



Seewiesen Colloquia

Thursday, 26 February 2015, 13:00 h, in House 4, Lecture Room

Auditory interactions in the night sky

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The aim of this talk is to introduce the work of the Acoustic and Functional Ecology Group, where we investigate sensory and behavioural strategies of interacting predators and prey, and to present some of the past work conducted by the Sensory Ecology Group on species interactions. Auditory information is the main sensory modality of echolocating bats, making them an ideal model system to investigate the sensory mechanisms and evolutionary adaptations of auditory processing. Due to their high intensity, bat echolocation calls are susceptible to eavesdropping by other animals, such as their prey or con- and heterospecific bats. We investigated the interspecific interactions of bats in a combined lab- and field-experiment, particularly testing if bats listen to the echolocation calls of other bats and make use of this information for their own decision making. Listening out for bat calls is even more relevant for prey insects. The strong predator-mediated selection pressure lead to the independent evolution of ears in many insect taxa. To escape from bats, eared moths possess simple ears, consisting of only 1-4 neurons, and a two-staged evasive flight response. Despite this simplicity, we showed that these ears are adapted to the species-specific predation pressure posed by their sympatric bat community and that they enable just-in-time evasive flight across multiple bat species that differ in the amount of predation threat. In contrast, predators generally experience a lower selection pressure to counter prey defences. Thus, evidence for a coevolved bat counterstrategy to moth hearing had been ambiguous. The barbastelle bat, however, is able to prey almost exclusively on eared moths by emitting low-amplitude calls, which are inaudible to moths, costly for the bat, and are derived from a high-intensity ancestral state, suggesting they are an adaptation to moth hearing. Our current work uses eared moths and echolocating bats as model system to study auditory guided flight at two extremes of sensory processing, focusing on dynamic biosonar emission and perception, and on behavioural variability as anti-predator adaptation.

Who is Holger R. Görlitz?

- 2008 PhD LMU Munich, Germany
- 2008 Postdoctoral Research Assistant, University of Bristol, UK
- 2011 Visiting Postdoctoral Research Fellow, University of Bristol, UK
- 2012 Senior Scientist, Sensory Ecology Group, MPI for Ornithology, Germany
- 2014 Emmy Noether Research Group Leader, MPI for Ornithology, Germany

Selected publications:

- Clare EL, Goerlitz HR, Drapeau VA, Holderied MW, Adams AM, Nagel J, Dumont ER, Hebert PDN & Fenton MB (2014): Trophic niche flexibility in *Glossophaga soricina*: how a nectar seeker sneaks an insect snack. *Functional Ecology* 28(3): 632-641.
- Luo J, Koselj K, Zsebok S, Siemers BM & Goerlitz HR (2014): Global warming alters sound transmission: differential impacts on the prey detection ability of echolocating bats. *Journal of the Royal Society Interface* 11(91): 20130961.
- Dorado-Correa AM, Goerlitz HR & Siemers BM (2013): Interspecific acoustic recognition in two European bat communities. *Frontiers in Physiology* 4:192.
- ter Hofstede HM, Goerlitz HR, Ratcliffe JM, Holderied MW & Surlykke A (2013): The simple ears of noctuid moths are tuned to the calls of their sympatric bat community. *Journal of Experimental Biology* 216, 3954-3962.
- Goerlitz HR, Genzel D & Wiegrebe L (2012): Bats' avoidance of real and virtual objects: implications for the sonar coding of object size. *Behavioural Processes* 89(1): 61-67.
- Goerlitz HR, ter Hofstede HM, Zeale MRK, Jones G & Holderied MW (2010): An aerial-hawking bat uses stealth echolocation to counter moth hearing. *Current Biology* 20(17): 1568-1572.