

Why do some Psylloidea and Heteroptera occur regularly on snow?

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Certain species of Psylloidea and Heteroptera have been observed on snow in South Norway during many years, mainly at temperatures around zero. However, they do not belong to the exclusive group of winter active arthropods, which use the snow surface as a natural habitat during their life cycle. While most invertebrate groups occurring on snow are recruited from the air space below the snow or by hatching from winter-open rivers and brooks, Psylloidea and Heteroptera drop or blow down from trees. All the eight recorded species of Psylloidea hibernate on coniferous trees, and return to their host plant (which is often *Salix* sp.) at the end of the winter. Their occurrence on snow mainly in March and April indicates very early activity, long before their host plants have developed leaves. The presence of specimens of Psylloidea on the ice of a large lake (Furusjøen, Rondane) showed that they could also be blown far away in late winter. *Kleidocerys resedae* (Heteroptera) occurs on snow mainly in November, when the animals drop down from birches to hibernate on the ground. *Gastodes abietum* (Heteroptera) overwinters in cones high up in spruce trees. The species has no obligatory diapause, however, and especially during mild periods in early and late winter, active animals may drop down on the snow surface.

Key words: Psylloidea, Heteroptera, insects on snow, winter.

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INTRODUCTION

Many different arthropod groups can be recorded on snow, especially in mild weather. It is a challenge to understand why they occur on snow, and from which habitats they colonise the snow surface. Regarding the first question, we can divide the snow surface fauna into three main groups: a) Specialized, cold-adapted species, which are regularly active on the snow surface as a natural part of their life cycle, e. g. certain Collembola, Diptera, Mecoptera, Plecoptera and one species of Araneida (Ulfstrand 1968, Hågvar & Østbye 1973, Hågvar 1973, 1976, 2000, 2001, Jonsson & Sandlund 1975, Leinaas 1983). They

use the snow surface for migration, copulation or feeding. b) Arthropods which can be observed rather regularly on the snow, but which do not belong to the exclusive first group, e. g. many species of Diptera and Araneida (Hågvar & Greve 2003, Hågvar & Aakra 2006). c) Casual visitors on snow. Especially during warm weather in early and late winter, spiders, beetles, various insect larvae etc. heated by the sun may crawl onto snow from snow-free patches, or flying insects may land on snow and made more or less immobile.

Regarding the second question, most arthropods on snow are recruited from the so-called subnivean air space below the snow cover. While