Secondary metabolites from insect-associated microbes

Studying the microbiome of social insects, such as termites, helps to identify new aspects of small-molecule mediated symbiotic relations. At the same time it serves platform to identify new antibacterial and antifungal agents.

Fungus-Growing Termite System

The fungus-growing termite system is a prime example of multilateral symbiosis. The ancient farming symbiosis involves a termite host (*Macrotermitinae*), a specialized fungal mutualist (*Termitomyces*) maintained in an optimized fungal garden system (fungus comb), the presence of complex and highly adapted bacterial communities within the insect gut and fungus comb, and the co-evolved garden weed (*Pseudoxylaria*).
Project Aim

Within this project, we aim to isolate, characterize and understand the role of natural products produced by microorganisms associated with fungus-growing termites. We used various different culturing techniques to isolate termite-associated microbes and pursued the whole genome sequence of several key isolates. Subsequent chemical analysis of our isolates in axenic and co-cultures revealed several new natural product classes showing a diverse set of biological activities.
Microbial Isolates

Pseudoxylaria sp.

Termitomyces sp.

Streptomyces sp.
Biosynthetic Pathway Analysis

We have sequenced the genomes of selected new microbial species to analyze their biosynthetic potential and potentially detect new natural products. The comparative analysis of the acquired genomic information likely reveals new biosynthetic enzymes and new biochemical transformations.

Video clip about our research project

Termine Fungiculture – A Hidden Treasure Trove

Our Collaborations

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- **Group of Assoc. Prof. K.-H. Kim** (Sungkyunkwan University, Republic of Korea)
- **Bio Plant Facility** (HKI)
- **Jena Microbial Resource Collection** (HKI)

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