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UPDATE ON THE DISTRIBUTION OF THE NARROWLY ENDEMIC *PAYSONIA LESCURII* (BRASSICACEAE)

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ABSTRACT

Paysonia lescurii (A.Gray) O'Kane & Al-Shehbaz [formerly *Lesquerella lescurii* (A.Gray) Watson], Nashville or Lescur's Bladderpod, is apparently endemic to 10 contiguous counties in central Tennessee, one county in south-central Kentucky, and ostensibly from one county in northern Alabama. Recent field, herbarium, and literature studies indicate that the species is extant and often abundant at numerous sites in the 10 Tennessee counties. One Kentucky location is well documented but the species has not been seen there since 1985. Documentation is apparently lacking for the Alabama reports and the species, at this time, should not be considered part of the flora of that state.

The genus *Lesquerella* was established by Watson (1888), commemorating paleontologist and bryologist Leo Lesquereux (1806-1889); 33 species were recognized. Payson (1921) monographed the genus, raising the number of species to 52. Rollins (1993), who studied the genus extensively, recognized 83 species in North America, noting that the distribution is centered in the southwestern United States and Mexico with one species distributed across the Canadian Artic from Greenland into Alaska and Siberia. At least five additional North American species have been described and several taxa occur in South America (Al-Shehbaz & O'Kane 2002).

Five species of the former genus *Lesquerella* are known to be present in Tennessee (*L. densipila, globosa, lescurii, perforata, stonensis*); two of these occur in Kentucky (*L. globosa* and *lescurii*) and one in Alabama (*L. densipila*, plus the Alabama endemic *L. lyrata*) (Atlas of Tennessee Vascular Plants 2017; Cranfill et al. 1985; Keener et al. 2017; Kral et al. 2011; Rollins 1952, 1955, 1993; Rollins & Shaw 1973; Tennessee Flora Committee 2015). Recently, one of these six taxa (*L. globosa*) was transferred to the existing genus *Physaria* (Al-Shehbaz & O'Kane 2002) and the other five to the newly-erected genus *Paysonia*, commemorating monographer E.B. Payson (1893-1927) (O'Kane & Al-Shehbaz 2002). In addition to these six species, *Physaria gracilis* (Hook.) O'Kane & Al-Shehbaz subsp. *gracilis* [*Lesquerella gracilis* (Hook.) Watson], mostly a midwestern species, was reported as possibly adventive in Alabama and Tennessee by O'Kane (2010), but it is not included in recent accounts of the flora of either state (Kral et al. 2011; Keener et al. 2017; Tennessee Flora Committee 2015). Additional study of this species in Alabama and Tennessee is warranted.

The purpose of this report is to update distribution data and provide some additional information on one of the former *Lesquerella* species, the narrowly endemic *Paysonia lescurii* (A.Gray) O'Kane & Al-Shehbaz, commonly referred to as Nashville or Lescur's Bladderpod.

Paysonia lescurii is a small (usually <1.5 dm, rarely >2.5 dm in height), flowering from late February to early May (Figs. 1, 2, photographs by the author). Distinctive, flattened fruits [siliques sensu Rollins (1993), silicles sensu O'Kane (2010) (Fig. 3)] mature and seeds are shed April–early June. Baskin et al. (1992) showed that seeds are dormant at maturity and require high summer temperatures to break dormancy. The species is a typical winter annual with germination occurring in autumn and flowering/fruiting the following spring. However, some seeds remain dormant (enter secondary dormancy) and a persistent seed bank is formed.

Habitats include hillsides, cedar glades, riverine flood plains, old fields, roadsides, vacant lots, and pastures. Early spring stands often cover several hectares before tillage in bottomland fields of the Cumberland River that were tilled the previous year (Figure 1). These large spring displays verify the comment by Rollins (1981) that the species has weedy tendencies.

Listed Status

Federally, *Paysonia lescurii* (as *Lesquerella*) was considered threatened by Ayensu and DeFillips (1978) but later removed from consideration as a federal candidate (U.S. Fish and Wildlife Service 1985) because it was found to be "more abundant and widespread than previously believed and not subject to the degree of threats to warrant status." In Tennessee, the species was listed as threatened by Collins et al. (1978) but later delisted (Somers 1989) for the reasons noted above. The species is very rare in Kentucky (Cranfill et al. 1985) and listed there as Historic (Kentucky State Nature Preserves Commission 2012).

