Book Reviews

Light and Life Processes

by Jerome J. Wolken; published by Van Nostrand Reinhold, 1986; xii + 259 pp.; price, £35.95

Light is of paramount importance to life. Photochemical changes are surely responsible for at least some of the steps that led from simple inorganic species to complex organic molecules and, ultimately, to living organisms. Photosynthesis is the most important photochemical process to life on Earth. It was responsible for the build up of oxygen in our atmosphere, and it maintains the present level. Living creatures undergo a variety of behavioural responses that are initiated by the action of light on photoreceptor systems. Such responses include movement (phototaxis) or changes in orientation (phototropism), the opening and closing of leaves and flowers in plants, stimulation of growth, and many other phenomena besides. Vision is the most direct and developed way in which animals with eyes sense light.

Wolken's book provides an accessible introduction to what he flowerily describes twice in his Preface as "the wondrous world of light that we live in". His approach to the mechanisms of nature's photoprocesses is through an understanding at the molecular level of the structures of the photoreceptors, of the chemistry of the pigment molecules that reside on the receptors, and of how the photochemical changes are translated into a photobiological response. Wolken has in mind a scientifically literate audience, but not one composed of research photobiologists. I think he succeeds in putting over his own enthusiasm for interpreting how light affects living organisms.

The first part of the book sets the scene for the photobiology that follows. Wolken describes briefly the chemistry of molecules associated with life, and the structural characteristics of living cells, discussing on the way speculations about how cells can develop from organic molecules and become living. He then explains the chemistry and structures of the most important pigment molecules, pointing out how the conjugated carbon–carbon bonds found in carotenes, linear pyrroles, porphyrins and flavins are so suitable for capturing the visible portion of Solar radiation that reaches the Earth's surface. Little of the chemical material will be unfamiliar to the readers of this journal, but the essentials are clearly expounded for the benefit of the non-chemist. Similarly, the brief account of cells and their behaviour provides a useful survey for those who have forgotten their elementary biology.

The photoprocesses to which the rest of the book is devoted include photosynthesis, phototaxis and phototropism, vision, the control of behaviour by light, photochemical memory, and bioluminescence. The scope is

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wide indeed. Wolken states that he has chosen to illustrate the various photobiological phenomena with examples taken primarily from organisms that he himself has studied. I have a slight suspicion that this decision may have determined the balance of the material presented. For example, I think that photosynthesis warrants more space than the 19 pages it is given here. The discussion of the chloroplast structure largely relates to a 1975 model proposed by Wolken, and the treatment of artificial photosynthesis concentrates on some particular experiments with liquid-crystalline systems. Again, I feel slightly uneasy about the balance in the discussion of vision. Although fascinating, the 38 pages devoted to the structure and optics of the eyes of vertebrate and invertebrate creatures is a little off-course for this book, especially when the discussion of visual pigments, the photochemistry of visual excitation, and the molecular structure of retinal rods (which is again largely about a 1975 model) together take only just over half the space given to other aspects of the eye. I would have thought that at least a mention was warranted of the way in which photoisomerization of retinal produces a neural signal by triggering a cascade of enzymatic reactions, and of the transmission of information from the receptor disk to the plasma membrane. The references in this section seem generally rather dated, and there is an implication that the structure of rhodopsin is unknown.

Subject to my remarks about balance, which must be recognized as a personal opinion only, I find that the author has succeeded in presenting important information in an interesting and lively way. He provides for non-specialists an introduction and a guide to photobiology. Ancient societies evolved legends that connected the origin of light with the creation of life, and Wolken shows some of the substance behind the myths. As photochemists we will all be pleased that a wide audience is being introduced to one aspect of our work.

R. P. WAYNE

Organic Photochemistry

by J. M. Coxon and B. Halton; published by Cambridge University Press, Cambridge, 1986, 2nd edn.; 243 pp.; price, £37.50; ISBN 0-521-32067-4

The first edition of this book was one of a number of introductory textbooks on photochemistry that were published about 15 years ago, and a distinctive feature of that book was its emphasis on *organic* photoreactions rather than general photophysical and photochemical processes. This remains an attractive feature of the second edition, and the main chapter titles reflect the organic orientation: Introduction — excitation and the excited state; Intramolecular reactions of the alkene bond; Intramolecular reactions of the