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Two new Missouri bryophytes including a disjunct population for *Leptodontium flexifolium* into the Interior Highlands

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ABSTRACT. — Two bryophytes, the moss *Leptodontium flexifolium* and the liverwort *Blasia pusilla*, are reported new for Missouri, with descriptions and synopses of ecology and distribution. In the United States, *L. flexifolium* is distributed otherwise in the southern Appalachian Mountains and a few southwestern states. *Blasia pusilla* is more widespread in North America, occurring in the Pacific Northwest, isolated pockets of the Rocky Mountains, and in states north and east of Missouri, and therefore is not unexpected in Missouri.

INTRODUCTION

On a June 2024 field trip, lunch was held at Missouri University of Science and Technology's Ozark Region Field Station near Newburg, Missouri, in the Ozark region of the Interior Highlands. Among the several buildings at the field station is an old cabin homestead roofed with cedar shake shingles that have accumulated numerous bryophytes. Investigation of these bryophytes revealed a disjunct location of *Leptodontium flexifolium*. The addition of *L. flexifolium* to the Missouri moss flora brings the total number of mosses documented from the state to 330 (see Atwood 2025). A December 2024 trip to Rocky Hollow Natural Area in Monroe County led to the discovery of a new state record for *Blasia pusilla*. This brings the total number of Missouri liverworts to 121 taxa (see Atwood & Brinda 2021, Atwood 2014).

DISCUSSION

Leptodontium flexifolium (Dick) Hampe ex Lindberg

In the contiguous United States, *L. flexifolium* (**Figure 1**) occurs primarily above ~2000 m (6,500 ft) elevation in mountainous regions of Arizona, Mexico, and Texas, and above ~1370 m (4,500 ft) in the temperate Southern Appalachian Mountains of North Carolina and Virginia (Consortium of Bryophyte Herbaria 2025, **Figure 2**). It is a substrate generalist occurring on soil, rock, and trees, particularly decorticate wood. The Missouri population is a range extension of ca. 850 km (528 miles) from the nearest known population, in western Virginia.

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Figure 1. *Leptodontium flexifolium* from *Volenberg s.n.* (MO 7048480), Phelps County, Missouri. *(Photo by the author)*

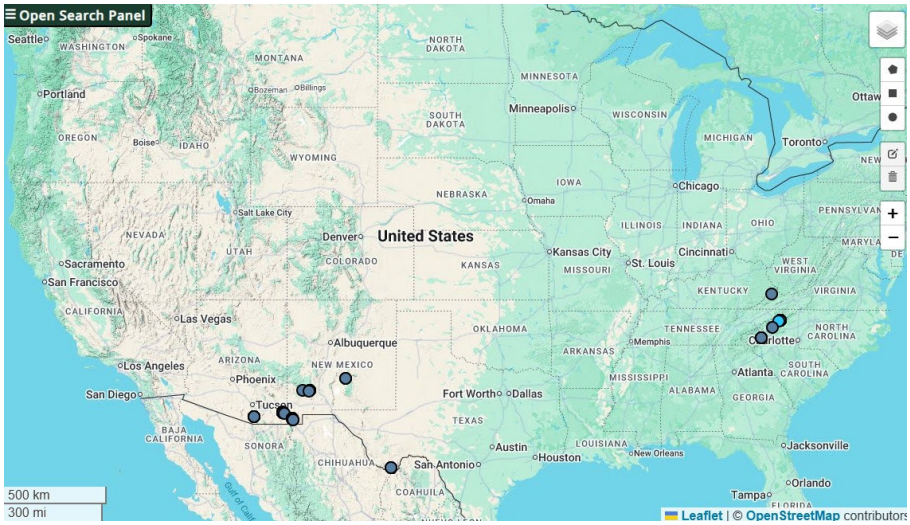

Figure 2. Vouchered specimen locations for *Leptodontium flexifolium* in the U.S. (coordinates generated from the Consortium of Bryophyte Herbaria 2025).

