**Sexual conflict and genome evolution in haplodiploid organisms**

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**Project background**
Sexual conflicts result from a clash of interests between the sexes [1]. In many cases, this battle is fought at the level of the gene: males and females may differ with respect to which version of a gene maximizes their Darwinian fitness. Whilst the effects of such intralocus sexual conflicts have been studied intensively in many organisms, the vast majority of studies have focused on species with classical, diploid sexual reproduction. However, as many as 15% of animal species exhibit an alternative, haplodiploid mode of inheritance. In such species, mothers monopolize the production of male offspring, either by asexual production of sons or by producing sons that eliminate their father’s genome after the zygote stage [2]. This asymmetrical mode of inheritance is likely to affect the outcome of intralocus sexual conflict. Specifically, as alleles that favour male fitness cannot be passed on directly from fathers to sons, sexual conflicts may be resolved in favour of females [2].

**Key research questions**
The aim of this project is to study the fate of alleles under intralocus sexual conflict in a range of haplodiploid taxa. Studying such exceptions to the general rules of reproduction provides illumination of the fundamental principles of evolutionary genetics [3].

**Methodology**
This project will combine laboratory experiments, gene expression studies and genome analyses. We will focus particularly on springtails and fungus gnats, as males in these species carry and express their father’s genomes, but do not pass them on to their offspring. In addition, these species still retain recognizable sex chromosomes, which enables informative sex chromosome / autosome comparisons (e.g. [3]). These experimental approaches will be combined with comparative phylogenetic analyses and the development of novel evolutionary theory, according to the interests of the student.

The first year of the PhD will focus on training in the required techniques and obtaining samples and generating sequence data, the second and third year will involve developing population genetic models to generate predictions and testing these predictions using the acquired datasets. The final year will focus on finishing the analyses and preparing manuscripts to disseminate the results.
Training
A comprehensive training programme will be provided comprising both specialist scientific training and generic transferable and professional skills. Specifically the student will undertake training in the use of molecular wet lab techniques, the analysis of sequencing data and the development of simple population genetic models.

Requirements
Candidates must be highly motivated with a keen interest in evolutionary biology and a strong motivation to pursue a scientific career. Previous experience with genetic techniques and genomic and/or theoretical analyses would be an advantage.

Further reading or any references referred to in the proposal

A project summary
Sexual conflicts result from a clash of interests between the sexes. This project studies such battle at the level of the gene and how it is affected by unusual reproduction.