
Preface

I started my first photobiological research project in the spring of 1957. My scientific interest ever since has been focused on photobiology in its many aspects. Because I have been employed as a botanist, my own research has dealt mostly with the photobiology of plants, but throughout this time, I have been interested in other aspects such as vision, the photobiology of skin, and bioluminescence. A first edition of the present book was published in 2002 and a second edition in 2008. This third edition is much expanded and completely updated. Eight new authors have been recruited among my eminent colleagues.

It has not been possible to cover all aspects of photobiology in one volume, but I feel that we have managed to catch a fair and well-balanced cross section. Many colleagues promised to help, but not all lived up to their promises. To those who did and who are coauthors to this volume, I direct my thanks; I think that they have done an excellent job.

Living creatures use light for two purposes: for obtaining useful energy and as information carrier. In the latter case, organisms use light mainly to collect information but also (e.g., by coloration and bioluminescence) for sending information, including misleading information, to other organisms of their own or other species. Collection of free energy through photosynthesis and collection of information through vision or other photobiological processes may seem to be very different concepts. However, on a deep level, they are of the same kind. They use the difference in temperature between the sun and our planet to evade equilibrium, i.e., to maintain and develop order and structure.

Obviously, all of photobiology cannot be condensed into a single volume. My idea has been to first provide the basic knowledge that can be of use to all photobiologists and then give some examples of special topics.

Thus, this book is intended as a start, not as the final word. There are several journals dealing with photobiology in general and an even greater number dealing with special topics such as vision, photodermatology, or photosynthesis. There are several photobiology societies arranging meetings and other activities. And last but not least, up-to-date information can be found on the Internet. The most important site apart from the Web of Science, Scopus, Google Scholar, and other scientific databases is the homepage for the International Union of Photobiology <http://iuphotobiology.com/societies.html>, which has links to a number of regional and national organizations for photobiology.

The subtitle of this book may be somewhat misleading. There is only one science. But I wanted to point out that the various disciplines dealing with light and life have more in common than is perhaps generally realized. I hope that the reader will find that the same principles apply to seemingly different areas of photobiology. For instance, we have transfer of excitation energy between chromophores active in photosynthesis, in photorepair of DNA, and in bioluminescence. Cryptochromes, first discovered as components in light-sensing systems in plants, are involved in the human biological clock and probably in the magnetic sense of birds and other animals, and they have evolved from proteins active in DNA photorepair.

Many colleagues have been helpful in the production of this book. Three of my coauthors—Professors Helen Ghiradella, Govindjee, and Anders Johnsson—who are also close friends have earned special thanks because they have helped with more chapters than those who bear their names. Helen has also helped to change my Scandinavian English into the American twist of the

islanders' tongue, but we have not changed the dialect of those who are native English speakers. Govindjee has contributed not only with his knowledge of photobiology but also with his great experience in editing. Drs. Margareta Johnsson and Helena Björn van Praagh have helped with improvements and corrections, and Professor Allan Rasmusson at our department in Lund has been very helpful when I and my computer have had disagreements. I have enjoyed the friendliness and help of other colleagues in the departments in Lund and Guangzhou. The staff of our biology library in Lund has been very helpful and service minded. Several colleagues, among them Stig Allenmark, Dainis Dravins, Dmitri Lapotko, Sandra Pizarelo, and Eric Warrant, have reviewed sections that deal with their own research areas. I deeply regret that one author, Gernot Renger, unexpectedly passed away before being able to complete his chapter. I wish to express my thanks to the publisher and printer staff for their support during the production of this book.

Many others have helped, but special thanks go to my wife and beloved photobiologist Gunvor, who has supported me during the work and put up with papers and books covering the floor in our common home; to her I dedicate those chapters of the book that bear my name.

There are several new chapters in the third as compared to the second edition: Chap. 11, Photoactive proteins; Chap. 13, Photoreceptive proteins and their evolution; Chap. 14, Signaling crosstalk under the control of plant photoreceptors; Chap. 17, Photosynthetic light harvesting; Chap. 25 Light-promoted infection; Chap. 27, Role of ultraviolet radiation in the origin of life. On the other hand, some chapters present in the second edition had to be skipped either for space limitation or for other reasons: Photosynthetic light harvesting, charge separation, and photoprotection: The primary steps; Photoperiodism in insects and other animals; Light treatment in medicine. The former chapter "Spectral tuning in biology" has been divided into two, one dealing with pigments and the other one with structural color. However, it will still be possible to obtain pdf files of chapters from the second edition from the publisher.

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Lars Olof Björn



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