

Project acronym: HAAR

Project title: High Arctic aphids reproductive system

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Discipline: Life Sciences & Biotech

Station(s): Sverdrup Research Station, Svalbard

Aphids (Insecta, Hemiptera, Aphididae) show a wide spectrum of lifecycle types and different species undergoing different life cycle scenarios depending on prevailing environmental conditions. Among them an endemic high arctic aphid species *Acyrtosiphon svalbardicum* Heikinheimo and *Sitobion calvulus* (Ossiannilsson) are unique, as characterized by extreme adaptive, probably genetically programmed, life-cycle. Unlike temperate aphids, the life cycle of those species is strongly modified and shortened, i.e. the fundatrix which hatches from the egg gives rise directly to sexual morphs (oviparous females and males); both viviparous wingless and winged females are rare. In this way those species are an excellent model for understanding the development and structure of the reproductive system, as well as the reproductive strategies of these bugs in the harsh conditions of the High Arctic.

The project was divided into two parts: (1) collecting material of the two High Arctic aphid species (*Acyrtosiphon svalbardicum* Heikinheimo and *Sitobion calvulus* (Ossiannilsson)) of low dispersal populations and extremely shortened life cycle in the vicinity of Ny-Alesund station, Svalbard, Norway and (2) further laboratory morphological, anatomical and histological work in the laboratories of the Faculty of Biology and Environmental Protection, University of Silesia, Katowice, Poland. The first part was the most important as without the fresh, properly preserved material the second part of the project will not be impossible to continue. In particular, in the framework of the field studies the following main objectives were determined: (1) the known location of the host plant of aphid species *A. svalbardicum* – *Dryas octopetala* have been verified; (2) oviparous females, males, stem mothers and eggs of the studied species have been collected and preserved for the further morphological and anatomical researches; (3) the proportions of oviparous females and males in the population studied have been estimated; (4) copulatory behavior of the sexual generation have been observed. In the second part of the project, examination and comparison of the structures of the reproductive system of the least known morphs - oviparous females and males as well as structure of the overwintering eggs will be done.