Algal biotechnology in Center Algatech, Czech Republic

Biorefinery: from biomass to valuable compounds

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Algatech, the Centre for Algal Biotechnology was established in 2011 as a successor the Department of Applied Algology founded in 1960 in Třeboň, Czech Republic as autonomous part of the Institute of Microbiology, Czech Academy of Sciences. ALGATECH is the largest centre for microalgae research in the Czech Republic. At present, ALGATECH Centre is an internationally recognised base for basic and applied research in microalgae photosynthesis with collaborations around the globe. The Centre consists of four laboratories: photosynthesis, cell cycles, microalgae biotechnology and photosynthetic bacteria that carry out both laboratory and outdoor trials.

Research topics of the Laboratory of Algal Biotechnology include: strain selection and characterisation, optimisation of culturing regimes in various systems, design and construction of cultivation units, indoor heterotrophic cultivation, outdoor phototrophic production of biomass as food and feed additives. Outdoor thin-layer cascades for mass cultivation of microalgae have been the trade mark of Třeboň since the 1960s. Recently, special focus has been given to isolation and characterisation of bioactive compounds with potential of pharmacological use. These substances are isolated, characterised and tested in our laboratories. Currently we use molecular biology and genetic manipulation to prepare algal and cyanobacterial strains overproducing desired high-value compounds. We test the concept of algal biorefinery, using the complete biomass.

The Centre's activities also include the development of new instruments and methodologies for photosynthesis research. Chlorophyll (Chl) fluorescence techniques have been developed since 1990s as one of crucial tools to monitor microalgae cultures. In this way, photochemical processes limiting photosynthesis in microalgae mass cultures can be characterised at the molecular level**.** Monitoring photosynthetic performance of the culture *on-line*/*in-situ* makes it possible to control cultivation process in order to adjust required cultivation conditions and select suitable cultivation system. Thus, we can also estimate the interplay between photosynthetic activity, growth and biomass yield, or even production of selected bioactive compounds.