Understanding the drivers of floral specialisation and its impact on bee nutrition and health

Supervisory team:
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Project description:
Flower constancy, the tendency of bees to visit the same type of flower during a foraging trip, is crucial for plant reproduction as it ensures the transfer of pollen between flowers of the same species. However, simulations have shown that this behaviour can limit bees' diet diversity, potentially affecting their health. Understanding the drivers of flower constancy and the consequences of this behaviour for diet diversity will be crucial to understand how nutrition and pollination by solitary and social bees are impacted by environmental change.

Increasing temperatures and changing land use patterns affect the availability and distribution of floral resources, leading to changes in foraging patterns. Bees have been shown to prefer warmer nectar and show improved associative learning when experiencing warmer rewards. In addition, bees prefer shorter flight distances between flowers when foraging. We, therefore, predict that increasing temperatures and flower clustering enhance flower constancy and reduce colony dietary diversity in bumblebees and honeybees. By manipulating temperature and flower arrangement in controlled environments, we will observe changes in bee foraging patterns and preferences. In the second part of the study, we will investigate the effects of increased flower constancy on bee health and gene expression related to health. By comparing bees with a narrow diet and bees with a broad diet, we will assess nutritional impacts and identify potential genetic markers of stress or health decline that are a result of a narrow diet. The proposed research will provide valuable insights into the resilience of bee populations facing environmental changes and inform strategies for supporting pollinator health in agricultural and natural ecosystems.

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.