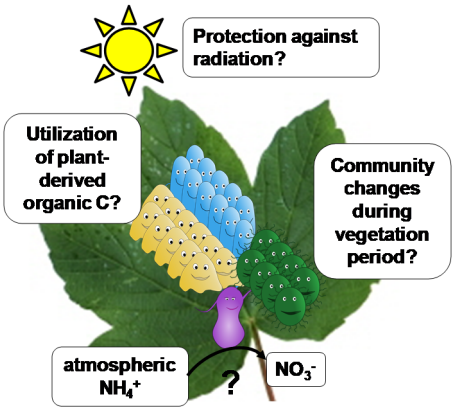
*Are you interested in exploring hidden microbial diversity and microbial processes in difficult to access environments such as tree canopies? Then join our team at the Institute of Biodiversity, Aquatic Geomicrobiology, for a **master project** aiming at the*

Identification of key drivers of bacterial diversity and abundance in the phyllosphere of temperate forests



Background:

Aerial surfaces of plants such as leaves and stems are usually densely colonized by microorganisms which play a vital role in defending the plant against pathogenic bacteria or fungi. In return, leaf-colonizing microorganisms benefit from organic compounds released by the leaves. Phyllosphere-microbiota have been intensely studied for herbaceous model plant species such as *Arabidopsis* while knowledge is still scarce regarding the phyllosphere of forest canopies, especially in temperate, deciduous forests.

Research questions:

- Do trees harbour species-specific phyllosphere-microbiomes?
- Is there a succession of phyllosphere microbial communities from spring to autumn?
- Which are key metabolic properties of phyllosphere microbiota that explain their survival and success in tree canopies?

Study site:

This master project will be linked to field investigations carried out in the Hainich Critical Zone Exploratory in Thuringia in the framework of the CRC AquaDiva, and using the Canopy Crane facility of the Leipzig hardwood forest. Special field infrastructure, especially in the case of the "Leipziger Auwaldkran", will allow access to tree canopies in up to 30 m height, enabling sampling of leaf material several times during the period of this master thesis.

Methods and experimental strategy:

We will focus on dominant and typical tree species of the two forest sites, such as *Fagus sylvatica* (Hainich), *Acer pseudoplatanus* (Hainich, Leipzig hardwood), *Quercus robur* (Leipzig) and *Tilia cordata* (Leipzig), which will be sampled at least twice (late spring upon sprouting of leaves and early summer when leaves are fully developed; autumn samples for comparison are available from a previous year). Community composition of phyllosphere-associated microbiota will be assessed using molecular methods such as 16S rRNA gene-targeted Illumina MiSeq amplicon sequencing and quantitative PCR. In addition, the student will isolate bacteria from leaf surfaces to further investigate growth, spectrum of substrates that can be used, and stress responses to desiccation/rewetting and to light/UV light to get insight into the bacteria's adaptation to life in the forest canopy.

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