

Predator personality and cognition: their impacts on prey

Supervisors

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Project description

Predator-prey interactions are a cornerstone of ecological systems. They underpin large scale macroecological processes, such as nutrient cycling, but are mediated by small, local-scale interactions of behaviour. Responses of prey to different predator species, and to the different selection pressures these species impose, are relatively well understood. However, in recent years, the idea that individuals within a species show consistent behavioural variation (i.e. animal personalities), including variation in cognitive abilities, has become one of the most hotly researched and exciting areas in animal behaviour. In this studentship, a range of fish predator species will be used to explore how variation in predator personality selects for different traits in prey, how this affects frequencies of different prey types and the ecological impacts of these effects, such as changes in habitat use and dispersal by prey.

Predator behaviour has repeatedly been shown to be important but the majority of research is still focused on the prey's perspective with the predator being treated as a "black box" (Lima 2002). Here the emphasis will be placed on the behaviour of the predator, particularly the cognitive processes that lead to encountering, detecting and successfully attacking prey, and how these vary with personality. The prey traits to be explored will be finalised upon discussion with the student depending on their research interests. Areas of interest to the supervisors include the evolution of prey colouration, prey movement and the collective behaviour of prey (i.e. group behaviour).

A wide range of experimental systems will be used in this project. Invertebrate and virtual prey (Ioannou et al. 2012) can be used in laboratory based projects in Bristol. Interactions between fish predators and fish prey (namely *Crenicichla alta* and guppies, *Poecilia reticulata*) can be carried out in laboratories at the University of Exeter and the University of the West Indies, Trinidad, as well as in the field in Trinidad. Laboratory experiments will use the latest automated tracking software to detail the interactions between predator and prey, with training in the analysis of trajectory data being provided. We expect the studentship to involve a diverse mixture of approaches as each has its advantages and disadvantages.

Lima, S. (2002) Putting predators back into behavioral predator-prey interactions. *Trends in Ecology & Evolution*, 17: 70-75.

Ioannou C.C., Guttal V., Couzin I.D. (2012) Predatory fish select for coordinated collective motion in virtual prey. *Science*, 337: 1212-1215.



The Northern Range mountains of Trinidad viewed from the University of the West Indies