

PhD Studentship: Bluetongue virus exploits transkingdom interactions between virus-bacteria-insect and ruminant host to enhance infection

Closing date: 05.04.19
Project Ref: 2019-19 KD/JH
Anticipated Start Date: October 2019
Duration: 3.5 years full-time

Eligibility:

- This studentship is open to science graduates (with, or who anticipate obtaining, at least a **2.1 or equivalent, in a relevant biological subject in their undergraduate degree, or a Masters degree - subject to university regulations**). Other first degrees, e.g. veterinary science, will be considered. You should be looking for a challenging, interdisciplinary research training environment and have an active interest in the control of infectious diseases.
- This is a **fully-funded studentship only open to UK students and eligible EU students who qualify for home-rated fees**, in line with [Residential Guidelines for Research Council Studentships](#).
- Students without English as a first language must provide evidence that they meet the English language requirement, e.g. with an IELTS score of 7.0 and no less than 6.5 in any of the subsections.

Supervision:

Principal Supervisors: Dr Karin Darpel (The Pirbright Institute), Prof Jayne Hope (The Roslin Institute, University of Edinburgh)

Co-Supervisors: Dr Marc Guimera Busquets, Dr Lyndsay Cooke (The Pirbright Institute)

Project Details:

Increasing evidence demonstrates that certain viruses can exploit bacteria or bacterial products to enhance their infectivity, replication and transmission. An exciting PhD project at the Pirbright Institute/University of Edinburgh is available to a highly motivated student with a keen interest in virology, immunology and cell-biology to investigate if transkingdom interactions between bacteria and viruses play a vital role during the infection and transmission cycle of vector-borne viruses.

Bluetongue virus (BTV) causes an economically highly significant haemorrhagic disease of ruminants and is transmitted to its mammalian host during blood feeding of its insect vector *Culicoides* biting midges. Within ruminants BTV replicates in a wide range of target cells, including phagocytic cells such as monocytes and dendritic cells. We have previously demonstrated that bacterial lipopolysaccharides (LPS) enhance BTV infection of bovine monocytes but not lymphocytes. LPS is present within *Culicoides* secreted saliva, providing the intriguing hypothesis that BTV might utilise bacterial products, provided by the insect vector or present during co-infections in the ruminant host, to enhance cell infection.

Within this project we will initially characterise if bacterial products facilitate BTV infection of monocytes through direct (e.g. increased virus-receptor binding, enhanced virus stability, increased virus uptake through virus aggregation) or indirect (e.g. immunomodulatory) mechanisms. The project will then expand to elucidate if bacterial products enhance BTV infection in other natural primary target cells, including those draining the skin, and if specific interaction between bacteria and BTV vary across strains from divergent serotypes as well as virus particle types (whole virus, infectious subviral particle (ISVP)).

Potential interaction of bacteria and virus in the context of vector-borne viruses will add further complexity to the already intriguing host-vector-virus interface and project outcomes will be of great interest to other vector-borne viruses including those transmitted to humans.

The successful candidate will be trained to apply a wide range of key virological and immunological technologies such as flow cytometry, immunofluorescence microscopy, electron microscopy, molecular viral diagnostics, primary cell infectivity assays, handling of vector insects and statistical analysis. The student will join a vibrant,

multidisciplinary and highly collaborative research environment and be highly encouraged to develop specific aspects of the project depending on their own scientific interest. The candidate will further learn to communicate their own research as part of regular lab meetings and attendance of national/international conferences and writing of peer-reviewed publication. All students at The Pirbright Institute and the Roslin Institute/University of Edinburgh are also greatly encouraged to participate in other development activities such as regular attendance of internal and external seminars, training courses, journal clubs and scientific outreach.

References for Background Reading:

1. Erickson et al., 2018, Cell Host & Microbe 23, 77–88
2. Stevens et.al. 2019 accepted Journal of General Virology
3. Darpel et.al. 2011 PloSOne 2011 Mar 14;6(3):e17545

Registration, Training and Funding:

This is a Pirbright Institute/University of Edinburgh fully funded project. The student will be mainly based at The Pirbright Institute and registered with the University of Edinburgh, with visits to the university to meet with their supervisor and undertake training or complete specific project tasks as required. Eligible students will receive a minimum annual stipend of £15,009 and university registration fees will be paid. A full range of research and transferrable skills training will be made available to the student as appropriate.

Applications:

Details of how to apply can be found here: [How to apply](#)

Essential documents:

- Application Form
- CV
- Two references sent directly by your referees

Please email your application to studentship@pirbright.ac.uk by the closing date noted above.