

Trichoclinocera (Diptera: Empididae): a new aquatic dance fly record for Missouri

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Abstract: We report first record of the occurrence of the aquatic empidid genus *Trichoclinocera* Collin in Missouri based upon aquatic macroinvertebrate samples collected during March 2016 from two riffles in East Fork of the Black River in Reynolds County in the Ozark Highlands. Substrate characteristics and notes on habitat from where larval specimens of *Trichoclinocera* were collected are also provided.

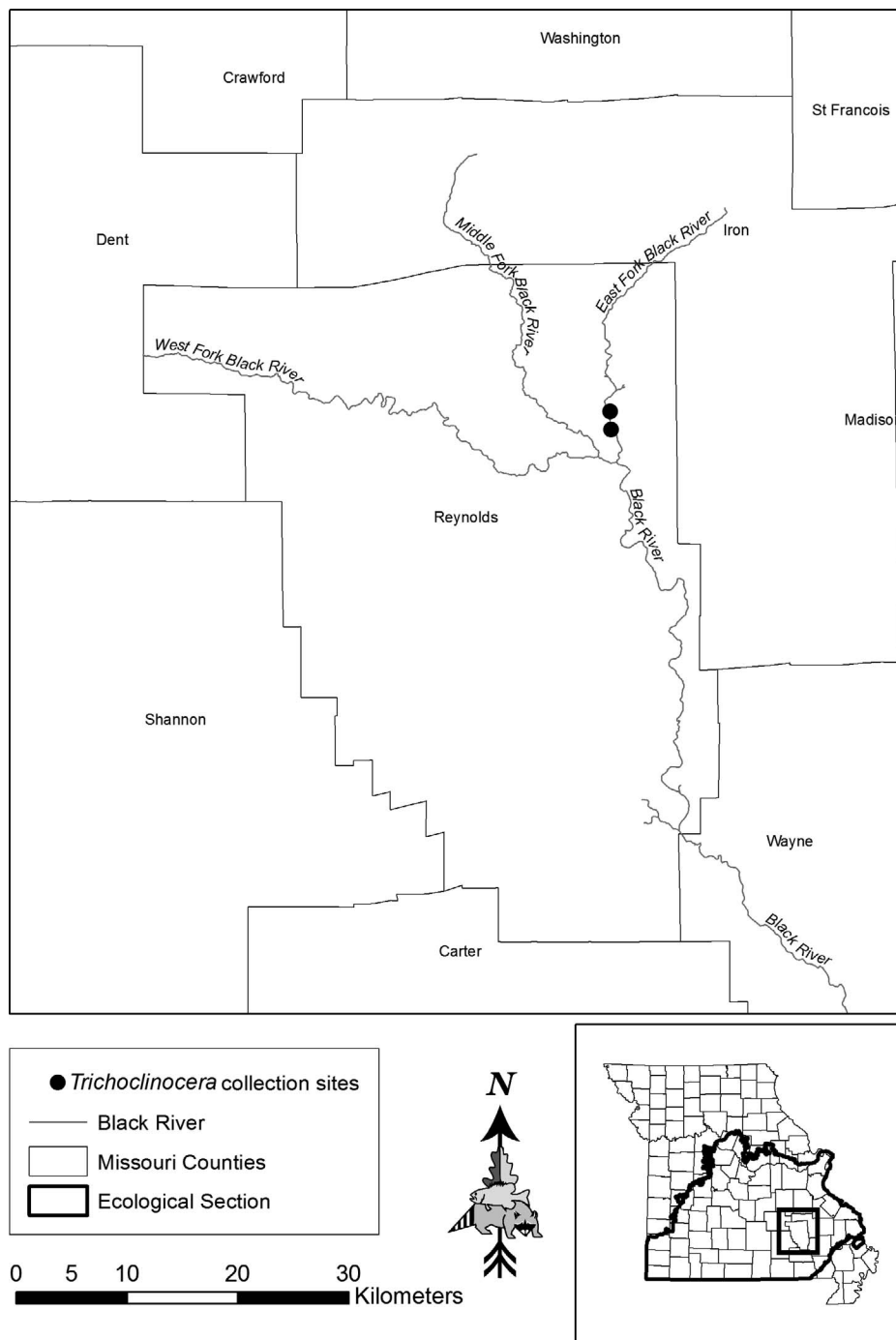
Key words: Missouri, Ozark Highlands, streams, Empididae, *Trichoclinocera*

The Empididae (dance flies) genus *Trichoclinocera* Collin is represented by 40 recognized species worldwide of which 16 occur in the Nearctic Region with six species – *T. agilis* Sinclair, *T. cummingsi* Sinclair, *T. fumosa* (Vaillant), *T. hamifera* (Melander), *T. minor* (Melander), and *T. ozarkensis* Sinclair reported to occur in some states bordering Missouri (Sinclair 1994; Saigusa and Sinclair 2016). However, there is no published documentation of *Trichoclinocera* occurring in Missouri. We identified larval specimens of *Trichoclinocera* in macroinvertebrate community samples collected from plastic mesh bags placed in riffles in East Fork of the Black River (EFBR) downstream from Lower Taum Sauk Reservoir. EFBR is a 4th order stream in Reynolds County in the Ozark Highlands Ecological Section of Missouri (Cleland et al. 1997; Nigh and Schroeder 2002) (Fig. 1). The plastic mesh bags were placed in riffles downstream from the Lower Taum Sauk Reservoir Dam as part of a larger project to assess potential change in macroinvertebrate communities if small substrates were augmented in the channel downstream from the dam. The mesh bags were 460 mm long by 230 mm wide, and of two

different mesh sizes (small 9.5 mm mesh and large 12.7 mm mesh). We sieved dry substrate from a gravel bar upstream of the reservoir into 4–8 mm, 8–16 mm, 16–32 mm, and 32–45.3 mm size groups and placed equal proportions of all four substrate size groups in the small mesh bags. Large mesh bags received equal proportions of only the three larger substrate size groups. Five gravel-filled bags of each mesh size were placed in five riffles located 0.08, 0.7, 1.3, 2.2, and 3.8 km downstream from the reservoir dam. The gravel-filled mesh bags were deployed within the five riffles in EFBR for 34 days prior to retrieval on 22 March 2016 to allow time for macroinvertebrate community colonization.

