

Evolution of virulence hot-spots in parasitic nematode genomes

Lead Supervisor: Dr Hans-Wilhelm Nützmann, Department of Biology & Biochemistry

Co-Supervisor: Dr Vicky Hunt, Department of Biology & Biochemistry

Project description:

Nematode parasites of the gastrointestinal tract e.g. *Strongyloides* spp. infect 1.5 billion people globally and cause a substantial disease burden. Understanding the mechanisms nematodes have evolved to infect their host is an important step towards developing much needed treatments and control methods. Our recent research has shown that virulence associated genes are grouped together in distinct ‘virulence hot-spots’ in the genome of *Strongyloides* nematodes.

This PhD project combines research on parasitic nematodes, evolutionary science, chromatin genetics and bioinformatics to improve our understanding of genome evolution of parasites. We will address fundamental questions about parasitism including

- (i) Is gene organisation and co-regulation of genes important for parasitism?
- (ii) Are virulence hot-spots characteristic of parasite genomes in general?
- (iii) How is the co-ordinated activation of virulence hot-spots controlled on molecular level?
- (iv) Are signatures of epigenetic marks associated with virulence hot-spots?

In the molecular biology component of the project, the student will work with *Strongyloides* parasitic nematodes and perform functional analysis of epigenetic marks, including investigating the role of histone modifications and small RNAs in the regulation of virulence hot-spots at different stages of infection. This will involve chromatin immunoprecipitation, gene editing experiments and gene expression analysis. The student will also be trained in the bioinformatic analysis of large-scale genomic and transcriptomic datasets to investigate the role of virulence hot-spots in nematodes and parasites in general. Together these approaches will help us to better understand the genetic toolbox used by parasites to successfully infect the host.

The doctoral researcher will be integrated into ongoing collaborations with laboratories in Japan, Germany, UK and USA. Our project is designed for students who are curious about evolutionary science, genetics and infection biology. For further background information about our research on gene organisation and nematodes, please visit <https://researchportal.bath.ac.uk/en/persons/hans-wilhelm-nuetzmann> and www.vickyhuntlab.org.

Candidate:

Applicants should hold, or expect to receive, a First Class or high Upper Second Class UK Honours degree (or the equivalent qualification gained outside the UK) in a relevant subject. A master’s level qualification would also be advantageous.

Applications:

Informal enquiries should be directed to Dr Hans-Wilhelm Nützmann, hwn25@bath.ac.uk.

Formal applications should be made via the University of Bath’s [online application form](#).

On the application form, please ensure that you quote ‘Evolution Education Trust’ in the Finance section and the supervisor’s name and project title in the ‘Your research interests’ section. Should you wish to be considered for more than project, quote the projects in order of preference and upload a separate personal statement relevant to each one.

Please see our Doctoral College website for [more information on how to apply](#) for a PhD at Bath.

Application deadline: 30 April 2019.

Interviews will take place in Bath on 14 June 2019.

Anticipated start date: 30 September 2019.