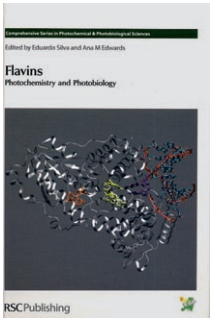
Flavins—Photochemistry and Photobiology



Edited by *Eduardo Silva* and *Ana M. Edwards*. Royal Society of Chemistry, Cambridge 2006. 328 pp., hardcover £ 169.95.—ISBN 978-0-85404-331-4

This compilation of articles covers a very active field of research, which has developed rapidly in the last few years, following the discovery of several biological photosensors that have flavins as chromophores. These new findings have fundamentally changed the paradigms in this scientific area, since the flavin chromophore, in contrast to the other known photosensors (phytochromes, sensory rhodopsins, and photoactive yellow protein, PYP), is attached noncovalently to the relevant apoprotein, and does not undergo a *cis--trans* isomerization upon photoexcitation. Also, very surprisingly, it is found that in several of the new photosensors the excited flavin reacts from the triplet state. This is the first known case of a chromophore triplet state participating in a biologically vital function.

The authors of the articles in this compilation include (in Chapters 8–11) several of the actual discoverers, who have made important contributions to the elucidation of the photoinduced mechanism in these photosensors, and are therefore able to describe, in a very detailed and interesting way, the scientific developments in this area during the last decade. The first four chapters deal with the spectroscopy and photochemistry of flavins in solution, then Chapter 5 describes the use of excited riboflavin as an antiviral and antibacterial agent. Chapter 6 discusses the phototoxicity of flavins, and Chapter 7 the possible role of flavins in photoinduced damage to the eye lens.

The writing of the articles is very uneven. Several of the articles written by non-native English speakers should have received a more thorough editing. That applies, for example, to Chapters 1 and 2. In the initial chapters describing the properties of flavins in common solvents, it would have helped non-specialist readers if the numbering of the atoms in the flavin skeleton (as referred to in the text) had been shown in the structure schemes. Most of the articles could have been improved by including lists of abbreviations (especially Chapters 1 and 2). The IUPAC recommendations on nomenclature and symbols are not always followed (e.g., in Chapter 4 the rate constant k is not italicized, and in Table 1 of Chapter 5 the term optical density is used instead of absorbance). A serious nomenclature problem is the use of the mesomeric arrow instead of the equilibrium double arrow in the Scheme on page 4. In Chapter 3 not all symbols have been explained. The heading of Table 2 in Chapter 7 is not clear, and einstein (for mole of photons) should not be written with capital E. In addition, some of the chapters have a well-balanced final discussion, whereas in other chapters that is missing.

Because of the complexity of the spectral properties of flavins, Chapter 2 would have benefited by including spectra of flavins at different pH values. In this chapter, a critical discussion, beyond the mere listing, of the reactions of photoexcited flavins would have also been very useful. For example, how are the reaction rate constants of the excited flavins in their different protonation states related to the redox potential of the substrate?

Chapter 9, by Winslow Briggs, gives an excellent historical account and classification of the photosensors that contain flavins as chromophores. However, the chapter contains no figures with the known structures, nor any schemes with mechanisms—in fact, it contains no figures whatsoever. This makes reading the chapter a bit difficult, especially for readers new to the field. I enormously enjoyed reading this chapter (as well as others).

In spite of some criticisms, as discussed above, the book should be extremely useful for students starting in this fascinating and rapidly developing area of research, as well as for specialists who would like to have a comprehensive account of developments in this field in the last few years. To this end, the authors have also put together a very extensive and complete literature list at the end of each chapter. I recommend librarians to acquire this book for their scientific collections.

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Discrimination of Chiral Compounds Using NMR Spectroscopy

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During the last couple of decades, stereoselective synthesis of chiral compounds has been, and is, one of the major challenges in modern organic, pharmaceutical, and medicinal chemistry. A considerable number of Nobel Prize winners have worked in this field, and some are still engaged in it. Such syntheses need to be supported by suitable analytical methods; in other words, they are effective only if they are accompanied by quick and easy ways to determine enantiomeric purity and, where relevant, absolute configurations.