Blankenship, R.E., Madigan, M.T. and Bauer, C.E. (ed.): **Anoxygenic Photosynthetic Bacteria**. - Kluwer Academic Publishers, Dordrecht - Boston - London 1995. 1331 pp. Hardbound US $ 492.00 (Paperback US $ 244.00). ISBN 0-7923-3681-X.

The book representing a second volume of the series Advances in Photosynthesis (Series editor Govindjee) is divided into 10 parts, each part containing several chapters. There are altogether 62 chapters written by more than 100 authors. This is a fascinating book showing power and progress of modern biological science. The up-to-date information in all important directions of the research in bacterial oxygenic photosynthesis is covered by the book. As studies of photosynthesis are of multidisciplinary nature, the results presented are of very broad scientific range. The pure physical theories (energy and electron transfer) are supported by modern biophysical methods (pulse laser spectroscopies, *etc.*). On the other hand, the most developed methods of molecular genetics (*e.g.* site-directed mutagenesis) have been applied to reveal the molecular and structural basis of the functional effects. These two extreme aspects of bacterial research are joined together by the biochemical approach. As the bacterial photosynthetic systems are considered to be good models for more complicated apparatus of green algae and higher plants, it is not surprising that in many respects the studies of bacteria reached the highest progress. From this point of view the book could be of great value for everyone engaged in physiology of bacteria and molecular mechanisms of photosynthesis, for researchers, students and university teachers. It is not possible to mention here all the aspects of bacterial photosynthesis presented in the book. Hence, the following outline can present only some of the topics. Part I containing 7 chapters is devoted to taxonomy, physiology and ecology of bacteria. The individual families of bacteria are treated separately, namely purple and green sulfur bacteria, heliobacteria, filamentous anoxygenic phototrophs (*e.g. Chloroflexus*-like organisms), aerobic anoxygenic phototrophs and bacteriochlorophyll-containing *Rhizobium* species. Part II (3 chapters) deals with molecular structure, biosynthesis, and degradation of tetrapyrroles (porphyrins) and lipophilic components of membranes (lipids, fatty acids, quinones, hopanoids). Part III (4 chapters) describes membranes and cell wall organization. Among others, the structure and function of porins in the cell wall is presented. Both cytoplasmic and intracytoplasmic membrane systems are reviewed. Chlorosomes are analyzed in a separate chapter. Organization of supercomplexes and interaction between photosynthetic and respiratory systems is described. Part IV (8 chapters) deals with the antenna structure and function. The energy transfer is treated from the theoretical quantum mechanical point of view (*e.g.* perturbation theory, stochastic Liouville equation, *etc.*) including the classical Förster energy transfer. Molecular basis of the antenna complexes is presented in detail. Recent results of experimental studies on energy transfer in LH1 a LH2 antennae are based mainly on ps and sub-ps laser spectroscopies. Special attention is paid to the role of carotenoids. The detailed properties of their excited electronic states are analyzed using the description by group theory of representations. The trapping of excitations in and detrapping from the reaction centers is a content of another chapter. Results of modern biophysical spectroscopic methods (*e.g.* circular dichroism, fluorescence polarization, hole burning, resonance Raman, NMR, *etc.*) in studies of antennae are shown. The structural basis of the energy transfer is contained in a detailed description of protein structures or structural models of subunit arrangement in complexes and in reconstitution experiments. Genetic aspects (*e.g.* utilization of mutants) close this part of the book. Part V (10 chapters) concentrates on reaction centers, electron and proton transfer. Structure of the protein subunits is presented also in stereo pairs. Both results of kinetic studies of electron transfer within the bacterial reaction center and quantum theory of electron transfer are given (including the vibration effects). The reaction center couples the proton translocation with the light driven electron transport. Methods of special magnetic resonance and effects of magnetic and electric fields enable to study the charge recombination dynamics in blocked reaction centers in detail. Mostly the molecular triplet states and their behaviour give the information on these processes. The infrared spectroscopy offers another information on vibrational states and their role. Reaction centers of green sulfur bacteria are compared to PS I reaction centers. Individual brief chapters deal with heliobacter antenna-reaction complex and the reaction center of *Chloroflexus aurantiacus* (green filamentous bacterium). Part VI

(6 chapters) describes the components of cyclic electron transfer and energy coupling reactions. Cytochrome biogenesis and mutational studies of cytochrome *bc*1 complex are surveyed. A special chapter contains information on cytochromes associated with the reaction center. Also the bacterial ATPase, transhydrogenase and NADH dehydrogenase are reviewed. Part VII (9 chapters) contains information about the metabolic processes. Carbon metabolism in green and purple bacteria is dealt with in separate chapters. An important metabolic process, nitrogen fixation, is described predominantly from the biochemical and genetic point of view. Other chapters deal with aerobic and anaerobic respiratory electron transport, storage products or degradation of aromatic compounds. Among another aspects of bacterial metabolism the flagellate motion, signal perception and membrane active transport are included. Part VIII (7 chapters) reviews the genetics and genetic manipulations of bacteria. Gene mapping, cloning and sequencing is described. The genetic aspects of bacteriochlorophyll and carotenoid biosynthesis are treated of. Part IX (5 chapters) surveys regulation of gene expression. Among others the hydrogenase, nitrogen fixation and photosynthesis genes and their regulation are presented together with post-transcriptional control of gene expression. The concluding Part X (3 chapters) is directed to some of biotechnological applications (polyesters as potential biodegradable plastids, screening of mutants by digital imaging spectroscopy or waste degradation by bacteria. Each chapter is equipped with a list of contents and references. Very valuable survey tables, protein primary structures, figures of structural and functional models, stereo pairs, *etc.*, are presented together with a group of colour plates. The book is supplemented with a comprehensive subject index.

J. NAUŠ (*Olomouc*)