on decayed log beside water course, *Holmberg 5613*.
- Forsstroemia trichomitria* (Hedw.) Lindb., mixed with *Anomodon* on tree trunk, *Atwood & Holmberg 3328*; on tree trunk, *Holmberg 5629*; on trunk of oak, 5 ft. from ground, *Atwood & Holmberg 3474*; on large fallen hackberry, *Atwood et al. 3355*.
- **Funaria flavicans* Michx., on soil, mown area, *Holmberg 5614*; on soil in gravel parking lot, *Holmberg 5601*.
- **Funaria hygrometrica* Hedw., on gravelly soil at parking lot edge, *Holmberg 5552*.
- **Gemmabryum caespiticium* (Hedw.) J. R. Spence, on fallen champion burr oak, *Atwood et al. 3347*.
- Gemmabryum dichotomum* (Hedw.) J. R. Spence & H. P. Ramsay, small patches along road edge, *Holmberg 2917* [This species was not found during this survey but was previously collected at Big Oak Tree State Park in 2009.]
- **Gemmabryum klinggraeffii* (Schimp.) J. R. Spence & H. P. Ramsay, sparse in cracks in pavement, *Holmberg & Atwood 5751*.
- Haplocladium microphyllum* (Hedw.) Broth., on well-rotted log, *Atwood 3430*, *Atwood & Holmberg 3456*, *Holmberg 5523*, *5553*; on soil, mown area, *Holmberg 5600*.
- Haplocladium virginianum* (Brid.) Broth., on rotted log, *Atwood 3380*, *Holmberg & Atwood 5860C*; on trunk of large fallen tree, *Atwood & Holmberg 3444*.
- **Hygroamblystegium varium* var. *varium* (Hedw.) Mönk., on rotted log, *Atwood 3376*, *Holmberg 5611*; on wet soil, *Atwood et al. 3345*, *3354*; on small decayed stick, *Holmberg 5609*, *5626*; on base of hackberry tree, *Holmberg 5628*.
- Hygroamblystegium varium* var. *humile* (P. Beauv.) Vanderp. & Hedenäs, on wet soil at edge of ephemeral pool, *Atwood & Holmberg 3321*.
- **Isopterygium tenerum* (Sw.) Mitt., on well-rotted log, *Atwood et al. 3350*, *Holmberg 5736*.
- Leptodictyum riparium* (Hedw.) Warnst., on rotted log, *Atwood 3371*, *Atwood & Holmberg 3322*, *Atwood et al. 3357*, *3363*, *Holmberg 5531*, *5608*, *5726*; on partially submerged knees of bald cypress, *Atwood 3395*.
- Leskea australis* Sharp, on buttressed base of bald cypress, *Atwood & Holmberg 3457*; on base of oak, *Atwood & Holmberg 3468*, *3471*; on expanded base of large cottonwood, *Holmberg 5519*; on 3 in. dia. *Vitis* sp. trunk on ground, *Holmberg 5524*; patch on base of small trunk, *Holmberg & Atwood 5850*.
- Leskea gracilescens* Hedw., on base of large bald cypress, *Atwood & Holmberg 3325*; on cypress knee, *Atwood & Holmberg 3463*; on buttressed oak, *Atwood & Holmberg 3449*, *Atwood et al. 3343*; common on decayed log, *Holmberg 5725*; on patch on edge of asphalt pavement,

