

Research Visit in Switzerland – Interview with Misa Slanska

Michaela Slanska is a student of Biochemistry at Masaryk University who works on her Diploma Thesis in Zbynek Prokop's Team of Loschmidt Laboratories. She visited prestigious Swiss university ETH Zürich from March to May 2021. On this occasion, we asked her for a short interview.



Could you tell us more about your Diploma Thesis you are working on in Loschmidt Laboratories?

The aim of my Diploma Thesis is to solve the kinetic mechanism of fluorinase, which is an enzyme that catalyzes the formation of the carbon-fluorine bond. Currently, organofluorines are used extensively in many areas of daily life and particularly in healthcare. They are produced by chemical methods requiring harsh conditions which are not environmentally friendly. Therefore, our goal is to produce fluorinated chemicals using biological pathways in living bacterial cells. To do this effectively, fluorinase needs to be engineered to improve its catalytic efficiency that is terribly low in the wild-type enzyme. My task is to determine the

rate-limiting step of the catalytic mechanism. This information will be used to rationally design a faster enzyme.

You had the opportunity to undertake a research stay at ETH Zürich in the well-known group of Prof. deMello. What project you were working on?

My work at ETH was a continuation of a project that I focused on during my Bachelor studies. We worked on haloalkane dehalogenases as model biocatalysts due to the amount of information available about this enzyme family. We prepared halogenated fluorogenic substrates and my task in Zürich was to apply these compounds in high-throughput sorting of a library of thousands of mutants constructed by directed evolution of the dehalogenase ancestor. Basically, we wanted to find the most active variants, which should help us understand which residues are key for dehalogenation. But due to the vast number of mutants in the library, we needed to enhance the throughput as much as possible. We decided to use sorting on chip using droplet-based microfluidics with the equipment currently unavailable in the Czech Republic, and that is what I was working on at ETH.

What did you like about your stay? What did you like least?

One thing I appreciated is that I got a little bit out of my comfort zone. Particularly, since I am quite introvert, I was a little worried about coming to a new country alone and having to build new relationships. But the people I worked with were very friendly and I started feeling almost like home after a few weeks. So, the best thing that I took away from the stay are new friendships. This is especially important in science where knowing people is a key to success. Another thing I liked was that I learned to look at my projects from a different perspective. I was not working with biologists and biochemists anymore as I do in Brno but mostly with

engineers. And although it was quite challenging for us to understand each other at the beginning, our different expertise complemented each other very well in the end.

What I liked a little less was the lack of biological equipment in the lab. This is of course understandable since the deMello group does not primarily focus on biology. But to give you an example, I had to harvest one liter of bacterial culture in falcon tubes of 50 milliliters at a time. So, what would take me 15 minutes in our lab, took me more than two hours at ETH. On the bright side, this experience made me appreciate all the instrumentation we have in Brno. What I liked the least was that the COVID-19 pandemic made it very complicated for my friends to come to visit me, but I am very grateful that I had the opportunity to travel at all.

Was there something new in particular you learnt during the research visit?

I was working on something completely new to me during the stay. Although we do work on development of microfluidic platforms in Loschmidt laboratories, I personally had no prior experience with them. I was learning new things almost every day at ETH. From chip fabrication, droplet generation and sorting to analyzing pre-steady-state kinetics of positive hits on chip. Also, I was working with living cells instead of purified enzymes for the first time, and as I learnt, this comes with many challenges. Surprisingly, I also gained new experience in microbiology – unfortunately usually by the hard way not seeing any colonies growing on my plate.

How did you spend your free time in Switzerland? Did you find time to travel?

Switzerland is one of the countries I always wanted to visit but never actually got to it. I decided at the beginning of my stay that I would travel somewhere every weekend. You would find me on a train travelling either to some city or to the breathtaking (both because of the view and because of the steep hike) Alps every Saturday morning. As I mentioned earlier, my colleagues were very friendly and we got for dinner or beers together after work sometimes.



During the weekends, we met as well, for example for barbecue. And since I lived with flatmates, there was always something to do and someone to talk to.

Thank you for the interview and good luck with your Diploma Thesis.