Evolutionary genomics of climate stress resilience in European badgers

Project ID: 3613

Supervisory team

Main supervisor: Prof Andrew Young (University of Exeter)
Second supervisor: Dr Barbara Tschirren (University of Exeter)
Non-academic (CASE) supervisor: Dr Ruth Cox (Animal & Plant Health Agency)
Other supervisors: Dr Theo Economou (University of Exeter) & Dr Oscar Rodriguez De Rivera Ortega (University of Exeter)

Host institution: University of Exeter (Penryn)

CASE partner: Animal & Plant Health Agency



Project description: Predicting the impacts of global change on animal health and disease requires an understanding of the genetic drivers and evolutionary potential of organismal resilience to climatic stressors (heat waves and droughts). In the short term, inbreeding may undermine resilience to climatic stressors, particularly in late life, by exposing the effects of deleterious recessive alleles. Over the longer term, however, climatic resilience could evolve, if populations harbour genetic variation for resilience to the stressors to which they are exposed (i.e. some genetic variants convey greater resilience than others). However, our understanding of the evolutionary genomics of climate stress resilience in animal populations remains poorly developed. This project will investigate the evolutionary genomics of climate stress resilience in European badgers (Meles meles), the primary wildlife reservoir for the UK's most economically significant zoonotic disease, bovine tuberculosis. We will do so in close collaboration with the Animal & Plant Health Agency (APHA; CASE partner on the project), using whole-genome resequencing, life-history and epidemiological data from ~2,500 badgers monitored throughout their lives across a range of climatic conditions over a 50 year field study in UK woodland. We will combine quantitative genetics and genomics with statistical methods from global change healthcare, to investigate (i) the impacts of inbreeding on climatic stress resilience (the extent to which fitness-related traits are impacted by heat waves and droughts), from development through to senescence, (ii) the quantitative genetics of climatic stress resilience (its evolutionary potential and genetic links to other traits, including tolerance of bovine tuberculosis infection), and (iii) the patterns of selection on, and evolution of, climatic stress resilience over the past 50 years. The doctoral candidate will be based in the University of Exeter's renowned Centre for Ecology & Conservation in Cornwall, and the project will be delivered via close collaborative with the Animal & Plant Health Agency, who run the long-term European badger project. Continued on next page……..

The supervisory team span multiple disciplines, providing training and support across evolutionary ecology (Main supervisor; Andrew Young), quantitative genomics (Barbara Tschirren), statistical modelling of climatic effects (Theo Economou & Oscar Rodriguez De Rivera Ortega), and wildlife disease (Ruth Cox). This ambitious project will advance our fundamental understanding of the genetic drivers and evolutionary potential of climatic resilience. It will also provide critical applied knowledge for predicting how climate change will impact European badger populations, and the associated potential for bovine tuberculosis persistence in wildlife, across the UK under future climate scenarios.

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.