

## Plant physiology

### **Morphological and physiological adaptations to UV radiation excess in lichen *Usnea antarctica***

supervisor: prof. RNDr. Martin Bačkor DrSc.

study form: full time

Annotation: Lichen *Usnea antarctica* is forming two ecotypes, depending on degree of exposition of thalli to photosynthetic active radiation (PAR) and UV. Main aim of this study will be comparison of anatomy and morphology of these ecotypes, assessment of UV radiation effect on selected metabolic processes and analyse content of selected compounds, which play role in increased tolerance of lichens against PAR and UV radiation.

### **Lichenism as environmental adaptation of cyanobacteria to environment with increased intensity of UV radiation**

supervisor: prof. RNDr. Martin Bačkor DrSc.

study form: full time

Annotation: Cyanobacteria (blue green algae) are capable to live in environment with high intensity of UV radiation. One from the adaptation to this environment is lichenism, symbiosis of algae, or cyanobacteria with fungi. The aim of this study will be assessment of selected parameters of metabolism in cyanobacteria *Nostoc commune* and cyanolichen *Leptogium menziesii* exposed to short-term and long-term exposition to UV radiation.

### **Monitoring of mercury content in environment using lichens**

supervisor: prof. RNDr. Martin Bačkor DrSc.

study form: full time

Annotation: Lichens are effectively employed in biomonitoring of environmental pollution for long time. It is mostly due to species determined differences in sensitivity against xenobiotics and lack of protective layer on the surface of lichen thalli – cuticle. The aim of this study is to determine mercury content in lichens related to distance from source of pollution (historical mining) and analysis of changes of selected parameters of lichen metabolism.

### **Physiological adaptations to nitrogen deficiency in green alga *Zygnema* sp.**

supervisor: prof. RNDr. Martin Bačkor DrSc.

study form: full time

Annotation: Algae from genus *Zygnema* are capable to growth in environments with low availability of nitrogen in environment. The aim of this study is to compare parameters of plant metabolism of alga in dependence from availability of selected forms of nitrogen concentrations and their concentrations.

### **Effect of environmental factors on accumulation of isoflavonoids and other phenolic compounds in *Lotus japonicus*.**

supervisor: doc. RNDr. Peter Paľove-Balang, PhD.

study form: full time

Annotation: The work is aimed to the biosynthesis of secondary metabolites, namely isoflavonoids in the model plant from the family *Fabaceae*. This plant is one of the intensively studied objects in plant physiology and molecular biology. The aim of the work is a comparison of several environmental factors on the accumulation of secondary metabolites with an important role in stress response, to acquire new knowledge in effect of these factors on the secondary metabolism. The most effective abiotic factors will be focused.

**Biosynthesis of phenolic compounds and its induction and regulation in model plants.**

supervisor: doc. RNDr. Peter Paľove-Balang, PhD.

study form: full time

Annotation: The work is focused to the biosynthesis of phenolic compound in the model plants, namely to understand the principles of the regulation of the formation of several groups of phenolic compounds. The important milestone is testing the biologicaly active compomnds that may coordinate their metabolic processes. Exogenous application of active compound will be used, or mutant lines will be used that differ in the accumulation of such compounds.