

Rochaix, J.D., Goldschmidt-Clermont, M., Merchant, S. (ed.): **The Molecular Biology of Chloroplasts and Mitochondria in *Chlamydomonas***. - Kluwer Academic Publishers, Dordrecht - Boston - London 1998. 733 pp. USD 320.00. ISBN 0792351746.

The presented monography is the seventh volume of the series *Advances in Photosynthesis* edited by Govindjee that provides a comprehensive and recent account of photosynthesis research. The editors of this volume have invited the most experienced scientists working with *Chlamydomonas* to summarize the current knowledge of photosynthesis and related parts of metabolism in this alga. They compiled 36 chapters underlining the particular features of *Chlamydomonas* that make this unicellular organism suitable for studying photosynthetic processes and their regulatory mechanisms operating under various environmental and stress conditions.

The first part consists of two chapters: a general introduction to the *Chlamydomonas* matter (Harris), and history and perspectives of *Chlamydomonas* photosynthesis research (Togasaki and Surzycki). The next part covers *Chlamydomonas* molecular genetics. It contains chapters on general organization of the nuclear genome (Siflow), methodology and peculiarities of its engineering (Kindle), a comparative analysis of mitochondrial and chloroplast genome evolution (Nedelcu and Lee), principles of chloroplast uniparental inheritance (Armbrust), chloroplast DNA replication, recombination and repair (Sears), chloroplast genetic engineering (Goldschmidt-Clermont), controlled chloroplast RNA stability as a regulatory mechanism of gene expression (Nickelsen), chloroplast transcription (Stern and Drager) and splicing (Herrin *et al.*), regulation of chloroplast translation (Hauser *et al.*), and protein import into and sorting within the chloroplast (Perret *et al.*). The third part contains chapters on the architecture of thylakoid membranes, on the structure and function of its main supramolecular complexes and on some of their low-molecular constituents. It deals with the following subjects: overall architecture of thylakoid membranes (Olive and Wollman), photosystem II "ontogenesis" (Erickson), detailed subunit-by-subunit comparative analysis of photosystem II from *Chlamydomonas reinhardtii* and other organisms (Ruffle and Sayre), structure and function of photosystem I (Webber and Bingham), light-harvesting systems assembly (Hooper *et al.*), structure, function and biogenesis of cytochrome *b₆/f* complex (Wollman), and assembly and function of the chloroplast ATP-synthase (Strotmann *et al.*). A few chapters stand out of this complex-by-complex description of thylakoid membrane: one discussing validity of the generally accepted Z-scheme (Reddind and

Peltier), one concerning pigment biosynthesis (Timko), one dealing with *Chlamydomonas* thylakoid glycerolipids (Trémolières), and two being rather methodological giving an overview of various methods for measurement of photosynthetic activity (Joliot *et al.*) and the description of a new digital imaging device measuring fluorescence and delayed luminescence (Bennoun and Béal). Following two chapters treat some of the enzymic systems not directly connected with the thylakoid membrane: the ferredoxin/thioredoxin system (Jacquot *et al.*), and the Rubisco genetic engineering (Spreitzer). The next part of the book brings information on some of the mechanisms regulating several metabolic pathways in response to changing environmental conditions: CO₂ assimilation and its adaptation to changing CO₂ availability (Spalding), starch biosynthesis regulation (Ball), state transition and photoinhibition (Keren and Ohad), copper dependent synthesis of plastocyanin (Merchant), responses to deficiencies in macronutrients (Davies and Grossman), and nitrogen assimilation (Fernández *et al.*). Remacle and Matagne review *Chlamydomonas* mitochondrial genetics, chapter 35 deals with the phenomenon of chlororespiration (Bennoun), and the last chapter is dedicated to the future of photosynthesis research on *Chlamydomonas* (Mets and Rochaix). Last but not least, the reader will find a clear and comprehensive subject index.

I can only guess the importance of this book for all the *Chlamydomonas* scientists, to whom it brings a huge set of reviews on their pet organism and offers, besides a plenty of clearly organized important facts, interesting bibliography as a starting point to future studies. But I am sure of its worth for the other people interested in photosynthesis research and teaching. The book is, of course, concentrated on *Chlamydomonas*, but many of the principles and phenomena discussed are valid for other photosynthetic organisms as well, and many of them at least impose the question whether they are not, too. Moreover, some of the topics, mainly in the part dedicated to the pigment-protein complexes, are discussed on the background of comparison with other organisms, a fact that I highly appreciate. Therefore, I would recommend leafing through the book to everybody interested in photosynthesis, working with *Chlamydomonas* or not. You will definitely find there new facts to satisfy your curiosity, something interesting for your lesson or an inspiration for your future work.

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