

# Geographical range and morphological diversity of the brown small minnow mayfly, *Baetis brunneicolor* (Insecta: Ephemeroptera: Baetidae)

S. Schipper<sup>1</sup>, J. Fang<sup>2</sup> & Luke M. Jacobus<sup>1</sup>

<sup>1</sup>Div. Science, Indiana University Purdue University Columbus, 4601 Central Ave., Columbus, Indiana 47203, USA; lmjacobu@iupuc.edu

<sup>2</sup>Environmental Monitoring and Data Management, Restoration & Infrastructure, Toronto and Region Conservation Authority  
5 Shoreham Dr., Toronto, Ontario M3N 1S4, Canada

## ABSTRACT

*Baetis brunneicolor*, also known as the brown small minnow mayfly, is a species found throughout central and eastern North America, but it is only sparsely represented in the western and far northern parts of the continent. Historically, it has not been found north or west of the prairie provinces of Canada. New data from the Yukon Territory extend its range considerably to the northwest. *Baetis brunneicolor* is part of the *B. vernus* group, which also includes *B. hudsonicus* and *B. bundyae* in North America. Although the *B. vernus* group globally may contain several morphologically cryptic but molecularly distinct taxa, *B. brunneicolor* currently appears to be a monophyletic taxon that is distinct using both lines of evidence. Morphological variability, primarily restricted to color differences, appears to be consistent across its range. The species is identifiable as both a nymph and as a male adult. This makes it one of only a few *Baetis* species that can be studied with some confidence in North America.

## Introduction

The small minnow mayflies, family Baetidae, are a morphological diverse group of aquatic insects found in a wide variety of freshwater habitats around the world (Barber-James et al. 2008). The small minnow mayfly genus *Baetis* Leach, 1815 contains 19 accepted species in North America north of Mexico (McCafferty & Jacobus 2016). One of these is *Baetis brunneicolor* McDunnough 1925. *Baetis brunneicolor* is part of the *B. vernus* group, which also includes *B. hudsonicus* and *B. bundyae* in North America. Although the *B. vernus* group may contain several morphologically cryptic but molecularly distinct taxa (Stahls & Savolainen 2008), *B. brunneicolor* currently appears to be a monophyletic taxon that is distinct using both lines of evidence (Webb et al. 2012). It also is identifiable as both a nymph (e.g., Wiersema et al. 2004) and as a male adult (e.g., Traver 1935). This makes it one of a few *Baetis* species that can be studied with some confidence in North America

## Morphological Diagnoses

Larvae have middle gills (Fig. 4) with smooth margins (Fig. 2) that are not of the elongate type (in contrast to *B. hudsonicus* and *B. bundyae*), with lengths that are less than two times their widths; labial palp with distinct medial projection, with inner margin of segment 2 concave (Fig. 3); labrum wider than it is long; markings on prothorax variable (Fig. 1); abdominal terga usually with color patterns very similar to one another, often with thin pale median longitudinal line and faint pair of pale sublateral markings (Fig. 4); scapes, pedicels and paraprocts with at most, only fine setae and scales (never robust setae). Male adults have forceps segment 2 conical in the proximal portion, inner margin with basal tubercle (though sometimes poorly developed?), forceps segment 2 usually with constriction (most visible on dorsal aspect); abdominal terga 2-6 dark brown with no reddish markings on posterior margins, contrasting with lighter colored sterna; mesonotum with distinct pale streaks anterior of bases of forewings; forewing length 5mm or more.

## Geographic Range

The species previously has been known from Nova Scotia (Peterson, 1989), south to South Carolina (McCafferty et al. 2010), and west to Colorado, Idaho (McCafferty et al. 2012) and Saskatchewan (McCafferty and Randolph, 1998). Based on these and other historical data, the species has not been found north or west of the prairie provinces of Canada.

## Materials & Methods

A biological inventory was conducted in Carmacks, situated 179 km north of Whitehorse, Yukon Territory. The Village of Carmacks is located at the confluence of the Yukon River and the Nordenskiöld River. It lies at the edge of Beringia, which stretches from the central Yukon to eastern Siberia. Aquatic insects were amongst other groups of flora and fauna collected within the 72-hour inventory period. Most specimens were collected with 500 micron D-frame nets. A few larger specimens were obtained from the seine nets while fish specimens were being collected. Additional, comparative materials were examined at the Purdue Entomological Research Collection.

## New Data

Larvae (n=5) (see Figs 1-4), Yukon Terr., Tatchun Creek, Near Lake, 62° 17' 13.56"N, 136° 14' 13.56"W, June 25, 2016, deposited in Royal Ontario Museum Collection. This record in the Yukon is significant in that it extends the known range of this species into the northwestern (far north) region of North America.



Figure 1.

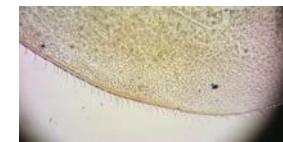


Figure 2.



Figure 3.



Figure 4.

## Acknowledgments

This study was funded in part by a 2016 IUPUC Office of Student Research Grant to SS. The biological inventory was conducted as an activity of the Biological Survey of Canada, of which JF & LMJ are members.

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