

New Missouri bryophyte records and an expanded distribution for *Trichostomum crispulum* in eastern North America

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ABSTRACT. — Ten bryophyte taxa — four liverworts and six mosses — are newly reported for Missouri, with notes regarding their morphology, distribution, ecology, and voucher specimen citations. The eastern North America range of *Trichostomum crispulum* is expanded to include Arkansas, Kentucky, Missouri, Nebraska, and Ohio. *Tortella tortuosa* is confirmed for Missouri based on recent Shannon County collections. Previous reports of this species from Taney County were based on mis-determinations of *T. humilis*.

INTRODUCTION

The last several years of fieldwork conducted by the authors, along with herbarium studies of specimens in the Crosby Bryophyte Herbarium at the Missouri Botanical Garden (MO), have discovered four liverworts and six mosses new to the Missouri bryoflora. The new liverworts — *Apopellia megaspora*, *Cephaloziella hyalina*, *Odontoschisma denudatum* subsp. *denudatum* and *Riccia campbelliana* subsp. *campbelliana* — increase the number of Missouri liverworts to 120 taxa (Atwood 2014, 2016; Atwood & Brinda 2015, 2019). The new mosses — *Entosthodon serratus*, *Philonotis hastata*, *Polytrichum strictum*, *Saelania glaucescens*, *Trichostomum crispulum*, and *Zygodon rupestris* — raise the number of documented Missouri mosses to 332 taxa (Atwood & Holmberg 2018; Darigo 2015; Holmberg & Atwood 2014). In addition to several new Missouri sites for *T. crispulum*, the eastern North America range of this species is expanded to include localities in Arkansas, Kentucky, Nebraska, and Ohio. Lastly, *Tortella tortuosa* is confirmed for Missouri based on recently collected specimens from Shannon County. Previous reports of this taxon from Taney County were based on mis-determined specimens of *T. humilis*. All cited voucher specimens are deposited in MO.

FLORISTIC ENUMERATION

***Apopellia megaspora* (R.M. Schust.) Nebel & D. Quandt (Figure 1)**

This calcareous species was described by Schuster (1981, as *Pellia megaspora* R.M. Schust.) for its delicate, deep-green plants, very large spores [64–77(80) × 100–115(120) μm] and lack of autumnal innovations and anthocyanins. In eastern North America, the species has been reported from Labrador, south throughout New England and west to Minnesota (Schütz et al. 2016;

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Stotler & Crandall-Stotler 2017). However, *A. megaspora* is likely to have an even greater distribution if specimens determined as *P. endiviifolia* (Dicks.) Dumort. are considered. *Pellia endiviifolia* [\equiv *Apopellia endiviifolia* (Dicks.) Nebel & D. Quandt] is now treated as a European, north African, and Asiatic species whose distribution excludes North America (Schütz et al. 2016; Stotler & Crandall-Stotler 2017). Whereas *Apopellia* species have multicellular slime papillae at the ventral apex of the thallus and a cylindrical pseudoperianth, *Pellia* species have 1(–2)-celled clavate slime papillae at the ventral apex of the thallus and a flap-like pseudoperianth (Schuster 1992; Schütz et al. 2016). The multicellular slime papillae in the Missouri specimens leave no doubt as to their affinity with *Apopellia* rather than *Pellia*.

Voucher Specimen: U.S.A. MISSOURI: FRANKLIN CO.: Shaw Nature Reserve, S of Maritz Trail House along slopes and small draw W of Wildflower Trail, on sandstone in hardwood forest, 38.463527, -90.820653, 3 Nov. 2021, *Brinda et al. 14638* (MO 7035924).



Figure 1. *Apopellia megaspora* from *Brinda et al. 14638*, Franklin County, Missouri. Photo by John C. Brinda.

***Cephaloziella hyalina* Douin**

Cephaloziella hyalina appears to be a common but overlooked element in the bryoflora of the southeastern United States (Schuster 1980; Wagner 2017). This light-green, autoicous species grows mostly on soil and has small creeping shoots; wide-spreading, obliquely inserted leaves; and vestigial, 1–2-celled underleaves that usually terminate in slime papillae. The leaves are usually 4–7 cells wide and bifid for more than half their length into two narrow lobes.