This yellowish to brownish-green, tuft forming moss has slightly tomentose stems reaching around 1 cm in height. The leaves are oblong-lanceolate, contorted when dry, and wide-spreading when wet; this is a common habit in the Pottiaceae. The distal halves of the leaves have coarsely serrate margins terminating in broadly acute tips. Plants are dioicous and sporophytes are unknown in North America. However, numerous brown, ellipsoidal gemmae are commonly found in the leaf axils (**Figure 3**). *Zygodon apiculatus* Redf. is similar in habit, often having denticulate leaf ends and lacking sporophytes, but it is much smaller (1–4 mm high), strictly corticolous, has appressed leaves when dry, and has a darker green color.

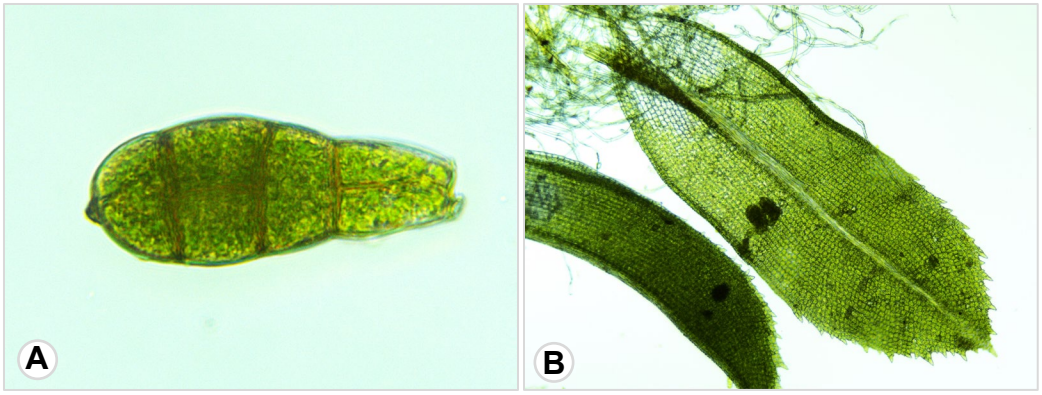

Figure 3. *Leptodontium flexifolium* **A.** Gemma at 250X. **B.** Leaf at 100X, showing strong teeth at distal end which are visible with a hand lens. *(Photos by the author)*

How this population ended up in Missouri is subject to several hypotheses. Due to the disjunct location of the Missouri population and an uncharacteristically low elevation of only 243 m (800 ft), along with its occurrence on a building (**Figure 4**), one hypothesis is that this introduction was inadvertently spread by human means. The original European owner of the land the research station resides on was William Riley Yelton (U.S. Department of the Interior, n.d.), who moved to the nearby Mill Creek area in 1869 from Tennessee (Yelton Family Genealogy, n.d.). William's brother, Barnett Cash Wilson, moved to Mill Creek in 1871 from Watauga Falls, North Carolina (Yelton Family Genealogy, n.d.). Watauga Falls is only ~15 air miles from Grandfather Mountain which has an extant population of *L. flexifolium*. Barnett bought property just east of his brother William's homestead. (U.S. Department of the Interior, n.d.). It is plausible that diaspores found their way to the Mill Creek area of Newburg, Missouri.

Figure 4. Cedar shingle roof of cabin at the Ozark Region Field Station. *(Photo by the author)*

A second hypothesis is that the diaspores came in on the current cedar shake shingles that replaced the older cedar shake roof circa 1995. It was noted by the former caretaker that the new cedar shake shingles were chemically treated for fire resistance, and that the roof prior to replacement was also covered in moss (M. Dean, former caretaker of the home, personal communication, 17 June 2025). It is unknown if diaspores could survive such a chemical treatment, and unfortunately, there is no checklist of the moss taxa present on the old cedar shake roof. Decorticate wood is a known substrate for *L. flexifolium*. A roughly 20-meter circle surrounding the house was searched in June 2025 for populations on other substrates such as soil or rock, but none were located. There are currently several healthy populations scattered across the cedar shake roof. Associated mosses include *Hedwigia ciliata* (Hedw.) Boucher, *Polytrichum ohioense* Renauld & Cardot, *Platygyrium repens* (Brid.) Schimp, and *Entodon seductrix* (Hedw.) Müll. Hal.

A third hypothesis is that the diaspores arrived via a wind driven vicariant event. If this were the case, one would expect to find more locations of this species in Missouri and possibly surrounding states. Perhaps more locations will be found in the future.

