

SEEWIESEN

LECTURE SERIES

FALL/WINTER/SPRING 2020/21

Max Planck Institute
for Ornithology

MAX PLANCK
GESELLSCHAFT



THURSDAY | January 21, 2021 | 14.00 | ONLINE

NATASHA MHATRE

Western University, London, Ontario, CA. | Host: Holger Goerlitz

An insect that uses a tool to sing and an amplifier to hear

Crickets use sound to find each other space over which potential mates can sense each other is determined by the loudness of song and the sensitivity of the auditory system. According to the textbooks, this space is enhanced purely 'passively' through morphology and mechanical resonance. Song producing wings and females ears resonate at the same frequency enhancing the size of their acoustic space. But some crickets didn't read the textbook. In this talk, I will present my research on *Oecanthus henryi* which is one such species. *O. henryi* is a tree cricket, and males of this species use an active behavioural strategy to make themselves louder. They manufacture an acoustic baffle, a tool that makes them louder. In fact, using a series of models and experiments, we showed that not only do they manufacture a tool, but they manufacture an optimal tool. Not to be outdone, we found that *O. henryi* females, have an active physiological amplification system in their ears. Using careful neurobiology we show that the amplifier doesn't actually make them more sensitive than other crickets, as previously speculated. Rather, it allows them to change the frequency that they are sensitive to. What is even more remarkable is that this amplification is achieved through the activity of only a handful of motor proteins. Both findings underline the poverty of our descriptions of invertebrate behaviour and biophysics, and point to a wealth of innovations yet to be discovered even among these 'simple' organisms.

WHO IS NATASHA MATRE?

2019 – present Canada Research Chair in Invertebrate neurobiology

2019 – present Brain and Mind Institute, associate member

2018 – present Assistant Professor, Department of Biology, University of Western Ontario, London, Canada

2014 – 2018 Postdoctoral Fellow, Department of Biological Sciences, University of Toronto, Scarborough, Canada

2013 – 2014 Fellow of the College of Life Sciences, Wissenschaftskolleg zu Berlin (Institute of Advanced studies), Berlin

2010 – 2012 Marie Curie Research IIF Fellow &

2012 – 2013 BBSRC Research assistant, School of Biological Sciences, University of Bristol, Bristol, UK

SELECTED PUBLICATIONS:

- (2017) Natasha Mhatre*, Robert Malkin*, Rittik Deb*, Rohini Balakrishnan, and Daniel Robert. Tree crickets optimize the acoustics of baffles to exaggerate their mate-attraction signal. *eLife*, 6:e32763 DOI: 10.7554/eLife.32763. * contributed equally
- (2018) Natasha Mhatre and Daniel Robert. The drivers of heuristic optimization in insect object manufacture and use. *Frontiers in Psychology*, 9, 1015;
- (2012) Natasha Mhatre, F. Montealegre-Z, R. Balakrishnan, D. Robert. Changing resonator geometry to boost sound power decouples size and song frequency in a small insect. *PNAS*. 109(22) E1444-E1452.
- (2013) Natasha Mhatre and Daniel Robert. A tympanal insect ear exploits a critical oscillator for active amplification and tuning. *Current Biology*. 23(19), 1952-1957.
- (2016) Natasha Mhatre, Gerald Pollack, and Andrew Mason. Stay tuned: active amplification tunes tree cricket ears to track temperature-dependent song frequency. *Biology Letters*. DOI: 10.1098/rsbl.2016.0016, 12(4), 20160016.

LNK TO TALK:

<https://gwdg.zoom.us/j/89029201570?pwd=OTZjaTQwNTAyRnJvUnBjTE5DVXBGOT09>

Meeting-ID: 890 2920 1570

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