Degree project / research training offer:

Projects on wing polyphenism in water striders

Phenotypic plasticity allows an organism to adjust its phenotype according to the prevailing environmental conditions and is thus one of the main mechanisms by which organisms adapt to changing environments. Many examples of plastic traits have been described to date, and classic examples include differences in morphology in response to the presence of a predator in water fleas, or changes in plant height in response to altitude.

Water striders (Gerridae) are a group of insects well-known for their variation in wing size. Environmental factors such as photoperiod, nymphal density and temperature can all influence if an individual produces wings or not, this is called wing polyphenism. We are currently working on understanding the genetic basis of this phenomenon in a comparative framework. We use water striders collected from nature to study the genetic and environmental factors that influence wing morph determination/development and we are now looking for motivated students to do degree projects (15-60hp) or research training. We are flexible and willing to plan the project according to the student’s own research interest.

Possible projects include (but are not restricted to):

Using RNA interference to screen genes that are differentially expressed between short and long-winged individuals. This project is suitable for any length and level of project and is highly scalable. It will include handling of water striders in the lab, molecular biology work, performing RNA interference assays.

Dissecting the light-dependency of wing growth – where and how does the water strider sense photoperiod? What’s the role of the circadian rhythm in wing morph determination? The aim of this project is to investigate how light, in particular, photoperiod, is sensed by water striders and which responds it produces. It is highly flexible but might include molecular biology work, RNA interference assays, phenotypic assays.

Investigating the hormonal control of wing development and knocking down candidate genes involved in hormonal pathways with RNAi.
This project is aimed to understand how two important insect hormones, ecdysone and juvenile hormone, affects wing polyphenism in *G. buenoi*. It will/can include exposing water striders to different hormone analogs and, RNAi assays, and phenotypic assays.

**Exploring wing polyphenism across the phylogeny of water striders to assess evolutionary dynamics of phenotypic plasticity**

With this project we are interested to investigate to which degree the response of photoperiod on wing polyphenism is conserved across several species of water striders that are found in Sweden. It will contribute to a long-term goal to explore the evolutionary dynamics of wing polyphenism/polymorphism at the genetic level.

Projects are available from spring 2021 and the requirements are an interest in evolution/plasticity and a high motivation for learning!

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