

BOOK REVIEWS

OXIDATIVE STRESS: OXIDANTS AND ANTIOXIDANTS

Helmut Sies, editor

Academic Press, 1991, xxii + 650 pages. £76 (\$150)

The first edition of this book was published in 1985, and introduced the term "Oxidative Stress" to the free radical literature. The 1991 edition, with an almost entirely new collection of authors, should be as popular as the first and is a very valuable contribution. In a pithy introduction, Helmut Sies discusses the definition of "oxidative stress" and recommends that it be "a disturbance of the prooxidant-antioxidant balance in favour of the former, leading to potential damage".

The first section of the book deals with the occurrence of oxidants. Free radical biologists are becoming aware that atmospheric chemists have studied free radical reactions for years, and also that the harmful actions of most common air pollutants upon plants and animals may involve free radicals. This will undoubtedly be a major growth area in the future, and our current state of knowledge is well-summarized by Hippeli and Elstner. Depletion of the ozone layer will lead to our increased exposure to UV radiation, so it is appropriate that the second Chapter, by Tyrrell, discuss UV-induced oxidative stress. Ziegler then discusses non-radical mechanisms for GSH oxidation whereas, in Chapter 4, Kasai and Nishimura review their seminal work on the measurement of 8-hydroxydeoxyguanosine.

The second section of the book is devoted to antioxidant defences. Demple and Levin discuss DNA repair enzymes, and Tartaglia *et al.* the bacterial adaptation to H₂O₂, with particular reference to the OxyR regulon. Both are valuable Chapters. Ketterer and Coles update the reader about the current state of knowledge of glutathione transferases, and the putative role of NAD(P)H: quinone oxidoreductase as a defence mechanism is reviewed by Prochaska and Talalay. Stocker and Frei present an excellent review of antioxidant defences in human blood plasma and their Chapter is followed by an article on antioxidant and "pro-oxidant" properties of phenols, by Kahl. This well-written Chapter is a valuable reminder that antioxidants capable of protecting lipids against peroxidation do not necessarily protect other molecular targets against damage, and may even cause damage themselves.

Section Three of the book is devoted to "Processes and Cell Responses". Trush and Kensler ably review the role of free radicals in the activation of pro-carcinogens. Ursini *et al.* discuss their pioneering work on phospholipid hydroperoxide glutathione peroxidases, and Esterbauer's distinguished group describes not only the possible biological effects of unsaturated hydroxyaldehydes but also its important work on LDL peroxidation. Baggiolini and Thelen discuss our current knowledge of mechanisms of phagocyte activation, a Chapter which is complemented by that of Brüne *et al.* on platelet activation and on the response of these cells to oxidative stress. A particularly-topical Chapter is that by Noack and Murphy, who discuss the interactions of nitric oxide with oxygen radicals and review techniques for the measurement of this gas.

The last section of the book is entitled "Towards Clinical Medicine". The free radical field has promised much to physicians, but has so far delivered little in the way

of new drugs approved for clinical use. Nowhere is this more true than in the field of Cardiology, as the excellent review by Omar *et al.* makes clear. In Chapter 19, Spector ably reviews oxidative damage to the human lens and its possible role in cataract development. Fuchs and Packer discuss current knowledge of oxidative stress and antioxidants in the skin and, in the last two Chapters of the book, Wendel *et al.* and Redl *et al.* review the role of reactive oxygen species in sepsis and shock. The book ends with a list of abbreviations and an index.

Overall, I found this to be an excellent book and I recommend it highly. There are already two copies in my laboratory.

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OXYGEN CHEMISTRY

D.T. Sawyer

Oxford University Press, England, £30, xiii + 223 pages

This interesting book presents very much a personal view of the author, a well-known organic chemist who has made major contributions to our understanding of superoxide chemistry, about the chemistry of oxygen and its derivatives. His conviction is that oxygen is the most important element in the realm of chemistry and water the most important of its compounds — a somewhat ironic view since much of the novel chemistry described by the author has been in non-aqueous media.

The book is usually commendably clear and sound when discussing the chemistry and bonding of oxygen and its derivatives, although I would personally prefer to see more discussion of the electronic structure of O_2 and of the so-called “spin restriction”. The author is rather fond of didactic statements and some of his criticisms are unnecessary. For example, at the top of page 53, I doubt that most chemists or biochemists would regard ferrates as ionic! The figure given of 15% of respired O_2 forming O_2^- in aerobes also seems a bit wide of the mark. The book is also weak in failing to discuss adequately the topic of aqueous Fenton chemistry: an authoritative discussion of this by a highly-regarded chemist could have helped to make sense of much of the controversy in the biological literature. In a few places, the author’s admirable chemical rigour deserts him. Thus, at the top of page 170, simple considerations of rate constant and concentration make it unlikely that reaction of O_2^- with chloroethenes is a mechanism for their toxicity.

Apart from citations of the author’s papers, most of the literature quoted is very old: indeed, the term “recent” is applied to papers as far back as 1984. The author has clearly not kept up with the massive explosion of books, reviews and papers on free radical biochemistry. This is a pity, because rigorous chemical analysis is missing from many of them and this book might have helped to bridge the gap.

Overall, this is an interesting book which I enjoyed reading, although I feel that it could have been done much better. The index is sketchy, the layout is often dull, boring and poorly-designed (why can't OUP consult some recent textbooks by American publishers?) and the paper is poor-quality, resembling the toilet paper in the cheap Stockholm hotel room I reside in as I write this review. OUP should certainly do better than this for a price of £30, and the contents of the book are certainly worthy of better presentation.

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