- Holmberg & Atwood* 5865; on large sycamore trunk, *Holmberg* 5508B; on base of large tree in open area, *Holmberg* 5598.
- Leucodon julaceus* (Hedw.) Sull., on fallen bark from large oak tree, *Atwood & Holmberg* 3460; on bark of fallen hackberry, *Atwood et al.* 3346; on bark of fallen tree, *Holmberg* 5514; small patches on edge of asphalt pavement, *Holmberg & Atwood* 5863.
- Orthotrichum diaphanum* Brid., on base of large sugarberry tree, *Holmberg* 2910. [This species had previously been collected at Big Oak Tree State Park but was not found during the current park survey. The specimen is very sparse and the species is rare in Missouri (S2).]
- Orthotrichum ohioense* Sull. & Lesq., on fallen upper limb of cottonwood tree, *Holmberg* 5549.
- Orthotrichum pumilum* Sw., on bark of large fallen tree limb, *Atwood & Holmberg* 3461; on knot-hole of decayed log, *Holmberg & Atwood* 5855; small patches on edge of asphalt pavement, *Holmberg & Atwood* 5864.
- **Orthotrichum pusillum* Mitt., on fallen elm trunk, from 30 ft up, *Holmberg* 5517.
- **Physcomitrella patens* (Hedw.) Bruch & Schimp., on cracking mud of dry lakebed, *Atwood & Holmberg* 3405, 3406, 3408, *Holmberg* 5728; on top of large bald cypress stump in dry lake bed, normally under water, *Holmberg* 5729.
- Physcomitrium pyriforme* (Hedw.) Hampe, on exposed soil in picnic area, *Atwood & Holmberg* 3307, *Holmberg* 5599; on wet bank along moat surrounding park, *Atwood & Holmberg* 3476.
- Plagiomnium cuspidatum* (Hedw.) T. J. Kop., on rotted log, *Atwood* 3375, *Atwood & Holmberg* 3454, *Atwood et al.* 3359, *Holmberg* 5536, 5612, *Holmberg & Atwood* 5860; on soil in picnic area. *Atwood & Holmberg* 3305.
- Platygyrium repens* (Brid.) Schimp., on large, fallen branch, *Atwood* 3432; on bark of fallen tree, *Holmberg* 5512.
- **Pleuridium subulatum* (Hedw.) Rabenh., on soil below boardwalk observation platform, *Atwood et al.* 3340.
- Ptychomitrium drummondii* (Wilson) Sull., on fallen tree limb, *Atwood* 3370; on trunk of bald cypress, *Atwood* 3377; on base of large elm, *Atwood & Holmberg* 3302; on fallen tree bark from large oak, *Atwood & Holmberg* 3466; abundant on 30 in. dbh bald cypress trunk, *Holmberg* 5544; on lower trunk of large fallen tree, *Holmberg* 5528; small patches on edge of asphalt pavement, *Holmberg & Atwood* 5862.
- **Ptychostomum pseudotriquetrum* (Hedw.) J. R. Spence & H. P. Ramsay ex Holyoak & N. Pedersen, on decayed log, *Holmberg* 5605.
- **Pylaisiadelpha tenuirostris* (Bruch & Schimp. ex Sull.) W. R. Buck, on rotted log, *Atwood* 3382, *Atwood & Holmberg* 3446, 3472, *Holmberg* 5604; on trunk of bald cypress, *Atwood* 3394, *Atwood & Holmberg* 3447, *Atwood et al.* 3353, *Holmberg* 5735, *Holmberg & Atwood* 5852.
- **Rhynchostegium serrulatum* (Hedw.) A. Jaeger, on rotted log, *Atwood & Holmberg* 3314, *Holmberg* 5625.
- **Rosulabryum flaccidum* (Brid.) J. R. Spence, on rotted stump, *Atwood* 3381; on side of bald cypress trunk, *Holmberg & Atwood* 5730.
- **Rosulabryum laevifilum* (Syed) Ochyra, on trunk of bald cypress, 6 ft. from ground, *Atwood & Holmberg* 3412; on soil in gravel parking lot, *Holmberg* 5602.

- **Schistidium viride* H. H. Blom & Darigo, on cement support beneath boardwalk, *Atwood & Holmberg 3480*.
- Sematophyllum adnatum* (Michx.) E. Britton, on well-rotted log, *Atwood & Holmberg 3413, Atwood et al. 3362*.
- Syntrichia pagorum* (Milde) J. J. Amann, on bark of large fallen tree limb, *Atwood & Holmberg 3462*; on fallen upper limb of cottonwood tree, *Holmberg 5551*.
- **Thuidium delicatulum* (Hedw.) Schimp., sparse, on rotted log, *Atwood 3374, Holmberg 5526*.
- **Tortella humilis* (Hedw.) Jenn., on cement support beneath boardwalk, *Atwood & Holmberg 3482*; on fallen champion burr oak, *Atwood et al. 3348*.
- **Trematodon longicollis* Michx., under boardwalk observation platform, *Atwood 3367, Holmberg 5633*.
- **Weissia controversa* Hedw., on soil, road on berm around lake, *Holmberg 5616*.
- **Weissia muhlenbergiana* (Sw.) W. D. Reese & B. A. E. Lemmon, on soil in mown area, *Atwood & Holmberg 3309, 3479, Holmberg & Atwood 5753*; on gravelly soil along road, *Holmberg 5603*; on soil, at base of wooded berm, *Holmberg 5731*.

