The evolution of plastic traits: from genes to fitness

This project focuses on variation in temperature plasticity across habitats and its consequences at the population level. Habitat heterogeneity creates the potential for intraspecific genetic and phenotypic variation. Until recently, the evolutionary importance of such genotypic and phenotypic variation was a subject of controversy because of the swamping effect of gene flow over small distances. However, new theoretical analyses have demonstrated that, if divergent selection is sufficiently strong, local adaptation can persist on a small spatial scale, and potentially initiate speciation.

Temperature is an important environmental determinant of fitness, especially for ectotherms which rely on external heat sources to maintain their body temperature and metabolism. I propose a mechanistic approach that looks at a process underlying temperature adaptation in life history in terrestrial ectotherms (Collembola). The research will use 1) laboratory and field experiments to study the effect of plasticity on population divergence; 2) molecular techniques such as suppression subtractive hybridization and linkage mapping to study the genetic architecture of temperature plasticity; and 3) spatially explicit modelling to demonstrate the wider applicability of my findings.

Duration:

5 years (1 Jan 2004 - 1 Jan 2009)

Participants:

Jacintha Ellers