

***NEOSTEMPELLINA REISSI* CALDWELL, 2000 (DIPTERA: CHIRONOMIDAE): A NEW MISSOURI STATE RECORD¹**

Samuel B. McCord², Heather A. Garrison³, Brandy S. Bergthold⁴,
William R. Mabee^{5,*} and John H. Epler⁶

ABSTRACT: We report the first recorded occurrences of the midge *Neostempellina reissi* Caldwell 2000 in Missouri, USA based upon aquatic macroinvertebrate community samples collected during March and September 2022, March 2023 and March 2024 from wadable streams in the Ozark Highlands. Basic physical, physicochemical, and water quality characteristics from the collection sites are provided.

KEY WORDS: Missouri, Wadeable streams, Ozark Highlands, Chironomidae, *Neostempellina reissi*

INTRODUCTION

The chironomid tribe Tanytarsini is represented by one informally described genus (Tanytarsini Genus A Ekrem, 2013) and fifteen described genera, including *Neostempellina* in the Nearctic Region (Pino et al. 2009; Epler et al. 2013; Epler 2014; Lin et al. 2018). The genus *Neostempellina* is represented worldwide by six recognized species: *N. thienemanni* Reiss in Europe (Reiss, 1984), *N. pilosa* Reiss in Turkey (Reiss 1987), *N. abnormis* (Lehmann) in Africa (Ekrem and Reiss 1999), *N. quaternaria* Guo et Wang in Inner Mongolia in northern China (Guo and Wang 2004), *N. reissi* Caldwell in the Nearctic Region (Caldwell 2000; Caldwell et al. 2010), and *N. simantoneoa* Sasa, Suzuki et Sakai in Japan and far eastern Russia (Orel 2023). *Neostempellina reissi* has been recorded from several states in the USA including Alabama, Florida, Maine, New York, North Carolina, Ohio, Pennsylvania, South Carolina, and Wisconsin (Caldwell 2000; Epler 2001, 2014; Caldwell et al. 2010; Bolton 2012; Eagan and Ferrington 2019). *Neostempellina* larvae are often found in tubules composed of fine grains of sand (Bohdan Bilyj pers. comm. 2025) and are known from habitats associated with cold springs, streams and rivers (Epler 2014). Our records represent the first documentation on occurrences of *N. reissi* in Missouri and basic physical, physicochemical, and water quality characteristics of the collection sites.

MATERIALS AND METHODS

Aquatic macroinvertebrate communities were sampled from segments of Wadeable streams as part of Missouri Department of Conservation and Missouri Department of Natural Resources stream biomonitoring and assessment programs. The samples were collected during March and September 2022, March 2023 and March 2024 with 500 µm mesh rectangular frame and D-frame aquatic kick nets in riffles (flowing water over coarse substrate), pool (depositional), and root mat (submerged, exposed, fibrous roots) habitats according to methods outlined by Sarver et al. (2002) and by MDNR (2012). The samples were preserved in the field in 10% formalin solution, rinsed in tap water in the laboratory, and chironomid larvae and pupae were sorted from the samples into

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² 629 Shawn Drive, Jefferson City, Missouri 65109, USA

³ Missouri Department of Conservation, St. Louis Region Office, St. Charles, Missouri 63304, USA

⁴ Missouri Department of Natural Resources, Jefferson City, Missouri 65109, USA

⁵ Missouri Department of Conservation, Central Region Office and Conservation Research Center, Columbia, Missouri 65201, USA

⁶ 461 Tiger Hammock Road., Crawfordville, Florida 32327, USA

* Corresponding author email = william.mabee@mdc.mo.gov

80 % ethanol, mounted in CMCP-10 mounting medium on glass-slides, covered with glass coverslips pinned with paper clips, dried, and examined with a compound light microscope. We based our identifications of larval specimens of *N. reissi* collected from the sites on taxonomic keys and descriptive information provided by Epler (2001, 2014), Caldwell et al. (2010), and Epler et al. (2013). Reference specimens of larval *N. reissi* collected are retained in collections of slide mounted chironomids at the Missouri Department of Conservation, Central Region Office and Conservation Research Center, Columbia, Missouri, USA and at the Missouri Department of Natural Resources, Bioassessment Laboratory, Jefferson City, Missouri, USA. Basic physicochemical and water quality parameters were measured at the collection sites using water quality meters with a calibrated sensor for each parameter and by collection of water samples in precleaned containers and subsequent processing in the laboratory.

