Project no 12

A bird’s eye view of warning signals

Supervisors:
Hannah Rowland (main supervisor)
Research Group Predators and Prey, Max Planck Institute for Chemical Ecology
Uwe Mayer (co),
Center for Mind/Brain Sciences, University of Trento, Italy

Background: Many animals are toxic and advertise this to predators with conspicuous or distinctive warning signals, termed aposematism [1]. For over 150 years, aposematism has provided a classical system in which to study evolution and adaptation. However, despite extensive comparative, theoretical and empirical study, there remain ambiguities at the heart of the field. For example, the decision by avian predators to attack and consume aposematic insect prey relies on the coordination of multiple sensory systems. Among these, the senses of vision and taste (gustation) play particularly important roles. The gustatory system is crucial for the detection and consumption of palatable, calorie-rich foods, as well as the discovery and rejection of bitter-tasting toxic substances. However, researchers have yet to determine how birds perceive and differentiate between the different quantities or profiles of defensive chemicals in different prey [2], and there is continued debate as to whether birds use oral taste cues, or post-ingestive cues of toxicity, to make their foraging decisions [3, 4].

Project Description: You will investigate the neural correlates of taste-induced foraging biases against novel and brightly coloured prey items in avian predators. You will examine how the experience of tasting two bitter solutions, or observing conspecifics experiencing defensive compounds, is converted by the avian central nervous system into adaptive behaviour. Using c-Fos immunohistochemistry you will identify areas of the avian brain that are activated by gustation. Your research will deepen our understanding of the control mechanisms underlying the intake of nutrients and avoidance of toxins. Understanding the sensory biology of birds will provide novel insights into the evolutionary biology of taste perception and food selection and will be of interest to researchers in behavioural and evolutionary biology, experimental psychology and the medical sciences.

Candidate profile: We are searching for a highly motivated student with a scientific, and curiosity-driven attitude and a strong interest in interdisciplinary research combining psychology, behavioural ecology, and neurophysiology. Excellent communication skills and proficiency in written and spoken English is required. A background in biology or neurophysiology is preferable. Experience with working with birds would be desirable, but not absolutely necessary.

Reading (optional):


4. Kassarov L. 1999 Are birds able to taste and reject butterflies based on ‘beak mark tasting’? A different point of view. *Behaviour* **136**.