Because photosynthesis is one of the most interesting, complex, and important fields of science, researchers always welcome a new contribution. For the most part, this book is readable and lucid. Its approach is broad, including the cellular components in photosynthesis, the primary and secondary reactions involving light, and also many of the related metabolic processes deriving from the original stimulus.

The preface states, "The book is written primarily for undergraduate students taking biochemistry courses, e.g., biochemistry, biology, and plant physiology students," but it is not clear whether the book is intended to supplement texts in these fields or to replace them. The former seems more likely, but the book is not completely suited to that purpose; many sections are elementary, and the text is high.

The text cites no references, but lists of books and articles suggested for further reading conclude each chapter. The book lists are helpful but somewhat parochial, since many titles originate in Great Britain. Suggested review articles cover a broader range.

It is impossible to cover all aspects of the light-harnessing apparatus in such a slender volume, so the authors understandably select and distill those that interest them most. They divide their subject into four related chapters on structure, function, and assembly. The introduction deals with the basic similarities and the special peculiarities of the structures and means by which prokaryotic and eukaryotic organisms derive energy from sunlight. Among other topics it discusses the basics of electron transport and introduces the arrangement of pigment-protein complexes. The presentation is acceptable except for a few hapless and disturbing inconsistencies. On the opening page, for example, one reads that "Prokaryotic cells (bacteria) generally have a cell wall and a cell membrane enclosing the cytoplasm, but no internal cell membranes." The same chapter cites such membranes several times. Also, a short summary of the general role accessory pigments play and their particular association with photosystems 1 and 2 would have been a welcome addition to this chapter.

Since the book covers photosynthetic systems, Table 1.1, which summarizes the major differences between prokaryotes and eukaryotes, should have omitted animal cells and concentrated on clarifying the differences between the cell membranes and cell walls of photoautotrophs, especially with regard to fine structure and biochemical composition of the walls. After this table, it came as a surprise to find Table 4.2, a similar, but much, comparison; such redundancy should not have escaped editorial attention.

The understandably brief passage on the history of photosynthetic research skips some important researchers and their discoveries. Such omissions are compounded by muddled attributions. I wish the authors had explained how "the idea that there were two sets of reactions in photosynthesis (light and dark reactions) came from the studies of action spectra." I was not aware that such a derivation is possible.

Chapter 2 covers "light reactions" from absorption through ATP production and reducing power. It includes the primary photosynthetic reactions, electron transport chains (mechanisms and carriers), and ATP synthesis. The authors also consider the efficiency and regulatory control of the light reactions.

The third chapter considers how reducing power and ATP formed in light are used subsequently for carbon and nitrogen fixation. This chapter presents a greater-than-usual overview of the Calvin cycle, CO₂ fixation in C₃ plants, CAM metabolism, photorespiration, the formation of polyamines, and amino acids. CO₂ fixation in bacteria, nitrogen metabolism, transport across membranes and regulation of photosynthesis-associated metabolism. It also covers biosynthesis of chlorophyll, gibberellic acid, and phytochrome. Despite the broad range of topics, this chapter presents the science's status in a stimulating fashion, if not in great detail.

Although most of the book is well written, some passages are not; for example, a section on photorespiration is really quite muddled. First it tells us that this process requires ATP and reducing equivalents (NAD(P)H). Then it states that when glycine, formed in the peroxisome, is transported into the mitochondrion and oxidized, serine is synthesized, creating ATP and CO₂. To make matters worse, in Figure 3.10 the reversed direction of the arrow indicates CO₂ and NH₃ input and oxygen release in this same process. Although the figure shows that subsequently, glyceraldehyde phosphorylation (by glyceral kinase) in the chloroplast requires ATP, it is not clear that "for 1 ATP formed during photorespiration a large number of ATP's and reducing equivalents are required." Some sentences challenge the ingenuity of any reader, such as the following (p. 85): "In the 1960s it was discovered that in certain plants the metabolites which were labelled initially, when radiolabelled CO₂ (¹⁴CO₂) was supplied, which contain 4 carbons and not 3 phosphoglycerate (a C₃ acid), were C₄ acids, e.g., oxaloacetate, malate and aspartate." More thorough editing would have contributed greatly.

"The Origin and Assembly of Chloroplasts" is an engaging and substantive final chapter that encourages some philosophical reflection. It considers growth and development, DNA, genome expression, and genetics and takes a provocative look at origin and evolution. Related to findings described in previous chapters, the authors offer some speculations on progressive prokaryotic evolution, the alternative to endosymbiont theory. The numerous illustrations include high-quality photomicrographs. Methodological practices are briefly described throughout the text, not to give definitive descriptions of these methods, but to encourage students to make the connection between experimental techniques and accepted knowledge, which they often study separately. The authors' good intention is, for the most part, well executed, but occasionally the descriptions offer so little detail that students will be confused rather than enlightened.

As often happens in books with many authors, style is inconsistent. The book also contains many typographical errors.

Finally, considering the intended readership, I was disappointed to finish the book without finding at least a general statement on associated research opportunities, for example, those directed at improving crop yields by "engineering" the genes of photosynthetic systems. A capable instructor, however, can easily compensate for this minor shortcoming, as well as most of the others.

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