CSC-Tübingen PhD Scholarship Program

2025/2026 application round: prospective PhD positions at the University of Tübingen

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Faculty: Faculty of Science

Institute / Section / Subject: Soil Microbial Interactions

Supervising Professor(s): Jun. Prof. Kyle Mason-Jones (*Dr. rer. nat.*)

About the Supervisor(s): Soil microorganisms play crucial roles in the carbon cycle and the recycling of plant nutrients. We research the ecological mechanisms of these processes and how they interact with agricultural practice. In particular, we aim to understand how viruses shape bacterial communities and redirect carbon and other nutrients between plants, soil and atmosphere.

Kyle Mason-Jones completed his PhD at the University of Göttingen in 2018 (*summa cum laude*), after which he did postdoctoral research on soil multifunctionality at the Netherlands Institute of Ecology, where he also started investigating soil phages. Since 2024 he is an Emmy Noether group leader for Soil Microbial Interactions in the Department of Geoscience at the University of Tübingen, and associated with the TERRA Cluster of Excellence. Visit the group at: https://uni-tuebingen.de/en/260325

Specification/Project title: Resolving Mechanisms of Soil Community Assembly and Function with Multitrophic Synthetic Communities

Topic Description: This project will use a recently established collection of bacteria, co-occurring phages and nematodes to create soil synthetic communities (syncoms). We will test hypotheses about the role of phage and nematode predators in the assembly and function of soil bacterial communities: (1) phage and nematode predation interact to enhance bacterial turnover and diversity, by preventing the dominance of resistance specialists; (2) by suppressing dominant taxa, these predators support the emergence of inter-taxon cooperation in bacterial communities; (3) bacterial inter-taxon cooperation and their co-evolution with phages is accelerated by nematode-mediated dispersal; and therefore (4) predation not only enhances carbon and nutrient turnover in soil, but also expands the range of degradative capacities due to emergent cooperative decomposition. Combinatorial community design will be achieved with high-throughput community phenotyping (MicroResp), followed by in-depth analysis of selected communities to determine their structure (metabarcoding and qPCR), function (including enzyme and decomposition activities), and evolution (isolation, phenotyping, and re-sequencing). Finally, syncom outcomes will be validated by manipulation of native soil communities, and syncom robustness will be evaluated by observing sensitivity to invasion. We aim for new insights into the ecological interactions responsible for healthy soil function.

Intended Degree: PhD (Dr. rer. nat.)

Type of the PhD Study: Full time (complete doctoral studies at the University of Tübingen)

Required Degrees and Qualifications: MSc in microbiology, geoecology, soil biology, or environmental science, with knowledge of microbial ecology or soil biogeochemistry. Experience in sterile culture techniques, genomic analysis or soil analysis are advantageous.

Language Requirements: The working language is English.

Notes: The project is based at the Geo- and Environmental Science Centre (GUZ), a world-leading institute in Earth and biogeosciences and home of the TERRA Excellence Cluster.