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### The Banded-wing *Moselia infuscata* (Claassen) Phenotype from California and Oregon, U.S.A. (Plecoptera: Leuctridae)

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#### Abstract

*Moselia* specimens from California and Oregon with a banded-wing phenotype were found to be indistinguishable morphologically from those of *M. infuscata* (Claassen) with typical wing pigment pattern. Preliminary DNA barcode data (Cytochrome c Oxidase subunit I [COI]), however, show significant genetic variation among four populations including three from northern California sites and one from southern Oregon. Although this genetic variation exceeded standard divergence thresholds often used to recognize distinct stream insect species, no new taxa are proposed at this time due to the preliminary nature of the data.

*Moselia infuscata* (Claassen 1923) was originally described from Seattle, Washington based on adult male and female specimens. Ricker (1943) placed the species in his new subgenus *Moselia*, which was raised to generic status by Illies (1966). The species has been reported from British Columbia to California and Nevada (Ricker 1943, Jewett 1959, Needham and Claassen 1925, Stark *et al.* 1998, Stewart and Oswood 2006), and adult terminalia have been illustrated by Needham and Claassen (1925), Jewett (1959), Kondratieff and Lechleitner (2002), and Stewart and Oswood (2006).

Larvae of *M. infuscata* often inhabit small seeps (Stewart & Stark 2002), small creeks (Ricker 1943), and tributaries of high altitude lakes. Adults are active depending on altitude from April until early August. Little biological information is available for this species (Muchow and Richardson 2000, Stewart and Stark 2002), but based on the abundance of adults and the rarity of larvae, we presume it to be hyporheic.

Claassen (1923) described the wings of adult *M. infuscata* as “infuscated”, no doubt the origin of the specific epithet. Ricker (1943) stated “both wings lightly infuscated with brown, creamy white along most of the costal margin,” and Stark *et al.* (1998) noted that “adults are unusual leuctrids in having white patches of pigment on the wing margins” (Fig. 1). An interesting aspect of this species, in addition to the white patches on the forewing margin, is a phenotype from Oregon that has distinctly banded wings (Fig. 2); however, examination of the male terminalia of specimens from these populations with banded wings indicated no apparent differences with specimens from “typical populations”.

There are nine DNA barcode records for expertly identified *Moselia* specimens on the Barcode of Life Database (BOLD; Ratnasingham and Hebert 2007; <http://www.barcodinglife.com>), including one of the banded phenotype from Split Rock Creek, Jackson County, Oregon. To generate these DNA barcodes, a 658 base pair region of the mitochondrial gene COI is sequenced (Hebert *et al.* 2003a). These sequences are then compared. For stream insects, specimens with very similar barcodes (ca. <2–3% divergent) are usually considered to be the same species and those with very different barcodes (ca. >2–3% divergent) are usually considered as different species (Hebert *et al.* 2003b, Zhou *et al.* 2009, 2010, Sweeney *et al.* 2011). We note that evidence for somewhat higher levels of intraspecific divergence within some Plecoptera species (generally ca. 3–6%) seems to be accumulating in the literature (select taxa in: Zhou *et al.* 2009, 2010, Sweeney *et al.* 2011, Avelino-Capistrano *et al.* 2014; Mynott *et al.* 2011, Elbrecht *et al.* 2014). The nine *Moselia* specimens on the BOLD database have been grouped into four BINs based on similarity (genetic distance; Table 1) by BOLD’s refined single linkage clustering algorithm (RESL). This algorithm delimits putative species and places them in BINs based on its ability to identify gaps between clusters of presumably conspecific individuals (Ratnasingham and Hebert 2013).

2♂, 2♀ (CSUC); Oregon: Jackson Co., Sheep Creek, NFD 22 Rd, 10.5 mi S Talent, 22 May 2014, B. C. Kondratieff, B. P. Stark, J. C. Sandberg & C. Verdone, N42.11254, W122.7858, 4♀ (CSUC); Jim Creek, NFD 22 Rd, 11.1 mi S Talent, 22 May 2014, B. C. Kondratieff, B. P. Stark, J. C. Sandberg & C. Verdone, N42.10609, W122.7874, 4♂, 2♀ (CSUC); Split Rock Creek, Wagner Creek Rd, 12.4 mi S Talent, 22 May 2014, B. C. Kondratieff, B. P. Stark, J. C. Sandberg & C. Verdone, N42.17018, W122.784174, 6♀ (CSUC); Wagner Creek, Wagner Creek Rd, 5.9 mi S Talent, 22 May 2014, B. C. Kondratieff, B. P. Stark, J. C. Sandberg & C. Verdone, N42.17018, W122.784174, 9♂, 5♀ (CSUC); McDonald Creek, NFD 22 Rd, 22 May 2014, B. C. Kondratieff, B. P. Stark, J. C. Sandberg & C. Verdone, 1♂ (CSUC).

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