Björn, L.O. (ed.): **Photobiology. The Science of Life and Light.** – Springer 2008, ISBN: 978-0-387-72654-0, e-ISBN: 978-0-387-72655-7. 2nd Ed. 684 pp. 149.95 €.

Light is the most important physical radiation in the living nature. In the first place, light including near infrared- and near UV regions brings energy which warms the earth and powers photosynthesizing organisms. Light is for most of organisms also the source of information and, *vice versa*, some of them emit light by themselves. When dealing with light, a physical and technical approach is also necessary to characterize, measure, or produce a defined light. The correct procedures, quantities and units should be used. All these aspects are included in this book. This is the second, updated and expanded, edition of the successful book. The book was written by a group of 17 authors from the whole world but most of the chapters were written by Lars Olof Björn. The whole-life experience in theory, experimental practice, and teaching of the editor is reflected in the book.

The book covers a very wide range of photobiological disciplines. This approach enables to elucidate similarities in individual mechanisms, for instance photosynthesis and vision. The book is divided into 25 chapters; each chapter is introduced by a condensed abstract. The initial chapters are devoted to physical basis of light. Diffraction, polarization, scattering, reflection, and absorption of light are described. Energy levels of molecules are used to explain their absorption and fluorescence. A reader is shortly informed about the energy transfer among molecules, generation of light by different light sources including lasers, optical filters, monochromators, and light detectors (*e.g*. photomultipliers). The following chapters describe basics of both classical and modern light microscopy. Such modern aspects as quantum dots, two-photon fluorescence microscopy or optical tweezers are mentioned.

Spectra of irradiances on the earth and under water are shown. The chapter named Spectral Tuning in Biology describes how different spectral regions are detected by various biological systems. Here basic information on light-detecting pigments (chlorophylls, phycobiliproteins, carotenoids, anthocyanins *etc*.) is given. A separate chapter is devoted to other group of receptor pigments: rhodopsins, phytochromes, cryptochromes, and phototropins. I appreciate the presentation of basic chemical formulas and spectral characteristics of the pigments.

Different types of eyes and their optical principles are described in another chapter. It is shown how eyes of fishes and insects differ in many respects from the human eye. Two chapters are devoted to photosynthesis. One chapter concentrates on the evolution of photosynthesis including different biochemical cycles and metabolisms (C_3, C_4, and CAM). Although the chapter occupies only several pages, a very nice overview of photosynthesis is given. A separate chapter describes the absorption of light in plants, *i.e*. so-called light harvesting, antennas, energy transfer and protective mechanism against overexcitation. So for instance the xantophyll cycle and non-photochemical quenching of chlorophyll fluorescence are presented. The quantity non-photochemical quenching of chlorophyll fluorescence (NPQ) could be probably described more in detail (*e.g*. a remark on Stern-Volmer equation, *etc*.) as it is used very frequently now (page 314). Important properties of the lowest excited singlet state of carotenoids are explained using symmetry rules.

Two chapters deal with circadian biological clocks and their synchronization by light and with photoperiodism in insects and animals. An individual chapter is devoted to photomorphogenesis and photoperiodism of plants.

Several chapters concentrate on relation of light reaction to human life and medical aspects of photobiology. The individual chapters are devoted to phototoxicity of some compounds, the danger coming from PAH (Polycyclic Aromatic Hydrocarbons) is stressed. The ozone depletion leads to the increased UV-radiation leading to effects on DNA and to generation of reactive oxygen species. Some small corrections may be suggested, for instance to present superoxide as an anion radical because it has both anionic and radical character (page 516). Vitamin D, its photochemistry and significance, photobiology of human skin including photocarcinogenesis are mentioned in other chapters. Last two chapters are devoted to some teaching experiments and demonstrations and to a construction of an amateur spectrophotometer. Of special interest for me are the chapters about light effect on magnetic orientation of animals or on bioluminescence.

Some chapters contain mostly physical information, but only necessary minimum of mathematics is used. There are many nice illustrations and schemes helping to understand the concepts and principles. A great amount of references is present in some chapters. The book contains very rich information on photobiology on more than 600 pages. If the book could be even thicker, I would suggest including more information about light-controlled movements like movements of chloroplasts and stomata, about biophotons, *etc*. But this would probably need a book of several parts. The book is basically suited for students and teachers. Not only basic necessary information on physical principles and biological mechanisms but also several practical simple experiments and a computer program are present. A great advantage of the book is combination of theoretical and very precious practical information. Everyone interested in the interaction of light and biological systems will find important and wide information there.

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