

PhD Studentship: Investigation of Novel Accessory Proteins in the Replication of Infectious Bronchitis Virus



Project Ref: 2025/01

Anticipated Start Date: October 2025 **Duration:** 3.5 years full-time

Closing date to apply: 17 February 2025



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 an undergraduate degree, or with 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 3.5 year fully funded studentship open to UK nationals. International applicants may apply, however funding for this studentship includes university tuition fees at the Home rate only - see funding information below.
- Students without English as a first language must provide evidence that they meet the English language requirement, e.g. with an average IELTS score of 7.0, with no lower than 7.0 in listening/reading and no lower than 6.5 in speaking/writing.

Supervision:

Principal Supervisors: [Dr Sarah Keep](#) (The Pirbright Institute), [Dr Edward Emmott](#) (University of Liverpool)

Co-Supervisors: [Dr Helena Maier](#), [Prof Nicolas Locker](#), [Dr Erica Bickerton](#) (The Pirbright Institute), [Prof Julian Hiscox](#), [Prof Peter McCormick](#) (University of Liverpool)

Research Groups: Coronaviruses, Coronavirus Cellular Biology and Viral Stress Responses

Project Details:

Coronaviruses encode several accessory proteins that have been proposed to counteract antiviral host responses *in vivo*. Infectious Bronchitis Virus (IBV) is a Gammacoronavirus causing Infectious Bronchitis, an acute highly contagious economically important disease of chickens. IBV is related to other important coronaviruses such as SARS-CoV-2 or Middle East Respiratory Syndrome (MERS) coronavirus that infect humans. While previous research has shown that IBV genes 3 and 5 encode four accessory proteins, namely 3a, 3b, 5a and 5b; work in the Coronavirus group has identified two additional accessory genes, 4b and 7, produced via novel non-canonical mechanisms. This results in the production of three yet uncharacterised viral proteins denoted 4b and 4c and 7. The impact of these proteins during IBV replication is currently not known, however, our preliminary data suggests they have a role during *in vivo* infection with deletion impacting pathogenicity and that 4b could regulate translation, stress and/or mitochondrial function.

In a collaboration between the Coronavirus, Coronavirus Cellular Biology and Viral Stress Responses groups at The Pirbright Institute and groups at the University of Liverpool, this PhD project aims to investigate the role of these novel accessory proteins in IBV replication, and impact on antiviral host defences and pathogenicity. The project will use Mass spectrometry to identify host interaction partners hijacked or subverted by these proteins. Further assays targeting interferon induction and signalling, mitochondrial function, stress signalling, translation and autophagy will interrogate the potential roles of the proteins/interactions. Using reverse genetics and virology techniques such as growth kinetics, the role of the proteins in the replication of IBV *in vitro*, *in ovo*, *ex vivo* as well as in the replication and pathogenicity of IBV *in vivo* will be investigated.

The project represents a collaboration between three research groups at The Pirbright Institute as well as groups at The University of Liverpool, presenting an excellent opportunity to gain experience in a wide range of scientific techniques, scientific approaches and viewpoints. Throughout the PhD the prospective student will be encouraged to take advantage of these opportunities whilst being empowered to work independently and to achieve the confidence to generate ideas for the next steps. Attendance and presentation of work at seminars, journal clubs and conferences will be supported.

References for Background Reading:

- 1) Keep, et al. (2020). Identification and confirmation of multiple novel non-canonically transcribed sub genomic mRNAs produced by avian coronavirus Infectious Bronchitis Virus. J. Gen. Virol DOI 10.1099/jgv.0.001474.
- 2) Dinan, et al. (2019). Comparative analysis of gene expression in virulent and attenuated strains of infectious bronchitis virus at sub-codon resolution. J. Virol. 93(18) e00714-19.
- 3) Bentley et al (2013). Identification of a noncanonically transcribed subgenomic mRNA of infectious bronchitis virus and other gammacoronaviruses. Journal of Virology 4: 2128 – 2136.
- 4) V'kovski et al (2021). Coronavirus biology and replication: implications for SARS-CoV-2. doi.org/10.1038/s41579-020-00468-6.

Registration, Training and Funding:

This is a Pirbright Institute/University of Liverpool fully funded studentship. The studentship covers stipend and Home rated university tuition fees. International students will attract tuition fees at the overseas rate and must show evidence of their ability to cover the difference between Home fees and Overseas fees for the duration of study.

The student will be based primarily at The Pirbright Institute and registered with the University of Liverpool. It is expected that the student will spend some time at University of Liverpool to learn specific techniques such as Mass spectrometry. The student will visit the university to meet with their supervisors and undertake training or complete specific project tasks as required. Eligible students will receive a UKRI-aligned stipend (£19,237 for 2024/25) plus a cost of living allowance of £2,200 per annum. Home rated university tuition fees will be paid. Highly subsidised Pirbright Institute student housing will be offered. A full range of research and transferrable skills training will be made available to the student as appropriate.

Applications:

[How to Apply](#): Closing date: 17 February 2025

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.