Liverworts & Hornworts

- Aneura pinguis* (L.) Dumort., on well-rotted log, *Atwood 3369, 3373, Atwood & Holmberg 3320, 3414, 3473, Atwood et al. 3361; Gier 3905 (NY); Holmberg 5535, 5538, 5541*. [Gier (1955) reported *Pallavicinia lyellii* (Hook.) Carruth. from Mississippi County based on specimens from Big Oak Tree State Park. Re-examination of these specimens, deposited at NY, found them to be misdeterminations of *A. pinguis*.]
- Chiloscyphus pallescens* (Ehrh. ex Hoffm.) Dumort., on well-rotted log, *Atwood et al. 3349*.
- Frullania eboracensis* subsp. *eboracensis* Gottsche, on bark of burr oak, *Atwood 1532*; on elm trunk, *Holmberg 2915*.
- **Frullania eboracensis* subsp. *virginica* (Lehm.) R. M. Schust., on trunk of oak, *Atwood & Holmberg 3443*.
- **Frullania ericoides* (Nees) Mont., on bark of fallen tree, *Holmberg 5513*.
- Frullania inflata* Gottsche, on bald cypress trunk, *Atwood 3378, Atwood & Holmberg 3327, 3448, Holmberg 5545*; on bald cypress log in marshy bottomland woods, *Holmberg 5631*; on upper trunk of recently fallen tree, *Atwood & Holmberg 3326, Holmberg 5522*; on bark of log, *Atwood & Holmberg 3459*; on trunk of large fallen oak, *Atwood 3433*; on trunk of oak, *Atwood 3435, Atwood & Holmberg 3300*; on maple, *Atwood 3436*; on hackberry trunk, *Holmberg 5507, 5523b*; many patches on shrub trunk in standing water, *Holmberg 5540*; on silver maple trunk, *Holmberg & Atwood 5851*; on American elm, 6 in. dbh, *Holmberg 5509*.
- Lophocolea heterophylla* (Schrad.) Dumort., on buttressed base of bald cypress, *Atwood 3383, Atwood et al. 3344, 3360, Holmberg & Atwood 5632, 5853*; on well-rotted log, *Atwood 3372, 3385, Atwood & Holmberg 3418, 3421, 3445, 3469, Atwood et al. 3351, Holmberg 5534*; on base of elm, *Atwood & Holmberg 3323*; on fallen 4 in. limb, *Holmberg 5630*.
- Notothylas orbicularis* (Schwein.) Sull., [This species was reported from the park by Doolen (1984) based on a specimen, *Doolen 801-B*, that was verified by Raymond Stotler† (Wanda Doolen, personal communication, 2017); the specimen could not be located.]

**Phaeoceros oreganus* (Austin) Hässel, on soil below boardwalk observation platform, Atwood 3368.

Porella pinnata L., on wet trunk base of oak, Atwood 3393, Atwood & Holmberg 3415, 3453; on base of large bald cypress, Atwood & Holmberg 3324; on exposed roots of tree, Atwood et al. 3342; on base of maple, Atwood 3437; on standing dead *Ilex* trunk, 4 in dbh, Holmberg 5542.

Ricciocarpos natans (L.) Corda, floating near shoreline of pond, Atwood & Holmberg 3330; on cracking mud of dry lakebed, Atwood & Holmberg 3407, Holmberg 5521.

ACKNOWLEDGEMENTS

Thanks to Allison Vaughn (Missouri State Parks Natural Resources Steward) and Jen Weaver (Missouri State Park Naturalist) for arranging and assisting with this survey. The curators at the New York Botanical Garden herbarium (NY) are thanked for the loan of specimens. Bruce Allen assisted with several determinations. John Brinda is thanked for allowing us to publish on his specimen of *F. hallianus*. Corinne Kozlowski helped prepare the graph and provided comments on an early manuscript draft. This project was supported by a Missouri Department of Natural Resources bryophyte survey contract to the authors. Additional support for fieldwork and herbarium studies was generously provided by the Darigo family to continue the Missouri bryophyte work of the late Carl E. Darigo, through a memorial gift to the Missouri Botanical Garden.

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*pdf effectively published online 30 December 2018 via <https://monativeplants.org/missouriensis>

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