Investigating the Role of Host Microbiome Dynamics as Drivers of Wildlife Disease Using a One Health Framework

Project ID: 3520

Supervisory team

Main supervisor: Dr Xav Harrison (University of Exeter)
Second supervisor: Dr Barbara Tschirren (University of Exeter)
Non-academic (CASE) supervisor: Dr Ruth Cox (Animal & Plant Health Agency / APHA)

Host institution: University of Exeter (Penryn)

CASE partner: Animal & Plant Health Agency / APHA



Project description: Host-associated microbes play a vital role in protecting animals from pathogenic infection, but the factors shaping the stability of these microbial communities remain poorly resolved. Given the microbiome's ability to structure patterns of infection, addressing this knowledge gap is important as it will allow us to predict where, when, and in which hosts disease outbreaks are likely to be strongest. European badgers (Meles meles) are an ideal model for understanding the interactions among hosts, pathogens, and commensal microbes. Badgers are a wildlife reservoir of the commercially important pathogen Mycobacterium bovis, the causative agent of bovine tuberculosis. Uncovering links between the microbiome and patterns of M. bovis infection is crucial for understanding spillover risk to farmed species, and thus management of the disease.This PhD project will use a OneHealth framework to study the interactions between host microbiome, M. bovis, and the environment. Specifically, you will: Quantify individual microbiome dynamics of European badgers, and how these patterns are shaped by host social interactions and space use· Investigate the role of the environment as reservoirs of both pathogens and commensal microbes that can colonise the host·Advance our understanding of how variation in the microbiome may correlate with increased probability of M. bovis infection status and progression·Identify molecular mechanisms within the microbiome that can shape host immunity to pathogen infection and thus risk of disease progression. This project will provide comprehensive training in a suite of state-of-the-art approaches and techniques. These include molecular and bioinformatic skills (e.g. metagenomics and RT-PCR), statistical analysis (e.g. Bayesian mixed effects models), and project design and management. Fieldwork will be based at Woodchester Park, Gloucestershire working with the project partner APHA, where you will sample wild-caught badgers and environmental reservoirs of microbes. You will be part of a dynamic and supportive research environment, and supported by a supervisory team with broad and complementary expertise covering animal ecology, epidemiology, statistics, and microbiome science.Badger photograph (C) Caroline Legg.

Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.