From cognition to nutrition and health: how do bees differ in their choices for plants?

Supervisory team:
Main supervisor: Prof Natalie Hempel de Ibarra (University of Exeter)
Second supervisor: Prof Karen Anderson (University of Exeter)
Non-academic (CASE) supervisor: Mr Roger English (South Devon AONB)
Dr Sean Rands (University of Bristol)

Collaborators: Dr Elizabeth Nicholls (University of Sussex), Dr Michael Smith (University of Sheffield), Prof Andrew Philippides (University of Sussex)

Host institution: University of Exeter (Streatham)
CASE partner: South Devon AONB

Project description:
Bees are one of the most important and best-known group of pollinating insects, and fundamental to the success of human agricultural and economic activities, from food production to sustainable management of landscapes, habitats and biodiversity. There are more than 20000 species in seven families, and all bees closely depend on flowers throughout their whole life which is unique amongst pollinating insects. Although they are highly sensitive to sensory cues and signals that allow them to quickly find flowers and bring back rich and nutritious floral rewards back to a nest for provisioning their brood, different bee species differ markedly in their life history traits, nesting habitats, physiology, morphology and behaviour.

This project aims to deepen our understanding of the mechanistic interactions between senses, physiology, learning and view-based navigation that underlie the foraging choices of bees of different species when pollinating crops in agricultural settings. New experimental approaches are successful in tackling these questions. We need to understand how social and solitary bees differ in their behavior and diversify their diet which helps them to develop strong health and resilience against environmental stressors and climate challenges. We are looking for a highly motivated graduate with a broad background in natural science disciplines. The work involves quantitative data analysis and spatial measurements, and a solid foundation and strong interest in developing analysis skills is essential. We welcome an interest in behavioural modeling which can be developed in this project. Methods include learning and food choice tests in both lab and field settings, tracking flight paths of individual bees, and quantify flower resources in agricultural areas of Devon using remote sensing methods and considering spatial movements of bees. You will benefit from working within a lively and interdisciplinary research environment at the College of Life and Environmental Sciences of the University of Exeter and access to sophisticated experimental facilites and equipment, including established behavioural labs, setup and analysis protocols for behavioural data, and the Environment and Sustainability Institute's DroneLab research facility Although the base location will be with the main supervisor, Prof Natalie Hempel de Ibarra (http link), at CRAB (http link) in Exeter, you will also work closely with the second supervisor, Dr Karen Anderson (http link), at the ESI (http link), in Penryn. Together with collaborators in Informatics from the University of Sheffield and Sussex, we provide world-class expertise in animal behaviour, neuroscience and physical geography. The studentship includes an industrial placement at the South AONB management unit.

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.