

Master thesis in biocatalysis (m/w/d)

About us

Nucleoside antibiotics, a diverse class of natural products, are of significant interest in drug design. They derive from nucleosides and nucleotides, the building blocks of DNA or RNA, but modifications in nucleoside antibiotics can dramatically alter the canonical nucleoside scaffold (For more information, see: <https://pubs.rsc.org/en/content/articlelanding/2024/np/d3np00051f>). These modifications, particularly those to the sugar core, are highly sought-after and privileged motifs for designing nucleoside-based drugs. This is evidenced by the success of drugs like sofosbuvir (anti-Hepatitis C) and remdesivir (anti-COVID-19). Motivated by this potential, our group is dedicated to studying the biocatalytic synthesis of natural and non-natural nucleoside analogues. Our work, mainly focused on nucleoside phosphorylases operating under mild and aqueous conditions, aims to reduce the environmental burden of drug synthesis. More information about our group and work can be found here: <https://www.tu.berlin/bioprocess/einrichtungen/arbeitsgruppen/molecular-biology-applied-biocatalysis>. We are also proud to be in close cooperation with the TU-spin off BioNukleo (<https://www.bionukleo.com>).

Your Task

We recently identified and screened a library of wild-type enzymes to find suitable biocatalysts for a sugar-modified substrate, which has long been thought inaccessible with nucleoside-phosphorylases. Excitingly, we identified an enzyme accepting this modified nucleoside for the first time. In your master's thesis, you would further explore, understand, and build upon these observed reactions. This includes but is not limited to kinetics, thermodynamic characterisation, and site-directed mutagenesis. The project is also in cooperation, aiming to understand the structural reason behind this unusual substrate spectrum. Finally, this project should give prospects for synthesising a relevant and bioactive nucleoside analogue by (chemo-)enzymatic nucleobase diversification.

Specific tasks are:

- Heterologous expression of the enzyme (in *E. coli*) and purification (Affinity chromatography)
- Biocatalytic reaction on a small scale to measure kinetic and thermodynamic reaction parameters
- Analysis of those reactions via state-of-the-art HPLC-(MS) and NMR techniques
- Data analysis (fitting, statistics) and visualisation

Your Profile

We are looking for a highly motivated person interested in the project.

- You are doing your master's in biotechnology, life sciences, biology, chemistry, biological chemistry, biochemistry or relevant subjects

- High degree of independence, motivation, and reliability
- Lab experience, a plus but not required: prior experience with the methods mentioned above
- Willing to learn new methods and skills

What we offer

- An exciting and socially relevant topic for your thesis
- Excellent scientific equipment and the latest technology
- Qualified and committed supervision
- Interdisciplinary collaboration in a committed and collegial team

Inclusion statement

We encourage individuals with varied backgrounds, such as age, gender, disability, sexual orientation/identity, and social, ethnic, and religious backgrounds, to apply for our opportunities. Our dedication to providing equal opportunities remains steadfast. We endeavour to establish a diverse and welcoming work atmosphere that acknowledges and appreciates the contributions of all individuals.

Contact data

The master thesis could be started immediately and is planned for a duration of 6 months. Applications can be submitted to the following addresses:

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