Voucher Specimens: **U.S.A. MISSOURI:** CEDAR CO.: ca. 1 mile S of Arnica on highway AA, gullies and rocky soil of oak-hickory forest with numerous sandstone exposures, soil on bank of creek, sec. 6 T34N R25W, 1 July 1963, *Redfearn 12878* (MO 3956753). ST. CLAIR CO.: ca. 1.5 miles SE of Johnson City, hickory forest with extensive sandstone bluffs, on sandy soil, sec. 5 T38N R27W, 2 July 1963, *Redfearn 13523* (MO 2847216). STE. GENEVIEVE CO.: Hawn State Park, Orchid Valley, near small seasonal waterfall, on soil of muddy stream bank in wooded bottomland, 37.7941666, -90.2655556, 5 May 2013, *Holmberg 4597* (MO 6495001).

***Entosthodon serratus* (Brid.) Fife**

Endemic to the southeastern United States, *E. serratus* is distributed from North Carolina to Oklahoma, south to Florida and Texas (Miller & Miller 2007 as *Funaria serrata* Brid.). Its small plants occur on soil in disturbed habitats and have oblong-lanceolate leaves, broadly acute apices, sub-percurrent to percurrent costae as well as distinctly serrate distal margins. The presence of inclined and curved, 1.5–2.0 mm long, smooth capsules and the lack a revolvable annulus help to distinguish it from the more commonly encountered Funariaceae in Missouri, i.e., *Funaria hygrometrica* Hedw. and *F. flavicans* Michx. Furthermore, those species have more densely gregarious plants while plants of *E. serratus* tend to be more scattered.

Voucher Specimen: **U.S.A. MISSOURI:** JEFFERSON CO.: Victoria Glades Conservation Area, along trail in NW corner of area, hardwood forest, on soil along trail, 38.2039300, -90.5442600, 27 May 2013, *Brinda et al. 4568* (MO 6491870).

Odontoschisma denudatum* (Mart.) Dumort. subsp. *denudatum

This species is widespread in eastern North America, ranging from New Brunswick to Minnesota, south to Florida (Stotler & Crandall-Stotler 2017). Reports of it from northwestern Arkansas (Timme & Redfearn 1997) are the nearest documented localities to the newly reported Missouri stations. *Odontoschisma denudatum* subsp. *denudatum* is characterized by its creeping stems with succubous, broadly ovate lateral leaves that are reduced in size towards both ends of the stem. The stems frequently terminate in a cluster of yellow-green, ellipsoidal, 2-celled gemmae. The median and marginal leaf cells are 18–24 µm long, strongly collenchymatous and have bulging trigones. In Missouri it differs from the more common and widespread *O. sphagni* (Dicks.) Dumort. [= *O. prostratum* (Sw.) Trevis. fide Gradstein & Ilkiu-Borges 2015] by the presence of gemmiferous shoots, strongly collenchymatous leaf cells with bulging trigones and the lack of differentiated marginal cells. The species is also corticolous, whereas *O. sphagni* is typically found on damp rock faces. Although *O. denudatum* subsp. *denudatum* has been listed as a Missouri species of conservation concern for several years, no reference to vouchered specimens has been previously published.

Voucher Specimens: **U.S.A. MISSOURI:** STE. GENEVIEVE CO.: Hickory Canyon Natural Area, ca. 3 km N of Sprott, along drainage below tall LaMotte sandstone bluffs leading to box canyons, on decorticate log with *Nowellia*

curvifolia, 37.8833, -90.3000, 29 August 2011, *Atwood 1906* (MO b6238313). SHANNON CO.: Rocky Creek Conservation Area, Island Branch Natural Area, boulder field below Island Branch Cave, sparse on sides of well-rotted log, 37.0992700, -91.4727800, 6 Nov. 2021, *Atwood et al. 3859A* (MO 7034523).

***Philonotis hastata* (Duby) Wijk & Margad.**

This widespread tropical to subtropical species occurs in seepage on wet soil over calcareous rock. It has a pale-green color, delicate habit and brood branches frequently produced in the upper leaf axils. The oblong-lanceolate leaves have acute or rounded apices, sub-percurrent costae, bluntly serrulate margins and a lax leaf cell areolation. These character states are superficially similar to those of *P. gracillima* Ångstr., a species of similar habitats and distributed in the southeastern United States, the Caribbean and Central/South America. As noted by Allen (2002) the morphological similarity between these two species, as well as *P. glaucescens* (Hornsch.) Broth., has resulted in taxonomic confusion and a poorly defined distribution of *P. hastata* in North America. *Philonotis gracillima* has papillose upper leaf cells that are approximately 10 µm wide or less (Zales 1973 as *P. glaucescens*). By comparison, the upper leaf cells of *P. hastata* are smooth to weakly papillose and 10–15 µm wide (Allen 2002). The Missouri specimens compare more closely to *P. hastata*.

