

Call for application (Master's thesis)

Master's thesis **Pharmaceutical Bioinformatics**

Topic: Cultivation and transcriptomics analysis of bacteria of the genus *Streptomyces* for the sustainable production of industrially used natural products

Background:

Some streptomycetes can use the very low concentrations of molecular hydrogen (H_2) in the air for energy supply. This property leads to improved survivability even when nutrients are scarce, but it also opens up the possibility of producing industrially used natural products, such as antibiotics or biofuels, solely on the basis of (green) H_2 as an energy source and CO_2 as a carbon source. The underlying molecular mechanisms and biochemical metabolic pathways of H_2 -oxidizing streptomycetes will be investigated with the aim of identifying genetic modifications that would support sustainable natural product production.

Tasks:

Spores of a *Streptomyces* strain are to be cultivated in the laboratory and the consumption of CO_2 and H_2 , among other things, measured and RNA samples taken. These will then be analyzed for differentially expressed genes and metabolic pathways in transcriptomics analyses in order to better understand the molecular mechanisms of controlled H_2 oxidation in the cell.

Requirements:

You should be motivated for the project, enjoy teamwork and be interested in both laboratory work and computer-aided analysis. Experience with bacterial cultivation and/or molecular biological methods and basic knowledge of the programming languages Python and R, e.g. as taught in the lectures or exercises “**Advanced Methods in Bioinformatics**”, are ideal.

Supervision:

The work and bioinformatics analysis is supervised by the Department of Pharmaceutical Bioinformatics at the Institute of Pharmaceutical Sciences (Dipl.-Pharm. Simon Pfäffle, AK Prof. Dr. Stefan Günther). The laboratory work takes place in the working group of Prof. Dr. Erik Schleicher (M.Sc. Johannes Berger) at the Institute of Physical Chemistry.

Start of project: October 2024

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