Molecular Biology of Free Radical Scavenging Systems. Current Communications in Cell and Molecular Biology, vol. 5; edited by J.G. Scandalios, Cold Spring Harbour Laboratory Press; New York, 1992; ix + 284 pages. $ 45.00.
ISBN 0-87969-409-2.

Whilst molecular oxygen is essential for aerobic organisms, it is also potentially toxic. The problem relates to the partially reduced reaction intermediates that arise when oxygen is being reduced to water in stepwise reactions during normal metabolism. These reactive intermediate oxygen species include superoxide anions and hydrogen peroxide. They are also generated in living cells exposed to a variety of environmental stresses, including air pollutants such as ozone or sulphur dioxide, as well as herbicides and radiation.

Increased levels of active oxygen species lead to a conditioin referred to as oxidative stress. Importantly, this can generate a variety of biochemical and physiological lesions which can sometimes lead to severe metabolic problems or even cell death. In particular, these highly reactive oxygen species can modify various biologically important macromolecules such as DNA, proteins, and lipids, to cause mutations, membrane damage and protein malfunction. In turn, these molecular modifications are intimately involved in various diseases such as aging, carcinogenesis and cardiovascular dysfunction in man, as well as senescence, chlorophyll destruction and reduced photosynthesis in plants.

In order to deal with oxidative stress aerobic organisms have evolved elaborate protective systems at the non-enzymatic and enzymic levels. A key question addressed in this excellent collection of chapters is the molecular mechanisms whereby the genome perceives oxidative stress and mobilizes a response to it. Such molecular biological information will be essential for any future attempts to utilize genetic engineering techniques to increase the tolerance in plant or animals to environmental oxidative stress and to reduce cellular damage by active oxygen.

Many of the genes for antioxidant enzymes have been isolated, cloned and characterized for diverse organisms. Now there is intense effort directed at understanding the molecular basis of the regulation and expression of such genes. Recently, such studies have become an essential feature of a variety of international conferences on the chemical and clinical aspects of active oxygen species. This book on the Molecular Biology of Free Radical Scavenging Systems makes a timely appearance as probably the first collection of reviews to be published in a single book specifically related to this now fascinating and important area of molecular biology. It represents the proceedings of a prestigious Banbury Centre Conference at the Cold Spring Harbour Laboratory.

This volume sets an excellently high standard, and for those of us in the field I hope it will be the forerunner of many. This area of endeavour is set to expand and new knowledge will accumulate rapidly. The book has contributions on DNA damage, particularly in relation to mitogenesis, aging and carcinogenesis; on the regulation and superoxide dismutases and catalases in normal and stressed animal, plant and yeast cells; the molecular structure of superoxide dismutases; the human superoxide dismutase gene particularly in Down's syndrome, superoxide radical production in *E. coli*, as well as in chloroplasts.

In summary, it is a relatively compact but pricey book. However, it will be useful for all researchers in laboratories entering this rapidly expanding area of molecular biology which offers a basis for the engineering of organisms with increased tolerance to oxidative stress.

Roy H. Burdon

Phospholipid Biosynthesis (Methods in Enzymology, vol. 209); edited by E.A. Dennis and D.E. Vance. Academic Press; San Diego, New York, 1992; xxxv + 584 pages. $ 85.00.

Phospholipids have become a major focus of interest in the field of cell signalling as we increase our understanding of the role of phospholipids as precursors for an expanding number of cellular regulators. This volume of Methods in Enzymology, devoted to the methodology of phospholipid biosynthesis, is therefore timely and nicely complements volume 197 in this series, which deals with enzymes involved in phospholipid degradation. These two volumes, together with the second edition of the book by D.E. and J. Vance on the Biochemistry of Lipids, Lipoproteins and Membranes, which is also just published, provides an essential library for the phospholipid biochemist.

The first section of volume 209 deals with a genetic approach to understanding phospholipid biosynthesis. These more specialized techniques enable a critical dissection of the role of phospholipids in cell function following from the production of mutants deficient in phospholipid biosynthesis. Techniques for the production and selection of phospholipid synthesis mutations are described for *Escherichia coli*, yeast and animal cells.

There follow sections devoted to the various classes of enzymes involved in phospholipid biosynthesis. In each case the assay, purification and properties of enzymes are described, following the normal Methods in Enzymology format.

The first section covers the important step of fatty acid addition catalyzed by acyltransferases from bacteria and various mammalian sources. At this time there is little information about the acyl chain specificity of these enzymes, and hence the possible role of these enzymes for determining the nature of the acyl chains in the final phospholipid.

