PhD Studentship:

Paramyxovirus genomes and their untranslated regions; more than meets the eye!

Project Ref: 2024/05
Anticipated Start Date: October 2024 **Duration:** 3.5 years full-time
Closing date to apply: 04.03.24

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 3.5 year fully funded studentship open to UK nationals. International applicants are welcome to apply, however overseas university tuition fees will apply and these are **not** included in the studentship – 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: Antonello di Nardo (The Pirbright Institute), Robin Shattock (Imperial College London)
Co-Supervisors: Dalan Bailey (The Pirbright Institute), Daniel Goncalves-Carneiro (Imperial College London)

RESEARCH GROUPS:

The student will join a multidisciplinary supervisory team, with extensive experience in molecular virology research, virus-host interactions and multi-scale processes that drive evolutionary dynamics of infectious diseases. At The Pirbright Institute, Dr. Antonello Di Nardo is a senior molecular epidemiologist working at the FAO World Reference Laboratory for Foot-And-Mouth Disease. His research revolves around multi-scale processes that drive transmission dynamics of infectious diseases. Dr. Dalan Bailey is a group leader with over 20 years of experience working on RNA viruses, including mechanisms of virus replication and drivers of host adaptation. At Imperial College London, Professor Shattock is a world leading expert in vaccine development. His lab focuses on the development of novel RNA-based vaccines and therapeutics. Dr Gonçalves-Carneiro's lab focuses on the study of coding biases and how synonymous mutations in virus genomes impact infection and contribute to immune evasion.

PROJECT DETAILS:

This project represents an excellent opportunity for a student to train and develop expertise in bioinformatics and molecular virology, to research important RNA viruses, to publish high quality peer-reviewed papers, and to present their work at national and international conferences. Working with a team of fellow PhD students, postdocs and PIs at both The Pirbright Institute and Imperial College London, the prospective student will lead their own research project on paramyxoviruses.

Paramyxoviruses are negative sense RNA viruses, and include many important human (Nipah, measles) and animal (peste-des-petits ruminants PPRV, Newcastle disease virus NDV) pathogens. Paramyxovirus genomes are specifically encapsidated by the viral nucleocapsid protein, supporting the idea that their RNA genomes are unstructured. This is opposed to the highly structured and functional RNA of some positive sense virus genomes, e.g. stem loops, pseudoknots, IRESs. As a result, a role for paramyxovirus untranslated regions (UTRs) in directing gene regulation has been overlooked, since their mRNAs are thought to lack these RNA regulatory elements. This project directly challenges this dogma. The PhD student will seek to understand the evolution of paramyxovirus UTRs, characterise their function and examine their mechanism of action in the broader context of innate immune recognition and translational regulation.

The student will merge cross-cutting bioinformatic and molecular virology research to conduct an extensive survey of the *Paramyxoviridae* genera, providing insights into the extent of UTR diversity between- and within-genus. They will also develop and implement assays and generate recombinant viruses to understand how paramyxovirus UTRs affect gene regulation and virus replication. Lastly, they will identify and characterise the host proteins involved in these viral regulatory processes, deepening our understanding of paramyxovirus-host interactions. Throughout this research, the student will develop an excellent technical and theoretical skill-set, building their expertise for a future career in biological/biomedical research.

REFERENCES FOR BACKGROUND READING:

1. Takeda M, Ohno S, Seki F, Nakatsu Y, Tahara M, Yanagi Y. Long untranslated regions of the measles virus M and F genes control virus replication and cytopathogenicity. J Virol. 2005 Nov;79(22):14346-54. doi: 10.1128/JVI.79.22.14346-14354.2005. PMID: 16254369; PMCID: PMC1280205.
2. Duprex WP, Dutch RE. Paramyxoviruses: Pathogenesis, Vaccines, Antivirals, and Prototypes for Pandemic Preparedness. J Infect Dis. 2023 Oct 18;228(Suppl 6):S390-S397. doi: 10.1093/infdis/jiad123. PMID: 37849400.
3. Bloyet LM. The Nucleocapsid of Paramyxoviruses: Structure and Function of an Encapsidated Template. Viruses. 2021 Dec 9;13(12):2465. doi: 10.3390/v13122465. PMID: 34960734; PMCID: PMC8708338.

REGISTRATION, TRAINING AND FUNDING:

This is a Pirbright Institute/Imperial College London fully funded studentship. All students are eligible for the full award (stipend and **home rated** university tuition fees). **International students will attract tuition fees at the overseas rate and must therefore be able to fund the difference between home and overseas tuition fees themselves. For home student eligibility guidelines, please refer to the UKRI Full Eligibility Criteria (Annex B)**.

The student will be based primarily at The Pirbright Institute and registered with the Imperial College London. 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 (minimum £18,622 for 2023/24) plus a cost of living top-up 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:

See our website for details of how to apply. Closing date: 04.03.24

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.

For queries, contact studentship@pirbright.ac.uk