

**Project:** **Investigating the role of lipids in infectious bronchitis virus replication**  
**(Ref: PIR6)**

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**Research Group:** **Nidovirus-Cell Interactions**

#### **Project Summary:**

Infectious Bronchitis Virus (IBV) is an avian coronavirus which causes substantial economic losses to the poultry industry as well as being significantly detrimental to poultry welfare. It has a positive-sense RNA (+RNA) genome, and upon infection, it causes cell membrane rearrangement, a trait common to all +RNA viruses (Paul & Bartenschlager 2013). The complicated membrane structures which can be formed have been studied in this lab (Maier et al 2013) and are thought to provide a site for viral RNA synthesis within the cell. Although these membrane rearrangements have been studied, the lipid composition of these structures is also thought to be important. Several viruses have been shown to modify the lipid metabolism of their host cell, which can affect the membrane fluidity and subsequently membrane curvature to form a site for virus replication (Heaton & Randall 2011). The aim of this project will be to identify the effect of IBV replication on the levels of lipids in infected cells, as well as any changes in metabolism or localisation of the lipids within the cell.

#### **Details:**

The aims of this project will be achieved using a range of molecular biology, virology and bioimaging techniques. To discover the localisation of lipids during infection, chemical compounds or antibodies which bind to specific lipids will be used which will allow for visualisation using confocal and stimulated emission depletion (STED) microscopy. This technique can be used to observe the lipids in uninfected cells and compare this to infected cells at different points over the course of infection. Following on from this, lipid metabolism during IBV infection will be investigated using chemical inhibitors. The effects of these inhibitors on virus replication will be analysed by plaque assay, Western blotting and RT-qPCR. These studies will provide the student with well-rounded experience of molecular biology, virology and bioimaging techniques which are highly transferrable to other research fields.

#### **References for Suggested Reading:**

- Paul and Bartenschlager. 2013. World J. Virol. 2(2): 32–48
- Maier et al. 2013. mBio 4(5): e00801-13
- Heaton & Randall. 2011. Microbes and Metabolism 19(7): 368-375