

Preface

I started my first photobiological research project almost exactly 50 years ago, 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 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, but this second edition is much expanded and completely updated. Several 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. I have had to limit myself, and one of the interesting topics that had to be left out is the thermodynamics of processes in which light is involved.

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 and other scientific databases, is Photobiology Online, a site maintained jointly by the American and European Societies for Photobiology (ASP and ESP, respectively),

at <http://169.147.169.1/POL.index.html> or <http://www.pol-europe.net/>, where details about photobiology journals and books can be obtained.

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 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. The study of the photomagnetic sense of birds has, in turn, led to new discoveries about how plants react to a combination of light and magnetic fields.

Many colleagues have been helpful in the production of this book. Two of my coauthors—Professors Helen Ghiradella 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' tounge, but we have not changed the dialect of those who are native English speakers. Professor 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 department. The staff of our biology library has been very helpful and service-minded.

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

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