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Animal personalities as drivers for intra- and inter-species interactions in natural arthropod communities

Unser Projekt auf einen Blick

Viele Tiere zeigen individuelle Differenzen in ihrem Verhalten („Tier-Persönlichkeiten“). Diese individuellen Differenzen (z.B. sind einige Individuen konsequent aggressiv und andere stets schüchtern) können erhebliche ökologische Folgen haben, da sie Einfluss haben können auf Populationsdynamiken, zwischenartlichen Wettbewerb, Ausbreitung sowie auf Jäger-Beute-Interaktionen, und somit auch die Erhaltung der biologischen Vielfalt oder sogar Aussterbe-Risiken beeinflussen können. Diese weitreichenden ökologischen Konsequenzen sind jedoch trotz intensiver Forschung in den Gebieten der Verhaltens- und Evolutionsökologie nach wie vor kaum verstanden.
Unser Hauptziel ist es, die Rolle individueller Variabilität im Verhalten zwischenartlicher Interaktionen durch Nahrungssuche, und innerartlicher Interaktionen durch Paarungen zu erklären.

Unser Fokus liegt bei der Nahrungssuche und den Paarungen einer in Europa weitverbreiteten Jagdspinne, *Pisaura mirabilis*. Durch eine Kombination von Labor- und Felduntersuchungen untersuchen wir die Einflüsse verschiedener Verhaltenstypen von Raubtieren auf die Gemeinschaftsstruktur der Beutepopulationen durch ihre Nahrungssuche (Ziel1 – zwischenartliche Interaktionen, tschechisches Team) und ihre Fortpflanzungsfähigkeit durch Paarung (Ziel2 – innerartliche Interaktionen, bayerisches Team). Spinnen sind wichtige generalistische Raubtiere und *Pisaura mirabilis* ist eine Jagdspinne, die zusätzlich die Nahrungssuche für die Paarung nutzt (Darbietung von Nahrung an das Weibchen).

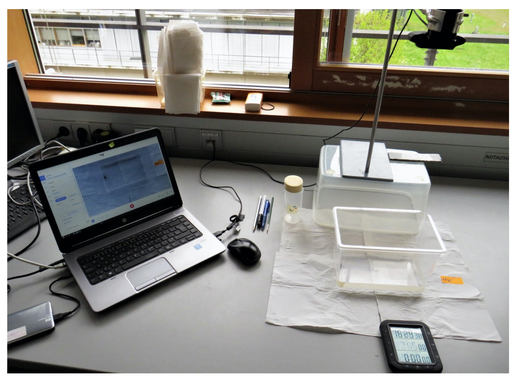
A female of the nuptial feeding spider *Pisaura mirabilis* (photo@Sabrina Weber)

A male of the nuptial feeding spider *Pisaura mirabilis* with a nuptial gift (photo@Sabrina Weber)

Field enclosures hosting replicate spider populations on the LMU Biology campus in Martinsried (Munich)

Experimental Approach

Our project is designed to provide complementary insights into the ecological and evolutionary consequences of individual variation in behaviours, specifically addressing how different predator behavioural types affect prey community structure through foraging (Objective1 – Czech team) and reproductive fitness through mating (Objective2 – Bavarian team). We address foraging and mating of a common European hunting spider, ***Pisaura mirabilis.***



Experimental set up in the laboratories of the Behavioural Ecology Group at the LMU.

Aim of our project

The growing recognition that animals across taxa show consistent individual differences in behaviour, often referred to as ‘animal personalities’, has led to the fields of behavioural and evolutionary ecology to largely focus on understanding the evolutionary implications of individual differences in behavioural expression. In any given population are certain individuals consistently more aggressive, while others are shy. These individual differences are expected to have significant ecological consequences as they may affect population dynamics, interspecific competition, dispersal, host-parasite interactions as well as predator-prey interactions potentially affecting the maintenance of biodiversity or even extinction risks. Yet, these broad ecological consequences remain poorly understood. ***Our main goal is to resolve the role of individual variability in behaviour on inter-species interactions through foraging and intra-species interactions through mating.*** *While exploring behavioural variation in foraging can clarify how different behavioural types gain food resources and how this cascades down to the prey community structure, addressing animals’ mating strategies can reveal the impact of behavioural variation on fitness of individuals and hence their reproductive success within a population.*

Field enclosures hosting replicate spider populations on the CAS Biology campus in České Budějovice

Spiders are one of the most abundant and most diversified generalist predators in terrestrial ecosystems and consume between 400 and 800 million metric tons of arthropods per year, which makes them irreplaceable elements in community ecology. Despite their indisputable impact on other arthropod communities, studies focusing on their role as main predators in ecosystem are scarce.

The spider ***Pisaura mirabilis*** *is an ideal study organism to answer our research questions as it is a predator that is often found in high abundances in nature and it has a peculiar mating system that involves hunting for insect prey, wrapping it in silk and donating the food item to females during mating (nuptial gifts).*

We use a combination of laboratory and semi-field studies to unravel:
1 – Inter-species interactions: the impact of predator behavioural type on prey selectivity and prey community structure. *Predators differing in behavioural types are expected to vary in their prey-selectivity affecting prey community structure in the wild (i.e., bold-aggressive spiders kill larger/dangerous prey and are more voracious).*
2 – Intra-species interactions: the role of behavioural types on male mating strategies and fitness. *Males of different behavioural types differ in the the nuptial gift strategy adopted, affecting male reproductive fitness (i.e., bold-aggressive spiders produce higher quality gifts and achieve higher reproductive success).*

Bayerische Staatskanzlei

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