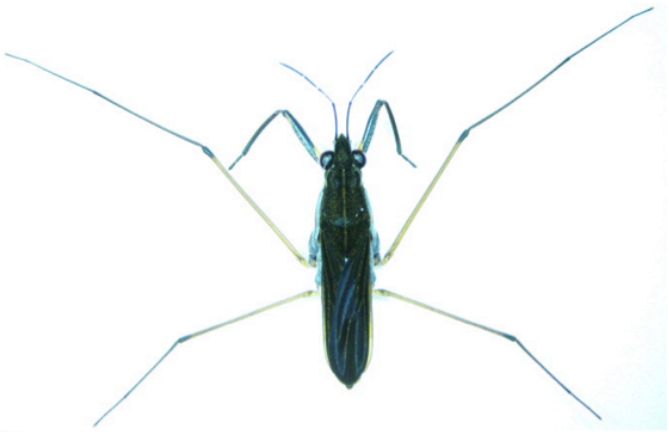
Degree project / research training offer:

Investigating the genetic basis of phenotypic plasticity

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 plasticity in wing polymorphism. Environmental factors such as photoperiod, nymphal density and temperature can all influence if an individual produces wings or not. We are currently working on understanding the genetic basis of this plasticity in a comparative framework. Eight species of water striders have been collected from the field to study the genetic basis and environmental factors that influence plasticity in wing development and we are now looking for motivated students to do a degree project (30-60hp) or research training. We are flexible and willing to plan the project according to the student's own research interest.

Short-winged male (*Gerris buenoi*).



Long-winged male (*Gerris buenoi*)

Possible projects include (but are not restricted to):

A comparative approach to investigate how environmental factors influence wing polymorphism in different water strider species (lab). 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, phenotypic assays and statistical assays to compare different treatments and species in relation to wing polymorphism.

Exploring traits associated with wing polymorphism – e.g. fitness related or sexually dimorphic traits (lab). The aim of this project is to investigate the trade-offs between the long-winged and short-winged morphs of water striders. It can include a variety of experiments but all with a focus on morphological and reproductive differences between long-winged and short-winged individuals. The project is suitable for any length and level of project.

Analysis of alternatively spliced transcripts associated with long-winged or short-winged morphs using RNAseq data (bioinformatic). This project is aimed towards students in bioinformatics and is only suitable for longer (30 hp or more) projects. The data (150 bp paired-end reads) is generated from RNA extracted from water striders in a nymphal stage when wing development and growth is still taking place.

Investigating the hormonal control of plastic wing development and knocking down candidate genes involved in hormonal pathways with RNAi (lab). This project is suitable for a student with a mechanistic interest in plasticity and evolution and that is used to working in a molecular biology lab. It will require at least a 30 hp project.

Projects are available from autumn/spring 2019 and the requirements are an interest in evolution/plasticity and a high motivation for learning!

Contact Arild Husby or Erik Gudmunds for more information:
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