

NOTEWORTHY COLLECTION OF *CYPRIPEDIUM REGINAE*
(ORCHIDACEAE) IN TENNESSEE, U.S.A.

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ABSTRACT

A new population of *Cypripedium reginae* Walter was found in Lewis County, Tennessee. This marks its first occurrence in the Interior Low Plateau ecoregion and fifth occurrence in Tennessee.

RESUMEN

Se encontró una nueva población de *Cypripedium reginae* Walter en Lewis County, Tennessee. Esto marca su primera aparición en la ecoregión Interior Low Plateau y su quinta aparición en Tennessee.

KEY WORDS: showy lady's slipper, *Cypripedium reginae*

INTRODUCTION

While conducting fieldwork on 15 May 2017 in calcareous seepage fens of Lewis County, Tennessee, a new population of *Cypripedium reginae* Walter, the showy lady's slipper, was discovered (Fig. 1a, 1b). The white petals, inflated pink labellum, hirsute stem, and cauline leaves make *C. reginae* easy to distinguish from other *Cypripedium* species in the southeastern U.S. This new population is small and, upon revisiting the site on 30 May 2018, only nine stems were counted. During the May 2018 visit, the plants were past flowering and only one wilted flower was visible upon one of the stems. Upon discovery of the population in 2017 a full census was not conducted, but it is clear from a review of the photographs that there were at least five flowering stems total in the population. *Cypripedium reginae* has a G4G5 global rank and in Tennessee is state endangered with an S1 rank (NatureServe 2017; Crabtree 2016).

DISCUSSION

Distribution.—*Cypripedium reginae* primarily has a northern distribution that ranges from southeastern and south-central Canada into the Great Lakes region of the northern and northeastern U.S. Populations in the Ozark and Southern Appalachian regions are far disjunct from the primary range (Kennedy 2007). This population of *C. reginae* marks its first occurrence in the Interior Low Plateau ecoregion and its fifth occurrence in Tennessee (see Fig. 2). The closest population of this orchid is in Claiborne County, Tennessee (Ridge and Valley ecoregion), a disjunction of over 330 km. There are other populations in Claiborne County and one in Johnson County (Blue Ridge ecoregion). This Lewis County population also marks the southernmost known population globally. There is a historic record from a specimen that was collected in 1913 from Jackson County, North Carolina (USA. North Carolina. Jackson Co.: Cashiers Valley, 24 Jun 1913, Ashe, NCU), which would be the southernmost occurrence. However, there is some uncertainty surrounding the validity of the locality data and the specimen's nativity, largely because the acidic habitat of the area specified in the label is highly unlikely for *C. reginae* (W. Knapp, North Carolina Natural Heritage Program, 2018, pers. comm.). Though there are historical occurrences of this species in the Interior Low Plateau in Kentucky (Kartesz 2015), it is currently unknown in the state. One collection from the 1870s is not clear on whether the collection is from Edmonson



FIG. 1. (a) *Cypripedium reginae*, vegetative. (b) *C. reginae*, in flower. (c) Calcareous seepage fen; *C. reginae* occurs in the shaded margin denoted by the white "X".

