PhD Studentship: Single cell sequencing to explore chicken B cell immune responses

Closing date: 9 April 2018
Project Ref: 2018/06/VN/DD-W
Anticipated Start Date: October 2018
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. Additional practical experience is welcomed.
- 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 RCUK Residential Guidelines for Research Council Studentships.
- Students without English as a first language must also 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: Prof Venugopal Nair (The Pirbright Institute); Prof Deborah Dunn-Walters (University of Surrey)
Co-Supervisors: Dr William Mwangi (The Pirbright Institute)

Project Details:

Antibodies produced in response to infection/vaccination are key in protection against diseases. Compared to the most species where the antibody repertoire is generated by V, D and J recombination, chickens achieve this by gene conversion using multiple upstream V pseudogenes. Studies on the dynamics of the antibody-mediated immune responses are hampered by the absence of quantitative, high-throughput systems to analyse individual antibody-secreting cells. Recent advances in microfluidic systems and next generation sequence analysis have enabled the prospects of examining the B-cell repertoire of single B cells.

The major aim of this project is to determine the antibody repertoire of chickens vaccinated with the highly immunogenic fusion (F) protein of Newcastle disease virus using single cell sequencing of B cells with the *Dolomite Bio* microencapsulation system. The project, built on the combined virology and immunology expertise at Pirbright and Surrey, will give excellent opportunity for a motivated student to acquire the knowledge for undertaking innovative bioscience research in the field of molecular immunology. The application of cutting edge technologies including single B-cell sequencing to analyse the complexity of the B-cell repertoire in avian species in response to vaccination will help in determining the antigenic epitopes on the virus, paving way for developing improved vaccines using structural vaccinology approaches.

References for Background Reading:

1. Michael J. H. Ratcliffe and Sonja Hartle (2014) Cells, the Bursa of Fabricius and the generation of antibody repertoires. In *Avian Immunology* 2nd Ed, (Eds: Schat, K. A, Kaspers, B & Kaiser, P) Academic Press pp: 65-91.

2. Hedda Wardemann and ChristianE.Busse (2017) Novel approaches to analyze immunoglobulin repertoires. Trends inImmunology 38 (7):471-82. http://dx.doi.org/10.1016/j.it.2017.05.003

3. Stefano Vergani, Ilya Korsunsky, Andrea Nicola Mazzarello, Gerardo Ferrer, Nicholas Chiorazzi and Davide Bagnara (2017) Novel Method for high-throughput full length IgH v-d-J sequencing of the immune repertoire from bulk B-cells with single-cell resolution. Front. Immunol. 8:1157. doi: 10.3389/fimmu.2017.01157.

Registration, Training and Funding:
This project is funded jointly between The Pirbright Institute and the University of Surrey. The student will work at both institutions as appropriate during the course of the studentship, and will be registered with the University of Surrey. Eligible students will receive a minimum annual stipend of £14,777 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.