

Structure-based drug design against a biosecurity pathogen

Supervisory team:

Main supervisor: Prof Nicholas Harmer (University of Exeter)

Second supervisor: Dr Vicki Gold (University of Exeter)

Non-academic (CASE) supervisor: Prof Joann Prior (Defence Science and Technology Laboratory (DSTL))

Host institution: University of Exeter (Streatham)

CASE partner: Defence Science and Technology Laboratory (DSTL)

Project description:

In this project, you will make the first steps in drug discovery for against a biosecurity pathogen. The project will teach you skills in protein preparation, protein structure determination, microbiology, molecular biology, and molecular modelling. For protein structure determination, the project will provide opportunities to work with experts in X-ray crystallography and single particle cryo-electron microscopy, with the possibility of using micro-electron diffraction if suitable samples are obtained.

The aim of the project will be to determine the mechanisms of key enzymes from the biosecurity threat *Coxiella burnetii*. This organism makes some unusual chemicals important for pathogenesis that require novel enzymatic activities. In the project, you will determine the structures of these enzymes; and relate the structure to function using enzymatic approaches and molecular dynamics. Once we have a good description of the enzymes and how they work, you will use these to perform virtual screening of potential drugs as a first stage of drug discovery. 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.

The project will also offer considerable opportunities to interact with the partner Dstl, and other collaborators in our wider network. Dstl will host the industrial placement, most likely in the third year of the PhD. 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.