

First record of the crystal darter (*Crystallaria asprella*) from Big River, Missouri, since 1963

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Abstract: *The capture of a crystal darter Crystallaria asprella, a state endangered species in Missouri, from the main stem of Big River (Meramec River drainage) in August 2009 represented the first documentation of the species in nearly 50 years from Big River, Jefferson County, and only the second record ever reported from this river.*

Key Words: *Big River, Crystal darter, Crystallaria asprella, Meramec River, Missouri, rare species*

The crystal darter *Crystallaria asprella* is among the most visually distinct darters with a forked caudal fin, four dorsal saddles, slightly translucent appearance in life, and maximum size exceeding 100 mm (Page 1983, Etnier and Starnes 1993). Although aspects of its biology are poorly known, the species is thought to require largely silt-free sand and small gravel substrates in which it may bury itself during the day, with increased nocturnal feeding activity in more shallow riffle habitats (Pflieger 1997, Boschung and Mayden 2004). *Crystallaria asprella* has been collected at depths of up to 3 m in the open channels of medium to large sized rivers with low to moderate gradients. Due to these habits and habitat preferences, it appears sensitive to human disturbances including siltation, impoundments, and pollution, all of which have likely reduced its distribution and abundance over the last 100 years (Grandmaison et al. 2003).

Crystallaria asprella is listed as endangered by the Missouri Department of Conservation, with a critically imperiled state ranking (S1) because of extreme rarity or other factors making it especially vulnerable to extirpation from the state (Missouri Natural Heritage Program 2011). Overall, *C. asprella* has a localized and rare global distribution (G3, vulnerable), and is a state species of special concern throughout most of its range, but it is not listed as a federally endangered species (Grandmaison et al. 2003, IUCN 2010). Historically, *C. asprella* occurred from Minnesota east to Ohio and south from Florida to Oklahoma (Page 1983, Grandmaison et al. 2003), but it has not been collected since the early 1900's in Indiana, Ohio, Illinois, Kentucky, and Tennessee and is considered extirpated in these states (Hatch 1998). Today it occurs discontinuously in

streams of the Mississippi River basin and Gulf Slope drainages in the southeastern United States. Although probably never common throughout most its range, the overall population of *C. asprella* appears to have declined, yet the status of many individual populations remains uncertain (Grandmaison et al. 2003).

In Missouri, *C. asprella* historically occurred in the Gasconade, Meramec, Black, St. Francis, and Little River drainage systems, although the species had never been commonly encountered or abundant in any collections from Missouri (Pflieger 1997). Based upon a lack of Missouri Department of Conservation (MDC) records since 1979, Pflieger (1997) listed its continued presence in the Meramec River drainage as “in doubt.” However, targeted sampling efforts over the past decade by state and university personnel have yielded specimens from a 60 km reach of the lower Meramec River (MDC and J.M. Ray, unpublished data). The record reported herein is approximately 13 river km from the nearest historical collection locality in the main stem Meramec River (MDC, unpublished data). By confirming the presence of *C. asprella* in the Big River (the major tributary to the Meramec River), Jefferson County, the distribution of the species in Missouri is expanded.

Despite two basin wide surveys (Mills et al. 1978, Meneau 1997), the only previously reported capture of *C. asprella* from Big River was of a single specimen collected approximately 20 km upstream of the mouth in 1963 (Pflieger 1975). However, based upon the distribution of historic collections over the past five decades, there has been a conspicuous lack of sampling effort in the lower reaches of main stem Big River. For example, Mills et al. (1978) captured more than 76,000 specimens representing 82 species from 90 collections (37 stations), but only sampled four locales from the lower 44 river km of the system. Meneau (1997) documented 61 species from the basin and reported a total of 100 species from Big River in compiling all previous collection records. However, only five localities from the lower main stem of Big River were included in these efforts.

Sampling occurred 15 August 2009 from 1000–1200 at a locality 8 river km above the mouth of Big River, 2.6 km NE Hoene Spring, Jefferson County, Missouri (38.468928° latitude, –90.604759° longitude), an area characterized as the

lower basin, a sixth-order stream reach with lower gradient (Meneau 1997). The channel width was approximately 35 m with limited riparian zone cover due to both rural dwellings and agricultural fields in the flood plain. Urbanization is rapidly increasing in the lower basin of Big River (Meneau 1997). The microhabitat of the capture was characterized as a moderately strong flowing run (no quantitative measure taken) immediately below a riffle, 45 cm depth, with a substrate composed of approximately equal parts gravel and clay. George et al. (1996) noted that the species does not normally associate with mud, clay or submerged vegetation. Low water conditions likely contributed to the capture; average discharge on the day of capture was 131 cfs, which ranked below the 50th percentile for August, historically the month of lowest discharge for Big River (U.S. Geological Survey 2011). After capture by seine, the specimen was measured, photo-vouchered (Figure 1), and released due to harvest restrictions on state endangered species. The specimen measured 123 mm SL (145 mm TL), suggesting an age of at least 2 y (Pflieger 1997) and was observed to have a limited amount of black spot parasite infestation. Based primarily upon shape characteristics of the anal fin, the specimen was determined to be a male in non-reproductive form (George 1993). Physical vouchers for eight other species were retained in the sampling effort and accessioned into the University of North Alabama-Florence Zoological collection (#301).

Although *C. asprella* has been collected using traditional collecting techniques (regular seines, backpack electrofishers) in the last decade, a newer gear type, the mini-Missouri trawl has added additional records of *C. asprella* from habitats that were previously not able to be sampled due to excessive depth or current velocity (Herzog et al. 2005). Hatch (1998) suggested that *C. asprella* occupies habitats that are not effectively sampled with standard sampling gear, which results in more conservative estimates of population size. Following Schmidt (1995), it is recommended that future sampling using various

gear types should occur in both historical stream reaches and areas containing suitable habitats from which *C. asprella* has not been previously collected to update the distribution of this species in Missouri.

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Figure 1. Photo Voucher of *C. asprella*.



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