

Oxygenic Photosynthesis: The Light Reactions. Donald Ort and Yocum, C. F., (eds). Series ed. Govindjee. Kluwer Academic Publishers, Netherlands, 1996. Price: Dfl 410, xvi + 682 pp.

This book represents the fourth in the series in *Advances in Photosynthesis* (Series Editor, Govindjee). The first volume, *Molecular Biology of Cyanobacteria* (reviewed in *Curr. Sci.* 1996, 70, 1101) seems to have received a warm welcome from its readers as this book filled the long-felt void on this subject. The second book in the series, *Anoxygenic Photosynthesis* has not been seen by this reviewer, but he has had a chance to read the third book in the series *Biophysical Techniques in Photosynthesis* which is again a useful addition as it deals with a variety of biophysical techniques from electron microscopy to time-resolved fluorescence spectroscopy; from X-ray diffraction, absorption emission to Mössbauer spectroscopy, neutron scattering, that are currently used for the study of electron and energy transfer processes, for probing the structure of photosynthetic apparatus and mechanism of oxygen evolution. This book provides the state-of-the-art techniques used in the ultrafast processes in photosynthesis.

The volume under review contains topics that constitute the 'heart and soul' of photosynthesis research. The two editors are eminent researchers and they have done a splendid job of collecting excellent chapters from some 58 (most of them internationally known) authors. The editors in their introductory chapter give an overview on the two vital aspects of light reactions in oxygenic photosynthesis: the electron transfer and energy transduction.

All the chapters in the volume have uniform format in presentation and are amply supplemented with cartoons, figures and micrographs that are elegant and illustrative. These chapters not only provide the background in the development of the current state of knowledge on photosynthetic light reactions, but also provide insights into the varied directions in current research in the electron transport and energy transductions processes in oxygenic photosynthetic organisms. Thus this book shall be useful both in teaching of advanced courses in plant and crop sciences and in

research programmes. The thirty-two chapters in this volume bring out a comprehensive picture on structural and functional relationships of photosynthetic apparatus in organisms that split water and evolve oxygen. These chapters adequately discuss the components and kinetics of electron transfer by the two photosystems – the components of intersystem electron transport carriers and the structure, assembly and regulation of ATP synthase complex of chloroplasts. The readers would find in this volume new developments in the structure of photosystem I, cytochrome f, light harvesting complexes of plants and algae. One also finds quite attractive discussions on molecular biology of chloroplasts, relating to the regulations at multiple levels in the expression of chloroplast genes; light regulations of nuclear genes required in photosystem light reactions. The readers would also find interesting topics such as evolution of plastids and thylakoid structure; development of thylakoid stackings; photosystem II heterogeneity, trafficking of proteins across the membranes, mechanisms of water oxidation and proton release during water oxidation as well as the exciting developments on structure analysis of reaction-centre single crystals, of photosystem I and on the basic mechanisms of proton electron transfer reactions. All the chapters are presented in a concise, clear and crisp manner. This would be appreciated even by the non-initiated readers. The literature citations are contemporary and comprehensive.

Photosynthesis research expands exponentially and one expects it to continue to do so. Thus, would the book of this type be out-dated soon? We know that the volumes like *Photosynthesis and Related Topics* written by Eugene Rabinowitch and published during 1945–1956 still serve as the source for ideas and outlooks in photosynthesis research. This reviewer, therefore, feels that the current book shall remain as a good source book for teaching and references for many years. Teachers would love to have a copy with them.

Kluwer Academic Publishers seem to have taken the leadership in publishing books, volumes and treatises in plant sciences. The quality of the production of this volume as well as the previous ones is superb and we must thank the series editor Govindjee for his pioneer-

ing zeal in bringing out these volumes in a timely manner. For the readers and users of these books, particularly from this part of the globe, the costs are prohibitive. Luckily the paperback covers are available. I suggest that this book must be made available in all college departmental and university libraries.

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Sixty Years of Biology: Essays on Evolution and Development. John Tyler Bonner. Princeton University Press, 41 William Street, Princeton, New Jersey 08540, USA. 1996. Price not known.

I have long been familiar with the terse statement with which a famous man once dismissed a book by another, presumably equally famous, man: 'What is new is not interesting and what is interesting is not new.' Upon reading J. T. Bonner's *Sixty Years of Biology*, one is, unfortunately, left with the same feeling. Unfortunate, because I had approached the book with high expectations: the subtitle of the book is *Essays on Evolution and Development*, and the recent re-emergence of trends toward a synthesis of these two fields is one of the most exciting developments (pun intended) in evolutionary biology. Years ago, G. H. Hardy started off a book by observing that it was a melancholy task for a mathematician to write about mathematics and then created a masterpiece (*A Mathematician's Apology*) that held the reader spellbound. Bonner starts off rather more optimistically, though he does sound a cautionary note in the preface, and then provides the reader with what can only be described as a rather melancholy experience.

