

## BOOK REVIEWS

### **Mutation Research DNAging Genetic Instability and Aging**

This special issue of Mutation Research focusses on the molecular basis of aging. The original papers and reviews included in this issue have been divided into two main sections. The first deals with topics relating to mitochondrial degeneration and the second with oxidative damage. The mitochondrial DNA molecule can be considered to be an additional human chromosome and oxidative damage to mitochondrial DNA is implicated in cell aging.

Contributions in the section on mitochondrial damage include a review by Schapira and Cooper on the role of mitochondrial dysfunction in neurodegeneration and aging. Alterations to mitochondrial (mt) DNA such as the deletions and mutations that are associated with aging are reviewed by Wei and a comprehensive hypothesis on the contribution of random mtDNA mutation and gradual loss of cellular bioenergy to the human aging process is presented by Linnane *et al.* Corral-Debrinski *et al.* report that in hearts deprived of mitochondrial substrates, due to coronary heart disease, the level of mtDNA deletion was greatly elevated. Bittles provides a good account of the evidence for and against the causal involvement of mtDNA in mammalian aging and Miquel provides an update on the mitochondrial hypothesis of cell aging, based on oxyradical damage to mtDNA.

In the second section Sohal and Brunk review the production by mitochondria of pro-oxidant species such as superoxide and hydrogen peroxide and Richter discusses damage to mtDNA caused by these species in relation to disease and natural aging. Mitochondrial lipid peroxidation is related to damage to mtDNA in a hypothesis presented by Hruszkewycz and oxidative DNA damage as the basis of aging is reviewed by Holmes *et al.* In addition, Sies and Menck discuss singlet oxygen induced DNA damage. A good account of oxidative damage to DNA in chromatin with particular reference to the methods used to measure the products of DNA damage including GC-MS (gas chromatography mass spectrometry) is provided by Dizdaroglu. The free radical theory of aging is discussed by Harman in relation to dietary, genetic and environmental factors. Finally, a hypothesis on the importance of protein oxidation in aging is presented by Dean *et al.* and Brink *et al.* discuss lipofuscinogenesis and cellular aging.

The editor is to be congratulated on an outstanding issue of Mutation Research that will be of great use to research workers in fields relating to mitochondrial oxyradicals, DNA damage and aging. This issue will contribute to the understanding of the known interactions between oxidative mitochondrial damage and aging and promote research into those that have yet to be elucidated.

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**Cardiovascular Toxicology**

Second edition, edited by Daniel Acosta, Jr.  
*Raven Press, New York, USA. \$124, 1992*

The first edition of *Cardiovascular Toxicology* was published in 1982, edited by E.W. Van Stee, and has proved popular; hence the publication of the present expanded version.

The book begins with an introductory chapter by the editor and his colleagues outlining the possible roles of oxidative stress and disturbances of calcium metabolism in cardiotoxicity. This is followed by two chapters that discuss methods for evaluation of the cardiovascular toxicity of chemicals. Section III, entitled "ischemic myocardial cell injury" contains three chapters, all well-written. However, the first of these deals with general characteristics of cell injury and might have been better placed in the Introduction section. I particularly enjoyed the article by Kloner and Przyklenk on the existence (or non-existence!) of lethal reperfusion injury in the myocardium.

Section IV of the book is devoted to cardiac toxicity; the anthracyclines, other antibiotics, endotoxin, catecholamines, okadaic acid, alcohols, heavy metals,  $\text{Ca}^{2+}$  antagonists,  $\text{K}^{+}$  channel blockers, organic solvents and CNS-acting drugs are among the compounds discussed. The thorny issue of the potentially-harmful effects of environmental tobacco smoke is explored in chapter 15.

The last section of the book (containing only 2 chapters) deals with vascular toxicology and, to the mind of this reviewer, is the least satisfactory. An introductory chapter outlines the structure of blood vessel walls and the different ways in which their components can be affected by toxins. The final chapter outlines in a superficial way the actions of a wide range of different toxins, without getting into details of mechanism of action.

Overall this is a good book, although I would like to have seen more on vascular toxicology, particularly in relation to atherogenic agents. I am pleased to have this book on my bookshelf, and I recommend it to others.

