TRANSACTIONS OF THE AMERICAN ENTOMOLOGICAL SOCIETY VOLUME 137, NUMBERS 1+2: 11-14, 2011

A New Genus and Species of Small Minnow Mayflies (Ephemeroptera: Baetidae) from Far Northern North America

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ABSTRACT

A newly discovered larva of Baetidae (Insecta, Ephemeroptera) is described from Nunavut, Canada as *Kirmaushenkreena zarankoae*, n. gen. and n. sp. The new taxon has a unique combination of generic characteristics, including unusual claw armature that is diagnostic. Closest relatives of the new genus may possibly be in the *Indobaetis* complex of genera. The absence of a villopore sets the new species apart from other far northern North American baetine species, and other differences and convergent similarities such as claw setation and gill dimensions among that fauna are discussed.

INTRODUCTION

A larval specimen of the mayfly family Baetidae was taken in August of 2010 from considerable depth in Baker Lake in the far northern province of Nunavut, Canada. [Relatively few mayfly species are known from Nunavut, (see McCafferty and Randolph 1998, Randolph and McCafferty 2001, Giberson et al. 2007).] Characterization of the specimen made it unidentifiable and unworkable in any keys to Baetidae genera in North America or elsewhere in the world. The specimen did not have gill and claw characteristics that define the often lentic genus *Callibaetis* Eaton, and among non *Callibaetis* baetids, it did not demonstrate labial, claw or gill characteristics that would place it in *Cloeon* Leach or *Cloeon* cognates sometimes known as the subfamily Cloeoninae. Among remaining possibilities, it did not belong to the very common *Baetis* complex of genera (a large number of genera worldwide that possess a femoral villopore). It possibly was related to the so-called *Indobaetis* complex of genera and especially the relatively variable, Eastern Hemisphere genus *Nigrobaetis* Novikova and Kluge. Its particular combination of generic characteristics and unique claw armature, however, indicated that it was a new genus and species as follows.

Kirmaushenkreena, new genus

Type species: *Kirmaushenkreena zarankoae* McCafferty, n. sp.

Larva.— Head and thorax not compressed laterally. Frons with very slight elongate surface convexity between antennal bases (but no interantennal keel). Prostheca of planate mandible reduced to single, undivided bristle (Fig. 2). Dorsal face of glossa with few internal setal bases evident (Fig. 3). Labial palp broadly and symmetrically pointed apically (Fig. 3). Femoral villopore absent (Fig. 4). Forefemur with outer apical lobe well developed and strongly wrapping inner apex (Fig. 4). Claws with two well-developed rows of denticles (outer row with distal half of denticles greatly enlarged) (Fig. 5). Claws with pair of preapical hairlike setae (Fig. 5). Hindwingpads present. Gills 1 (seven pairs) present. Gills elongate-oval, slightly over twice as long as wide. Paraproct without prolongation (Fig. 6). Median caudal filament well developed.

Adult.— Unknown.

Etymology.— The generic nomen is an anagram

of an amalgamation of the given names of my children, and thus is in honor of Kirk McCafferty, Maureen Smallidge and Shena George.

Species included.— *K. zarankoae* McCafferty, n. sp.

Distribution.— Far northern North America in the province of Nunavut, Canada.

Discussion.— As stated above, *Kirmaushenkreena* may be related to the baetine but non-*Baetis* complex genus *Nigrobaetis*. Characteristics that *Kirmaushenkreena* has in common with *Nigrobaetis* include the absence of a villopore, a non-compressed body shape, glossae with few dorsal setae (some *Nigrobaetis*), hindwingpads present (in most *Nigrobaetis*), Gill 1 present (in most *Nigrobaetis*), and a paraproct without a prolongation. The prostheca of the planate mandible tends to be normal with a thick base and rakelike apex in most *Nigrobaetis*, and those with a reduced prostheca have a double bristlelike or featherlike prostheca rather than the single, undivided form found in *Kirmaushenkreena* (Fig. 2).

Significantly, no *Nigrobaetis* or other *Indobaetis* complex genera (see Waltz et al. 1994) are known to have a pair of preapical setae on the claws as described above for *Kirmaushenkreena*, but such a pair is seen, for example, in the *Baetis* complex genera *Baetiella* Ueno, *Liebebiella* Waltz and McCafferty (see Waltz and McCafferty 1987a), and some *Acentrella* Bengtsson and *Baetis* Leach. Also, no *Nigrobaetis* or other *Indobaetis* complex genera have two rows of denticles as described for *Kirmaushenkreena*. In fact, no other known genera of Baetidae have the exact type of claw dentation as *Kirmaushenkreena*, although very disparate baetid genera, for example, *Iswaeon* McCafferty and Webb in North America (see McCafferty et al. 2005) and *Chopralla* Waltz and McCafferty in the Orient (see Waltz and McCafferty 1987b), have other forms of claws with double rows of denticles (not including those genera with double rows of basal spinules or microdenticles or with elongate spines).

