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Supervisor's evaluation on PhD student Markéta Linhartová

I first met Markéta as her supervisor for a Summer school project, not sure what year it was, but we both were much younger. Markéta had just started her university studies. We worked together for a few weeks and it was fun. Markéta appeared as very intelligent, enthusiastic and strong-minded young girl and I was happy when, about 3 years later, Markéta started her master project with me. The thesis dealt with an attractive (but a bit controversial) topic – a role of pilin proteins in the biogenesis of photosystems. A photosynthesis-related role of pilins has been proposed in 1999 in a publication of Wim Vermaas (Arizona State University); however, since the connection between proteins involved in cell motility or DNA uptake and photosynthetic apparatus sounded too odd, this work was ignored. During MSc project, Markéta collected data demonstrating that cyanobacterial pilin proteins are needed for the accumulation of photosystems, although the mechanism remained elusive.

Markéta has decided to continue on the same (risky) topic for her PhD project and it was indeed the difficult one since the rest of the laboratory worked on our traditional questions concerning the tetrapyrrole pathway and chlorophyll-binding proteins. Markéta had to build a collection of mutant strains and antibodies, learn specific techniques. Working a bit alone things went than relatively slowly but Markéta is not just intelligent but also persistent. She constructed and screened mutants lacking components of pilin machinery for their photosynthetic performance. To our surprise, the mutant lacking pilin peptidase (PilD) was dying very fast if cultivated photosynthetically. Markéta discovered that these mutant cells are drastically deficient in the synthesis of thylakoid membrane proteins and we published these results in the Mol. Microbiology journal. Before the project has been interrupted by Markéta's maternity leave, we collected additional data on the biogenesis of pilin proteins (under review in the Front Microbiol journal) and on the role of pilins in metal homeostasis. Markéta has further contributed into an important work on the chlorophyll synthase complex published in the Plant Cell journal; she shares first authorship.

Markéta's maternity break took more than five years, however Markéta started to write the thesis already home with her two small kids. It is hard and she has my great respect. Markéta is rigorous and thorough in designing and performing experiments, all she is doing in the laboratory has merit. She is very active, hard-working, keen to discover something new and never just blindly following my recommendations. Indeed, our

collaboration has not been always effortless. But we have progressively learned to understand each other. I had to start to listen and think more about what Markéta is saying to me, balance words and keep in mind that student self-confidence is a fragile entity. Markéta has wisely stopped her exhaustive thinking about what I'm saying to her. She has realized that it is better to ask me twice or three times instead of searching for a hidden message in my chaotic, semi-random chains of words, which I'm susceptible to generate.

In believe it is a very good PhD thesis changing radically our view on the function of pilin proteins in cyanobacteria. Markéta's unpublished data strongly suggest that the Type IV pilin machinery acquired a new function in cyanobacteria, related to uptake or transport of manganese ions, a key cofactor of Photosystem II. The list of Markéta's achievements is surely long enough to meet the criteria for the PhD degree and I'm looking forward to see her again in the laboratory.

Třeboň, July 10nd, 2021

Roman Sobotka