

MSc subject in spatial ecology

Spatial community composition of arthropod predators in relation to climatic variation and insect prey abundance in sub-arctic birch forest

Background and general research issue

Climate variation in spring affects hatching dates of most arthropods and is important for their distribution and seasonal abundance. Different response to climate variation across trophic levels may lead to a mismatch in hatching times of arthropod predators (e.g. ground beetles, spiders) in relation to seasonal availability of insect prey (moth larvae and pupae).

To understand the impact of climate variation on the relationship between arthropod predators and their insect prey, it is important to study the *spatial relationship* between predators and prey along climatic gradients.

In sub-arctic birch forest, leaf-eating geometrid larvae are the main prey species and display regular population outbreaks. The number of geometrid larvae and their timing of development show strong spatial variation over short distance along climatic gradients and may be a result of arthropod predators that depend on moth larvae and pupae as food.

The MSc project outlined below will investigate the spatial relationship between the abundance of different arthropod predator species and the number of geometrids along altitudinal (climatic) gradients in which air temperature steadily decreases with increasing altitude.

Study area

We have three study regions, each with 10 altitudinal transects. One at the island of Reinøya (approx. 70 km from Tromsø), one at Skogsfjord (also about 70 km from Tromsø) and one at Storelva (just outside Tromsø). All transects have stations for observations and data collection at 50, 100, 170 and 240 meters above sea level, each supplied with eight pit fall traps. Trapping of arthropod predators was done during fall 2008 and 2009 in two of the three altitudinal gradients. Detailed monitoring of the abundance of geometrid larvae as a potential food source is also in place. The candidate will therefore have a unique background material to work with in addition to field data collected during the present study.

Main research issue:

Does the number of species and proportional abundance of arthropod predators change according to spatial variation in moth abundance and phenology?

Methods:

Point-transect-estimation of occurrence and abundance of all arthropod predators at all stations along the altitudinal gradient. This project requires interest in taxonomy of insects and spiders.

Additional methods

- Registration of birch bud burst phenology along the altitudinal gradient
- Collection of moth larvae for determination of moth phenology (i.e. instar structure)
- Density measurements of moth larvae along the altitudinal gradients
- Logging of temperatures at all altitudes in all areas.

Start and field period

Preferred starting date is April/May 2010. Preference will be given to students willing to complete two field seasons (2010 and 2011). The students will receive field assistant salary during one of the seasons.

Supervisors:

The supervising team consists of PhD Tino Schott, researcher Snorre B. Hagen and Professor Rolf A. Ims from the University of Tromsø. For international candidates an additional supervisor can be appointed from the student's home university. The project is supported by the Norwegian Research Council.