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SCHWERPUNKT

ARBEITSVORHABEN

Prospects for Elucidating the Evolution of Cooperation and Mutualism with Genomics

Individuals are inextricably linked by social interactions in highly social organisms such as humans and ants, and social interactions associated with competition for resources or mating are a basic feature of life for most organisms. Social interactions can fundamentally alter the genetic basis and evolution of traits (e.g., size, behavior), because an individual's traits can be affected directly by its own genes as well as indirectly by the genes of its social partners. Indeed, the genetic composition of the social environment has been shown to strongly affect behavior, physiology, development, survival, and reproduction in diverse animals such as ants, flies, songbirds, fish, and humans, but the underlying molecular and behavioral mechanisms remain unclear. I study the genetic and behavioral underpinnings of complex social systems in order to understand how these systems function and evolve, and more generally to provide basic insight into the genetic basis and evolution of social life.

The evolution of social interactions within species can also be used as a conceptual model for the evolution of cooperation (i.e., mutualism) between species, which, like social interactions, is ubiquitous across the tree of life. Building on my previous research, I will work towards developing theoretical and empirical approaches to understand the evolution of interspecific interactions, in particular the evolution of mutualistic relationships. I will also explore the prospects (and limits) of using genomic approaches (e.g., sequencing across the tree of life) to elucidate major evolutionary transitions in biological complexity: from solitary to highly social life, unicellular to complex multicellular life, as well as single species to complex interspecific mutualisms.

Recommended Reading

Warner, M. R., A. S. Mikheyev, and T. A. Linksvayer (2017). "Genomic signature of kin selection in an ant with obligately sterile workers." Molecular Biology and Evolution 34: 1780 1787.

Linksvayer, T. A. and M. J. Wade (2016). "Theoretical predictions for socio-genomic data: the effects of kin selection and sex-limited expression on the evolution of social insect genomes." Frontiers in Ecology and Evolution 4: 65.

Mikheyev, A. S. and T. A. Linksvayer 2015. "Genes associated with ant social behavior show distinct transcriptional and evolutionary patterns." eLife 4: e04775.

KOLLOQUIUM, 27.03.2019

Misconceptions of Evolution and Progress Towards Elucidating the Evolution of Social Complexity

Several widespread misconceptions about evolution commonly cloud public understanding of the history and diversity of life. Perhaps more surprisingly, some of these common evolutionary misconceptions also regularly sneak into scientific papers in Evolutionary Biology. I will start by briefly discussing these misconceptions, focusing on how they impact research into my main area of interest: the evolution of insect societies, as found in the ants, termites, and some bees and wasps. Moving beyond these misconceptions, I will discuss prospects and recent progress for elucidating the genetic basis and evolution of insect societies. I will talk about the relative contribution of old versus new genes to the evolution of social complexity as well as well as the general genetic causes and consequences of the evolution of social complexity.

PUBLIKATIONEN AUS DER FELLOWBIBLIOTHEK

Linksvayer, Timothy A. (Amsterdam,2022)

Microbiome breeding : conceptual and practical issues

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1818315610

Linksvayer, Timothy A. (Amsterdam [u.a.],2019)

Re-thinking the social ladder approach for elucidating the evolution and molecular basis of insect societies

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Linksvayer, Timothy A. (Berlin,2018)

Pharaoh ant colonies dynamically regulate reproductive allocation based on colony demography

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1018600728

Linksvayer, Timothy A. (2017)

Ant nurse workers exhibit behavioral and transcriptomic specialization on larval stage but not caste

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Linksvayer, Timothy A. (Cambridge, Mass.,2017)

The neuropeptide corazonin controls social behavior and caste identity in ants

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Linksvayer, Timothy A. (2017)

Artificial selection on ant female caste ratio uncovers a link between female-biased sex ratios and infection by Wolbachia endosymbionts

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Linksvayer, Timothy A. (2017)

Genomic signature of kin selection in an ant with obligately sterile workers

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Linksvayer, Timothy A. (2016)

Honey bee colonies regulate queen reproductive traits by controlling which queens survive to adulthood

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1018598235

Linksvayer, Timothy A. (2016)

Late-instar ant worker larvae play a prominent role in colony-level caste regulation

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=101859760X

Linksvayer, Timothy A. (2016)

Theoretical predictions for sociogenomic data: the effects of kin selection and sex-limited expression on the evolution of social insect genomes

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