PhD Project Advertisement

Project title: ***VIROWORM: Characterising the Interplay between Parasitic Nematodes, Viruses and their Hosts***
Project No: FBS25-78-Bamford-qs

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Project description: Following the COVID-19 pandemic, and with the spectre of panzootic highly pathogenic avian influenza, the understanding of infectious diseases (including "macro"pathogenic nematode (roundworm) parasites and "micro"pathogenic viruses) is critical as they undermine human and animal health, productivity, and food security. Sustainable control of livestock pathogens is challenged by accelerating anthelmintic (dewormer) resistance and a lack of affordable or effective prophylactic/therapeutic options (anti-virals/vaccines) such that identification of novel interventions to protect against emerging viruses and nematode parasites is critical.

The ecology of viruses and gastrointestinal nematode (GIN) parasites overlap. Livestock GINs inhabit microbe-rich organs within the host where they reside alongside a diverse and dynamic microbiome that may encompass pathogenic viruses. Moreover, some GINs migrate through distal tissues such as the respiratory tract, engaging the host virome. Nematodes survival in these polymicrobial environments is, in part, supported by innate immunity through nematode-derived antimicrobial effectors (including antimicrobial peptides, AMPs). Although GIN-manipulation of the host microbial ecosystem during infection is known, how this extends to the virosphere – and how this is achieved - remains unknown.

This project will integrate expertise at QUB Institute for Global Food Security/School of Biological Sciences in animal virology and GI nematode biology, the experimental tractability of Ascaris suum as a model parasite, with University of Surrey expertise in population genetics and transmission dynamics of zoonotic parasites. The successful student, through exploitation of the porcine GIN model A. suum, will explore:

(i) the molecular interactions between GINs, viruses and their hosts;

(ii) the significance of GINs in influencing the host virome and protecting against invading viral swine pathogens (e.g. swine influenza A virus, porcine rotavirus);

and (iii) the potential for intra- and inter-host species transmission of viruses via GINs as vectors.

Altogether, the student will use cutting-edge techniques (such as 'omics, molecular virology/parasitology, AI-led exploration of virus-host interfaces) to characterize the interactions between GINs, viruses and their shared hosts at a molecular level, in order to understand the shared ecology and evolution of these macro and micropathogens, and identify means to exploit such information for the sustainable control of diseases driven by viruses and parasites and improve animal and human health globally.

Training opportunities: Our exciting project will provide general and subject-specific scientific training and professional development opportunities to enable the student to successfully transition into post-graduate employment. Specifically, the student will receive practical training in a broad range of multi-disciplinary laboratory techniques including genomics, genetics & bioinformatics (UoSurrey), molecular biology, transcriptomics, peptidomics, microbiology, virology, cell and nematode culture, microscopy (QUB). Additionally, the student will complete Bespoke QUB PhD training courses. Through these, the student will acquire and develop transferable skills including oral and written communication, problem-solving, critical thinking, and social/teamwork skills. The student will have opportunities to communicate

research findings orally via cross-institute lab meetings; postgraduate symposia; and national and international conferences, and will also gain communication skills through preparation of research data for publication in high-, impact scientific journals, and outreach activities (Pint of Science and writing for 'The Conversation').

Project supervision style: The student will be co-supervised by the project team (CB, MB, AM and LA) offering a rich training environment providing unique sources of expertise and support for the student to ensure progress is informed by most recent developments in the field. Lead supervisor (CB) will have overall responsibility for the project, day-to-day oversight of student progress, and coordinate contact with supervisory team. CB will meet with the student each week, participate in lab group meetings, and provide regular feedback to student on progress. Meetings will be joined by the entire supervisory team at least 6 times per year bimonthly hybrid meetings but can be dynamically altered.

Stipend (Salary): FoodBioSystems DTP students receive an annual tax free stipend (salary) that is paid in instalments throughout the year. For 2024/25 this is £19,237 (£21,237 at Brunel University) and it will increase slightly each year at rate set by UKRI.

Equity Diversity and Inclusion: The FoodBioSystems DTP is committed to equity, diversity and inclusion (EDI), to building a doctoral researcher(DR) and staff body that reflects the diversity of society, and to encourage applications from under-represented and disadvantaged groups. Our actions to promote diversity and inclusion are detailed on the FoodBioSystems DTP website and include:

- Offering reasonable adjustments at interview for shortlisted candidates who have disclosed a disability or specific learning difference.
- Guaranteed interview and applicant mentoring schemes for applicants, with UK home fees status, from eligible under-represented ethnic groups.

These are opt-in processes**.**

Our studentships are offered on a part time basis in addition to full time registration. The minimum registration is 50% FT and the studentship end date will be extended to reflect the part-time registration.

For up to date information on funding eligibility, studentship rates and part time registration, please visit the FoodBioSystems website.