

Pavel Hrouzek's group

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Title of the project: Iron scavengers - dynamics of siderophore production in cyanobacterium *Leptolyngbya* sp.

For how many student/s: 1

Description of the project:

Iron is an essential element for both photosynthesis and respiration, for life as we know it in general. In environment where iron is scarce the survival and growth of microorganisms often get limited by its availability. In aerobic aquatic environments iron is oxidized to Fe³⁺ that is not biologically available and often forms precipitates that sink to the bottom. To exploit such a pool of iron microorganisms have evolved **siderophores** that can sequester ferric iron, prevent its precipitation and render it available to cellular import.

In our research team we focus on **secondary metabolites** produced by *Cyanobacteria*. These compounds naturally present in the environment are often toxic to humans, yet their natural function often remains elusive. Recently we have identified a set of genes present in genome of a *Leptolyngbya* sp. strain that likely encodes the production of a secondary metabolite that according to our preliminary data capable of binding iron and hence a siderophore. Several trials have been performed to isolate it and verify its proposed structure. Now we would like to know how strong the interaction between the compound and ferric iron is, how fast the organism reacts to lowered availability of iron or sudden change of iron source (Fe²⁺ to Fe³⁺) and when the production of the proposed siderophores is triggered.

In the proposed project the student will:

- 1- isolate siderophores from biomass of cyanobacterium *Leptolyngbya* sp. The procedure will include extraction, fractionation of crude extract and finally purification of the compounds by semi-preparative HPLC (High Pressure Liquid Chromatography).
- 2- evaluate the affinity of the isolated compounds to Fe³⁺ especially in comparison to other known siderophores such as EDTA or deferrioxamine B.
- 3- cultivate the strain of interest in conditions where the amount and form of iron present will differ. During the course of cultivation dynamics of siderophore production will be observed by HPLC/MS (MS - mass spectrometry). The compounds obtained in the previous part of the project will be used as standards for accurate quantification.

Requirements:

The student is expected to be comfortable in speaking and writing in English. Language requirements also include basic understanding of written scientific text. Previous laboratory experience is an advantage not a necessity, however significant part of the project will be performed in the wet lab so the student should be comfortable with handling glassware and doing other works that will require fine motor skills. Study degree is not essential, although there is a slight preference for advanced bachelor student.