PhD Project Advertisement

Project title: *Developing Phage Therapy to Combat Drug-Resistant Poultry Pathogens*
Project No: FBS25-04-Mehat-sq
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Project description: The University of Surrey, in collaboration with Queen's University Belfast is offering an exciting PhD opportunity aiming to revolutionise how we combat bacterial infections in poultry. This project focuses on using bacteriophages (viruses that target bacteria) to address the challenge of drug-resistant, pathogenic *Escherichia coli* in farmed poultry – a key threat to global food security.

Background

Avian pathogenic *E. coli* (APEC) causes colibacillosis, a serious disease in poultry that results in significant economic losses. Traditional reliance on antibiotics to manage these infections has driven antimicrobial resistance (AMR), endangering human, animal, and environmental health. Phages offer a highly targeted alternative to antibiotics, with the potential to eliminate harmful bacteria while leaving beneficial gut microbes intact. However, the broader effects of phage therapy on poultry gut health and productivity are not yet fully understood.

Research Aims

This project will develop innovative phage therapies to selectively target drug-resistant APEC, while preserving the balance of the gut microbiome. Our overarching question is: How do phages impact the gut microbiome and impact poultry health?

During this fully funded studentship, you will:

1.   Develop Phage Cocktails: You'll isolate new phages and test their effectiveness, and create optimal combinations for targeting APEC and AMR plasmids.

2.   Evaluate Phage Therapy in Gut Models: Using our innovative *in vitro* avian gut model, you'll assess phage efficacy in suppressing APEC and analyse its impact on the gut microbial community through advanced genomic techniques.

3.   Explore Phage-Microbiota Interactions: Investigate how the diversity of the microbiota influences the success of phage therapy, and whether phages drive or adapt to community dynamics.

This project combines microbiology, bioinformatics, and veterinary science to tackle a global challenge. You'll gain hands-on experience in phage biology, , bacteriology, bioinformatics, and microbiota research, working with state-of-the-art facilities and a supportive team. Your findings will pave the way for groundbreaking interventions in sustainable poultry farming.

Training opportunities: The student will undertake a comprehensive training program to develop skills essential for their research project. This includes genomics and metagenomics courses offered by the Microbial Communities Research Collective at the University of Surrey, under the guidance of the lead supervisor. A 3-month placement at Queen's University Belfast will provide specialized training in meta-transcriptomic analysis of microbial communities, supervised by the co-supervisor. Practical expertise will be further enhanced through focused training in phage biology, equipping the student with knowledge of bacteriophages in microbial systems, and through access to the Flow Cytometry Core Facility, offering training in techniques for analysing cell populations. Additionally, the supervisory team will facilitate

connections with agri-food sector professionals, providing exposure to industry applications of the research. Together, these opportunities are designed to build a robust skill set in metagenomics, meta-transcriptomics, and industry collaboration, preparing the student for impactful research in microbial and agricultural fields.

Project supervision plan: The project will be supported by a strong, multidisciplinary supervisory team with complementary expertise, which the student is expected to actively engage with to build their own skills.
Supervision Structure:
Lead Supervisor: Weekly one-to-one meetings for the first year, shifting to biweekly thereafter. Supervisory Team: Monthly meetings.
Lab Group: Fortnightly lab meetings with the lead supervisor's research group, with invitation's to co-supervisors groups.
The student will be based in the School of Biosciences at UoS, with visits and access to Queen's University Belfast's AMR and One Health Lab. This placement, along with collaboration with multiple research groups, will encourage knowledge exchange and collaboration.
Progress Expectations: PhD confirmation document due 12-15 months after starting; Present research findings at one nation conference; Final thesis submission before the end of the registration period; Feedback on draft reports and chapters provided within four weeks.

Student profile: We are looking for candidates with a background in biological or animal science. An interest in machine learning will be useful.

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 an 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.