Voucher Specimens: U.S.A. MISSOURI: SHANNON CO.: Rocky Creek Conservation Area, Island Branch Natural Area, along Island Branch above spring, streamside, on soil over rock in hardwood forest, 37.096192, -91.472688, 304.32m, 6 Nov. 2021, *Brinda et al. 14680* (MO7035938). TEXAS CO.: Mark Twain National Forest, Paddy Creek Wilderness, along Little Paddy Creek, downstream of junction with Big Piney Trail, on wet soil over rock in riparian hardwood forest, 37.530948, -92.091747, 344.5m, 9 Nov. 2013, *Brinda 4869* (MO 7035939).

***Polytrichum strictum* Brid.**

Polytrichum strictum is widespread in North America and morphologically similar to *P. juniperinum* Hedw. in its leaf apices that end in reddish awns and its entire, broadly infolded leaf margins. *Polytrichum strictum* differs in having a dense matting of white rhizoids at the base of the stem, more stiffly erect leaves when dry and usually (see Allen 2014: 570) a close ecological association with *Sphagnum* L. The Missouri population was growing in a large hummock of *S. compactum* DC.

Voucher Specimen: U.S.A. MISSOURI: STE. GENEVIEVE CO.: Hawn State Park, Orchid Valley Natural Area, ca. 0.5 mile E of highway AA on Hawn Park Road, hardwood forest on sloping hillsides of wooded ravine, on wet sandy soil below ledge with *Sphagnum*, 37.7906000, -90.2647000, 15 Nov. 2013, *Atwood 2747* (MO 6493813).

Riccia campbelliana* M. Howe subsp. *campbelliana

Originally described from California, this species has been reported from scattered states in eastern and interior North America, including Arkansas, Georgia, Kansas, Louisiana, Oklahoma, and Texas (Schuster 1992). In Kansas, where the species is common and known from 17 counties, McGregor (1955) notes *R. campbelliana* occurs on shallow soil over sandstone in prairies and open oak woods. This habitat is identical to that of the Missouri specimens cited here. *Riccia campbelliana* has gregarious, grey-green thalli with orange-brown or salmon colored lateral margins and an acute median sulcus near the apex of the thallus segment. The ventral scales are hyaline, imbricate with the thallus margin, and about the same height. It has brownish spores 82–100 µm in diameter that are angular with a narrow wing margin and a vermicular ornamentation on both proximal and distal faces; the sinuous lamellae are elevated at the nodes as papillae that occasionally form distinct areola.

Voucher Specimens: **U.S.A. MISSOURI:** BARTON CO.: Prairie State Park, Regal Prairie Natural Area, Sandstone Trail between NW130th Ln. and East Drywood Creek, hills and slopes occasionally capped with rock outcrops, on soil over exposed sandstone with *Riccia hirta*, 37.5197000, -94.5460000, 21 Apr. 2014, *Atwood & Brinda 2753A* (MO 7036421). **DADE CO.:** Corry Flatrocks Preserve, S of Corry on County Road 761, ca. 0.80 miles N of Corry Branch crossing at intersection with County Road 290, on margins of outcropping, exposed, sandstone bedrock in prairie and pasture with *Riccia beyrichiana* and *R. tenella*, 37.4857100, -93.7279100, 9 Apr. 2015, *Atwood & Holmberg 3079* (MO 6764009).

***Saelania glaucescens* (Hedw.) Broth.**

This small moss has a widespread but scattered distribution in North America, ranging from Newfoundland to Alaska and south to New Jersey and Arizona. Iowa is the nearest documented station to Missouri (Seppelt 2007). The lanceolate and gradually acuminate leaves, percurrent costae, reflexed and irregularly serrate margins and subquadrate to short-rectangular leaf cells are superficially similar to the morphology of *Ceratodon purpureus* (Hedw.) Brid., but its blueish-glaucous color distinguishes it from that species as well as all other mosses in the Midwestern bryoflora.

Voucher Specimen: **U.S.A. MISSOURI:** TEXAS CO.: Mark Twain National Forest, Paddy Creek Wilderness, along Little Paddy Creek, downstream of junction with Big Piney Trail, on cherty limestone in riparian hardwoods, 37.530948, -92.091747, 9 Nov. 2013, *Brinda 4865* (MO 7035940).