The book is organized, to use the word loosely, around four major themes, with a chapter devoted to each. Bonner's brief and sketchy reminiscences on the major events in biology during the past sixty years constitute the final chapter and bring the book to a close. The first chapter, entitled 'Self-Organization and Natural Selection' meanders from D'Arcy Thompson to the

girth of trees, via Aristotle, Plato and Protozoa, and leaves the reader with no particular idea of either self-organization or natural selection. Unfortunately, this chapter sets the trend for the rest of the book to follow.

The most interesting chapter in the book is one on gene accumulation and gene silencing. Here Bonner treats phenomena wherein a process that is not originally under genetic control may evolve (even without selection) to become genetically determined. The opposite may also happen: a process genetically determined originally can evolve into a more flexible system that is responsive only to external signals. These ideas are developed further through examples from the study of animal behaviour and development. These are certainly interesting ideas even if the paucity of corroborative evidence renders them somewhat speculative.

The chapters on competition and the division of labour in biological systems contain little that is new to organismal biologists. At the same time, I am doubtful if these would be of much interest to non-biologists because the treatment is often choppy and the author has an annoying tendency to jump from one topic to another rather abruptly. From a scientist of Bonner's stature, I think one is entitled to expect more than a rambling series of musings on rather unconnected topics. Development and Evolution are today rapidly growing areas of biology. In recent years we have learnt a lot about how the development of organisms is controlled and managed by their genes, and about how simple biochemical processes occurring within organisms can give rise to complex patterns. On all of this, the book does not offer the reader anything. On the other side of the coin, evolutionary biologists in the past decade or so have greatly refined their understanding of how development can constrain evolution, and how much of evolution may, in fact, consist in escaping from the shackles of a prescribed ontogeny (e.g. by gene duplication). These aspects of evolution are barely touched upon by Bonner. Indeed, the book really does not do justice to either developmental biology or to evolutionary biology.

All in all, I found the book disappointing. The content is insipid and the penmanship uninspiring. I actually read the book twice, with a four week gap

between readings, in the hope of getting some intellectual stimulation from it. Unfortunately, two readings later, I was left with not much more than a greater appreciation of what Mirza Ghalib must have felt when he penned the line '*bahut be-aabru hokar tere kuche se ham niklay*' (dejected did I depart from your neighbourhood).

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Cell and Molecular Biology. S. C. Rastogi. New Age International (P) Ltd. 4835/24, Ansari Road, Daryaganj, New Delhi 110 001. 1996. Rs 550. 502 pp.

Thanks to the emergence of newer techniques of ever-increasing precision at cellular and molecular levels, recent years are witnessing unprecedented rapid developments in the fields of cell and molecular biology. Obviously, the students need to have good resource materials which may provide them a comprehensive view of the current information about the cell and its functioning. As expected, during the past few years many excellent textbooks on cell and molecular biology have become available and several of them have undergone new editions in a rather quick succession. The book under review is an attempt in this direction: as stated in the preface, the author has intended this book to serve as a textbook for undergraduate students.

This book has an impressive get-up, is neatly printed with a large number of illustrations (nearly all in the form of line-drawings) and is relatively (though not absolutely) free of typographical errors. It covers almost the entire spectrum of cell and molecular biology (although defining the limits of this field is nearly impossible today). Each chapter is followed by references and recommended readings and by a number of questions/problems. Thus, on first impression, the book appears useful.

However, when examined in greater depth, many serious weaknesses become apparent. The most glaring is the list of references and suggested readings: nearly

all the books and papers, referred to in the book, date earlier than the 1980s with only a very small number of books being as recent as 1985 or so. There is hardly any reference to the very large number of excellent books or reviews that have been published in the past decade. This gives a very wrong signal to young readers as well as to teachers in remote areas who may not have access to current literature. With an ostrich-like view of current literature, it is obvious that the subject matter dealt within the pages of this book is in many cases (though not all) relatively outdated and fails to convey the current excitement in a given area to the students.

Since the book is primarily addressed to under-graduates, it is obvious that none of the topics is dealt in any detail. However, the brief coverage of a topic due to the limited scope, cannot be an excuse for providing outdated and/or misinformed concepts. To substantiate this rather strong statement, I would cite some examples. In reference to ultrastructure of a lampbrush chromosome, it is stated on p. 241 'It consists of alternating regions of high-density granules and low density lateral loops. The high density regions are chromosomes'. The high-density regions within a chromosome cannot be chromosomes! Likewise, the description of polytene chromosomes on p. 242 includes, 'Until recently it was believed that each band represents a single gene with high DNA content. However, analysis has shown that each band on an average consists of about 30,000 base pairs, hence the band may be polygenic and a particular gene may be repeated several times'. There is neither any evidence for a gene being repeated in a band nor are they to be confused with 'polygenes' which is a distinct term in genetics. The exciting area of the immune response is surprisingly included in the chapter on 'Plasma membrane: structure and function'; like all other aspects, this topic is also covered very briefly but what is more worrisome is the fact that the discussion on antibodies does not have any mention of the remarkable processes of gene rearrangements that generate the antibody diversity. The reason given (in the chapter on Recombinant DNA Techniques) for calling the restriction endonucleases as 'restriction endonucleases' is also wrong. Almost all chapters have such confusing, and sometimes erroneous, state-