

## Msc Thesis – Effect of local and landscape-scale land use intensity on the symbiotic microbiomes of bumblebees

Bumblebees are essential pollinators of crops and wild flowers, and therefore key for maintaining human food security and biodiversity. Similar to humans, these social bees rely on a symbiotic bacterial gut microbiome community to help digest their food (particularly hard to digest pollen) and to fight off potential pathogens. Because they pass on their microbiomes within their colonies from mother and worker bees to the offspring, their microbiome is relatively stable. But we know that environmental stressors such as antibiotics and pesticides can disturb the healthy microbiome and turn it into a 'dysbiotic' disfunctional community. With this Msc thesis, we want to test whether land-use intensity affects these symbiotic microbiomes. This project builds on the HealthyPollination project (Prof. Ayasse, Prof. Wilfert), for which we have intensively studied health parameters of *Bombus lapidarius* under a gradient of land-use intensity in the field, as part of a long-term biodiversity monitoring scheme, the Biodiversity Exploratories (with sites e.g. in the Swabian Alb). We will use the hundreds of samples collected for this study to sequence their microbiome. This means that we will not only be able to study variation in the composition of the microbiomes, but will be able to relate it to local and landscape-level land use intensity as well as to their own health status (e.g. their body size, whether they carried viral pathogens and other health parameters). This wealth of data on individuals that are already in our freezers makes this project into a 'low risk, high gain' thesis 😊

In this project, you will be able to gain the following skills, apart from scientific writing and analysis

- Molecular work: DNase treatments, RNA transcription, nucleotide concentration and quality measurements; potential for qPCR
- Bioinformatics: microbiome analysis

Additionally, there might be the potential for additional field work or experimental work, depending on student interest.

Start date: The start date is flexible, but ideally between July-October 2024.

Project supervisors: Prof. Lena Wilfert, Dr. Kunal Jani & Dr. Fanni Borveto

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