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Investigation of secondary metabolites from insect-associated microbes and their contribution to insect homeostasis and defense

The major goal of my PhD project is to isolate, characterize and understand the role of natural products produced by microorganisms living in close association or even symbiotic relationship with insects, in particular fungus-growing termites. It is often believed that bacterially produced small molecules contribute to the host's fitness and development by acting as biological information carrier to maintain and modulate the multilateral interaction network. But fully characterized examples are still rare, and the mode-of-actions of those molecules are often not well understood. Studying the microbiome of social insects will help identifying both new aspects of small-molecule mediated inter-kingdom communication and symbiotic relationships, as well as new antibacterial and antifungal agents. Results obtained will benefit both academic research as well as industrial pharmaceutical research.

Publications

Benndorf R, Martin K, Küfner M, de Beer ZW, Vollmers J, Kaster AK, Beemelmans C (2020)
Actinomadura rubteroloni sp. nov. and *Actinomadura macrotermidis* sp. nov., isolated from the gut of the

fungus growing-termite *Macrotermes natalensis*. *Int J Syst Evol Microbiol* , [Details PubMed](#)

Benndorf R, Schwitalla JW, Martin K, de Beer ZW, Vollmers J, Kaster AK, Poulsen M, Beemelmans C (2020) *Nocardia macrotermis* sp. nov. and *Nocardia aurantia* sp. nov., isolated from the gut of the fungus-growing termite *Macrotermes natalensis*. *Int J Syst Evol Microbiol* , [Details PubMed](#)

Guo H, Schwitalla JW, Benndorf R, Baunach M, Steinbeck C, Görls H, de Beer ZW, Regestein L, Beemelmans C (2020) Gene Cluster Activation in a Bacterial Symbiont Leads to Halogenated Angucyclic Maduralactomycins and Spirocyclic Actinospirols. *Org Lett* 22(7), 2634-2638. [Details PubMed](#)

Rak Lee S, Schalk F, Schwitalla JW, Benndorf R, Vollmers J, Kaster AK, de Beer ZW, Park M, Ahn MJ, Jung WH, Beemelmans C, Kim KH (2020) Polyhalogenation of Isoflavonoids by the Termite-Associated *Actinomadura* sp. RB99. *J Nat Prod* , [Details PubMed](#)

Schwitalla JW, Benndorf R, Martin K, Vollmers J, Kaster AK, de Beer ZW, Poulsen M, Beemelmans C (2020) *Streptomyces smaragdinus* sp. nov., isolated from the gut of the fungus growing-termite *Macrotermes natalensis*. *Int J Syst Evol Microbiol* , [Details PubMed](#)

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Lee SR, Lee D, Yu JS, Benndorf R, Lee S, Lee DS, Huh J, de Beer ZW, Kim YH, Beemelmans C, Kang KS, Kim KH (2018) Nalenenamides A-C, Cyclic Tripeptides from the Termite-Associated *Actinomadura* sp. RB99. *Molecules* 23(11), [Details PubMed](#)

Guo H, Benndorf R, Lechnitz D, Klassen JL, Vollmers J, Görls H, Steinacker M, Weigel C, Dahse HM, Kaster AK, de Beer ZW, Poulsen M, Beemelmans C (2017) Isolation, Biosynthesis and Chemical Modifications of Rubterolones A-F: Rare Tropolone Alkaloids from *Actinomadura* sp. 5-2. *Chemistry* , [Details PubMed](#)

Supervisor

[Christine Beemelmans](#)

Co-Supervisors

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Start of PhD

April 1, 2014

Doctoral Disputation

July 24, 2020

