



### [M.Sc. thesis] Three-dimensional insect eye morphology in relation to ecological niche

Insect compound eyes, consisting of a varying number of ommatidia, are known to be adapted to the animal's life style. The size of the single ommatidia and the angle between these ommatidia (inter-ommatidial angle) are important factors for the light capturing capacity and acuity (spatial resolution) of the compound eye. Even within a single compound eye, the size of and angle between the ommatidia can vary.

The aim of this project is to understand the ecological factors that influence the spatial distribution of different ommatidial sizes and angles over the compound eyes of multiple insect species. Additionally, the size and orientation of the eyes in relation to the main body axis will be analysed to identify the insects' visual fields, including the area in which vision from both compound eyes overlap and thus allow 3D-vision.

The focus group of this study will be earwigs (Dermaptera). They inhabit a variety of ecosystems and microhabitats worldwide. Many species are omnivore generalists, while others are specialized predators or herbivores. A few species are known to fly regularly while others are wingless. These different life-styles and the relatively small number of ommatidia per eye make Dermaptera an ideal taxon for studying the evolution of the three-dimensional eye morphology in relation to their ecological niche.

Prospective candidates should have acquired skills/knowledge in two or more following topics during their studies:

- basic knowledge about insect morphology, systematics and evolution
- basic knowledge of statistics
- basic knowledge in a programming language

The project will involve computational approaches to capture and analyse the 3D-morphology of earwig eyes using  $\mu$ CT-scans. Additionally, the applicant is expected to expand a literature database on the ecology of the studied species.

Of course candidates can expect to receive in-depth training regarding the above methodological topics. Candidates can expect to gain skills in programming, statistics, working with large datasets of different types and image analysis all of which will be beneficial for a career in science or the industry.

Applications should contain your CV, your transcript of records and a short statement about your motivation to work on the depicted topic in **one** PDF file.

The successful candidate will be supported financially with a student assistant (SHK) contract.

Contact can be made in English or German with Dr. Alexander Blanke (E-mail: [blanke@uni-bonn.de](mailto:blanke@uni-bonn.de)). Information about the workgroup can be found online <https://zoologie.uni-koeln.de/arbeitsgruppen/ag-blanke>

The workgroup will move to the Institute of Evolutionary Biology and Animal Ecology, University of Bonn, An der Immenburg 1, 53121 Bonn in September 2020. Work on the thesis can start in October or later.