Thiopeptide control in heavy metal-resistant *Streptomyces*

Actinobacteria produce antibiotics such as thiostrepton, which affect the transcription factor TipA. Target genes of this regulation in antibiotic and heavy metal resistance, including vitamin B12 synthesis, are to be characterized by cultivation and molecular biological experiments.

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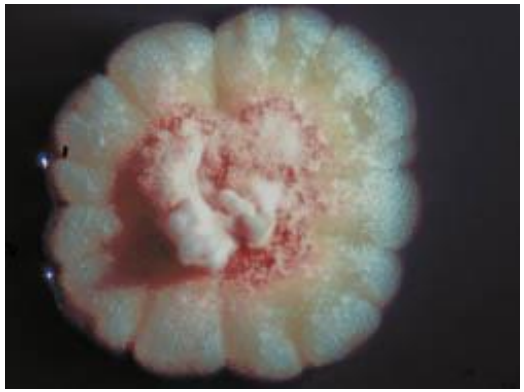
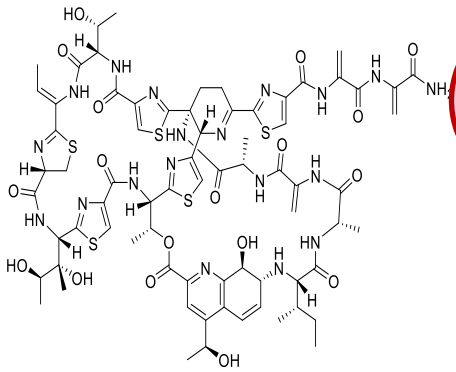
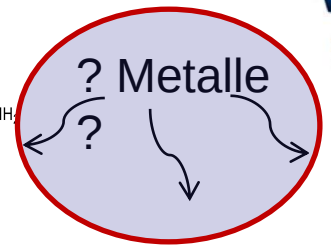
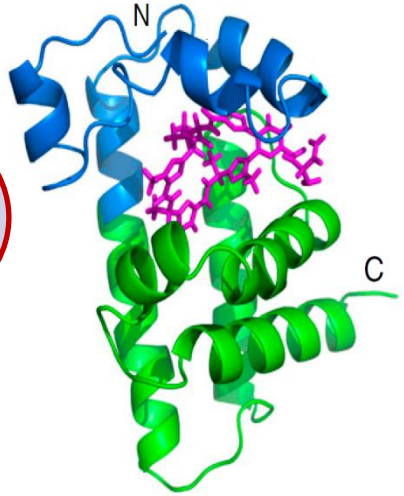




Thiostrepton
(Anderson, *et al.*, 1970)





TipAS-Thiostrepton complex
(Habazettl, *et al.*, 2014)

Mycorrhizal symbiosis in metal and salt stress

How can fungi protect and stabilize the mycorrhiza in inhospitable environments? The ectomycorrhizal fungus *Tricholoma vaccinum*, which enters into a symbiosis with spruce (*Picea abies*) at higher metal and salt concentrations, shows strong gene regulation.
The genes and their functions are to be characterized bio-informatically, by cloning and cultivation. Further, metal and salt tolerance tests and co-culture experiments are planned in combination with microscopic analyses.

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Influence of the environment on the growth of truffles

High-priced truffles can only arise in the symbiosis of tree roots such as beech, oak or hazel with ectomycorrhizal fungi such as *Tuber aestivum*. They are cultivated in truffle gardens. In cooperation with mushroom growers from Thuringia, the aim is to investigate which factors play a role in the successful cultivation of truffles. The associations with helper bacteria and the existing microflora and the influence of biogeochemical processes on fitness in times of climate change will be identified and their role in fruiting body development will be determined.

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Interaction of *Serpula lacrymans* and *Schizophyllum commune*

The two wood-decomposing fungi influence each other. In particular, the presence of *S. commune* significantly inhibits the growth of *S. lacrymans* and leads to increased pigment formation. Since the two mushrooms don't have to touch for this, volatiles probably play a role.

The influence of the different developmental stages of *S. commune* and also mutants with a different volatiloma compared to the wild type will be investigated. Another project will focus on how modified inositol affects signaling in *S. commune S. lacrymans*. Preliminary studies show less growth inhibition here.

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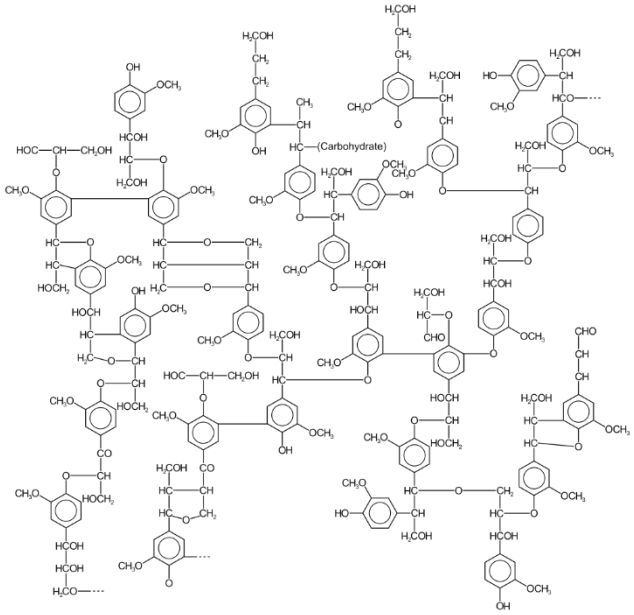
S. lacrymans vs. *S. commune* Inositol mutant

S. lacrymans vs. *S. commune m*onokaryon

S. lacrymans vs. *S. commune d*ikaryon

Remediation of contaminated soils using *Schizophyllum commune*



Lignin

Polycyclic aromatic hydrocarbons (PAHs) contribute significantly to environmental pollution because they are difficult to degrade and pose a health risk. Among other things, they can have carcinogenic effects.

S. commune is a white rot fungus and consequently produces peroxidases and laccases that break down the complex molecule lignin from wood. Lignin has a similar structure to PAHs. We want to investigate whether *S. commune* is a possible organism for the remediation of contaminated soil with PAH-contaminated soil. A laccase overexpressing strain is available for these studies.

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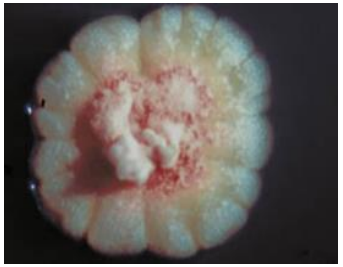
Other topics are possible by arrangement

„omics“ in the higher basidiomycete *Schizophyllum commune*

Ectomycorrhizal fungi



Bioremediation using microorganisms

See also at
https://www.mikrobiologie.uni-jena.de/en/institute/microbial-communication

Prof. Erika Kothe, Dr. Katrin Krause