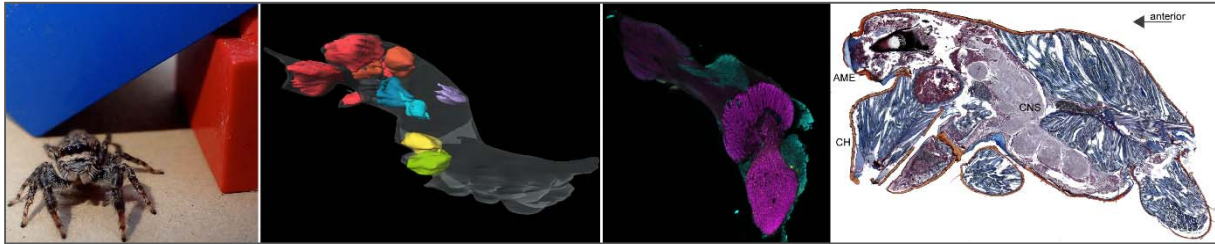


# Anatomy and plasticity of brain centers in spiders



**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.

- **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.
- **Importance of visual vs. vibratory information:** This thesis topic focuses on behavioral differences between two focal spider species, particularly with regard to prey recognition. The aim of the project is the establishment of behavioral experiments, which will later allow us to relate changes in brain structure that arise due to differential sensory input, to differences in behavior.

**When to start:** For most projects any time, if live animals are required in early summer. 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:**

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