

Postdoctoral Researcher - Evolutionary Ecology of Chemical Defences

Max Planck Institute for Chemical Ecology, Jena, Germany

Application Deadline: December 13th 2017

Start date: From March 2018

Website: tinyurl.com/ybmk3nuq

Qualifications

The postdoctoral researcher should have a PhD in relevant biological subject (e.g., biology, ecology, zoology, biochemistry, or genetics), and a strong background in evolutionary biology/ecology, chemical ecology, or sensory biology (or any combination of those fields). They should provide clear evidence of research productivity, and of having been responsible for the direction of their research. Proficiency in statistics and the use of R is particularly encouraged. Funding is for 2.5 years, with a possible extension of 2 years contingent on progress. The payment and benefits are based on the TV*D guidelines.

Description

Chemically defended organisms communicate their unprofitability to potential predators with conspicuous warning signals – aposematism. A profitability spectrum among chemically defended organisms may be important in shaping ecological communities and interactions among species. For example, variability in chemical defences can switch the evolutionary dynamics of signalling systems from mutualistic to parasitic, from signal monomorphism to signal diversity. But what constitutes unprofitability, and how important is it in shaping interactions among species? We investigate these questions using a combination of laboratory experiments and field studies.

Project 1: The profitability spectrum of aposematism. There is a growing body of theoretical and empirical evidence that warning colours can be related in some way to the defence that they advertise. We will test the link between warning colours and chemical defences in lepidoptera/ hemiptera. We will investigate how organisms optimise their aposematic defences. When should prey invest in only a single defence, and in what circumstances should they spread their investment across more than one defence? The project includes aspects of: insect culturing; characterization of aposematic traits, including their costs (using biochemical, metabolic, spectroscopy, machine learning and imaging techniques); and efficacy assays with predators.

Project 2: Ecological pharmacodynamics. The standard black box approach to predator physiology cannot shed light on the mechanisms by which the chemical defences of prey have their effect. Opening the black box is vital if we want to understand (i) the processes that have selected for critical sensory abilities in consumers, and (ii) how chemical defences change organism behaviour and physiology. We will research the effects of consuming chemically defended prey using vertebrate and invertebrate predators. This will provide an opportunity to research adaptive evolution at the molecular and phenotypic level, and to explore the evolutionary ecology of variation in defences. The project will utilise techniques such as: working with specialist and generalist invertebrate or vertebrate predators/consumers; toxicokinetics; identification and cloning of genes; quantitative real-time RT-PCR; heterologous expression techniques; and bioinformatics procedures including comparative analyses.

Application Materials

Applicants should send a single pdf file comprising of a cover letter with a - statement of their research interests, a C.V. (including publication list), and the names and contact details of at least one referee. Please send this to Dr. Hannah Rowland (hrowland@ice.mpg.de). Applications will be accepted up to and including December 13th 2017, with interviews conducted in January 2018. For more information contact hrowland@ice.mpg.de.

Submit applications and further questions to:

Hannah Rowland

Max Planck Institute for Chemical Ecology

E-mail: hrowland@ice.mpg.de