RESULTS

The stream sites where larval *N. reissi* were collected are Rockhouse Hollow Creek (RHC), Universal Transverse Mercator (UTM) Easting: 580511, UTM Northing: 4087061 in Douglas County, sampled during 22 March 2022 (n = 4); an unnamed tributary to North Fork of the White River (NFR), UTM Easting: 575524, UTM Northing: 4096008 in Douglas County, sampled during 22 March 2022 (n = 21); Brushy Creek (BC), UTM Easting: 585801, UTM Northing: 4090642 in Howell County, sampled during 22 March 2022 (n = 3); an unnamed tributary to Bates Creek (BaC), UTM Easting: 692307, UTM Northing: 4195082 in Washington County, sampled during 19 September 2022 (n = 1); Bourbeuse River (BR), UTM Easting: 624388, UTM Northing: 4223062 in Phelps County, sampled during 29 September 2022 (n = 1); Big Paddy Creek (BPC), UTM Easting: 583876, UTM Northing: 4156934 in Texas County, sampled during 03 March 2023 (n = 1); Eleven Point River site 1 (EPR-1), UTM Easting: 654421, UTM Northing: 4070318 in Oregon County, sampled during 13 March 2024 (n = 1); and Eleven Point River site 2 (EPR-2), UTM Easting: 631479, UTM Northing: 4071974 in Oregon County, sampled during 13 March 2024 (n = 2). These streams ranged in classification from headwater to large rivers. All the sites where larval *N. reissi* were collected are within the Ozark Highlands Ecological Section of Missouri (Cleland et al. 1997; Nigh and Schroeder 2002) (Figure 1).

Site Descriptions: Watershed areas of the stream segments sampled at RHC, NFR, BC, BaC, BR, BPC, EPR-1 and EPR-2 are, respectively, 3.22 km², 2.89 km², 4.03 km², 5.19 km², 216.3 km², 47.8 km², 1,114.33 km² and 518.84 km². Discharge at RHC, NFR, BC, BaC, BR, BPC, EPR-1 and EPR-2 was, respectively, 3.703 m³/s, 0.875 m³/s, 3.216 m³/s, 0.003 m³/s, 0.024 m³/s, 11.60 m³/s, 101.536 m³/s and 2.599 m³/s when sampled.

The mean wetted width of the stream segment sampled at BaC was 0.397 m, the mean depth was 20.3 cm, and the dominant substrate was coarse gravel with 31.4 % of the particles being 16-64 mm in diameter when sampled. The riparian corridor of the segment sampled at BaC had 68.6 % vegetated cover in the canopy, 72.0 % in mid-canopy, and 70.9 % vegetated groundcover present on both sides of the stream. These environmental parameters were not measured at RHC, NFR, BC, BR, BPC, EPR-1, and EPR-2. Basic physicochemical and water quality characteristics from the segments of RHC, NFR, BC, BaC, BR, BPC, EPR-1, and EPR-2 where larval specimens of *N. reissi* were collected are presented in Table 1.

