



## Exploring unknown life stages of Arctic Tanytarsini (Diptera: Chironomidae) with DNA barcoding

ELISABETH STUR<sup>1</sup> & TORBJØRN EKREM<sup>2</sup>

Museum of Natural History and Archaeology, Norwegian University of Science and Technology, NO-7491 Trondheim, Norway.

E-mail:<sup>1</sup>Elisabeth.Stur@vm.ntnu.no, <sup>2</sup>Torbjorn.Ekrem@vm.ntnu.no

### Abstract

We present the first results from a project on Spitsbergen and Bear Island where the ultimate goal is to provide genetic and morphological identification keys to all species. Five Tanytarsini species have been recorded from Svalbard. By sequencing partial COI gene sequences, we have associated larvae of all of these, and describe the hitherto undescribed larval stages of *Microspectra insignilobus* Kieffer, *M. radialis* Goetghebuer and *Tanytarsus heliomsonyctios* Langton. We also present keys to larva, pupa and imagines of all Tanytarsini species found on Svalbard and discuss larval morphology in relationship to characters preserved in subfossil material. Of particular interest is the mandible and mentum of *T. heliomsonyctios* which show close resemblance to the tentatively associated larvae of *Corynocera oliveri* Lindeberg. An overview over *Tanytarsus* species with “*lugens*-type” larvae is given and the phylogenetic value of mandibular accessory teeth is briefly discussed.

**Key words:** Chironomids, immature stages, descriptions, keys, Svalbard

### Introduction

Chironomidae species are likely the most frequent and diverse macroinvertebrates in Arctic freshwater ecosystems and species level identifications of immatures, in particular larvae, are important for both biomonitoring and paleolimnological studies. Nevertheless, knowledge of larvae belonging to Arctic species is limited and no up-to-date identification keys and literature for Arctic Chironomidae exists today.

Due to its accessibility and infrastructure, the Svalbard archipelago has become an attractive area to conduct environmental and climate studies in the high arctic. The activity calls for increased knowledge of the insect fauna, especially of the family Chironomidae. Since various paleolimnological and ecological studies use chironomids as indicator organisms, it is necessary to produce a reliable overview of and keys to the chironomid species in the area.

The study of chironomids from arctic islands has a long tradition. Several Swedish and a French expedition in the mid 18th century resulted in Boheman's (1865) “Spetsbergens Insekt-Fauna”, and “Bidrag til Kännodomen om Beeren Eilands och Spetsbergens Insekt-Fauna” by Holmgren (1869). Kieffer and Thienemann (1919a, b) analysed the chironomid material from Koch's 1911 expedition, and Edwards (1922, 1924, 1925 & 1935) followed by processing material from the Oxford University expeditions to Spitsbergen in the 1920s and Bear Island in 1932. Knowledge of arctic chironomids from Norwegian expeditions has been published by Goetghebuer (1933), and Oliver (1962) reviewed the Orthoclaadiinae of Bear Island – based on material from the Tromsø Museum's Bear Island Expedition in 1957.

Coulson & Refseth (2004) presented an overview of the terrestrial and freshwater invertebrate fauna of Svalbard. In their list, class Insecta is represented by 230 species, including 128 Diptera and over 60 chironomids. The authors characterized their list of chironomids as a conservative estimate of the Svalbard fauna and addressed at the same time the need for taxonomic revisions of the most of the species found on Svalbard. Compared to the total number of chironomid species currently present on Svalbard, a high percentage were originally first described from the archipelago. We have counted 20 valid species names originally described from Svalbard. Some of these have later also been recorded elsewhere. But the true number of species that are endemic to the high arctic is difficult to evaluate since many genera are in need of taxonomic revision.