

New State Records and Habitat Characteristics for *Kloosia* Kruseman (Diptera: Chironomidae) from Wadeable Streams in Missouri

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Abstract: First records of occurrence of the midge genus *Kloosia* Kruseman in Missouri are reported based upon aquatic macroinvertebrate community samples collected during April 2012 and October 2015 from reaches of Grindstone Creek in DeKalb County and South Blackbird Creek in Schuyler County in the Central Dissected Till Plains. Select physical and water quality characteristics from the reaches are also provided.

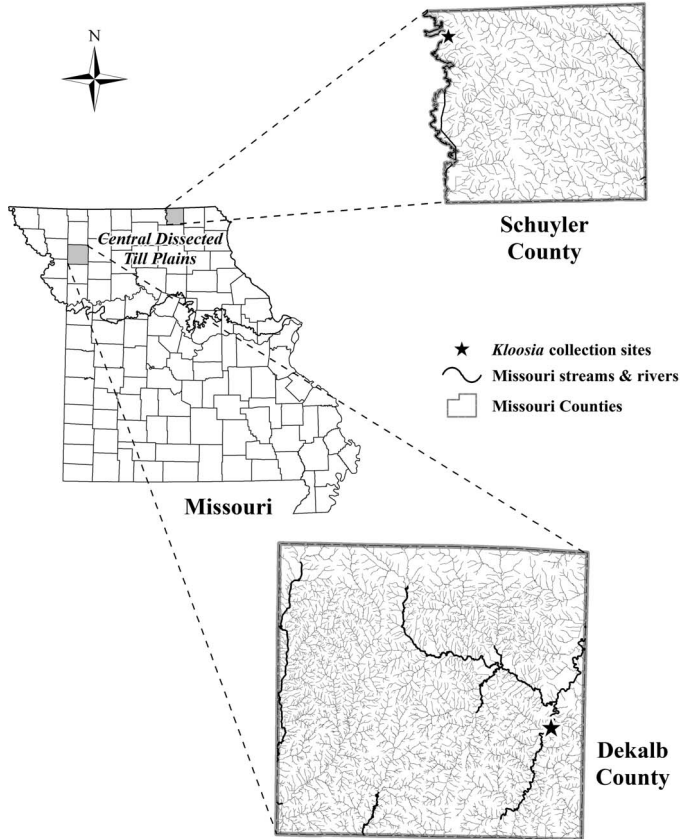
Key words: Missouri, wadeable streams, Chironomidae, *Kloosia*

The chironomid genus *Kloosia* (Kruseman, 1933) occurs in the Holarctic, Afrotropical, and Oriental regions (Epler et al. 2013) and is represented worldwide by four recognized species—*Kloosia pusilla* Linnaeus in the Palearctic Region (Fauna Europaea 2017, accessed 9 February 2017 from the Fauna Europaea on-line database, <http://www.faunaeur.org>), *K. africana* Reiss in the Afrotropical Region (Reiss 1988), *K. koreana* Reiss in the Oriental Region (Reiss 1988) and Japan (Kobayashi 2007), and *K. cf. dorsenna* (originally described as *Oschia dorsenna* by Sæther 1983) in the Nearctic Region (Epler 2001). Researchers have reported *Kloosia* to occur as far north as Lake Superior (Stroom et al. 2003) and Ohio (Bolton 2012) to as far south as North Carolina and South Carolina (Hudson et al. 1990; Caldwell et al. 1997; Epler 2001) and as far west as Kansas (Ferrington et al. 2008) in the USA. We identified larval specimens of *Kloosia* from macroinvertebrate samples collected during 11 April 2012 and 6 October 2015,

respectively, from Grindstone Creek (GC) in DeKalb County and South Blackbird Creek (SBC) in Schuyler County in the Central Dissected Till Plains Ecological Section of Missouri (Cleland et al. 1997; Nigh and Schroeder 2002) (Fig. 1). The macroinvertebrate community samples were collected from GC and SBC using 500 µm mesh aquatic kick nets in riffle, pool, and submerged rootmat habitats according to methods outlined by Sarver et al. (2002). We also sampled woody debris habitat at SBC by brushing submerged surfaces of woody debris into a 500 µm mesh bag according to methods outlined by Sarver et al. (2002).