Distribution

Tennessee: Extant populations are known from 10 Tennessee counties (Atlas of Tennessee Vascular Plants 2017), i.e., Cheatham, Davidson, Dickson, Montgomery, Rutherford, Smith, Sumner, Williamson, Wilson, and Stewart (Figure 4). The distribution is centered in the Central (Nashville) Basin, Davidson and surrounding counties. The Cumberland River, which flows northwestwardly through the Basin, has apparently provided a migratory pathway to the Western Highland Rim counties of Cheatham, Dickson, Montgomery, and Stewart in Tennessee, and Trigg County in Kentucky (Fig. 4). In these counties the species is almost exclusively found in Cumberland River bottomlands (Fig. 1), which are occasionally flooded by river overflow or backwaters.

Kentucky: The only report from the state was by Chester (1982) from Trigg County (Figure 4). The bottomland site is on the west side of the Cumberland River within Land Between The Lakes, a U.S. Forest Service National Recreation Area. Prior to 1983, this small bottomland site was planted yearly in corn or other crops for wildlife food. Thereafter, the site was seeded to perennial grasses and is in a successional stage today. Fitch et al. (2007) showed that populations of several species of *Paysonia* are enhanced by agricultural disturbance and do not compete with perennial grasses. The species has not been seen in Kentucky since 1985 (Campbell & Medley 2012; Kentucky State Nature Preserves Commission 2012). Impoundment of the Cumberland River by Barkley Dam in 1966 destroyed much of the suitable habitat for the species in Kentucky. Continued searches of remnant bottomlands north of the Tennessee border have been unfruitful to date.

Alabama: Kral (1983) first reported the species from the state (Limestone County, Fig. 4). Rollins (1993), in his comprehensive treatment of the Brassicaceae for North and Central America, reported the species from northern Alabama without citation but referenced Kral (1983) in the literature cited. Al-Shehbaz (1987) noted presence of the species in Alabama, specifically crediting Kral (1983). Others including Alabama in the distribution are O'Kane (2010), USDA, NRCS (2017) and Weakley (2015).

I have not been able to verify the Alabama reports. There are no specimens from Alabama at the Gray Herbarium (GH), where the majority of *Lesquerella* collections by Dr. Rollins are housed (e-mail from Anthony Brach, Curatorial Assistant, Harvard University Herbaria, to Dr. Brian Keener, 24 February 2016). A comprehensive study of the Limestone County flora (Hofmann 1999) found only *Lesquerella densipila* Rollins. The species is not included for the state by Kral et al. (2011), Keener et al. (2017), or Kartesz (2015).

The original Alabama report (Kral 1983) was apparently based on a specimen collected 29 Mar 1958, *J.P. & M. Gillespie 893*. The herbarium label indicates Florida State University but the specimen now is at BRIT (image supplied by Tiana Rehman, BRIT Collections Manager, 1 February

2017). The sheet contains 16 entire or partial plants in flower-bud stage, originally identified as *Barbarea verna*. Dr. Kral annotated the specimen in 1968 as *Lesquerella lescurii* (Gray) Watson (written on sheet directly above the original label). In 1986, Dr. Rollins attached an annotation label in the upper left, noting: "Lesquerella, more likely L. densipila Rollins – Too young to be sure." (quotation marks are those of this author). Location information on the label indicates "Roadside 3 miles north of Owens Junior High School on highway #60." Interestingly, current Highway 60 is a short section on uplands south of the school (now Owens Elementary School). Three miles north of the school place the collection site within the floodplain of the Elk River, a suitable habitat for both *P. densipila* and *P. lescurii*.

Roadsides along current Highway 60 and several Elk River agricultural floodplains were searched on 3 March 2017 by the author and Dr. David Webb; in addition, Dr. Webb searched the area again on 20 March; both searches failed to find *Paysonia*. However, there are documented collections of *P. densipila* from the area as noted generally by Rollins (1993) and specifically by Hofmann (1999) and Keener et al. (2017). Documentation that *P. lescurii* occurs (or ever occurred) in Alabama is apparently lacking or at least questionable.