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**Dietary Fats: Determinants of Preference, Selection and Consumption**

Edited by D. J. Mela

*Elsevier Applied Science*, 1992, ix + 192 pages  
Price £75.00 ISBN 1-85166-865-9

The volume is the proceeding of a meeting on "Determinants of Preference, Selection and Consumption of Dietary Fats", held at the AFRC (Agriculture and Food Research Council) Institute of Food Research, Reading, 1-2 May 1991.

The book contains eleven chapters contributed by some of the conferees. Without a preface, it is somehow difficult to gauge the aims of the book. The Cataloguing-in-Publication Data is not included in the book. Nevertheless, chapter one by M. J. Wiseman explores the present and past trends in dietary fat consumption and concludes that fat intakes have tended to stabilise around "40% of energy" over the past 25 years.

R. Shepherd considers the application of social psychological models to fat intake. The chapter identifies a number of factors affecting food choice. Food choice is of importance in nutrition since this determines the type and amount of food consumed and can account for the nutritional status of the individual. The chapter also discusses the model of Fishbein and Ajzen on the relationship between attitude and behaviour.

H. Tourila discusses preferences and attitudes related to fat-containing foods. Some of the findings suggest that whilst chocolate and ice cream are highly preferred and recognised as significant source of, calories, sugar and weight gain, the widely used food items such as milk do not evoke "conflicting beliefs as does chocolate and ice creams".

D.J. Mela and R.J. Marshall considers sensory properties and perceptions of fats. A. Drewnowski considers sensory preferences and fat consumption in obesity and eating disorders. J. Blundell, V. Burley, J. Cotton and C. Lawton discuss dietary fat and appetite control. They suggest that when evaluating the effects of dietary fat upon appetite control, satiation and satiety must be considered. It is reported that in subjects exposed to a range of high fat foods, the weak effect on satiation (within meals) induced a very high calorie intake.

C. Fischler considers in his chapter entitled "from lipophilia to lipophobia" the changing attitudes and behaviour towards fat.

The book continue with chapters on "sensory and metabolic influences on fat intake" (by Reed, Mela and Friedman), "factors influencing fat consumption in direct selection studies" (by Kanarek), "the investigation of orosensory stimuli in the intake and preference of oils in the rat" (by Smith) and concludes with a chapter on "consumers considerations in reduced fat food" (by C. William).

The materials presented in the book are informative and it would be useful source book for health counsellors. The role of fat in coronary heart diseases is very topical at present. The presentation of the book is rather poor. Perhaps the volume would have been best served by a paperback publication with succinct editorial attention. The lack of an index make the book difficult to access.

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### **Determination of Vitamin E: Tocopherols and Tocotrienols**

by Claude Bourgeois

*Elsevier Applied Science*, 1992, vi + 162 pages

Price £75.00 ISBN 1-85166-7547

The level of scientific publications on vitamin E/ tocopherols and related research epitomises the interest in this reproductive agent/antioxidant. Claude Bourgeois begins his fascinating treatise on over 400 methods for the determination of tocopherols and tocotrienols by describing the discovery of vitamin E through to the first synthesis of  $\alpha$ -tocopherol by Karrer in 1938.

Sample processing is then discussed with emphasis on extraction procedures. We were reminded that homogeneity does not always exist for solid samples (such as in foodstuffs or animal feedstuffs); whereas this is not the case with liquid samples (such as blood plasma or vegetable oils).

The book continues with the various methods for the determination of tocopherols and tocotrienols. Extensive discussion and useful references on seminal determinations by colorimetric, open column chromatography, paper chromatography, thin layer chromatography, gas chromatography, HPLC, electrochemical, spectrophotometric, fluorometric and automated, methods, are discussed.

Tocopherols undergo redox reactions, hence there is a consensus to determine them by electrochemical means. The author reviewed the literature on electrochemical detection and highlighted in this, the polarographic method of Loliger and Saucy (*Z. Lebensm. Unters. Forsch.*, (1980) 170 413). Potentials of the various homologs of tocopherols (T) 718 mV ( $\alpha$ -T), 818 mV ( $\beta$ - and  $\gamma$ -T), and 894 mV ( $\delta$ -T) have been obtained by this technique. In each of the methods discussed, the author comments on the advantages and the inherent weaknesses. What could be done to improve sensitivity in any one of the methods depends on the type of sample (such as pharmaceuticals, blood plasma and biological tissues, fats foods and feeds).

Given the active interest in the validation of the various methods for the measurement of levels of the antioxidant by scientists in the free radical field and in nutrition research, this book deserves to be in the library of the relevant institution. Sadly, at 46 pence per page, individual book collectors may not so easily enjoy the benefits of this quality publication.