Chironomid larvae and pupae were mounted on glass-slides and examined with a compound light microscope. Taxonomic keys and descriptive information provided in Epler (2001), Ferrington et al. (2008), and Andersen et al. (2013) were used to identify the specimens. *Kloosia* is a member of the *Harnischia* group. Larvae can be distinguished from those of morphologically similar taxa by the small, SI setae being much smaller than the blade-like SII; a six segmented antennae; a premandible with three apical teeth; a mandible lacking dorsal spine and dorsal tooth; mandibular seta interna present; a mentum with six pairs of lateral teeth; ventromental plates rounded with short striae not reaching the anterior margin; large claws on the anterior parapods; a body with segments appearing subdivided; anal setae short, but slightly longer than supraanal setae; and lacking a procerus (for full description see Epler et al. 2013). The larval specimens of *Kloosia* collected are retained in reference collections at the Missouri Department of Conservation, Central Region Office

Figure 1. Location of the reaches of Grindstone Creek and South Blackbird Creek where larvae of *Kloosia* were collected in Missouri, respectively, during 11 April 2012 and 6 October 2015.



and Conservation Research Center, Columbia, Missouri, and at the Missouri Department of Natural Resources, Environmental Services Program, Aquatic Bioassessment Unit Laboratory, Jefferson City, Missouri.

Researchers have reported *Kloosia* to occur in both lotic (Hudson et al. 1990; Caldwell et al. 1997; Epler 2001) and lentic (Stroom et al. 2003) habitats in North America, and larvae of this genus are considered psammophilic, being generally associated with sandy bottoms of clear, flowing

streams and fine substrates of large rivers (Mustow et al. 1997; Epler 2001; Bij De Vaate et al. 2007; Ferrington et al. 2008; Epler et al. 2013). The five larval specimens of *Kloosia* collected from GC were found in a riffle habitat sample, whereas a single larval specimen of *Kloosia* collected from SBC was found in a pool (depositional) habitat sample.

Grindstone Creek and SBC are both 3rd order, wadeable streams. Watershed area of the reach sampled at GC is 168.35 km² and watershed area of the reach sampled at SBC is 55.10 km². Discharge was 0.65 m³/s at GC and 0.03 m³/s at SBC. Although the same set of environmental parameters were not measured at GC that were measured at SBC, mean wetted-width of the reach sampled at SBC was 6.14 m and mean depth was 19.6 cm. The dominant substrate at SBC was sand with 77.1 % of particles being 0.06-2.0 mm. Riparian corridor of the reach sampled at SBC was 91% canopy, mid-story, and ground cover present on both sides of the stream. Select water quality characteristics from the reaches of GC and SBC where we collected larval specimens of this midge are presented in Table 1.

This report represents first documentation of the occurrence of *Kloosia* in Missouri and adds to knowledge of the diversity of midge fauna inhabiting wadeable streams in the state. This report also contributes to knowledge of the habitat of *Kloosia* in North America. In addition, because a tolerance value is not available for *Kloosia* (e.g., see Ferrington et al. 2008) for application in derivation of aquatic macroinvertebrate index of biotic integrity used in bio-monitoring and assessment of streams, this report also adds to baseline information on environmental parameters associated with the larval stage in the life-cycle of *Kloosia*. Additional sampling of streams will likely increase knowledge about the occurrence, distribution, and habitat of *Kloosia*.

Acknowledgements

Ken Lister, Seth Lanning, Christopher Fisher, and Will Morton assisted with sample collection and processing. Adriane Podgursky and Logan Philpott also assisted with sample processing. Margie Mitchell prepared the map for the manuscript.

Table 1. Select water quality characteristics from the reaches of Grindstone Creek (GC) and South Blackbird Creek (SBC) where larval *Kloosia* were collected, respectively, on 11 April 2012 and 6 October 2015. Temp = water temperature (°C), DO = dissolved oxygen (ppm), Cond = conductivity (µS/cm), pH = standard units (pH), Turb = turbidity (NTU), TP = total phosphorus (µg/L), TN = total nitrogen (mg/L), NO = nitrate-nitrite (mg/L), NH = ammonia (mg/L), NVSS = nonvolatile suspended solids (mg/L), VSS = volatile suspended solids (mg/L), Chlor = total chlorophyll (µg/L). Dashed lines indicate no data was collected.

Stream	Temp	DO	Cond	pH	Turb	TP	TN	NO	NH	NVSS	VSS	Chlor
GC	11.0	—	403	7.8	41.2	260	2.09	1.48	0.10	—	—	—
SBC	23.8	7.56	570	7.9	50.3	69	1.48	0.30	0.11	18.2	4.1	7.8

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