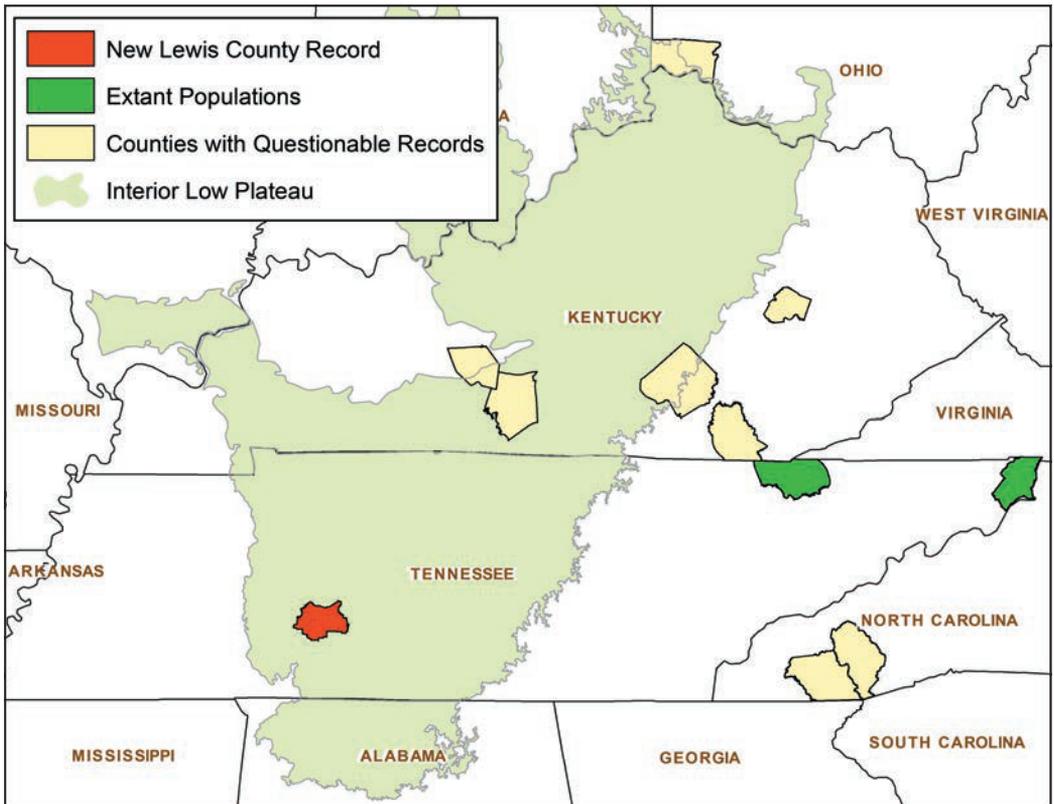


FIG. 2. Distribution of *Cypripedium reginae* populations by county. Questionable records are those where the locality or validity has been called into question either because they are unverified site observations or historic observations or because the locality or nativity is unlikely because of the habitat.

or Barren County. Further, it was collected as *Cypripedium spectabile* Sw. and the synonymy with *C. reginae* is uncertain. The Pulaski County record is based on unverified sight observations from the 1960s and 1970s (Campbell 2012).

Habitat.—Though *C. reginae* is a wetland species, its habitat varies greatly across its range from mossy conifer swamps in the north to woodland glades, stream edges, bluff seepages, and wet meadows (NatureServe 2017). This small Lewis County population grows in a tight cluster on the edge of a small limestone outcrop beneath a shrub canopy in a gently sloping calcareous seepage fen in the Western Highland Rim (Fig. 1c). This is similar to the other extant Tennessee populations that also occur in calcareous seeps. Like other seepage fens typical of the Western Highland Rim, it is relatively small in size (this particular one is roughly 150 m²) and embedded in an oak-hickory forest matrix. It is dominated by herbaceous plants and has shallow, gravelly soils on top of limestone bedrock. Much of the fen is in a gap in canopy cover, but the small cluster of *C. reginae* grows in the shrub-shaded margins of the fen.

This specific site is unique in that *C. reginae* co-occurs with other rare species, some of which are in the same fen and others that are in very close proximity. These include the federally endangered *Xyris tennesseensis* Kral, the formerly federally threatened *Helianthus egertii* Small, the state threatened *Marshallia trinervia* (Walt.) Trel., and two species which are listed as special concern in the state: *Parnassia grandifolia* DC. and *Juncus brachycephalus* (Engelm.) Buchenau (Crabtree 2016). Other associated herbaceous plants include *Carex torta* Boott ex Tuck., *C. hystericina* Muhl. ex Willd., *C. granularis* Muhl. ex Willd., *C. vulpinoidea* Michx., *C.*

