

Immune system ageing in European badgers: fitness consequences, evolution and implications for disease dynamics

Supervisory team:

Main supervisor: Dr Andrew Young (University of Exeter)

Second supervisor: Dr Barbara Tschirren (University of Exeter)

Non-academic (CASE) supervisor: Dr Richard (Dez) Delahay (Animal and Plant Health Agency, National Wildlife Management Centre)

Host institution: University of Exeter (Penryn)

CASE partner: Animal and Plant Health Agency, National Wildlife Management Centre

Project description:

Senescence, late-life declines in reproductive success and survival, is widespread in natural animal populations, but its mechanistic causes and wider implications remain poorly understood. This project will investigate the role that 'inflammageing' (ageing of the inflammatory immune system; a major hypothesised driver of late-life frailty in humans) plays in driving late-life declines in reproductive success, survival and disease tolerance in wild European badgers.

The project will utilise the extraordinary long-term field study of European badgers led by the Animal and Plant Health Agency (APHA; our CASE partner on the project), in which the life-histories and disease states (tuberculosis infection) of 40 social groups of badgers have been monitored continuously for the past 40 years. The project therefore offers unprecedented opportunities for pure and applied research on ageing and its evolutionary and epidemiological implications in an iconic model system harbouring an economically significant wildlife disease.



Our work to date has provided compelling evidence of age-related changes in inflammatory state in this system. We now wish to advance our understanding of these changes, their fitness consequences and their implications for the progression and transmission of infectious disease. We also anticipate investigating the environmental drivers of variation in inflammatory state, the potential for the evolution of inflammatory state (i.e. the extent to which it has a heritable genetic component), and the inter-generational effects of inflammatory state (i.e. how inflammation in mothers affects the performance of their offspring). The study will thereby provide the first comprehensive investigation of the causes and consequences of inflammageing in a natural animal population.

The project would therefore suit candidates with an interest in any or all of evolutionary ecology, ageing, immunology and wildlife disease. Applicants will not be expected to be familiar with all of these fields from the outset; a keen interest in the topic and a willingness to learn are the key criteria. The PhD will be hosted within Andy Young's and Barbara Tschirren's research groups in Exeter's Centre for Ecology and Conservation (CEC) in Cornwall, UK. The CEC hosts one of the largest groups of organismal biologists in the world, with particular research strengths in evolution, behaviour, ecology, conservation and marine biology, providing a vibrant research-active community and a large cohort of early-career researchers to interact with during your time here.



If you would like to discuss the project further, feel free to get in touch.

Primary supervisor: Andy Young – a.j.young@exeter.ac.uk

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.