Contents of each gravel-filled mesh bag was preserved in 10% formalin solution upon collection, transported to the laboratory, rinsed with tap water, and subsampled and processed according to methods outlined by MDNR (2012). Macroinvertebrate specimens sorted from each subsample were transferred to 80% ethanol and viewed with use of a dissection microscope at magnifications up to 80x to determine taxonomic identities of specimens collected. Taxonomic keys and descriptive information provided in Sinclair (1994) and Courtney and Merritt (2008) were used to identify the larval specimens of *Trichoclinocera* we collected. Diagnostic characteristics used in identification of *Trichoclinocera* larvae include the absence of posterior spiracles on the body, absence of lateral setae on the abdomen, absence of a brushy protuberance on the last thoracic segment, the number and degree of development of prolegs (creeping welts), and presence of a pair of dorsolateral lobes and median lobe of the terminal abdominal segment (Sinclair 1994; Sinclair and Harkrider 2004; Courtney and Merritt 2008). Mature larvae of *Trichoclinocera* can be distinguished from those of morpho-

Figure 1. Location of riffles in East Fork of the Black River in Missouri where larval *Trichoclinocera* were collected from gravel-filled mesh bags during 22 March 2016.



logically similar Empididae (i.e., *Clinocera* Meigen) by the distinctly forked apex of the median lobe of the terminal abdominal segment (Sinclair 1994).

The two larval specimens of *Trichoclinocera* we found in material collected from EFBR are not identified beyond genus because descriptions of species within the genus are based upon

adult characteristics and the species currently cannot be distinguished based on larvae or pupae. However, the species is possibly *T. ozarkensis* based on proximity of EFBR to Arkansas and Illinois locality records for adults of *T. ozarkensis* provided by Sinclair (1994). The larval specimens of *Trichoclinocera* are retained in collections at the Missouri Department of Conserva-

tion, Central Region Office and Conservation Research Center, Columbia, Missouri, and the Canadian National Collection of Insects, Ottawa, Ontario, Canada.

The *Trichoclinocera* larvae we found were only in two small mesh bags in two riffles at 2.2 and 3.8 km downstream from the dam. Watershed area of reaches with riffles where we collected larval *Trichoclinocera* are 230.3 km² and 238.3 km². Average discharge of EFBR was 1.4 m³/s (1.2–1.6 m³/s), water temperature 10.0 °C (9.6–10.5 °C), dissolved oxygen concentration 9.5 ppm (8.4–10.3 ppm), conductivity 110 µS/cm² (104–115 µS/cm²), pH 7.4 (pH 7.2–7.6), and turbidity 3.9 NTU (3.5–5.9 NTU) during 22 March 2016 (summarized from data provided courtesy of U. S. Geological Survey 2017, stream gage 07061290, accessed 25 July 2017 from USGS on-line database, <https://waterdata.usgs.gov/mo/nwis>).

After processing macroinvertebrates from each gravel-filled mesh bag, we sieved contents from each bag into 10 substrate size categories. On average the bags where larval *Trichoclinocera* were found contained 20.3% of substrate particles 31.5 mm or larger, 17.2% 22.4–31.5 mm, 14.3% 16.0–22.4 mm, 14.2% 11.2–16.0 mm, 12.0% 8.0–11.2 mm, 12.1% 5.6–8.0 mm, 7.1% 4.0–5.6 mm, 2.1% 2.8–4.0 mm, 0.2% 2.0–2.8 mm, and 0.5% 0.1–2.0 mm. Larvae of some dance fly genera are associated with both lotic erosional and depositional and lentic littoral habitats (Courtney and Merritt 2008), but the genus *Trichoclinocera* is restricted to lotic habitats with rocky substrates (Sinclair 1994). Although the sieved substrate in bags we deployed in riffles in EFBR would not be the same as native substrate of the riffles, this agrees with our collection of larval *Trichoclinocera* from gravel-filled mesh bags.

The Empididae in general are considered facultative regarding tolerance to environmental stress and can be found in pristine to moderately disturbed environments, but are found in abundance most often in moderately disturbed environments (Voshell 2002). It is interesting we found larval *Trichoclinocera* only in bags deployed in riffles furthest downstream from the dam. Riffles closer to the dam were noted impaired by the Missouri Department of Natural Resources and listed on the 303(d) List of Impaired Waters in 2016 (MDNR 2016). Perhaps riffles greater than 1.3 km downstream of the dam have recovered to a moderately disturbed state.

This report represents first documentation of occurrence of *Trichoclinocera* in Missouri and adds to knowledge of the diversity of empidid fauna inhabiting streams in the state. This report also contributes to knowledge of the habitat of *Trichoclinocera* in North America. Additional macroinvertebrate sampling in streams combined with rearing and association of *Trichoclinocera* larvae and pupae to adults through collections and molecular techniques will add to knowledge of the taxonomy, distribution, habitat, and autecology of *Trichoclinocera* species.

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