***Tortella tortuosa* (Schr. ex Hedw.) Limpr. (Figure 2)**

This species is a widespread calciphile in North America, distributed from Newfoundland south to Virginia, west to Alaska, California, and Texas (Eckel 2007). Gier (1955) reported *T. tortuosa* from Missouri based on two Taney County specimens deposited at Iowa State University (ISC). Although Redfearn (1972) re-examined this material and found them to be mis-determinations of *T. humilis* (Hedw.) Jenn., his annotations were overlooked by Darigo (2015)

who cited *T. tortuosa* from Taney County. The specimens constituting Gier's (1955) report of *T. tortuosa* (Conard 40-1105 and 29 Aug. 1931, *Rissens s.n.*) have duplicates in MO (MO 4449075 and 4449076) that have Paul Redfearn's annotations of *T. humilis* from 1966. *Tortella tortuosa* is dioicous, but both specimens are autoicous, as is *T. humilis*, and both have sporophytes. Additionally, the stems have a central strand in cross section; a diagnostic feature of *T. humilis*. In contrast, a central strand is lacking in *T. tortuosa*. Finally, the leaves are contorted when dry, oblong-lanceolate and 2–3 mm long with broadly acute apices that terminate in a short mucro. In comparison the leaves of *T. tortuosa* are spirally twisted when dry, linear-lanceolate, 4–5 mm long and gradually acuminate with a long apiculus. *Tortella tortuosa* is confirmed for Missouri based on the Shannon County specimens cited here.

Voucher Specimens: U.S.A. MISSOURI: SHANNON CO.: Rocky Creek Conservation Area, Island Branch Natural Area, boulder field below Island Branch Cave, on dry tops of dolomite boulders, 37.0992700, -91.4727800, 6 Nov. 2021, *Atwood et al.* 3854 (MO 7034540) & 3868 (MO 7034536), *Brinda et al.* 14659 (MO 7035941).



Figure 2. *Tortella tortuosa* from *Brinda et al.* 14659, Shannon County, Missouri. Photo by John C. Brinda.

***Trichostomum crispulum* Bruch (Figure 3)**

This species has a widespread but scattered distribution in North America occurring on igneous and calcareous substrates from Greenland to Alaska, south to Florida, Texas, California, and Arizona (Zander 2007a). As noted by Zander (2007a,b), specimens of *T. crispulum* from the midwestern and southeastern states are morphologically similar to *Weissia jamaicensis* (Mitt.) Grout, a Neotropical species reported as far north as Missouri in eastern North America (Zander

2007b). Both species are dioicous and have lanceolate leaves with cucullate apices, erect to weakly inflexed distal margins and stout costae that in cross section have two stereid bands (Zander 2007a,b). Redfearn (2005) reported *W. jamaicensis* from eight Arkansas counties, while Darigo (2015) reported it from 17 Missouri counties. After collecting authentic *T. crispulum* specimens in Arkansas, Kentucky, Missouri and Ohio, a re-examination of the Interior Highland specimens of *W. jamaicensis* deposited in MO was undertaken to evaluate whether these specimens are also *T. crispulum*. Indeed, based on leaf cross-sections almost all of the specimens could be referred to *T. crispulum* or other superficially similar species, such as *W. controversa* Hedw. or *W. muhlenbergiana* (Sw.) W.D. Reese & B.A.E. Lemmon. As seen in leaf cross-sections *T. crispulum* has a semicircular to reniform shaped costa with the abaxial (lower) surface and stereid band larger or of equal in size to the adaxial (upper) surface and stereid band. In comparison, leaf cross-sections of *W. jamaicensis* have a prominent, obovate shaped costa with the adaxial (upper) surface strongly bulging and an enlarged stereid band versus the weakly bulging abaxial (lower) surface and moderately enlarged stereid band. The two species also differ slightly in their dry leaf stance and appearance: curled to crisped and glossy in *T. crispulum* versus wiry to spirally contorted and glaucous in *W. jamaicensis*. Consequently, the Interior Highlands distribution of *W. jamaicensis* is more restricted than previously thought, with authentic material not seen from Arkansas and only a single collection found in Missouri (Stone County, Redfearn *et al.* 5439, MO 2036632 & 4422875). In Missouri, *W. jamaicensis* deserves a state listing as a species of conservation concern, whereas *T. crispulum*, although newly reported, is known from numerous localities across 15 counties.

