

## **Spectroscopic Study of the Function of Carotenoids in Photosynthesis**

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Abstract of the thesis

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The research of the role of carotenoids in photosynthesis is a fast-growing branch of a biophysical and biochemical research of photosynthesis principles. The Optical Spectroscopy Group of the Department of Chemical Physics and Optics at the Faculty of Mathematics and Physics of Charles University in Prague is fully engaged at this scientific field.

The objective of this work was a spectroscopic characterization of photosynthetic pigments isolated from the green algae *Scenedesmus Quadricauda* and localization of their absorption within the spectrum of intact cells.

Crucial adaptations at the low-temperature setup were carried out prior to the measurements. The new depth recorder was installed inside the optical cryostat, which meant a significant improvement of liquid helium operation. A new Peltier-cooled photomultiplier Hamamatsu was added to the fluorescence measurement setup to enable the detection of very low optical signals. The setup for absorption measurements was equipped with a new stable light source – 1000 W wolfram bulb connected to stabilised power supply.

All the pigments contained in green algae were successfully extracted: neoxanthine, violaxanthine, luteine,  $\beta$ -carotene and chlorophylls. Low temperature spectroscopic measurements of carotenoids dissolved in organic solvents were done for the first time so that their *in vitro* response to the temperature drop to 4,2 K could be examined. Absorption spectra of all the isolated carotenoids were measured both at the room temperature and at 4,2 K. The conclusion of this thesis is an approximate localization of the carotenoids' absorption in the absorption spectrum of intact cells of green algae. This signifies a lot for the better knowledge and further study of the role of carotenoids in photosynthesis.

**Keywords:** photosynthesis, carotenoids, absorption, *Scenedesmus Quadricauda*