Wissenschaftskolleg zu Berlin

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FOCUS

PROJECT

Communication in Complex Communities; Ecology Matters

From the simplest cells to the complex societies of bees or humans, life thrives on communication. Often, the fate of organisms hinges upon communicating with other species. For example, prey with defenses can evolve warning signals to prevent predators from attacking them. Although theory and data show how signals arise in simple interactions between a few species, there are large gaps in our understanding of how communication evolves in the rich communities we find in nature. Even more strikingly, we have little theory and little data on how signaling between species affects the population dynamics of their communities. I am going to dedicate my stay at the Wissenschaftskolleg to advancing our understanding of how communication evolves in communities that feature multiple trophic levels, differences in biodiversity, and how one species indirectly affects another.

Recommended Reading

Mappes, J., H. Kokko, K. Ojala, and L. Lindström (2014). "Seasonal changes in predator community switch the direction of selection for anti-predatory defences." Nature Communications 5: 5016.

Mappes, J., N. Marples, and J. A. Endler (2005). "The complex business of survival by aposematism." Trends in Ecology and Evolution 20, 11: 598-603.

Alatalo, R. V. and J. Mappes (1996). "Tracking the evolution of warning signals." Nature 383: 708-710.

COLLOQUIUM, 12.11.2019

150 years after Alfred Russel Wallace: is there still something new we can learn about natural selection when studying the colours of animals?

Ever since Darwin and Wallace, animal colours have been at the core interest of naturalists because coloration is involved in the survival and reproduction of individuals. Coloration is easy to observe and accessible for experimental manipulation. In my presentation, I will first introduce some historical aspects to animal coloration research: Why were the conspicuous colours of caterpillars a problem for Darwin? Why is mimicry one of the most powerful example of natural selection but at the same time a highly paradoxical adaptation? I will also give examples of how recent technological developments have advanced our understanding of measuring colour patterns and how different animals can see them. In my research, I use colourful and distasteful wood tiger moths (Arctia plantaginis) and their bird predators. This moth species has many colour morphs (= polymorphism), which is puzzling because predators are expected to learn to avoid the most effective and common signal and thus wipe out other colour variants from the prey population, yet polymorphism is common among aposematic animals. I present the results of experiments that test ecological conditions that may drive diversity in warning signals and mimicry. Finally, I will present some ideas of my on-going work at Wiko, where my aim is to understand why selection for phenotypic similarity (= mimicry) may be stronger in the tropics and neo-tropics than in temperate and boreal environments.

PUBLICATIONS FROM THE FELLOW LIBRARY

Mappes, Johanna ([London],2024)

Predator selection on phenotypic variability of cryptic and aposematic moths

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1885971176

Mappes, Johanna (Chicago, Ill.,2022)

The effect of predator population dynamics on Batesian mimicry complexes

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1795570709

Mappes, Johanna (Oxford [u.a.],2020)

Biased predation could promote convergence yet maintain diversity within Müllerian mimicry rings of Oreina leaf beethes

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1762011891

Mappes, Johanna ([London],2014)

Seasonal changes in predator community switch the direction of selection for prey defences

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1668802619

Mappes, Johanna (Amsterdam,2005)

The complex business of survival by aposematism

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1668801299

Mappes, Johanna (London,1996)

Tracking the evolution of warning signals

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1668800209