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Eva Lievens, Dr.

Evolution and Biodiversity

Universität Konstanz

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Born in 1989 in Ghent, Belgium

Studied Biology at Ghent University, Evolutionary Biology at the University of Montpellier 2 and Uppsala University, and Evolution and Biodiversity at the University of Montpellier

FELLOWSHIP
College for Life Sciences

ARBEITSVORHABEN

Parasite Dose and the Course of Infection: An Interdisciplinary Meta-analysis

We live on a planet of parasites. Parasitic species occur across the tree of life and infect all kinds of host organisms. Parasites play a crucial role in ecology and evolution: infections can change the food webs and nutrient flow of an ecosystem and impose strong selection pressures on host populations. From a practical perspective, parasites do enormous damage to human health and to agriculture, but can also serve our purposes as biocontrol agents. Thus, it is important to understand the ecological and evolutionary factors that govern how parasites inter-act with their hosts.

One central aspect of parasite ecology is variation in exposure dose. Depending on where a host is, how it behaves, and who it interacts with, it can encounter different numbers of a parasite species. This variation in dose can cause differences in the course of infection, that is, in the number of parasites inside the host at a given time (the parasite "burden"). In turn, differences in burden affect the severity of the infection and the risk of transmission to new hosts.

Although there is often detailed case-by-case information on the effects of exposure dose for specific host-parasite combinations, we lack an understanding of the general patterns. For example, higher doses can lead to higher overall parasite burdens, lower overall parasite burdens, or earlier peaks in parasite burden. Are certain types of parasites or conditions more likely to produce one pattern than the other? My project aims to answer this and similar questions by using meta-analysis to synthesize published studies from diverse fields. The ultimate goal is to detect fundamental patterns in dose effects and thus to aid predictions for novel host-parasite combinations.

Recommended Reading

Lievens, Eva J. P., Julie Perreau, Philip Agnew, Yannis Michalakis, and Thomas Lenormand (2018). "Decomposing Parasite Fitness Reveals the Basis of Specialization in a Two-Host, Two-Parasite System." Evolution Letters 2: 390–405. https://doi.org/10.1002/evl3.65.

Lievens, Eva J. P., Yannis Michalakis, and Thomas Lenormand (2020). "Trait-Specific Trade-Offs Prevent Niche Expansion in Two Parasites." Journal of Evolutionary Biology 33: 1704–1714. https://doi.org/10.1111/jeb.13708.

Pais-Costa, Antónia, Eva J. P. Lievens, Stella Redón, Marta I. Sánchez, Roula Jabbour-Zahab, Pauline Joncour, Nguyen Van Hoa, Gilbert Van Stappen, and Thomas Lenormand (2022). "Phenotypic but No Genetic Adaptation in Zooplankton 24 Years after an Abrupt +10□C Climate Change." Evolution Letters 6: 284–294. https://doi.org/10.1002/evl3.280.

Lievens, Eva (Kettering,2022)

Phenotypic but no genetic adaptation in zooplankton 24 years after an abrupt +10 C climate change

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1852899832

Lievens, Eva (Oxford [u.a.],2020)

Trait-specific trade-offs prevent niche expansion in two parasites

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1853035343

Lievens, Eva (Kettering,2018)

Decomposing parasite fitness reveals the basis of specialization in a two-host, two-parasite system

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1853035793