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### **Biochemistry of Food Proteins**

Edited by B. J. F. Hudson

*Elsevier Applied Science*, 1992, x + 419 pages

Price £110.00 ISBN 1-85166-768-7

The preface states that food protein specialists would find much value in the book. "Biochemistry of Food Proteins" is essentially a collection of extended reviews from the "Development in Food Protein" Series (edited by Hudson), emphasising issues in biochemistry. One of the many significant mission statements in the book is "all food systems have characteristic functional properties and an enhanced understanding of food component interactions is required to explain the molecular basis for food functionality" (page 93).

The present volume contains eleven chapters. The first chapter by Schnepf is on protein-water interactions. Water and proteins play an important functional role in life processes. The implication of the interaction for food protein is discussed. Howell considers in the second chapter protein-protein interaction. This interaction affects the processing, storage and behaviour of proteins in food. The interactions of globular proteins such as egg albumen, milk whey, blood plasma and soyaglobulins with each other and/or with casein or myosin (non-globular proteins) are discussed.

In chapter 3, Marshall and Chrastil discuss interaction food proteins with starch. The characteristic textures of foods are due in part to protein and starch interaction. The major characteristics of the interaction, influence of heat and moisture, and the importance of starch granules are considered.

Chapters 4 through to 11 considers respectively, Maillard reaction (by J. M. Ames), metal-protein interactions (by Gillard and Laurie), haemoproteins in meat and meat

products (by Ledward), modification of food proteins by non-enzymatic methods (by Shih), modification of food proteins by enzymatic methods (by Hamada), the plastein reaction: fundamentals and application (by Watanabe and Arai), application of enzymes in food (by Frost), and proteins as a source of flavour by (Weir).

The term plastein reaction refers to, for example, the protease-catalysed process involved in the formation of a plastein from protein hydrolysate or an oligopeptide mixture. The chapter by Ledward on haemoproteins in meat and meat products is of interest given the increasing concern on the stability and quality of food in the face of oxidative reactions and the role that the haemoproteins (such as haemoglobin or myoglobin) could play in mediating such reactions during food handling. Another enjoyable chapter deals with the application of enzymes to food. We are reminded that the use of malt in brewing and baking and the use of calf stomach in cheese manufacture are enzymatic processes. The chapter charts other applications: from baking, alcoholic drinks, dairy products, enzymatic production of food additives (for example, the transesterification of tannin with propanol catalysed by Tannase, produce the antioxidant propyl gallate) through to use of plant proteases to tenderise meat.

The groups of professions that could derive benefit from the book and hence that can be added to statement in the preface, are many. It is unfortunate that the pricing strategy applied by the publisher means that only main libraries can afford books of this nature.

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### **Lipid-soluble Antioxidants: Biochemistry and Clinical Applications**

Edited by A. S. H. Ong and L. Packer

*Birkhauser Verlag*, 1992, xii + 640 pages

Price SFR 168.00 (approx £76)

ISBN 3-7643-2667-0 (Basel)

ISBN 0-8176-2667-0 (Boston)

The editors have put together contributions by various authors to a conference that took place in Penang Malaysia (19-22 September 1991). There are four sections in the book namely (1) vitamin E: tocopherols and tocotrienols and ubiquinones (2) carotenoids, flavonoids and retinoids (3) parasitic and infectious diseases and (4) clinical applications: antioxidant therapy. Each section contain a mixture of review papers and original research papers.

Reactive oxygen species are continually formed in biological systems. Although some of these serve useful purposes, their generation in excess of the antioxidant status of the biological system, imposes the condition of oxidative stress. The free radical reaction of lipid peroxidation (such reaction is minimised by use of antioxidants during food processing for example) has become a major research area in recent years. The book does well in presenting a discussion on related issues: e.g. the physiological and pharmacological usefulness of antioxidants and inherent benefits in the treatment of health disorders in which a role for free radicals has been implicated. Vitamin E (a collective term for different tocopherols and tocotrienols) is the major lipid-soluble antioxidant in cellular membranes.

