Book review

Antioxidants in Science, Technology, Medicine and Nutrition. Gerald Scott. Albion Publishing, Chichester, UK (1997) (pp. 334) ISBN 1-898563-31-4. £70.00.

Oxidation leads to deterioration in the structure and function of technological materials such as rubber and plastics, of pharmaceutical agents, and of biological materials, including foodstuffs, cellular and subcellular membranes, lipoproteins and DNA. The mechanism of action of antioxidants is, therefore, of interest to the biologist, biomedical scientist, food technologist, nutritionist, pharmacologist and polymer chemist. The study of antioxidants in technology is well established, and the field of life science can benefit from the findings from the field of pure and applied organic chemistry.

The author of this book is a renowned chemist with extensive experience in the degradation and stabilization of polymers. The author points out that "Antioxidant research in the life sciences has not yet reached its zenith since some of the more important conclusions arising from 'classical' chemical studies of antioxidant mechanisms have not yet crossed the disciplinary barrier". This book is an attempt to make the inter-disciplinary jump, and aims to present the relevance of "antioxidant mechanisms to current studies of antioxidants in both technology and biology".

The book, written in the form of a detailed review of the literature, comprises six chapters, each extensively and individually referenced. The first chapter is a detailed account of peroxidation, chain scission and cross-linking from the organic chemist's viewpoint, with many specific examples of polymer peroxidation reactions, such as those occurring in polypropylene, olefins, polysulfides of vulcanized rubber, and polybutadiene. The underlying chemistry is not clearly explained, however, and appears to demand rather more than the "advanced high school chemistry" stated as the only prerequisite. Furthermore, the relevance and applicability of the mechanisms described, some of which take place at very high temperatures and pressures, to the field of medicine or nutrition is difficult for the non-chemist to discern. Chapter 2 covers causes of peroxidation in various biological substrates, and touches on the consequences in terms of disease states. However, in contrast to the detail of the previous chapter, information appears superficial and perhaps over simplified. Inflammation is described as "the normal response of the cell to hostile invasion by micro-organisms", and the now well characterized disorder of cystic fibrosis "results from a defective gene which leads to pulmonary infection and diminished pancreatic function".

Chapters 3 and 4 describe the mechanisms by which antioxidants work. The sections on preventive antioxidants, synergy and antagonism of antioxidants I found particularly interesting, and there are some gems of information if one digs deep. However, examples used are generally from the organic polymer field, and various formulas, figures and tables appear with little or no explanation to help the non-chemist find these jewels. In addition, while the author sensibly highlights the importance of cooperation and interaction between different mechanisms of antioxidant action, I do not agree with his apparent use of the term 'synergy' as a blanket term for antioxidant cooperation.

Chapter 5 deals with mechanisms of antioxidant action *in vivo*. This chapter, and the others, would have benefitted from better quality figures and more informative legends. There are also several errors: ascorbic acid is described as being "located mainly in the blood plasma", although intracellular levels are generally substantially higher than those in plasma; oestrogen is wrongly described as "a hormone produced by the pituitary gland"; reduced lipoic acid is said to regenerate "ascorbate in oxidatively stressed LDL", although ascorbate is restricted to the aqueous phase. Haemachromatosis and thalassaemia are described as "due to iron overload"; rather the reverse is true, i.e. these disorders or their treatment cause iron overload. Chapter 6 is an account of epidemiological studies of antioxidants and their relationship with selected disease states or environmental agents. There is considerable overlap here with an earlier section, and a reworking of the relevant chapters would have avoided duplication and helped clarify for the reader the current knowledge on cause and effect relationships.

Overall, this book is not an easy read. Abbreviations used are often non-standard and inconsistent, diagrams are of poor quality, tables are badly set out, and there are many typographical errors. The many hundred references cited, along with frequent references to different sections of the book, disturb the flow of an already rather cumbersome and difficult text. It is no easy task for an individual to write authoritatively and clearly on all aspects of a subject. A book which crosses disciplinary barriers and demonstrates the relevance and application of findings in one scientific field to the needs of another will be an important development in antioxidant research. In its current form at least, however, this is not the book.

I. F. F. Benzie