

First record of *Prosimulium ursinum* (Diptera: Simuliidae) in Northeast Greenland

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Abstract

A single female of *Prosimulium ursinum* (Edwards, 1935) (Diptera: Simuliidae) was recorded in Zackenberg Valley, Northeast Greenland, in a Malaise trap catch. In Greenland, this species has hitherto only been recorded from eastern Greenland, about 580 km south of the present finding. Identification of the species and relationships between closely related species are discussed.

Dansk sammendrag

En enkelt hun af kvægmyggen *Prosimulium ursinum* (Edwards, 1935) blev i sommeren 2009 taget i i en Malaise-fælde i Zackenbergdalen, Nordøstgrønland, hvor forfatteren G.V. arbejdede med snyltehvepses parasitering af sommerfugle. I Grønland er arten hidtil kun fundet på Bløseville Kyst, ca. 580 km syd for Zackenberg. Bestemmelsen af arten og dens taxonomiske relationer til nærstående arter diskuteres. Arten er en 'sibling species' (består af en række småarter), der tilsammen har arktisk circumpolær udbredelse. Der kendes kun parthenogenetiske (jomfrufødende) hunner, hvis munddele er funktionsløse, og den voksne tager ikke næring til sig.

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Introduction

In April 1935, F. W. Edwards (1935a) reported a new black fly species, *Simulium* (*Prosimulium*) *ursinum*, from eastern Greenland (Cape Dalton, 'none further south than 68° N' [map: 69°25'N] and Lake Fjord, 66°17'N [map: Lake Fjord/Tugtilik]). However, since he did not provide a formal description, the name constituted a *nomen nudum*. In May 1935, when Edwards (1935b) published a formal description for this species based on nine pupae (English River) and several larvae (Salmon River) from Bear Island (Bjørnøya), Norway, 74°30', *Simulium* (*Prosimulium*) *ursinum* became an available name (Peterson 1970). The genus *Prosimulium* Roubaud was originally treated as a subgenus of *Simulium* Latreille, and later elevated to genus by Malloch (1914). Nomenclature in this paper follows Adler and Crosskey (2010).

The currently recognized distribution of *Prosimulium* (*Prosimulium*) *ursinum* (complex) includes Norway (Bear Island, mainland), Canada (British Columbia, Labrador, Nunavut incl. Baffin and Southampton Islands, Northwest Territories, Quebec and Yukon), Finland (northern part, biological provinces Ks [Kuusamo], Li [Inari Lapland] and Le [Enontekiö Lapland]), Greenland, Iceland, Russia (Karelian Republic and Murmansk



Figure 1. A view of the Zackenberg Valley in July 2009. Photo: Gergely Várkonyi.

Region), Sweden and USA (Alaska) (Adler & Crosskey 2010, J. Ilmonen, unpublished [Finnish records]). The suffix '(complex)' after the species name indicates that the morphospecies is an aggregate of sibling species defined on chromosomal criteria, which are called cytospecies. In this paper we present a new record of the species complex about 580 km north of the earlier published records from Greenland.

Material and Methods

Insects were sampled by sweep netting and six Malaise traps operated from 15 July to 2 August 2009 in Zackenberg Valley (Fig. 1), NE Greenland, by Dr Tomas Roslin and one of us (GV). The Malaise traps were placed along a 3.4 km semilinear transect from Zackenberg River bank to the mid-slopes of Aucellabjerg (UTM coordinates ranging between 8264309–8267014 and 0512643–0514750, ca 10–130 m a.s.l.) and covering various biotopes including (i) *Dryas* spp. dominated sandy riverbank slopes with small snowbed patches, (ii) wet fens with grassy vegetation, (iii) flat *Salix arctica* dominated snowbed areas covered with hummocks and, less extensively, *Cassiope tetragona-Vaccinium uliginosum* heath, (iv) *Cassiope-Vaccinium* heaths on slopes (with some *Salix*-hummock snowbeds) and (v) fell slopes with open *Dryas* vegetation and *Vaccinium*-heath.