Waltz et al. (1994) gave *Nigrobaetis* generic status, restricted its concept from that of Novikova and Kluge (1994), and compared it with four other probably related genera of the *Indobaetis* complex: *Alainites* Waltz and McCafferty, *Diphetor* Waltz and McCafferty, *Indobaetis* Müller-Liebenau and Morihara, and *Takobia* Novikova and Kluge (see also Waltz and McCafferty 1997, Lugo-Ortiz and de Moor 2000). Waltz et al. (1994) indicated, however, that the phylogenetic relationships of *Nigrobaetis* were not yet fully known. The same can be said for *Kirmaushenkreena*.

Kirmaushenkreena zarankoae, new species

Larva.— Middle instar body length 4.8 mm. Cerci length 3.2 mm. Median caudal filament 3.0 mm. Body light cream with no markings discernible (markings may has disappeared in original formalin fluid preservative.) Denticles of mandibular incisors fused as in Figs. 1 and 2. Mola of planate mandible consisting of dense field of short triangular spines (Fig. 2). Maxillary palp reaching tip of galealacinia. Labial palp with medio-subapical lobe relatively well developed (Fig. 3). Femora with relatively dense row of short spinelike setae along outer edge (Fig. 4). Similar row of spinelike setae along inner edge of tarsi (shorter spinelike setae in multiple rows along inner edge of tibiae) (Fig. 4). Gills near oval, without apparent tracheation. Gill 7 not pointed. Paraproct shape and serrations as in Fig. 6.

Adult.— Unknown.

Material.— HOLOTYPE: Larva, NUNAVUT, Canada, Baker Lake, 9.9m grab, UTM: NAD83 14W 0640822 7213432, 20-VIII-2010, J. Fang, T. Thomson, D Cote-Latrielle; whole body in fluid, some parts dissected and slide-mounted in euparol on three slides, deposited in the Purdue Entomological Research Collection.

Etymology.— This species is named after Danuta Zaranko, of Nobleton, Ontario, who originally brought the specimen to my attention.

Discussion.— With the discovery of *K. zarankoae*, the recent discovery of the lentic *Waynokiops dentatogriphus* Hill, Pfeiffer and Jacobus, and the dearth of larval specimens of the lentic *Cloeon dipterum* (L.), it is becoming clear that lentic habitats have been undersampled with respect to mayflies in North America. The remoteness of the area and the depth at which *K. zarankoae* was taken also help explain why this unusual mayfly genus was not discovered until very recently.

Without accounting for the villopore presence or absence (absent in *K. zarankoae* and present in all others discussed below), some other far northern North American baetines may be compared with *K. zarankoae* in terms of convergent similarities and differences. As per most far northern baetine larvae, the gills of *K. zarankoae* are elongate, to about the extent seen in far northern *Acentrella* (e.g., see Morihara and McCafferty 1979, Fig. 13f) and the far northern species *Baetis foemina* McDunnough (see Morihara and McCafferty 1979, Fig. 18e), but not to the extreme extent found in *Baetis hudsonicus* Ide or *B. bundyae* Lehmkuhl (e.g., see Lehmkuhl 1973, Fig. 5). Gill elongation may possibly be a convergent adaptation for life in the northern tundra (perhaps a swimming function in the mainly lentic habitats).

The outer femoral row of setae (Fig. 4) and the presence of a pair of preapical setae on the claws in *K. zarankoae* are similar to that seen in *Acentrella feropagus* Alba-Tercedor and McCafferty [Morihara and McCafferty (1979, Figs. 13c,d) as *B. lapponicus* (Bengtsson)], and *B. foemina* and *A. lapponica* larvae also possess a pair of preapical claw setae. The latter three species (e.g., see Müller-Liebenau 1970, Fig. 46), however, differ from *K. zarankoae* with respect to such things as essential mouthpart morphology and most obviously by their lack of a developed medium caudal filament. The highly elongated gills, the non-reduced prostheca of the planate mandible, the less dense outer femoral row of setae, and the lack of preapical claw setae and double row of denticles in *B. bundyae* and *B. hudsonicus* could all be used to distinguish them from *K. zarankoae*, without regard to the villopore.

