The Role of Carotenoids in Excitation Energy Transfer during Photosynthesis: Research by Fluorescence and Transient Absorption Spectroscopy Methods

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Diploma thesis abstract.

The task of this thesis project was experimental research of early physical events of photosynthesis, which include excitation energy transfer and relaxation processes within carotenoid molecules.

The first chapter examines light-harvesting complex LH2 of purple bacteria *Chromatium minutissimum.* Two samples were studied: LH2 complexes from wild-type cell and complexes from carotenoid-depleted cells. Previously unknown energy transfer path was found by steady-state absorption and fluorescence spectroscopy methods: from high excited states of bacteriochlorophyll to second singlet state of carotenoid. Quantum efficiency of this transfer was determined.

The second chapter examines carotenoid-protein complex OCP (orange cariotenoid protein) from Cyanobacterium *Synechocystis* by transient absorption spectroscopy methods. OCP complex is proved to be a photosensor. Rate and efficiency of photoproduct generation were determined. Global analysis technique was applied to determine carotenoid excited states lifetimes.