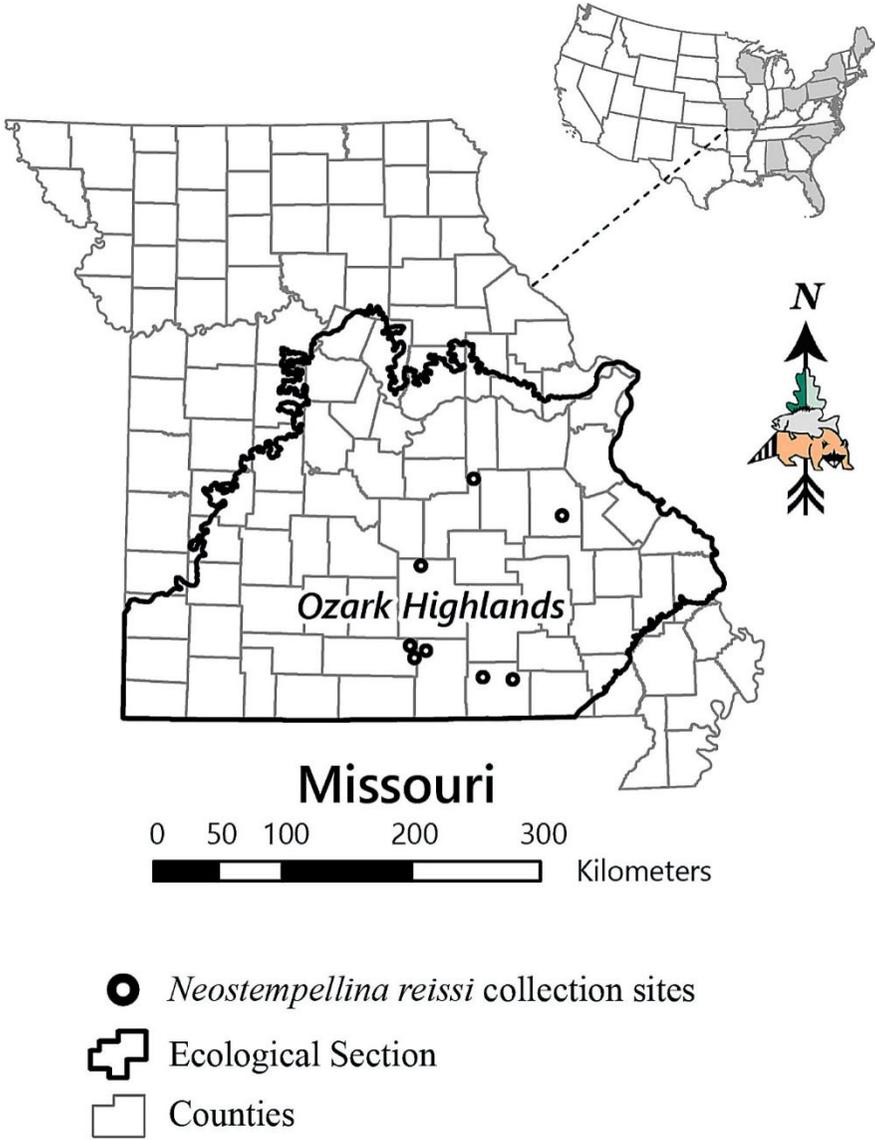


Figure 1. States (shaded grey) in the USA with records for *Neostempellina reissi* and locations where larval *N. reissi* were collected in Missouri during years 2022, 2023, and 2024.

DISCUSSION

A total of 34 larval specimens of *N. reissi* were found in Missouri from wadeable segments of streams located within the Ozark Highlands Ecological Section. In general, these streams have gravel dominated substrates and are of higher gradient relative to streams in other ecological sections of Missouri. The cool water temperatures, low total phosphorus, nitrogen, and suspended solids concentrations of the sites where larval *N. reissi* were collected reflect the high quality of the stream segments when sampled.

Table 1. Basic physicochemical and water quality characteristics from the stream segments of Rockhouse Hollow Creek (**RHC**), an unnamed tributary to North Fork of the White River (**NFR**), Brushy Creek (**BC**), Bates Creek (**BaC**), Bourbeuse River (**BR**), Big Paddy Creek (**BPC**), Eleven Point River site 1 (**EPR-1**), and Eleven Point River site 2 (**EPR-2**) where larval *Neostempellina reissi* were collected on 22 March 2022 (RHC, NFR, and BC), 19 September 2022 (BaC), 29 September 2022 (BR), 30 March 2023 (BPC), and 13 March 2024 (EPR-1 and EPR-2). **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 (inorganic) suspended solids (mg/L), **VSS** = volatile (organic) suspended solids (mg/L), **TSS** = total 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	TSS	Chlor
RHC	10.9	10.4	202	7.8	25.0	6	0.14	0.02	<0.02	-----	-----	<5.0	-----
NFR	12.2	10.5	179	7.8	4.6	<5	0.10	0.06	<0.02	-----	-----	<5.0	-----
BC	10.9	10.5	54	7.1	16.0	<5	0.22	0.09	<0.02	-----	-----	<5.0	-----
BaC	20.2	6.1	380	8.5	0.03	7	0.14	0.02	0.01	2.8	1.3	4.1	0.7
BR	19.3	6.9	402	7.4	1.5	22	0.31	0.01	<0.02	-----	-----	<5.0	-----
BPC	9.7	10.8	157	7.5	<1.0	<5	0.11	0.04	<0.02	-----	-----	<5.0	-----
EPR-1	15.8	11.7	341	8.1	<1.0	17	0.68	0.64	<0.02	-----	-----	<5.0	-----
EPR-2	17.5	11.1	313	7.5	1.6	13	0.48	0.41	<0.02	-----	-----	<5.0	-----

Larvae of *N. reissi* were previously classified as *Stempellina* sp. C (e.g., see Epler 2001; Bolton 2012) and some specimens of *N. reissi* may have been labeled *Stempellina* in earlier collections in Missouri. Regardless, this report provides the first documentation on occurrences of *N. reissi* in Missouri and adds to knowledge of the diversity of midge fauna inhabiting wadeable streams in the state. This report also adds to knowledge of the distribution and habitat of *N. reissi* in the Nearctic Region. Additional macroinvertebrate community sampling in clean, cool, wadeable streams within karst areas like the Ozark Highlands should add to knowledge of the distribution, habitat, and autecology of *N. reissi*.

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