

Understanding the genetic basis of reproductive strategy in a parasitic nematode system

Supervisory team:

Main supervisor: Dr Vicky Hunt (University of Bath)

Second supervisor: Dr Cameron Weadick (University of Exeter)

Prof Laurence Hurst (University of Bath)

Collaborators: Prof Taisei Kikuchi (University of Tokyo, Japan)

Host institution: University of Bath

Project description:

The gastrointestinal parasitic nematode, *Strongyloides*, is an important parasite that infects ~600 million people globally. These parasites have a unique lifecycle that is ideally suited to understanding the genetic and epigenetic basis of reproduction. The *Strongyloides* lifecycle alternates between a parasitic adult female generation that reproduces by parthenogenesis and a free-living sexually reproducing male and female generation. The offspring of parthenogenic adults develop into female infective 'iL3' larvae (that will go on to infect a new host) or larvae that develop into sexually reproducing adults. All offspring produced by sexually reproducing adults are iL3s. Importantly, adult females in alternate generations are genetically identical, and both produce iL3 offspring, offering an ideal laboratory model to compare reproductive strategies. This project will investigate differences in the embryos derived from parthenogenic and sexually reproducing adult females to understand fundamental principles about reproductive biology.

We hypothesise that embryos derived from different reproductive strategies (i) differ in their ability to be a parasite e.g. to successfully infect a host. (ii) express genes, transposable elements and small RNAs at different levels. (iii) and (ii) is directly affected by environmental factors such as temperature, exposure to immune stress, dietary restrictions, and composition of microbial communities they are exposed to.

This project will test these hypotheses using a combination of laboratory and bioinformatic skills. The student will receive full training in all aspects of the project such as parasite culturing and biology, sequencing methods such as RNAseq and small-RNAseq, and bioinformatic analysis of sequence data. The student will benefit from a team of supervisors with diverse expertise.

This project will be carried out in collaboration with Taisei Kikuchi (University of Tokyo), and the student will have opportunities to visit Japan as part of their studies and training. Applicants should have a strong first degree or masters with an interest in parasitology, nematodes, reproductive biology and/or genetics.

Applicants are encouraged to get in touch with Vicky Hunt (v.l.hunt@bath.ac.uk) to find out more if they're interested in this project. The successful applicant will be based in the Hunt lab (Bath) but will work closely with co-supervisors Weadick and Hurst and collaborator Kikuchi.

Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.