



Robber fly venom evolution (Transcriptomics/Venomomics)

MASTER THESIS 1

Venom evolution of specialized hymenopteran hunting robber flies applying comparative transcriptomics

This master thesis will be part of the PhD project from Stephan Drukewitz who works on the first comparative venom evolution of different robber flies. Until today it is unclear how their possible venom delivery system works and the toxin cocktail is composed.

You will process and analyze transcriptome data of a genus of one robber fly species and identify and describe their different toxins. A broad range of methods in Next Generation Sequencing but also molecular systematics and co-evolution will be learned and applied. The data will be complementary analyzed together with transcriptomic, genomic and proteomics data to describe the venom of a new non-model venomous species groups. A genomic component will be to identify expressed toxin in the genome, which we currently sequence in collaboration with the MPI-EVA in Leipzig.

Most of these analyses will be run in Linux environment on special local workstations, however, you will also use High Performance Computing on the HPC cluster in Leipzig, EVE. Methodological keywords are: assembly, transcriptome processing, hmm-search, InterProScan, Domain search, Illumina data processing, toxin evolution, phylogenetic tree and network reconstructions, functional alignment, genomics.

You will be part of a small and effective but also fun, young working group at the Institute of Biology in Leipzig. The work is expected to be started from April 2017, however, the precise date is flexible and can be discussed.

BACHELOR THESIS

Venomomics of specialized hymenopteran hunting robber flies

(Master thesis preferred)

see above.





Robber fly venom evolution (Functional morphology)

BACHELOR THESIS 1

Comparative 3D reconstructions of synchrotron based μ -computer tomography scans of putative venom gland systems in *Dasygogon* robber flies

This work is also part of the PhD Project of Stephan Drukewitz working on comparative robber fly venom evolution. You will work on scan data that was generated in a particle acceleration ring at the Paul Scherer Institute in Switzerland (PSI Synchrotron facility).

You will reconstruct the unclear anatomy and functional morphology of salivary gland and putative venom gland systems of a robber flies species. You will use Windows and Linux based operating systems and state of the art graphics reconstruction programs such as ITK-SNAP, Fiji, Blender on special workstation computers. The discussion of results demands understanding and familiarization into anatomical literature of insects and dipterans. The results will be combined with transcriptomic, genomic and proteomics data to describe the venom of a new non-model venomous species groups.

The thesis will start with a workshop on 3D reconstruction taught by Dr. Alexander Blanke (University of Hull) that is financed by a DFG grant end of March. You will be part of a small and effective but also fun, young working group at the Institute of Biology in Leipzig. The work is expected to be started in April 2017 (after the workshop), however, the precise date is flexible and can be discussed.

BACHELOR THESIS 2

Comparative 3D reconstructions of synchrotron based μ -computer tomography scans of putative venom gland systems in *Laphria* robber flies

See above.

