
Algae and Cyanobacteria From Extreme Environments

"Our mission is to assess the diversity of algae and cyanobacteria in various extreme environments, their survival limits and adaptation mechanisms."

Offer

We are open to a wide spectrum of collaboration with partners from applied research, industry, and state and non-profit organisations.

- Isolation, purification and characterization of algal strains
- Providing an evolutionarily diverse set of valuable algal strains

Requirements

We are looking for cooperation with academic partners as well as public and private organizations in the fields of algal ecology and biotechnologies.

Know-how & Technologies

The application potential connected with our research lies in the utilization of algae and cyanobacteria from extreme environments to produce many high-value chemicals, such as polyunsaturated fatty acids, carotenoids and phosphatidylglycerol – the health-beneficial compounds used as nutraceuticals and pharmaceuticals and in cosmetics, among many other uses. Our main scientific focus is aimed at:

- Ecology of phytoplankton and phytobenthos in polar and mountain lakes
- Recovery of mountain ecosystems from acidity
- Diversity, ecology and ecophysiology of snow algae
- Algae and cyanobacteria as producers of compounds interesting for biotechnology
- Diatom research as bioindicators of environmental and climatic changes in polar ecosystems for paleoecological reconstructions

Content of Research

As primary producers, algae and cyanobacteria are important components of both natural and man-made extreme environments such as snow, hot springs, polar or acid lakes.

Our current research projects are focused on polar and mountain photoautotrophic microorganisms, with an aim to understand their ecology, diversity and biogeography. We combine field sampling and laboratory experiments to address important questions from the autecological to the ecosystem level. We also study the impact of anthropogenic acidification on the structure of assemblages and the constraints of their biological recovery.

Main Capabilities

- Algae and cyanobacteria isolation and cultivation – bringing them from extreme conditions to the laboratory
- Optimisation of growth conditions and production of target compounds
- Assessment of ecological status of aquatic environments based on physico-chemical characteristics and the species composition of algae and cyanobacteria

Key Research Equipment

Equipment for field sampling and measurement of basic physico-chemical parameters in aquatic environments, fully equipped laboratory for:

- Isolation, and cultivation of algal strains
- Molecular characterization of strains
- Optical, fluorescent, scanning and transmission electron microscopy

Main Projects

- 2014–2016 Czech Science Foundation “Microorganisms as a source of essential fatty acids with a focus on extremophile strains“

- 2010–2014 Czech Science Foundation “Detection of exobiological markers using Raman spectroscopy as a key method”
- 2007–2011 Czech Science Foundation “Constraints and limits of biological recovery from acid stress: What is the future of headwater ecosystems in the Bohemian Forest”

Partners and Collaborations

National Botanic Garden of Belgium (Meise, Belgium) | Institute of Ecosystem Study (Verbania, Italy) | Ghent University (Ghent, Belgium) | Universidad de Buenos Aires (Buenos Aires, Argentina) | Institute of Botany, Academy of Sciences of the Czech Republic (Třeboň, Czech Republic) | Institute of Microbiology, Academy of Sciences of the Czech Republic (Praha, Czech Republic) | University of South Bohemia (České Budějovice, Czech Republic) | Masaryk University (Brno, Czech Republic)

Achievements

Publications in respected international journals: biogeosciences, Phytochemistry, fems microbiology ecology, freshwater biology, Journal of applied phycology, polar biology.

Collaboration on Czech patents:

- No. 303645 – Strain of the alga *Chlamydomonas cf. nivalis* for the production of phosphatidylglycerol (PG), the method for increasing the PG content in this organism, and the use of this strain for the industrial production of PG
- No. 306000 – Nutrient solution for culturing photosynthesizing microorganisms, process for its preparation and use
- No. 307402 – A production strain of the *Bracteacoccus bullatus* alga for the production of oils containing essential unsaturated fatty acids, a method of producing these oils and the use of this strain for the industrial production of these oils

Are you interested in this expertise?

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Experts and their department

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