The involvement of the phosphate group in phospholipid structure provides sections on enzymes involved in the addition of phosphate, the kinases, and the removal of phosphate, the phosphatases. Again enzymes from a variety of eukaryotic and prokaryotic sources are described.

Other sections deal with enzymes involved in group transfer reactions and in the biosynthesis of more specialized phospholipids. The diversity of enzymes involved in phospholipid

biosynthesis becomes apparent from these sections of the book.

The final section deals with the area of phospholipid transfer proteins which is perhaps a less glamorous aspect of phospholipid biochemistry. However, this is an area that may achieve a much higher profile in future as the role of these proteins in cell function is clarified.

The previous volumes in this series that cover phospholipids date back to 1981 (volumes 71 and 72). I am sure the time interval before this area of enzymology is covered again will be shorter.

David Wilton

The Mitochondrion in Health & Disease; by David Tylor, VCH Publishers; New York, 1992; xv + 557 pages. DM 225.00. ISBN 1-56081-046-7.

This book provides a detailed record of the structure, metabolic activities and abnormalities of mitochondria. It is no surprise to read that the idea for the book came to the author almost 20 years ago. It was the two decades of the 1960's and 1970's where rapid change and paradigm shift provided the basis for present day molecular and medical studies. Tyler's approach is mainly historical, and in some respects slightly old fashioned. None the worse for that it might be said. How many times do the glossy present day texts gain in clarity but lose in interest and excitement? Unfortunately the present volume leans slightly too far to the descriptive, and becomes a source of information rather than a text for explanation.

The book opens with a 40 page chapter on the 100 year history of mitochondrial research. This is informative and interesting and obviously reflects the authors deep commitment and personal involvement in the subject. The next 100 or so pages deal with morphology, an area often neglected in most textbooks. The thoroughness of treatment in this area does not always extend to some of the other topics. Contrast for example a relatively meagre 14 pages allocated to mitochondrial DNA, RNA and protein synthesis. Nevertheless, the chapters on metabolism and respiratory systems of mitochondria are detailed and full of helpful information for the interested reader. A full chapter is usefully given to the metabolite-transporting systems of mitochondria.

Sometimes the historical approach is counter-productive and interferes with the flow of material. Is it really necessary to give coverage to the early alternative theories of energy coupling in the main text? These could be moved easily to the opening historical chapter. Some sections are more up-to-date than others. Most do not go further than the mid 1980's. The final chapter, however, does present a topical and readable survey of medical aspects of mitochondrial research. Disorders of mitochondrial metabolism are thankfully few in number. Their study, however, is important not only for the understanding of the particular disease but also often provides information on mitochondrial assembly and function in humans.

A strangely anecdotal glossary is provided. It includes such items as the etymology of fumarate (smoke), succinate (amber) and aconitate (monkshood), but also several straightforward entries such as biochemistry, hypothesis and substrate.

Overall, the author's extensive knowledge of the subject enables him to present a workmanlike survey of a century of progress in mitochondrial research.

John M. Wrigglesworth

Calcium Ions in Nerve Cell Function; by P.G. Kostyuk, Oxford; Oxford University Press, 1942; viii + 220 pages. £ 32.50. ISBN 0-19-854672-6.

Professor Kostyuk and his colleagues in the Bogomoletz Institute of Physiology in Kiev have made many notable contributions to the study of Ca currents in nerve cells, extending back some twenty years or so. Many of these contributions stemmed from the introduction of their technique for intracellular perfusion (described in detail in another book, *Intracellular Perfusion of Excitable Cells*, by P.G. Kostyuk and O.A. Krishtal: Wiley, 1984). This allowed a much more rigorous isolation of the relatively small Ca currents from larger contaminating currents. They first applied this technique to large snail neurons but then extended it to mammalian sensory neurons. Unlike many of his 'Eastern block' colleagues, much of Professor Kostyuk's work has been published in major Western journals, so is readily accessible. Notwithstanding, this little volume provides, inter alia, a very welcome summary of his laboratory's work, including such less well-known aspects as (for instance) the effects of Ca^{2+} ions on electrophoretic mobility.

As the above implies, the major part of the book concerns electrophysiological studies on voltage-gated Ca-currents – largely, but not exclusively, in molluscan nerve cells. Ten years ago this would have been an esoteric and foreign territory to readers of FEBS Letters, but times have changed and FEBS Letters now has its fair share of ion channel papers, replete with records of channel currents. Nevertheless, the reader should be warned that