

Environ. exp. Bot. **53**: 85-95, 2005.

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Grimm, B., Porra, R.J., Rüdiger, W., Scheer, H. (ed.): **Chlorophylls and Bacteriochlorophylls. Biochemistry, Biophysics, Functions and Applications.** – Springer, Dordrecht 2006. ISBN-10 1-4020-4515-8 (hard bound). XXIX + 8 + 603 pp., € 245.00.

The 25<sup>th</sup> volume of the well-known series “Advances in Photosynthesis and Respiration” is devoted to the major pigments of photosynthesis. It is a successor of the often cited voluminous book edited by Hugo Scheer that was published fifteen years ago by the CRC Press. It consisted of 42 chapters; this number is similar to the 37 chapters of the new book. It is again a multi-authored book and most of the seventy authors (some of them were authors in both issues) tried to present an up-to-date state of knowledge in the respective fields of chlorophyll and bacteriochlorophyll research. Nevertheless, I was surprised reading author’s apology on p. 381: Harold Paulsen wrote the chapter 26 in mid-2002 (!) and states that Fig. 1 (sketch of LHCII structure) is outdated. I do not understand why it was not possible to replace the figure – did the editorial and publisher procedures take full four years?

The chapters belong to five topical parts. The first of them is on structures, chemistry, and analysis of chlorophyll pigments (9 chapters) and starts with an overview of the whole book that also gives practical information (*e.g.* comparison of ring numbering according to two nomenclatures on p. 3, possible substituents on pp. 5–6). The following chapters deal with synthesis, structure, and reactivity of chlorophylls, features of chlorophylls of the *c* group, unusual tetrapyrrole pigments in individual photosynthetic bacteria and algae, special chlorophylls in reaction centres, chlorophylls formed during heavy metal stress, and degradation products formed during digestion, extraction, and storage of plant materials. Four chapters are of an immense practical value: they deal with methodical questions. The first of them is on the use of spectroscopic methods in structure determination of pigments. The following chapter gives recommendations for spectrophotometric and spectrofluorometric assays of chlorophylls and bacteriochlorophylls and shows errors introduced by using old-fashioned methods and equations. Next chapters show the methods of analysis of chlorophylls by high performance liquid chromatography and by simple open-column chromatography (extraction and detection techniques are also given).

Ten chapters of the second part deal with metabolism of chlorophylls, beginning with biosynthesis of 5-amino-levulinic acid, the respective enzymes, the basic pathways and last steps leading to biosynthesis of chlorophylls *a*

and *b* and bacteriochlorophylls *a* to *e*, involvement of tetrapyrrole compounds in cellular regulation, and with chlorophyll catabolism. The importance of chlorophyll evolution in phylogeny of oxygenic photosynthesis is stressed in last chapter of this part.

Nine chapters of part three are devoted mainly to bacteriochlorophylls and their reaction with the native environment in different organisms. Interactions with proteins in reaction centres, light-harvesting complexes, and chlorosomes, *etc.* are given here. Most chapters show models of the respective structures, global ring currents, macrocycles, protein maquettes, pigment-protein complexes, and so on.

The part dealing with functions of chlorophylls consists of four chapters only. Excitation energy transfers in different photosynthetic structures, carotenoid-to-bacteriochlorophyll energy transfers, and their dynamics are in the focus of these chapters.

The last part is on practical applications of chlorophylls and bacteriochlorophylls. Two chapters describe their use in diagnostics and photodynamic therapy as well as results of clinical trials, in complex electronic systems and biological and technical models, and in monitoring chlorophyll contents in oceans used to predict primary biomass production. Last chapter is on functionalized transformation products of chlorophylls and bacteriochlorophylls in natural sediments. Thus these pigments are very important in geochemical and paleoenvironmental studies.

The texts are accompanied by many figures and schemes (10 colour figures are present on pages CP1 to CP8), with tables and wide lists of references. As usual in this book series, there is a very good and detailed subject index (over 40 pages!). I welcome that three of the four editors work in Germany: this ensured a better balance of results produced in individual parts of world than that in some other volumes of this book series.

I fully recommend this book to all researchers, students, and teachers interested in natural pigments and in the processes of photosynthesis. As a university student I read cover-to-cover the “Untersuchungen über Chlorophyll” by Willstätter and Stoll published in 1913 – the difference in contents of that book and the reviewed one is certainly much larger than I did expect in my young days!

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