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APHYLLON RIPARIUM (OROBANCHACEAE) IN ARIZONA

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ABSTRACT

Recent iNaturalist observations have shown *Aphyllon riparium* along the Verde River in northwest Arizona, a distance of about 300 air miles from the nearest known populations in northwest New Mexico. Additional observations and vouchers by the authors document the Arizona plants.

Plants of *Aphyllon riparium* (L.T. Collins) A.C. Schneid. (Orobanchaceae) were observed along the Verde River near Clarkdale, Arizona, by volunteers and instructors with the Verde River Institute as a part of their citizen science river monitoring and education program in 2022— photos were posted on iNaturalist (https://www.inaturalist.org/observations/130653465) (Figs. 1, 2, 3). Correspondence between the present authors lead to subsequent expeditions in search of the plant, resulting in new localities, additional photos, and collection of specimens. Over the next twelve months, approximately 20 photographs of the species were posted on iNaturalist by multiple observers along the Verde River in the vicinity of Clarkdale and Cottonwood, Arizona.

When *Aphyllon riparium* was first recognized (Collins 1973), it was believed to occur only in the Midwest along the Ohio, Wabash, and Platte Rivers. Further investigation led to an expanded range that extended into New Mexico and western Texas (Collins et al. 2009). The Verde River localities are about 300 air miles from the nearest known populations in northwest New Mexico. The Arizona plants are typical in morphology, host parasite relationship (parasitizing *Xanthium strumarium* L., Fig. 3), and ecological setting.

Voucher. **Arizona**. Yavapai Co.: Sand bar along the Verde River ca. 0.7 mi N of Clarksdale, parasitic on *Xanthium*, 28 Aug 2022, *Coburn 3120* (MO, ARIZ, ASU).

A sample for DNA analysis was taken from prepared herbarium specimens and processed by the second author. The results (Collins et al. 2023) matched six previously tested samples of *Aphyllon riparium* from across the range of the species, confirming the identity of the Arizona plants.

These new Arizona populations were found along the river on frequently flooded sandbars, floodplains, and terraces in silt and sand, primarily deposited by floods one year prior, which is the usual habitat for *Aphyllon riparium.* The Verde River Habitat is riparian deciduous forest with *Salix goodingii*, *Populus fremontii*, and *Baccharis salicifolia* and in ruderal vegetation (including *Xanthium strumarium* and *Amaranthus palmeri*) in scoured areas with frequent flood disturbance. The surrounding upland vegetation is Upper Sonoran or Lower Mogollon Transition desert scrub (Griffith et al. 2014). Most of the Verde River localities were observed in particularly dense stands of *Xanthium*, which was determined, by excavation, to be the *Aphyllon* host (Fig. 3). Other hosts are *Ambrosia trifida* in the Ohio River watershed and rarely *Dicoria canescens* in northwest New Mexico.

Aphyllon riparium is often misidentified as *A. ludovicianum* (Nutt.) A.C. Schneid. and was treated as such by Munz (1930), which has led to difficulty in their distinction. *Aphyllon ludovicianum* has rounded corolla lobes whereas *A. riparium* has distinctly pointed corolla lobes. Many state, regional and local floras continue to follow Munz's treatment, thus perpetuating the misinterpretation. Additionally, *A. riparium* utilizes primarily the annual hosts *Ambrosia trifida* and *X. strumarium* while *A. ludovicianum* utilizes perennial *Artemisia*, *Grindelia*, and *Heterotheca* species.

The first author suggested that *Aphyllon riparium* has evolved recently in the moist environment of riparian habitats along midwestern rivers (Collins 1973). The occurrence of the species along the Rio Grande and now the Verde River indicate instead that it evolved in riparian environments in parallel with multiple other *Aphyllon* species in the arid and semiarid environments of western North America. *Aphyllon riparium* adapted to mesic environments and annual host species, in contrast to the remainder of species in sect. *Nothaphyllon* that seem to exclusively parasitize perennial hosts. Based on the work of Schneider & Moore (2017), it seems more likely that the eastern populations *A. riparium* developed from windblown and water born seeds (or possibly birds) carried eastward to central USA.

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Figure 1. *Aphyllon riparium* in illustrating the inflorescence and corolla morphology and color.

Figure 2. Mature *Aphyllon riparium* in situ with host *Xanthium strumarium*.

Figure 3. Excavated *Aphyllon riparium* with host *Xanthium strumarium*.