



## Research project / Master project: Investigating the interaction between a molybdenum-dependent riboswitch and the Moco Carrier Proteins

The following project is conducted at the laboratory of Prof. Dr. Roland K.O. Sigel at the Department of Chemistry, University of Zurich, and will be supervised by Prof. Dr. Sigel and Fabio Amadei.

### Abstract

A new family of molybdenum-dependent riboswitch has been discovered in 2008<sup>[1]</sup>, Genetic assays demonstrated that this riboswitch is able to control gene expression in response to molybdenum cofactor (Moco) production. However, evidence of the direct interaction between Moco and the RNA is still missing due to the instability and oxygen sensitivity of Moco. This molecule cannot be produced by classical chemical synthesis, but it can be obtained bound to Moco Carrier Proteins (MCP). These proteins protect Moco from degradation and they act as a vector to transfer Moco to the respective molybdenum-dependent enzyme<sup>[2]</sup>. The *in vitro* transfer of Moco from the MCP into an appropriate apo-enzyme has been confirmed and surprisingly the addition of anions such as tungstate promotes the Moco transfer.

[1] E. E. Regulski, R. H. Moy, Z. Weinberg, J. E. Barrick, Z. Yao, W. L. Ruzzo, R. R. Breaker, *Mol. Microbiol.* **2008**, 68, 918-932.

[2] K. Fischer, A. Llamas, M. Tejada-Jimenez, N. Schrader, J. Kuper, F. S. Ataya, A. Galvan, R. R. Mendel, E. Fernandez, G. Schwarz, *J. Biol. Chem.* **2006**, 281, 30186-30194.

### The project

The goal of the project is to investigate the molybdenum-dependent riboswitch/MCP interaction. This information will be extremely important for a better understanding of the direct interaction between Moco and the molybdenum-dependent riboswitch. Footprinting assays, as well as Native PAGE, will be mainly used to characterize the formation of an RNA-protein complex and to elucidate the effect that tungstate and other anions have on this complex. Other methods such as DLS, SPR and MS will also be considered.

### We offer

You will work in an interdisciplinary team of chemist, biochemists, biologists and bioinformaticians. You will learn how to produce and purify an RNA of interest, radiolabeled it at different positions and perform with it the most common footprinting assays. Most of the experiments will be performed in anaerobic conditions. The starting date will be mutually agreed upon.

### We expect

We are looking for a motivated student with a background in biochemistry, chemistry, biology or the like. Experience with RNA handling is an asset but not required.

### Application / Contact Details

Please send a short motivation letter and your CV to Fabio Amadei (fabio.amadei@chem.uzh.ch).