Ref: 04/PR-N

Project Title: Immunocapture of bluetongue virus virions with virus-specific antibodies to enrich for virus reads prior to next generation sequencing

Supervisors: Paulina Rajko-Nenow, Simon King **Research group:** Non-Vesicular Reference Laboratories

Project Summary:

During the one-year placement, the student will support an ongoing research project on molecular and serological diagnostics of bluetongue virus and related orbiviruses. The student will be expected to help develop, implement and validate a method for virus enrichment based on virion immunocapture. In this method, BTV virions will be captured using the virus-specific antibodies in order to reduce the amount of host RNA present in the clinical specimens [1].

Details:

The primary purpose of the Non-Vesicular Reference Laboratory (NVRL) is to provide a diagnostic service and characterise outbreaks of livestock diseases caused by Bluetongue virus (BTV), African horse sickness virus (AHSV), African swine fever virus, Peste des Petits Ruminants Virus, Rinderpest virus and Capripox viruses. The NVRL also performs applied research such as the development and validation of new diagnostic assays as well as characterising and investigating the molecular epidemiology of arboviruses. Our group also maintains the Orbivirus Reference Collection which is a unique collection of dsRNA virus isolates.

BTV is the causative virus of bluetongue (BT) disease, an infectious disease of ruminants, transmitted mainly by biting midges (*Culicoides* spp). BT is a World Organization for Animal Health (OIE) reportable disease and it is of considerable socioeconomic concern and of high importance in the international trade of animals. Before 1998, BT was considered an exotic disease of the UK, but since has caused a number of outbreaks across Europe [2]. Currently, BTV serotype 8 (BTV-8) and BTV-4 have been circulating in France and the risk of BTV incursion to the south coast of England seems likely in the future.

BTV belongs to the *Orbivirus* genus within the family *Reoviridae* and and as with other members of this genus, it has a linear double-stranded (ds) RNA genome consists of 10 segments (Seg-1 to Seg-10). The BTV genome encodes for seven structural (VP1 to VP7) and five non-structural proteins (NS1 to NS5). The high genetic viability observed in orbiviruses is attributed to evolutionary forces such as point mutation and reassortment of individual genomic segments.

The student will be under direct supervision during the initial training in high-containment facility, then he/she will be expected to work independently. The student will be trained on selected laboratory techniques e.g. virus propagation on different cell lines, nucleic acid extraction, ELISA, conventional and real-time PCR and Sanger sequencing. In addition, the student will support the NVRL in routine duties such as housekeeping, consumable management, sample reception and other duties as required. This placement will provide the successful student with a unique opportunity to work in an ISO/IEC 17025-accredited Reference Laboratory and to gain practical knowledge of diagnostic techniques.

References for Suggested Reading:

1. Knierim, D., Menzel, W., Winter, S. (2018) Immunocapture of virions with virus-specific antibodies prior to high-throughput sequencing effectively enriches for virus specific sequence. *Plos One*, May 9, 2019
2. Kundlacz, C et al. (2019) Bluetongue Virus in France: An Illustration of the European and Mediterranean Context since the 2000s. *Viruses*, 11 (7)

To Apply:
Please email your CV (no more than two sides of A4) and a covering letter detailing why you would like to undertake the placement and the knowledge and skills that you will bring to the Institute to yvonne.walsh@pirbright.ac.uk.
Closing date to apply: 31.01.20