Voucher Specimens: **U.S.A. ARKANSAS:** BENTON CO.: U.S. Army Corps of Engineers lands, on bluffs above Beaver Lake, ca. 1.8 km W of Pine Top, woodland, dolomite glade, rock crevice, 36.325942, -93.898115, 368.8m, 5 May 2014, Brinda *et al.* 5986 (MO 7036410). NEWTON CO.: “Lost Valley” ca. 4 miles SW of Ponca. T16N R23W, 19 Mar. 1963, Redfearn 11949 (MO 3957639). POPE CO.: Long’s Pool NW of Scottsville, soil on cliff above river, 28 May 1953, Anderson 11953 (MO 5351385). **KENTUCKY:** WOLFE CO.: Daniel Boone National Forest, Clifty Wilderness, along Swift Camp Creek between Chestnut Log Branch and Rose Drake Branch, *Tsuga*-hardwood forest, on sandstone rock, 37.773715, -83.563717, 19 July 2014, Brinda 6331 (MO 7036413). **MISSOURI:** CAPE GIRARDEAU CO.: Trail of Tears State Park, along Sheppard Point Loop Trail, limestone rock crevice in hardwood forest, 37.445730, -89.453820, 23 Sept. 2012, Brinda 4009 (MO 6491650). CARTER CO.: Big Springs, moist shaded limestone bluff, 21 Oct. 1968, Sharp 6630A (MO 3958651). CHRISTIAN CO.: Along S bank of James River and adjacent bluffs, secs. 5–6 T27N R22W, 11 July 1961, Redfearn 8893 (MO 2041040, 3957160). DADE CO.: Open limestone glade, ca. 3 miles E of Neola, on exposed limestone, sec. 19 T32N R21W, 27 July 1960, Redfearn 6804 (MO 3957161). DENT CO.: Montauk State Park, on N side of Hwy 119 bridge and E bank of Current River, scattered small patches on sandy deposits over granite block of unshaded, S-facing wall at boat ramp to riverbank, NE1/4 NE1/4 sec. 27 T32N R7W, 27 Nov. 1998, Darigo & Darigo 3297 (MO 5124155,

5363729). HOWELL Co.: Mark Twain National Forest, Carman Springs Natural Area, along Spring Creek between Spring Hollow and Carman Spring, on limestone in hardwood forest, 36.917055, -92056503, 17 May 2014, *Brinda 6035* (MO 7036407). JEFFERSON CO.: Myron and Sonya Glassberg Family Conservation Area, N-facing cliffs along the Meramec Ricer, on sandstone in hardwood forest, 38.44563, -90.677977, 20 April 2014, *Brinda #'s 5878* (MO 7036409), 5879 (MO 7036411); Valley View Glades Conservation Area, on Valley View Trail, ca. 0.75 miles NE of parking lot, on unshaded, sandy soil above limestone on S-facing slope of glade above creek, NW1/4 sec. 30 T41N R4E, 15 May 1997, *Darigo 2846* (MO 4418782). MARIES CO.: Along Clifty Creek, ca. 4 miles E of Shantytown, on limestone beneath ledge, SW1/4 sec. 6 T38N R9W, 8 July 1967, *Redfearn 21630* (MO 3957147). MCDONALD CO.: Along a small spring-fed creek adjacent to highway E, ca. 2 miles S of Powell, on underside of limestone ledge, sec. 28 T32N R30W, 27 June 1962, *Redfearn 10852* (MO 3957159). Along Mill Creek near Mill Creek Baptist Church, NE-facing wooded slopes and limestone bluffs, on shallow soil in limestone crevice, T21N R32W, 2 Apr. 1960, *Redfearn & Houk 5389* (MO 3973662). OREGON CO.: Mark Twain National Forest, Irish Wilderness, along Whites Creek Trail, near small spring flowing into Whites Creek, on limestone in hardwood forest, 36.741497, -91.185946, 2 May 2015, *Brinda 7429* (MO 7036417). Mark Twain National Forest, Irish Wilderness, along Whites Creek, N-facing limestone bluff W of Fiddler Spring, on limestone in hardwood forest, 36.729460, -91.199398, 2 May 2015, *Brinda 7463* (MO 7036415). Greer Springs, ca. 6 miles N of Alton, on shaded vertical limestone, SW1/4 sec. 36 T25N R4W, 31 May 1960, *Redfearn 6000* (MO 3957146), 12 July 1963, *Redfearn 14001* (MO 3957162). PULASKI CO.: S-facing dolomite bluffs along spring branch of Pruett Springs, ca. 2 miles S of Big Piney, rocks along creek bed, sec. 32 T34N R10W, 16 Oct. 1960, *Redfearn 7694* (MO 3957145). SHANNON CO.: Rocky Creek Conservation Area, boulder field below Island Branch Cave, on dry tops of dolomite boulders, 37.0992700, -91.4727800, 6 Nov. 2021, *Atwood et al. 3842* (MO 7034507), *Brinda et al. 14658* (MO 7035055). Pulltight Spring, ca. 5 miles S of Rector, NW1/4 sec. 4 T30N R5W, 14 June 1961, *Redfearn 8490* (MO 3957156). ST. FRANCOIS CO.: St. Francois State Park, Coonville Creek Wild Area, limestone bluffs along the Swimming Deer Trail, hardwood-cedar forest, on limestone, 37.954895, -90.515015, 26 Apr. 2015, *Brinda #'s 7416* (MO 7036412), 7417 (MO 7036414). TEXAS CO.: N-facing slope and alluvial soil along small creek ca. 5 miles E of junction of highways U and HH, crevices of limestone rocks and sand soil, 16 Apr. 1960, *Redfearn 5503* (MO 3957153, 3957157). WEBSTER CO.: W-facing limestone and dolomitic bluffs and oak hickory forest with cherty soil along Terell Branch, ca. 3.5 miles S of Fordland, on shaded limestone along branch, sec. 20 T28N R18W, 29 June 1961, *Redfearn 8732* (MO 3973663). WRIGHT CO.: W-facing wooded bluffs along Gasconade River ca. 0.5 miles E of Hartville, on shaded limestone ledge, NW1/4 sec. 5 T29N R14W, 13 June 1961, *Redfearn 8330* (MO 5644987). **NEBRASKA:** GARDEN CO.: Ash Hollow State