The respective chapters are, in section 1, new horizons in vitamin E research—the vitamin E cycle, biochemistry and clinical applications; the reactivity of tocotrienols and other lipid-soluble antioxidants towards peroxy radicals; physical/chemical studies of vitamin E in membranes; synergistic effect of lipid hydroperoxy radical scavenging and lipid hydroperoxide reduction in the inhibition of lipid peroxidation in biomembranes; determination of rate constants for antioxidant activity and use of the crocin assay; vitamin E in protection of oxidative impairment in endothelial and platelet functions; antioxidant effectiveness of tocopherol isomers; effect of vitamin E on metabolism of uremic low density lipoproteins in human monocyte-derived macrophages, differences of antioxidative effect between vitamin E and selenium; tocopherol and tocotrienol plasma transport and tissue concentrations: implications for their relative biological functions; modulation of cell proliferation by tocopherols and tocotrienols: role in atherosclerosis; vitamin E and health in the marmoset monkey: a non-human primate model for nutritional research; antitumour and antioxidant activity of tocotrienols; tocopherols, carotenoids and the glutathione system; and nutrition of tocopherols and lipid metabolism.

In section 2, carotenoids and vitamin A: an overview; metabolism of carotenoids by enzymes of oxygen metabolism, role of  $\beta$ -carotene in disease prevention with special reference to cancer; anti-tumour and anti-tumour promoting activity of  $\alpha$ - and  $\beta$ -carotene; production of palm oil carotenoid concentrate and its potential application in carotenoids, novel polyene polyketones and new capsorubin isomers as efficient quenchers of singlet molecular oxygen; modification of alloxan diabetes in rats by vitamin A status; flavonoids in foods: their significance for nutrition and health; studies on flavonoids and related compounds as antioxidants in food; autocoid-immunopharmacology of flavonoids; anticarcinogenicity of flavonoids as studied by inhibition of lipid peroxidation, microsomal degranulation and their interaction with benz(a)pyrene metabolites; and role of retinoids in modulating the molecular actions of environmental carcinogens.

In section 3, free radicals and antioxidants in malaria; oxygen free radicals in malaria; the mechanism of antimalarial action of artemisinin (Qinghaosu); erythrocytic GSH level and stability in *Plasmodium vivax* malaria; plasma lipid peroxidation in *Plasmodium* malaria; presence, formation and function of ubiquinones Q<sub>6</sub> and Q<sub>8</sub> in filarial parasites; and catalase activity in red cell and liver of mice infected with *Plasmodium berghei*.

In section 4, the hypolipidaemic effect of different diets; epidemiological correlations between poor plasma levels of essential antioxidants and the risk of coronary heart disease and cancer; effect of different antioxidants in experimental myocardial infarction, lipid-soluble plant phenols as antioxidants and anti-mutagens, anti-cancer effects of cis-unsaturated fatty acids and antioxidants in African children; dihydrolipoic acid is protective against reperfusion injury; effect of Japanese herbal medicine, Sho-saiko-to-go-keishi-kashakuyaku-to (TJ-960) on aging; lipoprotein oxidation; hepatic lipid peroxidation in ethanol potentiated aflatoxin B<sub>1</sub> hepatotoxicity; palm oil vitamin E effects in hypercholesterolemia, fat soluble antioxidant vitamins in cancer patients, butylated hydroxytoluene toxicity; effects of tocotrienols-rich vitamin E on patients with peripheral vascular disease; and protection from air pollution injury by dietary vitamin E.

Notable chapters in the book include those from Packer, Olson, Hunt *et al.*, Stavric and Matula, Ralph and Ralph, Gey, and Kahl. Packer considers new horizons in vitamin E research with a look at the clinical applications of the concepts of the vitamin E cycle, whilst Kahl expertly reviews the complex scenarios associated with

the toxicity of BHT, a synthetic antioxidant. Indeed it is this possibility that a number of synthetic phenolic antioxidants could exert adverse effects in biological systems that has contributed to the growing interest (in particular among food manufacturers) in the use of "natural antioxidants", of which flavonoids considered by Starvic and Matula, are examples.

Lipid-Soluble Antioxidants: Biochemistry & Clinical Applications will find many friends amongst food scientists and biomedical scientists. A number of complementary books have also addressed the role of antioxidants in nutrition and in health: examples include, *Food Antioxidants* (B. J. F. Hudson), *Oxidative Enzymes in Foods* (D.S. Robinson and N.A.M. Eskin), *Free Radicals and Food Additives* (O.I. Aruoma and B. Halliwell), *Oxidative Stress: Oxidants and Antioxidants* (H. Sies) and *Determination of Vitamin E: tocopherols and tocotrienols* (C. Bourgeois).

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