Announcement

Master Thesis

"How does the cabbage stem weevil *Ceutorhynchus pallidactylus* disarm the "mustard oil bomb" of its host plant?"

Background

Weevils of the genus *Ceutorhynchus* feed exclusively on crucifers (Brassicaceae), although these plants evolved a strong phytochemical defense system to prevent being eaten by herbivores. Upon feeding damage, glucosinolates are hydrolyzed by β-thioglucosidase enzymes (myrosinases) to form isothiocyanates well known for their toxicity for herbivorous insects. Few groups of insects successful adapted to this so-called "mustard oil bomb" and are specialized to feed on crucifers. With over 400 species, the genus Ceutorhynchus represents by far the largest insect radiation on Brassicaceae. It can therefore be expected that Ceutorhynchus considerably contributed to the "arms-race" between insects and crucifers. Their species richness further implies that these beetles evolved an efficient strategy to overcome the chemical defense in crucifers.

Goals

To infer the adaptation of *Ceutorhynchus* species to their crucifer hosts, feeding bioassays will be performed with *Ceutorhynchus pallidactylus* and *Arabidopsis thaliana*, a plant containing 4-methylsulfinylbutyl glucosinolate. After ingestion of *A. thaliana* leaves, weevil bodies and feces will be extracted in methanol and the extracts analyzed by liquid chromatography-tandem mass spectrometry (LC-MS/MS). The lab work will be conducted in the Max Planck Institute for Chemical Ecology (MPI-CE) in Jena, in collaboration with Dr. Franziska Beran (Research Group Sequestration and Detoxification in Insects).

Schedule

Work may begin March 2022 or soon thereafter and is scheduled for one year. Publication of results is intended. The project is ideally suited as MSc thesis work in the curricula *Zoology* or *Ecology & Ecosystems* at the University of Vienna.

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