ACKNOWLEDGMENTS

First, I thank Arwin Provonsha for line drawings. In addition to Danuta Zaranko (see etymology of the new species name), Ryan Vanengen of Agnico-Eagle and the sampling team of Jessica Fang, Tom Thomson and Daquin Cote-Latrielle are acknowledged for their contributions to the discovery of the new genus and species.

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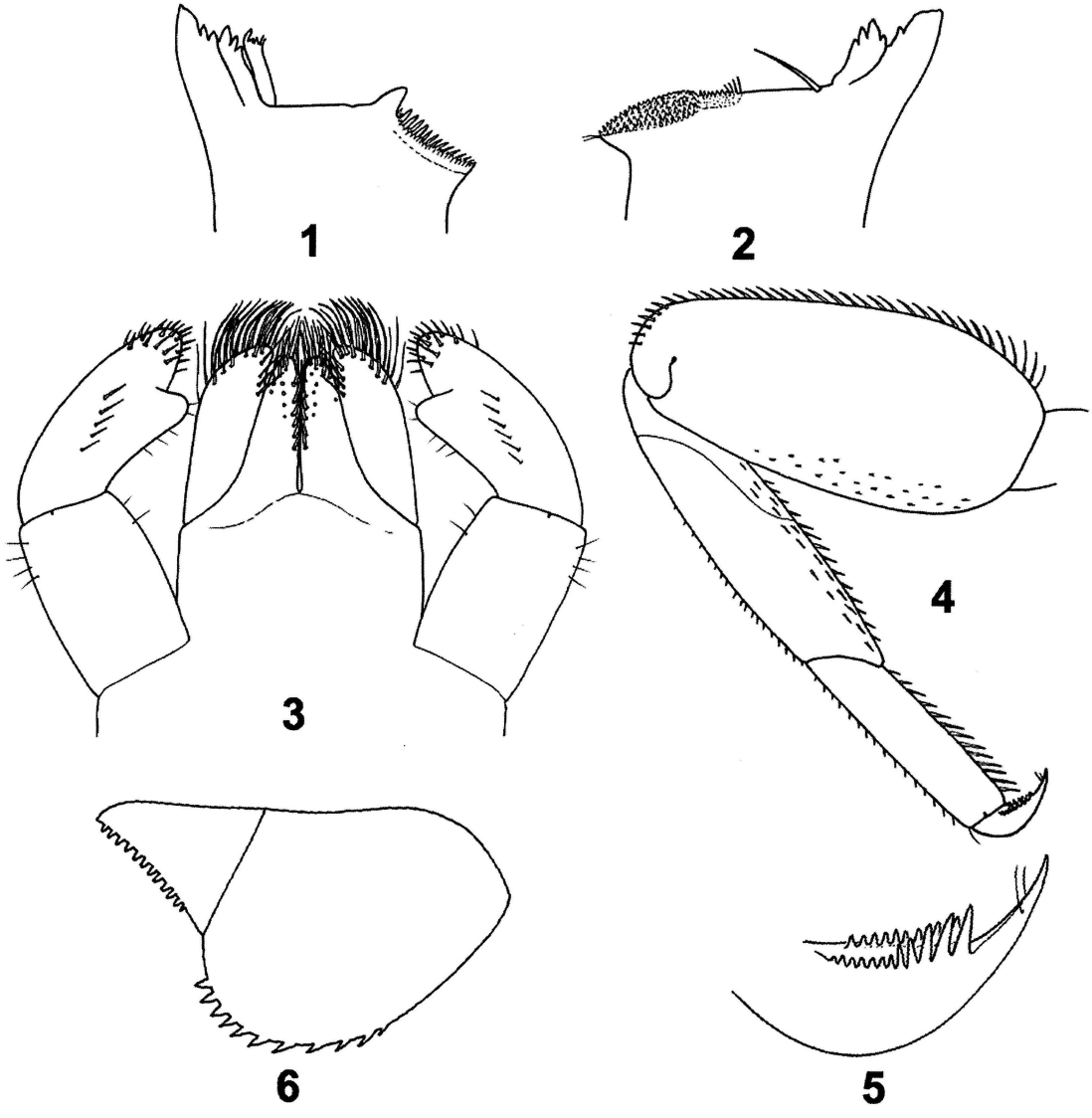

Figs. 1-6. *Kirmaushenkreena zarankoae* larva. 1. Angulate mandible. 2. Planate mandible. 3. Labium. 4. Foreleg. 5. Foreclaw. 6. Paraproct.