

Structure-function studies of *Coxiella burnetii* O-antigen biosynthesis

Supervisory team:

Main supervisor: Prof Nicholas Harmer (University of Exeter)

Second supervisor: Prof Clive Butler (University of Exeter)

Non-academic (CASE) supervisor: Prof Joann Prior (Defense Science and Technology Laboratory; Dstl)

Collaborators: Dr Isobel Norville (Defense Science and Technology Laboratory; Dstl)

Host institution: University of Exeter (Streatham)

CASE partner: Defense Science and Technology Laboratory (Dstl)

Project description:

In this project, you will determine the mechanisms of two enzymes involved in *Coxiella burnetii* O-antigen biosynthesis. *C. burnetii* is an endemic pathogen of livestock, causing abortions, and is also a human pathogen. Its O-antigen is a strong vaccine candidate, and the biosynthesis requires novel enzymatic activities. The aim of the project will be to determine the structures of these enzymes using X-ray crystallography or cryo-electron microscopy as appropriate; and to relate the structure to function using a series of enzymatic approaches and molecular dynamics. This project will contribute to a wider programme aimed at using the O-antigen as a vaccine candidate against *C. burnetii*.

The project will offer the opportunity to learn a wide range of skills, including protein chemistry, molecular biology, structural biology, enzymology and molecular modelling. There will also be considerable opportunities to interact with the partner Dstl, and other collaborators in our wider network. The project will offer a challenging and interdisciplinary PhD in cutting edge research areas. All of these methods are well established in the supervisor's group and their collaborators. There will be opportunities to also learn associated methods that the laboratories specialise in as the project develops. This project will be based in the recently established Living Systems Institute in Exeter, which houses a diverse group of leading interdisciplinary researchers. You will join a vibrant group of young researchers with interests across a range of diseases.