> *Voucher specimen*: **U.S.A. MISSOURI**: PHELPS CO.: Ozark Region Field Station near Newburg, on south-facing slope of cedar roof shingles of old cabin, 37.8606871, -91.9421259, 29 June 2024, *Lorie Volenberg s.n.* (MO 7048480).

***Blasia pusilla* L.**

In North America, *Blasia pusilla* (**Figure 5**) occurs in the Pacific Northwest from Washington south to California, in the Rocky Mountains from Idaho to Colorado, and north and east of Missouri from Minnesota to South Carolina (**Figure 6**). *Blasia pusilla* prefers disturbed areas in cool-temperate to circumboreal regions (Schuster 1992). It typically occurs in barren or disturbed, neutral to slightly acidic sites on water-retaining soils such as clay or loam, decaying rocky substrates such as shale, and on rocks often subject to periods of inundation. Specimens of *B. pusilla* are known from several of Missouri's surrounding states including Iowa, Illinois, Kentucky, and Tennessee. Most of the specimens from Illinois were collected in moist, sandstone-based locations, thus raising the expectations of *B. pusilla* occurring in Missouri.

Figure 5. *Blasia pusilla* from *Volenberg s.n.* (MO 7095603), Monroe County, Missouri. *(Photo by the author)*

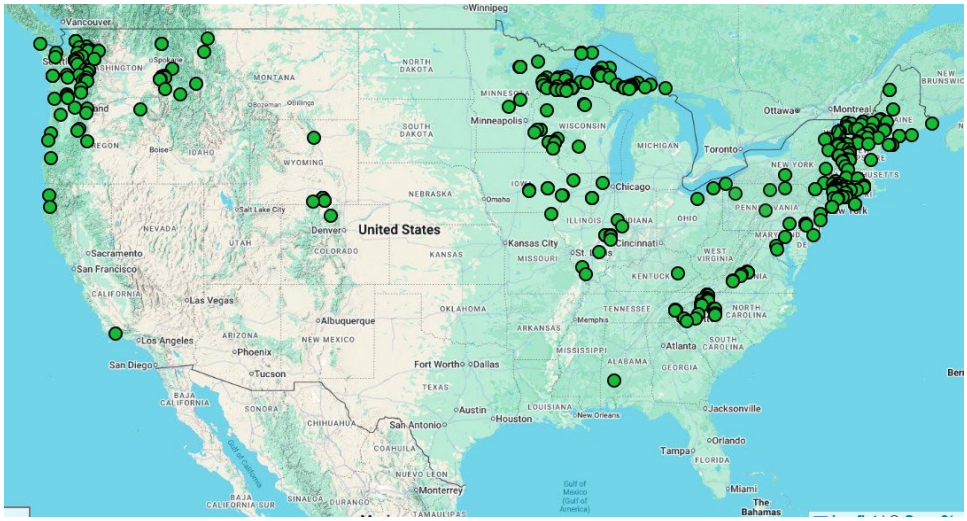

Figure 6. Vouchered specimen locations for *Blasia pusilla* in the U.S. (coordinates generated from the Consortium of Bryophyte Herbaria 2025).

This complex thalloid liverwort has a green to yellow-green, dichotomously branched thallus that is a bit ruffly near the edges. Dark spots at the bases of the thallus lobes contain communities of nitrogen-fixing cyanobacteria. It is not uncommon for the thallus of this species to deteriorate throughout the year before a flush of new growth the following spring, or to disappear, due to its predisposition for unstable and disturbed areas (Schuster 1992). It is, however, a master of reproduction. It has two forms of asexual propagation: stellate shaped gemmae produced from surface cells at the distal end of the thallus, and ovoid to ellipsoid shaped gemmae produced in flask-like structures (**Figure 7**). This dioicous liverwort can also reproduce sexually. When the

various forms of reproduction are present, there are no other liverworts with which this species may be confused. When lacking reproductive structures, the thallus may look like *Pellia epiphylla* (L.) which lacks cyanobacteria.

