

## Introductory Remarks to Symposium 24

## Evolution of behavior: from genes to circuits

James Lightfoot and Monika Scholz, Bonn

Behavioural evolution is shaped by the interplay between genetic factors and neural circuitry. The genetic changes can influence behavioural traits through alterations to a multitude of different processes including modifications to neurotransmitter systems, receptor sensitivity, and synaptic connectivity all of which determine the neural circuit properties. These changes are also under natural selection and ultimately it is the behavioural adaptations that enhance an organism's fitness which become fixed and drive evolutionary change. Importantly, understanding the evolutionary events underpinning changing behavioural phenotypes has been previously complicated by a focus on a limited number of standard model species for neurobiological research. Fortunately, recent technological advancements have resulted in the emergence of new model systems which have facilitated the comparative studies necessary to understand the mechanisms and evolutionary origins of behavioural diversity.

Numerous evolutionary behavioural studies are exploring comparative species developed alongside existing model systems such as nematodes, flies and mice in order to exploit the wealth of knowledge in these organisms. Additionally, researchers are also developing species representing previously unexplored phyla to understand specific facets of their behaviour and its evolution. Accordingly, in the symposia we will cover both of these aspects. This includes exploring the shared and unique circuits underlying the evolution of parental care behaviors in diverse poison frog species (Eva K Fischer, UC Davis). Using *Drosophilids*, we will examine the evolution of olfactory circuits in these species (Christoph Giez, Francis Crick Institute). We will discuss feeding behavioural diversity and the evolution of predation using the nematodes *Caenorhabditis elegans* and *Pristionchus pacificus* (Monika Scholz, MPI for Neurobiology of Behavior). In locusts we will investigate their food seeking abilities (Yannick Günzel, University of Konstanz). Finally, we will discuss the evolution of complex innate behaviours through the web building of orb-weaving spiders (Andrew Gordus, Johns Hopkins University).

## Symposium 24

Friday, March 28, 2025  
11:30 - 13:30, Lecture Hall 9

Chairs: James Lightfoot and Monika Scholz, Bonn

- 11:30 **Opening Remarks**
- 11:35 Eva Fisher, Davis, USA  
MECHANISMS OF BEHAVIORAL EVOLUTION:  
LESSONS FROM POISON FROGS (S24-1)
- 12:00 Christoph Giez, London, UK  
CELLULAR AND MOLECULAR MECHANISMS  
UNDERLYING THE EVOLUTION OF CENTRAL  
NEURAL CIRCUITS AND BEHAVIOUR (S24-2)
- 12:25 Monika Scholz, Bonn  
PREDATORY AGGRESSION IN NEMATODES  
EVOLVED THROUGH ADAPTATIONS TO NOR-  
ADRENERGIC CIRCUITS (S24-3)
- 12:50 Yannick Günzel, Konstanz  
CROWDED AND HUNGRY LOCUSTS: FIN-  
DING FOOD IN SMELLY SWARMS (S24-4)
- 13:05 Andrew Gordus, Baltimore, USA  
UNTANGLING THE WEB OF BEHAVIORS USED  
IN SPIDER ORB-WEAVING (S24-5)