Historical Park, along ridge on E side of Windlass Hill, E of Oregon Trail, on soil in juniper woodland, 41.260520, -102.113054, 27 July 2017, *Brinda 10057* (MO 7036405). **OHIO: OTTAWA CO.:** Lakeside Daisy State Nature Preserve, ca. 2 km SE of Lakeside, limestone glade and adjacent woodland, on soil, 41.532031, -82.725419, 5 June 2018, *Brinda 12037* (MO 7036406).



Figure 3. *Trichostomum crispulum* from *Brinda et al. 14658*, Shannon County, Missouri. Photo by John C. Brinda.

***Zygodon rupestris* Schimp. ex Lorentz**

This small, widespread species has a scattered distribution in eastern and interior North America ranging from New Brunswick to North Carolina and Tennessee, west to Ontario and Wisconsin (Vitt 1970). *Zygodon apiculatus* Redf. is the only other member of the genus known from Missouri (Redfearn 1967). *Zygodon rupestris* is similar to *Z. apiculatus* in having lanceolate leaves with short apiculi of multiple, concolorous cells; pluripapillose upper and median leaf cells; papillose cells covering the upper abaxial surface of the costae; and ovate to cylindric, multicellular gemmae with horizontal cell walls. Although Vitt (2014) reduced *Z. apiculatus* to the synonymy of *Z. rupestris*, we do not agree. *Zygodon rupestris* is distinguished from *Z. apiculatus* by its more gregarious habit; larger stature (8–20 vs. 0.5–5 mm); and entire versus irregularly serrulate apical leaf margins.

Voucher Specimen: **U.S.A. MISSOURI:** SULLIVAN CO.: Union Ridge Conservation Area, Dark Hollow Natural Area, along draw NE of parking area, tree base in hardwood forest, 40.322500, -92.934122, 1 Sept. 2014, *Brinda 6625* (MO 7036400).

ACKNOWLEDGMENTS

Malissa Brigglar and Allison J. Vaughn provided collecting permits for properties managed by the Missouri Department of Conservation and the Missouri Department of Natural Resources, respectively. Nels Holmberg and Susan Farrington are thanked for their comradery on various field trips over numerous years. Bruce Allen provided comments on an earlier draft of this manuscript. The Darigo family is gratefully acknowledged for their support through a memorial gift to the Missouri Botanical Garden to continue the Missouri bryophyte work of the late Carl E. Darigo.

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