

Preface

The science of biophysics of light harvesting has accumulated vast amount of knowledge in the last 20 years about the workings of the photosynthetic membrane of higher plants. The subject is a manifestation of a grand molecular design of the complex photosynthetic machinery performing a sequence of primary energy transformation events. Hence, it represents an excellent example for learning the principles of structure and mechanisms of functioning of membrane proteins, their interactions with each other and their cofactors, dynamics in the membrane and in the isolated state and various mechanisms of adaptation to the environment. The author's own 30 years' experience in the field of biophysics of photosynthesis and work done by his numerous colleagues has been presented in the context of gradual explanation of complexity, historical development and multidisciplinary character of the subject, *The Photosynthetic Membrane*. The need for such a text is long overdue, since it does not cover the whole photosynthesis but focuses on its light phase processes, concentrating on the light harvesting: a well-structured and regulated process that ensures phenomenal flexibility of adaptations of plants to light that are essential for their survival. The book starts from a general introduction to the essential features of life; one of the most important is the energy requirement that is fulfilled almost solely by sunlight. Further, the advantages and peculiar physicochemical features of the nanoscale level of the photosynthetic membrane organization are described and the general makeup is presented setting the scene and preparing the reader for the detailed up-to-date description of numerous methods of investigation of the photosynthetic membrane structure and functions, light harvesting principles, atomic structure of light harvesting antenna complexes, the macrostructural organization and integration of antennae within photosystem complexes, dynamic nature of light harvesting proteins studied by various spectroscopies and adaptations of the light harvesting machinery in the intact membrane to light. This book also contains a chapter considering the potential of the educational and practical applications of the knowledge obtained in studies of the photosynthetic membrane organization and light harvesting processes. The author contemplates the role of the fundamental knowledge in general and explains possible ways it can be used in crop science, solar energy utilization by mankind and in solving the problems associated with the global climate change.

The author addresses this book, first of all, to the final year undergraduate students of various biology specializations. Therefore, he makes all effort to adapt it to different levels of training in chemistry and physics. The level of complexity gradually increases towards the end of the book making it relevant to postgraduate students and for a broader audience of those involved in photosynthesis research as well as bioenergetic membranes in general. With this book, the author hopes to awake an interest of a broad audience of students, scientists and those who are attracted to the phenomenon of energy transformation processes in living nature and welcomes any feedback.

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