



EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN



CSC-Tübingen PhD Scholarship Program

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

Faculty: Faculty of Mathematics and Natural Sciences

Institute / Section / Subject: Center for Molecular Plant Science (ZMBP)

Supervising Professor(s): [Prof. Dr. Eric Kemen](#)

About the Supervisor(s): The research at [Kemen lab](#) focuses on microbial interactions in plant ecosystems. Prof. Kemen received his PhD from the University of Konstanz (2007), before joining Jonathan Jones' group at the Sainsbury Laboratory in Norwich for postdoc. In 2012 he became a group leader at the Max-Planck Institute in Cologne. In 2017 he was appointed full professor (W3) at the University of Tübingen.

Topic:

Investigating the obligate pathogen centered microbial network using metagenomic HiC approach

Obligate biotrophic pathogens causes severe damages to various crops, but our strategies to control them are limited. Our recent research suggests that host colonization by obligate pathogens is not only depend on the host genotypes, but also on surrounding microbiota. To infer these microbe-microbe-host interactions, sequence based network analysis is a powerful tool. Classic network analysis only predict the statistical relevance of co-occurrences or mutual exclusions of taxa from sequencing data, and does not necessarily represent true ecological interactions(1). Recently, sequence based prediction become powerful tools to accelerated our understanding of microbial interaction within plant microbiome(2). We would like to incorporate metagenomics strategies to dissect the mechanisms of metabolic interactions between different microbes by using the obligate pathogenic model oomycete *Albugo laibachii*. To achieve better genome assemblies for both *A. laibachii* and its associated microbiomes, we have generated HiC data for *A. laibachii* spores. The prospective PhD student will receive bioinformatics trainings including genome and metagenomic assemblies from long read data, HiC assemblies, and genome analysis such as biosynthetic gene predictions. In addition, the prospective student can also practice wet-lab skill microbe competition assays and sterile plant infection experiments. Combining all cutting edge experiments we aim to dissect the microbial interactions that are crucial for obligate parasitism. This project will contribute to our understanding of the relationship of obligate lifestyles with the microbiome, which includes both agriculturally important pathogens and symbionts such as wheat rusts and arbuscular mycorrhizal fungi.

Required degrees: MSc in Biology or relevant. Strong interests in bioinformatics are preferred.

Language Requirements: English (TOEFL iBT 95 or IELTS 6.5 or equivalent)

Reference:

1. L. Röttgers, K. Faust, *Nat Rev Microbiol.* **17**, 193–193 (2019).
2. M. Schäfer *et al.*, *Science.* **381**, eadf5121 (2023).