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BOOK REVIEWS

Flavins: Photochemistry and Photobiology. Comprehensive Series in Photochemical and Photobiological Sciences Edited by Eduardo Silva and Ana M. Edwards (P. Universidad Catolica de Chile, Santiago). Royal Society of Chemistry: Cambridge. 2006. x + 328 pp. $329.00. ISBN 0-85404-331-4.

This volume contains 12 chapters that deal in a comprehensive fashion with a wide range of topics related to the photochemistry and photobiology of flavins. An introduction to the biochemical and photochemical properties of flavins is provided in the first two chapters. The photochemistry of flavins in industrial and medical applications is presented in Chapters 3−5. The biological toxicity of flavins induced by light is covered in Chapters 6 and 7, and the biological relevance of flavin-containing enzymes and proteins in DNA repair and light-sensing processes in bacteria, plants, algae, and fungi is illustrated in the last five chapters. Coverage of the literature is up-to-date and focuses on the many exciting advances that the field has witnessed mostly in the past decade.

The general properties of flavins are summarized in the first chapter by Edwards, with ample use of material from previous review articles published on flavins and flavoproteins. Although the lack of novel material may be a disappointment to someone who is adept in the field, this chapter provides an excellent and concise summary of the general properties and classification of flavoproteins, thus serving as a good introduction to the photochemistry and photobiology of flavins for those scientists who are interested in gaining basic knowledge in this area of research. In Chapter 2, Ahmad and Vaid focus on the spectral and photophysical properties of flavins and present the latest developments on photoreduction and photoaddition reactions of flavins. A comprehensive summary of the most recent literature on flavin-sensitized photoreactions completes this chapter. Encinas and Previtali discuss in Chapter 3 the application of the interaction of the excited states of flavins with amines in vinyl polymerization. The recent advances on the kinetic and mechanistic behaviors of riboflavin-promoted photooxygenation reactions of sympathomimetic and ophthalmic drugs are presented by Garcia et al. in Chapter 4, and a commercial application of the antiviral and antibacterial properties of photoactivated riboflavin to transfusion medicine and blood safety is illustrated by Goodrich et al. in Chapter 5. Although, in principle, the topic of the latter chapter is of significant interest, it is presented more like an advertisement for a biotechnological process than as a purely scientific endeavor, leaving the reader perplexed as to whether the chapter fits well with the rest of the book. Nonetheless, the medical relevance of the process that is described is of interest. The toxic effects of riboflavin as a photochemical sensitizer on DNA, lipids, amino acids, and proteins, as well as the cell toxicity and apoptotic behavior on tumor cells of photoactivated riboflavin, are nicely illustrated in Chapter 6 by Edwards. Chapter 7 by Silva and Quina presents a new study on the photoinduced processes in the eye lens. A comprehensive review of the current available knowledge on blue light-initiated DNA repair by photolyases is presented by Kay et al. in Chapter 8. This chapter extensively covers the spectral properties and structures, as well as substrate binding and mechanistic properties of the different classes of photolyases, with particular attention to the most recent advances using biophysical and biochemical tools. The next chapter by Briggs on the flavin-containing photoreceptors in plants, i.e., cryptochromes, phototropins, and members of the ZTL/ADO family, thoroughly and effectively covers the enormous progress in our understanding of the biochemistry and photochemistry of these proteins that has accumulated in the past decade. The chapter concludes with a review of LOV domain-containing proteins in bacteria and fungi, a topic that is fully expanded in the following chapter by Losi. Here, she nicely presents a detailed analysis of prokaryotic LOV and BLUFF proteins and domains and their photochemical reactions and provides an exhaustive review of bacterial LOV protein families. She concludes the chapter with a comprehensive summary of the light-triggered responses observed in bacteria, their possible links to flavin-containing photosensors, and the use of prokaryotic flavin-containing photosensing proteins for addressing important questions pertaining to the evolutionary aspects of both prokaryotic and eukaryotic photoreceptors. In Chapter 11, Iseki et al. present a nice account of a novel FAD-containing photoactivated adenylyl cyclase recently identified in the unicellular flagellate *Euglena gracilis*. The final chapter by Kennis and Alexandre is a detailed review of the mechanisms of light activation in flavin-containing photoreceptors, with particular focus given to the recent advances on the three-dimensional structures, as well as the steady-state and pre-steady-state spectroscopy and photocycles of LOV and BLUFF domains. An extensive subject index completes the volume.

In conclusion, this book is an extremely useful resource that summarizes current knowledge of the photochemistry and photobiology of flavins and flavin-containing proteins. It should be an essential part of the collection of any comprehensive chemistry or biology library and would certainly serve as an essential and updated reference for scientists interested in this topic. The timely coverage of the recent literature, as well as the several unanswered questions that are presented throughout the volume, should inspire many researchers to further explore the exciting field of flavin photochemistry and photobiology.

Giovanni Gadda, *Georgia State University*

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