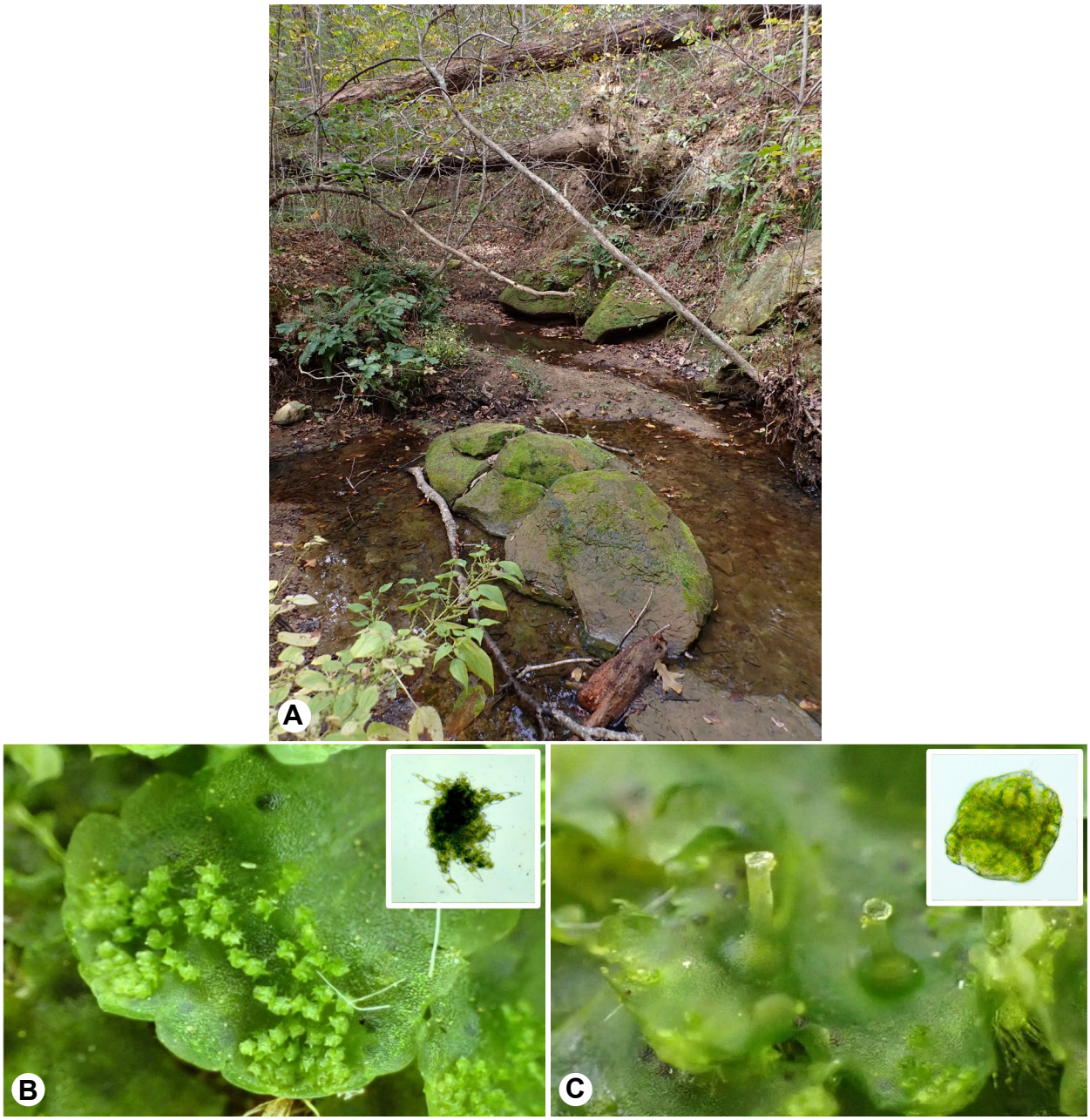

Figure 7. A. *B. pusilla* on a sandstone boulder in a seasonal creek. **B.** Stellate gemmae produced at apex of thallus, inset 250X of stellate gemma. **C.** Ovoid gemmae produced from flasks, inset 1000X ovoid gemma. *(Photos by the author)*

Voucher specimen: **U.S.A. MISSOURI**: MONROE CO.: Rocky Hollow Natural Area, on sandstone boulders in seasonal creek, 39.5011218, -92.1191325, 16 December 2024, *Lorie Volenberg s.n.* (MO 7095603).

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