In summary, the endemic winter annual *Paysonia lescurii* is known from 10 counties in Middle Tennessee, where it has weedy tendencies, often forming extensive early spring stands. The species is well-documented in literature and with specimens from one site in Kentucky, but it exists there now as a seed bank if at all. Reports from Alabama apparently have been based on an immature *Lesquerella* (*Paysonia*) specimen of questionable identity and the species should not be considered part of the Alabama flora unless indicated by new data. The life cycle is not unlike that of many widespread winter annuals and the question posed by Payson (1921) has yet to be answered: "One wonders what the limiting factors in it distribution may be."

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Figure 1. *Paysonia lescurii* in a bottomland field, Cheatham County, Tennessee. The Cumberland River is just past tree line on left. Field was cultivated in soybeans in 2016. Image taken 24 February 2017

Figure 2. Flowers of *Paysonia lescurii*; petals 5-7 mm long. Same site as Figure 1. Image taken 10 March 2017.

Figure 3. Distinctive, flattened fruits of *Paysonia lescurii*, each fruit 4-6 mm long, 3-4 mm wide. Same site as Figure 1. Image taken 22 April 2017.

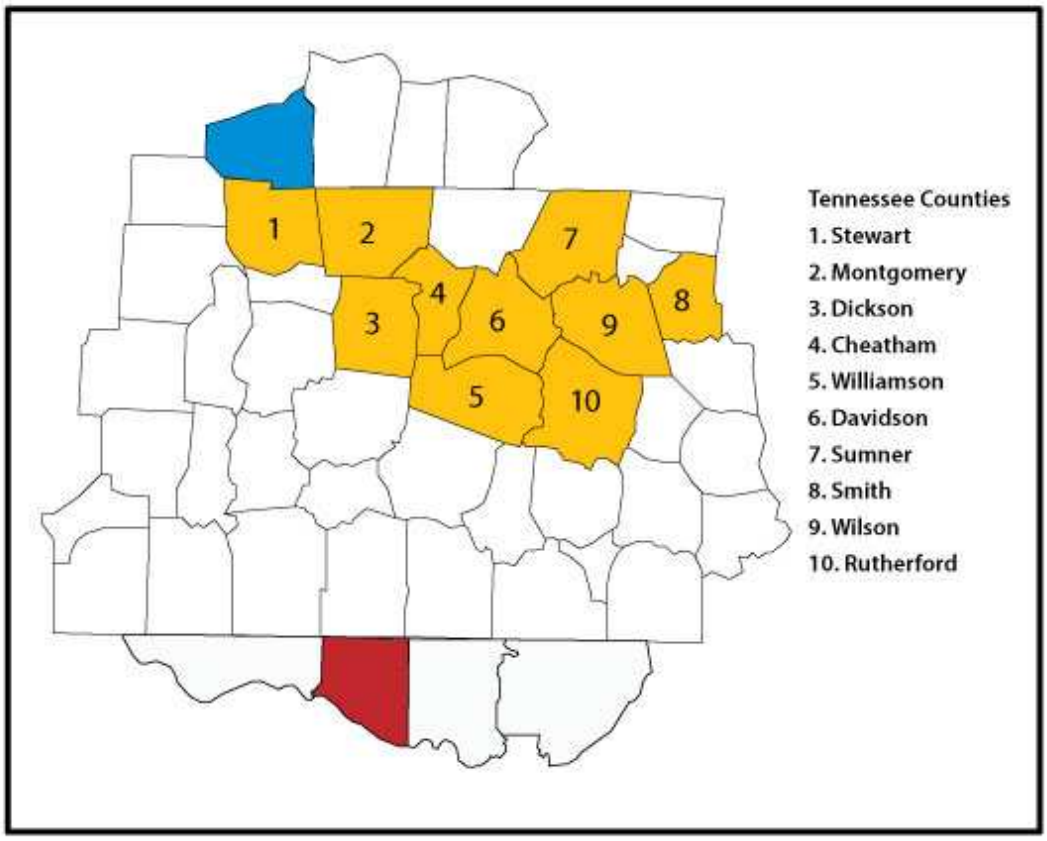

Figure 4. Known and reported county distribution of *Paysonia lescurii*. Blue = Trigg County, Kentucky (Historic, documented from one site); Orange = ten counties in Tennessee (documented from numerous sites); Red = Limestone County, Alabama (reported but not confirmed).