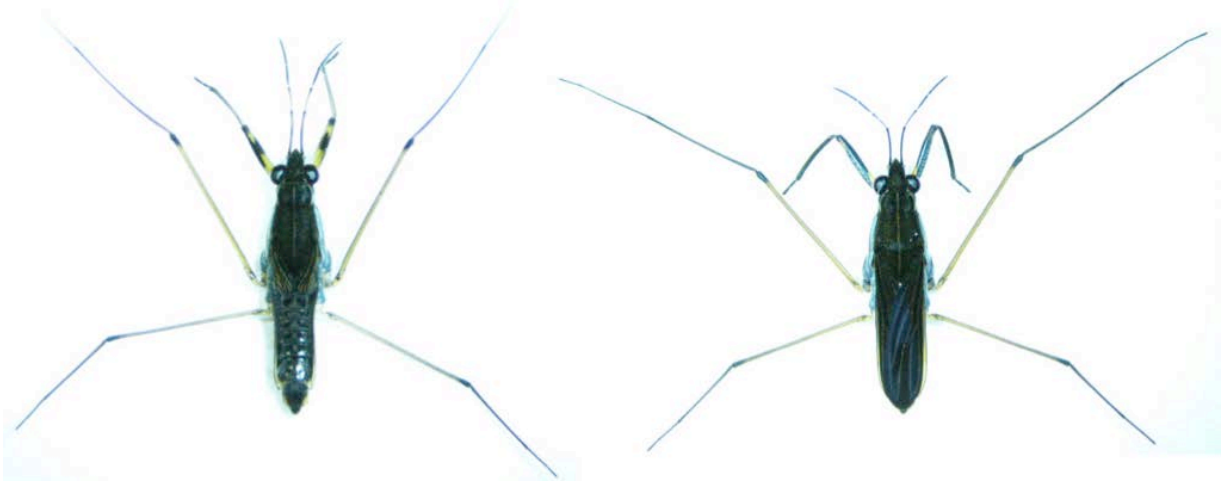
Degree project / research training offer:

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 length. Environmental factors such as photoperiod, nymphal density and temperature can all influence if an individual produces wings or not, a phenomenon 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 natural populations 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 (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):

Using RNA interference to investigate the role of the Fat/Hippo signaling pathway in wing morph determination.
This project is highly scalable and 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 genes in wing morph determination?
The aim of this project is to investigate photoperiod is sensed by water striders and which responses 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 explore the putative role of ecdysone in regulation of wing polyphenism in *G. buenoi*. It will/can include exposing water striders to different hormone analogs and, RNAi assays, phenotypic assays and RT-qPCR.

Quantifying the heritability of wing length determination in polymorphic water strider species and assessing the presence of non-additive effects.
Some water strider species have their wing length determined by environmental cues. Others, by genetic factors or a combination of both. The aim of the project is to quantify the proportion of variation in wing length encoded in the genome in the latter group, by means of crosses in traditional quantitative genetics experiments.

Projects are available from autumn 2023 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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