Pollination in an uncertain environment

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Project description: The co-evolution of plants and their pollinators is thought to be one of the driving factors in the 'abominable mystery' (Darwin) that is the biodiversity of flowering plants. There is a diverse range of well-studied cues used by pollinators to enhance foraging efficiency, and this is still being added to (for example, floral iridescence, humidity and electric fields, discovered in the last 5 years). One reason why cue diversity is prevalent is the need for robustness in plant-pollinator interactions in a highly changeable environment. Yet, it is still unknown how, or if, variations in weather conditions impact on pollinator foraging and learning. While it is known that bees can discriminate light quality and temperature, and modify their foraging efforts, the extent to which bees can discriminate other weather conditions (humidity, pressure, electric potential gradient, or combinations thereof) has not been investigated. This project would test the capacity of pollinators to discriminate changeable environmental conditions and characterise how such conditions impact on pollinator services, behaviour and ecology. This is a technology led project, as it will pilot the use of inert cyclic perfluorocarbons to track bees in the environment, a method being developed between the labs of DR and DS. By bringing the bee into contact with a uniquely identifiable tracer, the bee's visitation path and pattern can be tracked through the collection of samples at fixed points around a hive.

This project will also provide some important first-steps into a deeper understanding of how the interactions between pollinator sensory biology, physiology and environment are mediated. The cross-institutional supervisory team will provide complementary expertise in several distinct cross-disciplinary biosciences. Specifically, the proposed project aims to study which environmental parameters bees can detect and discriminate (protocols established in HW, NHdI, and DR labs), and if quantified changes in weather conditions can causally alter foraging strategy (modelling methods established by SR and landscape based single insect tracking established by DR and DS). Bringing together expertise in bee behaviour, theoretical modelling, landscape ecology and sensory ecology, along with unique facilities (such as the rainfall simulator at Fenswood farm and the atmospheric chemistry suite, Bristol) this project offers the unique opportunity to foster our understanding of economically important insects and their foraging strategies in relation to a changing environment. This project will therefore provide training in an interdisciplinary range of skills in a number of well-established laboratories working across a range of NERC-specific themes.