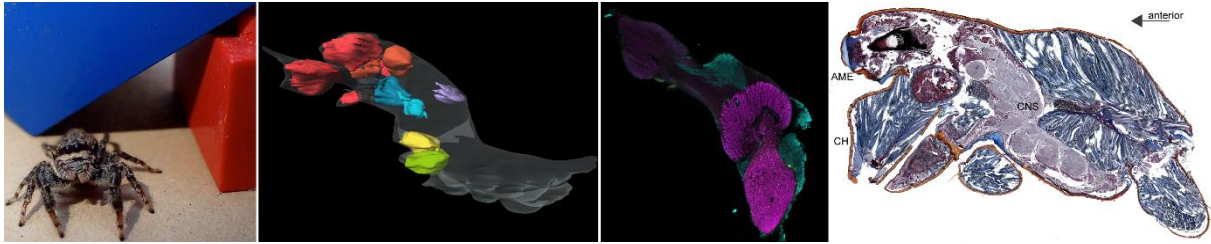


Lifestyle, senses and the brain: Comparative nervous system analyses in spiders



Background: The ecological diversity found in spiders is associated with major differences in sensory equipment, such as different number, size and arrangement of eyes. The scant available data suggests major corresponding differences in brain architecture between different spider species.

We study the anatomy of the spider central nervous system, the functional roles of their brain areas, and their degree of plasticity depending on presence or absence of sensory stimuli (Steinhoff et al., 2017, 2018). We focus on two groups of spiders that differ in their biology and relative importance of sensory modalities (vision and vibration): cursorial hunters and stationary hunters. We are investigating the plasticity of specific brain areas in response to visual and vibratory sensory enrichment during development.

Plans: There are a number of different thesis opportunities within the framework of this project. Below you find some examples of possible topics- if you are generally interested in the overarching framework of the project, please get in touch. Individual thesis topics can be discussed and adjusted according to your qualifications.

- **Comparative analysis of the primary sensory organs:** This thesis topic investigates the sensory equipment of different spider species, such as eyes and sensilla. Whereas the eyes are used in vision, sensilla are used to sense mechanical and chemical cues. We will compare the sensory equipment of spiders with different lifestyles and relate the findings to differences in the brains of the focal species.
- **Lifestyle and the brain:** This thesis topic focuses on comparative brain morphology. You will compare the brains of spider species that differ in their lifestyle, analyze structural differences as well as differences in relative volumes of brain areas.
- **Sex differences in brain plasticity?** This thesis topic will tackle the question, whether the brains of male jumping spiders are affected by an enriched environment in the same way as the female's brain. You will compare male *M. muscosa* which grew up in four different environments: a physically enriched treatment, a socially enriched (group-) treatment, a deprived environment and wild caught spiders.

When to start: For most projects any time. Get in touch!

What you will learn:

- Planning and conducting a scientific project
- Troubleshooting
- Presentation skills

Methods (vary depending on the topic):

- Micro Computer Tomography and 3D reconstruction
- Histology
- Visual & vibratory playback

For a noncommittal meeting, please get in touch with:

Philip Steinhoff, General and Systematic Zoology, philipsteinhoff@gmail.com

Prof. Dr. Gabriele Uhl, General and Systematic Zoology, gabriele.uhl@uni-greifswald.de