Thesis-Topics 2024 - Animal architectures I
(Bachelor, Master BEE)

Master thesis: 1. Dynamic properties of Netcaster (*Deinopis*) capture webs and silk lines
Supervisors: Dr. Jonas Wolff; Dr. Daniele Liprandi, Prof. Peter Michalik; external: Dr. Martín Ramírez (MACN)

Background: Netcasters (Deinopidae) are a unique tropical family of spiders: instead of constructing a snare to intercept flying prey, these spiders hold their sticky web with their front legs and throw it against insects. During this high speed attack the web undergoes rapid cycles of extension and relaxation.

Question: How can the web sustain fast stretching without breaking? Do netcasters have silks with special properties? Do they form special structures with their silk, such as spiralling threads, that can act like shock absorbers? *So far this is not known to science - and you could change that!*

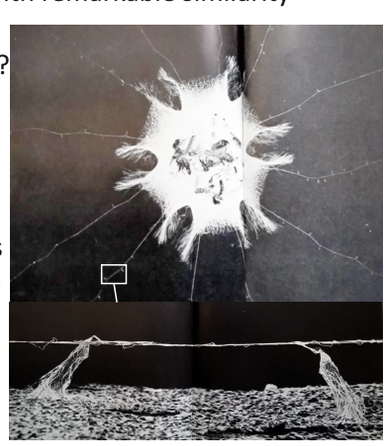
Start: mid April 2024

Tasks:
- dynamic stress-relaxation tests of isolated nets and radial lines
- quasistatic tensile tests of silk fibres and threads produced by netcasters
- high speed video recordings and video-tracking of prey capture events
- microscopy of silk threads and webs

Why should I take this topic?
- work with interesting, exotic animals
- learn to use a combination of experimental techniques: tensile testing, high speed video, microscopy
- learn about biological materials: how their properties correlate with ecological functions and how humans can draw inspiration from them to design new super-materials and devices
- work in a young, interdisciplinary team

Bachelor or Master thesis: 2. Structural optimisation of spider signal transmission lines applied to rigid substrates **Supervisors: Dr. Jonas Wolff; Dr. Daniele Liprandi; Prof. Gabriele Uhl**

Background: Some spiders construct tubular retreats in substrate crevices and have evolved radial signal lines as extended sensory devices to detect prey in the vicinity of their shelter. These signal lines - similar to telegraph lines - are suspended above the substrate on little tower-like structures with remarkable similarity across convergent lineages.



Question: How efficient are such signal lines in transmitting vibrational information? How does the structure of the line and its suspension affect signal transmission efficiency? *So far this is not known to science - and you could change that!*

Start: mid April 2024 or later

Tasks:
- keeping 1-3 different species of spiders (Segestriidae, Oecobiidae and/or Liphistiidae) and constructing a setup for the collection of spider web samples
- measuring triggered silk thread vibration via laser vibrometry or high speed video tracking analysis
- light and scanning electron microscopy of web samples

Why should I take this topic?
- work with interesting, exotic animals
- learn to use a combination of experimental techniques: bioacoustics and microscopy
- learn about biological materials: how their properties correlate with ecological functions and how humans can draw inspiration from them to design new super-materials and devices
- work in a young, interdisciplinary team

Caught your interest? Please contact
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