Results

A single female of *Prosimulium ursinum* was recorded (identification: see Discussion) from a Malaise trap (UTM coordinates 8264309:0512643) dating from July 21th to August 2nd 2009. The trap was placed on a SW facing slope of the Zackenberg river bank, ca 10

m from the river. The area within a 10-m circle around the collecting head of the trap consisted of low vegetation (most abundant species: *Salix arctica* 20%, *Dryas* spp. 15%, *Polygonum viviparum* 8%, *Luzula confusa* 6%, *Trisetum spicatum* 5%, and open sand 30%). At the trapping locality, the river channel was widened, and outside the flooding season the main river channel was surrounded by slowly flowing side channels. In addition, there were snowmelt-fed wetlands above the channel with numerous small seeps and tributary streams flowing into the river.

Label data:

NE GREENLAND, Zackenberg Valley; 74°28'N, 20°34'W; UTM 8264309:0512643; 21.VII.–2.VIII.2009; Malaise trap No. 2, T. Roslin & G. Várkonyi leg., J. Ilmonen det.

The specimen is deposited in JI's collection.

Discussion

Based on published references (Edwards 1935a), our record of *P. ursinum* is ca. 580 km north of the previous records of this species in Cape Dalton (Blosseville Kyst), Greenland. Our record is also the second northernmost locality globally, only a few km (2 degrees) south of the latitude of the collections from Bear Island. Blackflies are, however, a little-studied insect group in Greenland. In total, Adler and Crosskey (2010) list only three species of blackflies from Greenland: *Prosimulium ursinum*, *Simulium vittatum* Zetterstedt, and *Simulium rostratum* (Lundström).

In Finland, *P. ursinum* has been collected from small, cold streams and meltwater seeps. Peterson (1970, 1977) recorded larvae and pupae from small, cold trickles in North America and Iceland. According to Adler et al. (2004), immature stages of the species are found in cold upland streams up to 3 m wide. Hence, it is probable that in the Zackenberg Valley the species does not develop in the violently flowing river, but rather in the seeps and small streams flowing into the river from the valley slopes and adjacent wetlands, or in the slow-flowing side channels of the river. *Prosimulium ursinum* overwinters as eggs that can survive drying and severe cold (Carlsson 1962). One of us (GV) tried to collect larvae for cytotaxonomic identification in the Zackenberg River and a smaller stream (Kærelv) in 2010, but none were found.

Females of *Prosimulium macrophyga* (Lundström), *Prosimulium neomacrophyga* Peterson, and *P. ursinum* are externally very similar: all have non-biting mouthparts and a reduced spermatheca, which separate them from other *Prosimulium* species (Peterson 1970, J. Ilmonen, unpublished [*P. macrophyga*]). Males of *P. ursinum* have never been recorded, but males of the other two species are known. Females of *P. ursinum* can, however, be separated from the other two species on the basis of the shape of the ovipositor lobe and the sclerotisation of the genital fork on well-preserved specimens (see Peterson 1970: fig. 26 and 27, Rubtsov 1956: fig. 55). Carlsson (1962) also used length:width ratio ('longer than broad' vs. 'as long as broad') of the second antennal segment to separate *P. macrophyga* and *P. ursinum*. This character, however, seems vague at least in Finnish populations, because the segments are very similar in shape (J. Ilmonen, unpublished). Records of *P. ursinum* are mostly based on hard-part morphology of larvae and pupae, which are even more difficult to separate from the species mentioned above.

Prosimulium ursinum is an aggregate of sibling species defined on chromosomal criteria (Adler & Crosskey 2010). Available evidence strongly suggests that the occurrence of several taxonomically different entities is indeed probable. *Prosimulium ursinum* is a parthenogenetic allotriploid species, apparently having *P. neomacrophyga* as one parent in Alaska and Nunavut in the Nearctic (Adler et al. 2004), and *P. macrophyga* as one parent

in the Palaearctic region (P.H. Adler & J. Ilmonen, unpublished data from Finland). Further, recent preliminary results from DNA barcoding (standard mitochondrial gene cytochrome c oxidase unit I [COI] sequences; Hebert et al. 2003) show that the specimen recorded from NE Greenland is genetically very similar (COI mean difference 0.34%, range 0.0-0.61, n = 4) to specimens collected from Finland, and more different (COI difference 1.95%, n = 3) from *P. ursinum* from Yukon, North America (specimens of Rivera & Currie 2009) (J. Ilmonen, unpublished data). However, the relationship and origin of the various closely related species need further work applying cytotaxonomy and DNA sequencing.

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