

AN EXTENSION OF THE DISTRIBUTION RECORD FOR *DICRANOPSELAPHUS VARIEGATUS* (COLEOPTERA: PSEPHENIDAE) FROM TENNESSEE

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ABSTRACT—Four specimens of *Dicranopselaphus variegatus*, found in a Nashville Basin stream, represent four of five known larval specimens reported from Tennessee. Specimens were collected during qualitative benthic surveys in Puckett Creek, Rutherford County, Tennessee as part of a larger study of culvert replacement. The project was funded by the Tennessee Department of Transportation.

Barr and Spangler (1994) reported *Alabameubria starki* Brown (1980) to be the junior synonym of *Dicranopselaphus* Guerin-Meneville (1861) *variegatus* Horn (1880). Prior to 1994, *Alabameubria* had been designated from specimens collected in Alabama and Tennessee; *Dicranopselaphus*' range was considered Illinois eastward to Maryland and New York (Brown, 1980; Pennington, 1985; Brown, 1991). As a result of Barr and Spangler's efforts, the distribution of *Dicranopselaphus variegatus*, an extremely rare species, presently includes the eastern United States; from New York to Alabama (Barr and Spangler, 1994; Merritt and Cummins, 1996; Shepard, 2002).

Published accounts validating site-specific collections of *Dicranopselaphus* or *Alabameubria* in the eastern United States have been few. In Alabama, one larval specimen was collected from Murphy Creek, Blount County, during June 1973, one larval specimen from Paint Rock River, Jackson County, in August 1978, a larval specimen from a tributary of Big Canoe Creek, St. Clair County, in April 1981, three larval and five adult specimens from the junction of Mill Creek and a Murphy Creek tributary in Blount County during May 1988, and one larval specimen from Mill Creek, Blount County, during May 1988 (Brown, 1980; Pennington, 1985; Barr and Spangler, 1994). A single specimen was collected from the West Fork of the Obey River, Overton County, Tennessee, a fourth order Cumberland Plateau stream within the Obey River Watershed of the Cumberland River Drainage, in May 1980 (Pennington, 1985).

We report the collection of four larval *Dicranopselaphus variegatus* specimens from Puckett Creek, Rutherford County, Tennessee; a second order stream of the Nashville Basin Physiographic Province within the Stones River Watershed of the Cumberland River Drainage (Etnier, 1993). Puckett Creek originates as Armstrong Branch, which flows under State Route 99 near Overall, Tennessee. Puckett Creek in turn flows into the West Fork of the Stones River. The portion of Puckett Creek within which the four specimens were collected is located where State Route 96 (Franklin Road) crosses the stream (Lat. N 36°10'39.396", Long. W 82°44'37.03').

Qualitative sampling of Puckett Creek's benthic communities began July 2000 and continued until April 2002, during which time *Dicranopselaphus* specimens were inadvertently collected using a standard D-frame kick net (500-micron mesh).

Puckett Creek was one of several Tennessee streams in which benthic surveys were conducted as part of a Tennessee Technological University research project funded by the Tennessee Department of Transportation to investigate short-term impacts of bridge/culvert construction activities on benthic macroinvertebrate communities (Malone, 2004). Construction activity consisted of replacing a bridge with a five-barrel culvert for the purpose of converting State Route 96 into a four-lane highway.

Dicranopselaphus specimens were collected in two of three Puckett Creek study reaches located upstream and downstream of construction activity. A 100-m recovery reach and a 100-m impact reach, separated by a 50-m buffer, were located downstream, with the impact reach beginning immediately downstream of construction. A 100-m control reach was located 50-m upstream of the construction area. Three *Dicranopselaphus* specimens were collected from the recovery reach; the first specimen on 15 August 2000, and the other two specimens on 10 January 2001. A fourth specimen was collected within the control reach on 18 May 2001. Exact collection locations within each reach were not observed since specimens were not discovered until benthic samples were processed, as was the case with Pennington's specimen (Pennington, 1985).

Dicranopselaphus larvae are aquatic, feed on algae and/or detritus, and tend to cling to the substratum in areas of reduced flows where silt accumulates (Pennington, 1985; Brown, 1991; Shepard, 2002). Additionally, mature *Dicranopselaphus* larvae on the verge of pupation can be found on dry substratum at stream edges (Barr and Spangler, 1994). Puckett Creek provided such ecological requirements, as it typically approached seasonal intermittence and was conducive to algal growth. Such productive sluggish waters are characteristic of low gradient limestone bedrock streams in the Nashville Basin (Etnier, 1993). *Dicranopselaphus* larvae in Puckett Creek's control and recovery reaches likely spend most of their lives attached to limestone bedrock and associated algae. Algal mats perhaps provide refugia as well as food sources for *Dicranopselaphus* larvae.

The control reach averaged 4.1-m wide and 0.13-m deep. A narrow riparian zone separated the right stream bank from a private residence, while land on the left bank was mostly wooded. Substrate was dominated by limestone bedrock; however, a mixture of organic fines and gravel characterized pool tail-outs and low gradient riffles.

Puckett Creek's recovery reach averaged 5.1-m wide and 0.11-m deep. The right stream bank was wooded, while the left bank consisted of a narrow riparian zone. Substrate was dominated by limestone bedrock, and contained trenches ranging from 0.05-m to 0.8-m deep and 0.3-m to 0.5-m wide. The West Fork of the Obey River was 0.6-m deep at the location where Pennington's *Dicranopselaphus* specimen was collected (Pennington, 1985). Therefore, trench depth in Puckett Creek's recovery reach could provide habitat of reduced flow for *Dicranopselaphus* larvae (vertical sides of limestone trenches and/or cobble and gravel within trenches).

Dicranopselaphus larvae are typically taken singly (Merritt and Cummins, 1996). This was the case in Puckett Creek, except two specimens were collected in the recovery reach 10 January 2001. However, *Dicranopselaphus* specimens were collected on two occasions in the recovery reach over the course of the investigation, versus a single collection in the control reach. Trench depth and a wider stream channel (more surface area of substrate, direct sunlight exposure, and increased algal growth) downstream of the culvert provided *Dicranopselaphus* larvae with more suitable habitat in the recovery reach when compared with the control reach.

Significant increases in percent fines, unusually high turbidity, removal of riparian vegetation, and increased algal growth were all factors influencing macroinvertebrate responses downstream of Puckett Creek's culvert. However, spring spates returned downstream substrate to pre-construction conditions by April 2002. *Dicranopselaphus*' arbitrary distribution and adaptability to living in areas of silt and reduced flows, Puckett Creek's natural productivity, and short-term nature of observed stream habitat changes suggest that culvert construction did not influence *Dicranopselaphus variegatus* populations in Puckett Creek.

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