

SEEWIESEN

# LECTURE SERIES

FALL/WINTER/SPRING 2019/20

Max Planck Institute  
for Ornithology

MAX PLANCK  
GESELLSCHAFT



THURSDAY | November 7th, 2019 | 13.00 | HOUSE 4 LECTURE ROOM

## BIBIANA ROJAS

University of Jyväskylä | Host: Goerlitz Research Group

### Multimodal warning signals in predator-prey interactions

Chemically defended animals often display conspicuous colour patterns that predators learn to associate with their unprofitability and subsequently avoid. Such animals, known as aposematic, deter predators by stimulating, for example, their visual and chemical sensory channels. Thus, aposematism is considered to be 'multimodal', which is advantageous because multimodal signals provide to the receiver more information per unit of time than unimodal signals. Despite this being widely known, the different components of aposematic signals tend to be studied in isolation, with most studies focusing on visual signals. Novel signals of aposematic prey are expected to be selected against due to positive frequency-dependent selection, but nature has a wide range of examples of variation among aposematic prey which contradict evolutionary expectations and leave us wondering how this variation can arise and persist. Using a polymorphic tiger moth (*Arctia plantaginis*) and a polytypic poison frog (*Dendrobates tinctorius*), we explore the forces of selection on variable aposematic signals at different scales, and study predator response to the visual and chemical components of their multimodal warning signals. Our findings in both systems highlight the importance of accounting for variation in both components of multimodal aposematic displays, and, most importantly, of testing whether or not relevant predators react differently to this variation, as they are the ultimate selective agents in predator-prey systems.

#### WHO IS BIBIANA ROJAS?

2012 PhD in Life and Environmental Sciences, Deakin University, Australia  
2013-2017 Postdoc, Centre of Excellence in Biological Interactions, University of Jyväskylä, Finland  
2018-present Academy of Finland Research Fellow, Evolutionary and Behavioural Ecology Group Leader, University of Jyväskylä, Finland

#### SELECTED PUBLICATIONS

- Lawrence, J. P.†\*, Rojas, B.†\*, Fouquet, A., Mappes, J., Blanchette, A., Saporito, R., Bosque, R. J., Courtois, E., & Noonan, B. P. 2019. Weak warning signals can persist in the absence of gene flow. (†Equal contribution). PNAS 116: 19037-19045.
- Rojas, B.\*, Mappes, J. & Burdfield-Steel, E. 2019. Multiple modalities in insect warning displays have additive effects against wild avian predators. Behavioral Ecology and Sociobiology 73:37.
- Rojas, B.\*, Burdfield-Steel, E., Gordon, S. P., De Pasqual, C., Hernández, L., Mappes, J., Nokelainen, O., Rönkä, K., Lindstedt, C. 2018. Multimodal aposematic signals and their emerging role in mate attraction. Frontiers in Ecology and Evolution 9:93.
- Rojas, B.\*†, Burdfield-Steel, E.†, Pakkanen, H., Suisto, K., Maczka, M., Schulz, S. & Mappes, J. 2017. How to fight multiple enemies: target-specific chemical defences in an aposematic moth. (†Equal contribution). Proceedings of the Royal Society B 284: 20171424.
- Rojas, B.\*, Devillechabrolle, J. & Endler, J. A. 2014. Paradox lost: colour pattern and movement are associated in an aposematic frog. Biology Letters 10: 20140193.

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