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Wise, R.R., Hoober, J.K. (ed.): **The Structure and Function of Plastids**. – Springer, Dordrecht 2006. ISBN 10 1-4020-4060-1 (hard-bound). XL + 575 pp., € 250.00, USD 329.00, GBP 192.50.

The 23rd volume of book series „Advances in Photosynthesis and Respiration" is dedicated to one of the basic topics of photosynthesis that is studied since 17th century everywhere in the world. Where the centres of recent studies on plastids are is shown by the listing of affiliation of 57 authors of this representative book. Twenty six of them work in the U.S.A., the remaining 31 authors in institutions of ten countries: Australia (5), Germany, Japan, Mexico, Sweden, and the U.K. (4 each), France and Switzerland (2 each), and Brazil and Korea (1 each).

B. Gunning, F. Koenig, and Govindjee reviewed the history of recognizing chloroplast structure. This interesting introductory text brings also five figures that are probably not known by young scientists. Twenty-seven chapters of the book are divided into five sections. Section I is entitled "Plastid Origin and Development" and its five chapters describe diversity of plastid forms, basic plastid types and specializations, their origin and evolution affected genomically, by presence of photosynthetic pigments, and by factors of environment, protein import into chloroplasts, and the mechanisms of plastid division. The reader will find here also explanation of some less known terms, such as tic- and toc-translocation (in chapter 3) or dynamin (family of eukaryote-specific proteins involved in the fission of several membrane systems; chapter 5).

Section II, "The Plastid Genome and its Interaction with the Nuclear Genome" (5 chapters), is devoted to expression, prediction, and functions of the thylakoid proteome, nucleus- and chloroplast-encoded factors in synthesis of photosynthetic apparatus (chloroplast splicing, translation, elongation, assembly, modulation by radiant energy, *etc*.), plastid transcription and functions of the respective polymerases, plastid-to-nucleus-signalling (one finds here, among others, list of mutants with morphologically aberrant plastids or regulation of the tetrapyrrole pathway), and utilization of trace metals (Fe, Cu, Mn) in chloroplasts.

Section III is entitled "Photosynthetic Metabolism in Plastids". Its four chapters deal with light/dark regulation of chloroplast metabolism (ferredoxins, thioredoxins, ferredoxin:thioredoxin reductase and target enzymes of carbon cycles), physiological significance of chlororespiratory pathway that reduces and oxidises plastoquinone pool (with special attention to studies on *Arabidopsis* and *Chlamydomonas*), CO_2 concentrating mechanism (functions of five types of carbonic anhydrases, differences in cyanobacteria, eukaryotic algae, and higher plants), and with synthesis, export, and partitioning of photosynthates (intermediates, sucrose, starch, photosynthetic carbon oxidation cycle, *etc*.).

Six chapters of Section IV ("Non-Photosynthetic Metabolism in Plastids") are devoted to biosyntheses of chlorophylls, carotenoids, lipids (glycerolipids, fatty acids; their transport is also analysed), amino acids (namely glutamine, glutamate, aspartate, branched-chain and aromatic amino acids), and sulphur metabolites. A special chapter is on the regulation of calcium fluxes in chloroplasts. Section V consists of seven chapters on plastid differentiation and responses to environment. Individual chapters deal with plastids in ripening fruits (chromoplasts, metabolism of saccharides, lipids, carotenoids, activity of polyphenol oxidase) and plastid fate during leaf senescence (gerontoplasts, degeneration of thylakoid system and basic substances, plastoglobuli, extrusion of material, catabolism of pigments, reactive oxygen species), role of plastids in gravitropism (I was pleased to find here reference to an early paper of the Czech scientist Bohumil Němec, written in 1900), with chloroplast movements as responses to environmental signals (involvement of phototropin, phytochrome, Ca ions, *etc*.), and with oxygen metabolism and stress physiology (the water-water cycle, dissipation of excess energy, and photoprotection). Special chapters are devoted to kleptoplasts (plastids acquired from photosynthetic organisms by heterotrophic organisms such as ciliates, foraminifera, and sacoglossans) and apicoplasts (chloroplast-derived organelles originating by secondary endosymbiosis).

All chapters are accompanied by explanatory figures (including electron micrographs and schemes), summarizing tables, and lists of complete references. In some chapters directions for further research are outlined. In the introductory pages prepared by the series editor Govindjee the reader will find interesting information, *e.g*. list of selected earlier books on chloroplasts or reference to a useful two-disc CD set of "Plant Biology", that contains more than 1 000 images (see www.plantcellbiologyonCD.com). Generally, it is a very useful book for students and scientists in plant biology, biochemistry, and genetics.

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