laevivaginata (Kuk.) Mack., *C. atlantica* L.H. Bailey ssp. *atlantica*, *Juncus coriaceus* Mack., *Glyceria striata* (Lam.) Hitchc., *Oxypolis rigidior* (L.) Raf., *Rudbeckia palustris* Eggert ex C.L. Boynt. & Beadle, *Phlox glaberrima* L., *Spigelia marilandica* (L.) L., and *Chamaelirium luteum* (L.) A. Gray. Woody associates include *Asimina triloba* (L.) Dunal, *Alnus serrulata* (Aiton) Willd., *Lindera benzoin* (L.) Blume, *Amelanchier arborea* (F. Michx.) Fernald, and *Acer rubrum* L.

Biogeography.—This new population shares some associates with the Claiborne County, Tennessee, population, most notably *Parnassia grandifolia* DC., which has similar biogeographical patterns in the Southeast. The *P. grandifolia*-*C. reginae* association is also seen with populations in Shannon County, Missouri (Orzell-875, 1982, MO), a 350+ km disjunction, and another population on the Springfield Plateau in northern Arkansas, a 400+ km disjunction (Witsell 2008). Other species disjunct from Claiborne County and the surrounding region to Lewis County include *Carex interior* L.H. Bailey, *C. hystericina* Muhl. ex Willd., and *Symphyotrichum prenanthoides* (Muhl. ex Willd.) G.L. Nesom (Estes 2004). Like *C. reginae*, these species all have a primarily northern distribution with southeastern disjunctions. This pattern has been hypothesized to be the result of the retreat of northern species to southern refugia during Pleistocene glaciation (Gonzales et al. 2008; Hewitt 2000).

Ecology.—One unique aspect of the fen communities in the Western Highland Rim is that there are co-occurring rare species that have varying sensitivities to light. For instance, *Xyris tennesseensis* Kral, which is considered to be a heliophyte (Kral 1983; US Fish & Wildlife Service 1994), co-occurs with *P. grandifolia* DC., which is generally considered to be a shade-loving species. *Cypripedium reginae* is found in both full shade and full sun environments (Smith 1993) though some sources say the orchid is sensitive to prolonged shade (NatureServe Explorer 2017). This particular population of *C. reginae* is in a shaded margin of the fen. In Claiborne County, Tennessee, it also grows under light shade in the protection of shrubs and stunted trees on the margin of an open, herb/graminoid-dominated, sloping bedrock seep, similar to its position in this new Lewis County population (D. Estes, Southeastern Grasslands Initiative, 2018, pers. comm.). It may be that the light requirements in the southern populations differ from those in the north, but determining if there is a difference is difficult due to the paucity of populations.

Due to the charismatic nature of the *Cypripedium* genus and its susceptibility to poaching, the locality of this population has been reported to the Tennessee Department of Environment and Conservation's Natural Heritage Program. The biologists at the Division of Natural Areas of the Tennessee Department of Environment and Conservation conduct monitoring in the areas surrounding this occurrence, and future searches could be conducted as part of their continued monitoring, considering that appropriate habitat for *C. reginae* is abundant in the region.

Voucher specimen: U.S.A. Tennessee. Lewis Co.: [locality info withheld due to rarity], 15 May 2017, *Breeden 44-17* (APSC).

ACKNOWLEDGMENTS

I am grateful to Dwayne Estes for his ongoing assistance in my research that led to this discovery and Wes Knapp, Alan Weakley, Theo Witsell, Devin Rodgers, Tara Littlefield, Julian Campbell, Todd Crabtree for filling in some of the gaps on the distribution of this orchid. I would also like to thank Roger McCoy and Andrea Bishop at the Tennessee Natural Heritage Program for granting access to this location and Josh Kraft for looking into historic specimens. Kim Taylor, Marsha McLaughlin, and an anonymous reviewer provided helpful reviews.

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