

MASTER PROJECT

Trait-fitness relationships during adaptive divergence

BACKGROUND - Adaptive divergence is the process by which novel phenotypes are created from a common ancestral form by adapting to different environmental conditions. This implies that a certain trait combination increases local fitness of a novel phenotype in one environment over another. However, usually little is known about how the traits that are selected for are mechanistically related to fitness of different ecotypes. For example, while the novel phenotype might have higher relative fitness in a particular environment, absolute fitness might be decreased if a reasonably strong link exists between the selected traits and overall fitness. We propose a series of experiments that will investigate the mechanistic relationship between morphological traits and fitness during adaptive divergence.

STUDY SYSTEM - To investigate trait-fitness relationships in the process of adaptive divergence, the common freshwater isopod *Asellus aquaticus* is an ideal model organism, as contemporary differentiation of local populations has been reported over a broad range of ecosystems, including lakes and streams in Switzerland.

Eawag Kastanienbaum is located at Lake Lucerne, where a large population is readily available for experiments – other populations in lakes and streams are in reasonable distance from the laboratory facilities.



POSSIBLE EXPERIMENTS

- Sample *A. aquaticus* populations in different habitats (e.g. lake vs. stream) and test for phenotype-environment interactions (e.g. pigmentation-background colour or size-microhabitat)
- Retrieve specimens from different habitats and conduct laboratory experiments including mating trials to investigate relationships between origin (habitat), life history, and fitness
- Measure diet preference of specimens from different habitats and investigate local adaptation in stoichiometric food preference

LOCATION – Main laboratory work will be conducted at Eawag Kastanienbaum (LU).

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