
An Aptamer Based Platform for High Throughput Screening of the β -Subunit of Tryptophan Synthetase

Project at the University of Cambridge in the group of Prof. Florian Hollfelder by Yanik Weber
June 2019

Defying the odds of the ongoing Brexit debate, I had the opportunity to conduct a project work in the group of Prof. Florian Hollfelder at the University of Cambridge. The main focus of the group lies on using microfluidics as a tool for high-throughput experiments in chemical biology. In directed evolution, the phenotype of a protein is altered by replacing amino acids in its sequence. Then picking the sequence with the desired properties. The advent in molecular biology created tools to diversify a defined sequence into several millions of different sequences. To detect and pick the desired phenotype, the screening capacity and sensitivity are crucial for a successful screen. In this way the time scale of evolution collapses from millions of years to several weeks resulting in novel chemistry.

This project focused on the development of a new, high throughput screening platform for the β -subunit of a tryptophan synthetase. When expanding to a high throughput screen, by implication the odds of yielding a variant with higher catalytic activity increases. To establish a broadly applicable screening platform in double emulsions, we chose the approach of using a fluorescently labelled DNA-Aptamer as a detector for the catalytic activity in droplets.

As the project combined protein engineering with microfluidics I had the opportunity to broaden my knowledge in both fields. The group's diversity was mirrored by the wide background of the members including microfluidics, chemistry and biology. I especially liked the openminded approach to research. Everybody discussed current problems and exchanged useful information to find solutions and alternatives in a way I've not experienced so far. Even as a visiting student I was free in my decisions for further experiments and the accessibility to equipment and chemicals was exceptional and contributed a lot to the positive outcome of the project in this restricted time frame.

Founded in 1209 by scholars leaving Oxford, Cambridge is the second oldest University in the English-speaking world, which is echoed in the cityscape. The Department of Biochemistry is located in the city centre near Pembroke college, one of the 31 constituent colleges. Including post- and undergraduates about 20'000 students are affiliated to the University. Paired with the historical buildings, the whole city incarnates a creative, open and positive atmosphere. I was very happy for the opportunity to do a 3-month project abroad and would like to thank the SNI for their generous financial support.



Left: View from the church of St Mary the Great on King's college and its perfectly mowed lawn. Middle: Impressions from the annual cardboard boat race on the river Cam. Right: Chapel of the Pembroke college.