

Oxygenic Photosynthesis: The Light Reactions

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Advances in Photosynthesis is an ambitious new book series seeking to provide a comprehensive and state-of-the-art account of photosynthesis research. Photosynthesis is the process by which higher plants, algae and certain species of bacteria transform and store solar energy in the form of energy-rich organic molecules. These compounds are in turn used as the energy source for all growth and reproduction in these organisms. As such, virtually all life on the planet ultimately depends on photosynthetic energy conversion. This series of multiauthored books spans topics from physics to agronomy, from femtosecond reactions to season long production, from the photophysics of reaction centers to the physiology of whole organisms, and from X-ray crystallography of proteins to the morphology of intact plants. The intent of this new series of publications is to offer beginning researchers, graduate students, and even research specialists a comprehensive current picture of the remarkable advances across the full scope of photosynthesis research.

The titles to be published in this series are listed on the backcover of this volume.

Oxygenic Photosynthesis: The Light Reactions

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Preface

Oxygenic Photosynthesis: The Light Reactions is the fourth volume to appear in the series *Advances in Photosynthesis* by Kluwer Academic Publishers. Following the precedent set by earlier books in this series, our goal as editors has been to provide beginning students and seasoned researchers alike with a comprehensive reference text devoted to the major topics that comprise the area of photosynthetic energy transduction in oxygenic eukaryotes. We have interceded as editors to write a brief prefatory chapter that provides a general, integrated outline of the major areas of oxygenic photosynthesis research as they exist at the present time. Our goal for this chapter is to provide a capsule summary of the book's contents that can be used by readers to gain a general view of the field before they delve into the various subject areas that are given specialized coverage in the text. In addition to the guidance offered in the introductory chapter, we have worked closely with the authors of individual chapters to provide extensive cross-referencing among chapters. Using these cross-references, an interested reader can readily pursue a particular topic in substantial depth if this is desired.

The book is organized so as to divide its contents into three general subject areas. These are (1) thylakoid membranes (structure, synthesis and assembly); (2) the photosynthetic apparatus (photosystems, interphotosystem components, coupling factor, and light-harvesting complexes); and (3) molecular biology/genetics of the photosynthetic apparatus (chloroplast and nuclear genomes). The first chapter of most of the subsections within each of the major topic areas is structured by its author(s) as a mini-review of the subject matter at hand while the following chapters contain detailed reviews. It is our hope that this organization will enhance the attractiveness and value of the text to students who are making their first acquaintance with the fascinating topics embraced by the text, as well as to faculty who participate in advanced courses on photosynthesis. All of the contributing authors were given wide latitude in reviewing and evaluating the present status of their areas of expertise. We believe

that this strategy has produced a volume that will stand as a benchmark reference for some time to come.

Reading and editing the chapters for this book was a pleasant exercise. Time and again our attention was drawn to the enormous progress that has been made in understanding mechanisms and structures associated with oxygenic photosynthesis. Although this process, oxygen evolution coupled to NADP^+ reduction, is unavoidably complex on account of the number of components and reactions involved, readers of this book will quickly discern that questions surrounding structure and mechanism are being answered at an unprecedented pace. Crystal structures are replacing 'cartoon' representations of multi-subunit protein complexes, mechanistic details of reactions are under intense scrutiny, and the techniques of molecular biology are providing a new means of probing photosynthetic reactions at all levels, from the intact membrane to reaction centers.

The substantial leaps forward that characterize photosynthesis research today occur from a foundation laid by the research efforts of a generation of scientists who are the founders of this field. This book is in many ways a tribute to those scientists. Our own progress in this field was heavily influenced by contacts with these individuals, who were dedicated to advancing their field and to nurturing the next generation. We both profited immensely from our contacts with Norman Good, as a mentor (DRO) and supportive colleague in the early stages of a career (CFY), and it is to his memory that we dedicate this book.

Production of a book of this scope is an enormous undertaking. *Oxygenic Photosynthesis: The Light Reactions* owes its existence to the efforts of the authors who contributed to this book. Just as important are the two people who assisted us at all stages of editing, communication and assembly. As we point out in the introductory chapter, Iris Heichel assumed a major responsibility for checking our editing (a major duty in itself), assembling the index and acting in the most polite way possible to prevent the sorts of idiocies that academic scientists (in this case the

editors) are famous for committing. Without Iris, this book would not exist. In turn, Iris and the editors would like to thank Larry Orr of the Center for the Study of Early Events in Photosynthesis at Arizona State University. Larry must be among the best-natured editorial production experts in the world. He managed to convert disks containing incomprehensible programs into lucid text, caught the

errors we missed, and did much more to assure the professional as well as timely appearance of this book. Finally, we would like also to acknowledge Govindjee, not only for his leadership in developing the *Advances in Photosynthesis* series, but also for his work in the trenches, reading and commenting on each of the chapters in this book.

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