

Book reviews

Reaction Mechanisms in Environmental Organic Chemistry. By R.A. Larson and E.J. Weber. Lewis Publishers, CRC Press, Boca Raton, USA, 1994. xiv + 433 pp. Price £56. ISBN 0-87371-258-7.

The physical and chemical factors that govern the transport of organic compounds in the environment have been intensely studied. Organic reactions that transform particular chemicals into by-products, however, have received significantly less attention. Studies involving organic reactions under environmental conditions have shown that the environmental alteration products of some organic molecules are much more hazardous than their precursors; for example, treatment of natural waters with chlorine causes potentially toxic or mutagenic organochlorine compounds to be formed.

The purpose of this volume is to assist in the understanding of fundamental environmental chemistry by providing an overview of the environment, of the principal organic chemical species in it, and of the processes and reactions that tend to transform such species. The reactions of environmentally important organic compounds are illustrated using traditional mechanistic and physical organic chemistry concepts and data.

The initial introductory chapter conveys a detailed description of the three principal environmental compartments, namely air, water and solid phases, and surveys the conditions found in each of them that tend to promote chemical reactions. The largest fraction of identifiable dissolved organic compounds, in both marine and fresh waters, is carbohydrate in nature, as is approximately 10% of the organic matter in oil. The remainder of the book is an in-depth study of the principal types of organic reactions that may occur under environmental conditions, with discussions on the particular structural features of organic molecules that may make them more or less susceptible to each type of reaction.

Chapters 2 and 3 deal with hydrolyses and reductions, respectively, the latter being a process that until recently has been neglected from an environmental perspective. The fourth chapter takes place in a range of environments, from the upper atmosphere to the surfaces of sediments, and encompasses a plethora of oxidising agents. In Chapter 5, disinfection is discussed. Such reactions and their projects are the subject of public debates in virtually every community in which water treatment is undertaken.

Sunlight-induced reactions (photochemistry) are covered in Chapter 6. Such reactions will undoubtedly come under increasing scrutiny, as the world adjusts to life under a changing regime of solar energy, featuring

higher levels of short; energetic UV-B wavelengths. Finally, Chapter 7 contains a variety of other reactions that do not fit into any of the aforementioned categories, but are nevertheless significant in determining the fate of many classes of compounds.

This is a well-presented and thoroughly indexed volume that is an essential reference work on environmental chemistry for all those working in water treatment, hazardous waste and environmental engineering.

John F. Kennedy
Charles J. Knill

Analyzing Food for Nutrition Labeling and Hazardous Contaminants — Food Science & Technology, Vol. 65. Edited by I.J. Jeon and W.G. Ikins. Marcel Dekker, New York, USA, 1995. viii + 496 pp. Price \$165. ISBN 0-8247-9349-8.

The analysis of foodstuffs for particular chemical components can be extremely challenging due to the complicated nature of the matrices involved. This is especially true when the analysis is intended to provide nutrition labelling information or is focused on the identification and quantitation of hazardous contaminants.

This volume has been designed as a practical guide to assist analysts in deciding which methodologies to adopt for a particular analysis and help those who are seeking an improved method relative to the one that they currently use. When selecting a method, one often considers accuracy and precision to be the most important criteria. However, a number of other factors are often of equal importance in a practical situation, such as speed, convenience and cost of the analysis. Each chapter of this book is devoted to giving the reader more insight into the advantages and disadvantages of performing an analysis by a particular method.

The first half of the book deals specifically with the analytical methodologies that pertain to nutrition labelling, or by tackling subject areas in terms of food component types. Areas covered include fatty acids, cholesterol, carbohydrates, dietary fibre, proteins and amino acids, minerals, and vitamins. The second half of the book is devoted to the analysis of hazardous contaminants in foods, and covers topics such as mycotoxins, pesticide residues, lipid-derived toxins, naturally occurring hazards and toxins arising from the cooking/processing of foodstuff materials.

This comprehensive reference manual serves as a valuable resource for individuals in regulatory agencies, quality control, food safety and food industry personnel. It

will also prove extremely useful for those in academia with interests in food analysis for nutrition labelling and hazardous contaminants, as well as undergraduate and postgraduate students in such disciplines.

Charles J. Knill
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Miscellaneous Foods by W. Chan, J. Brown and D.H. Buss. The Royal Society of Chemistry, Cambridge, UK, 1994. vii + 193 pp. Price £27.50. ISBN 0-85186-360-4.

Miscellaneous Foods presents an authoritative update on up to 82 nutrients for 418 foods. The foods covered include fats and oils, sugars, preserves, confectionery, savoury snacks, beverages (including alcoholic beverages), soups, sauces, pickles, other miscellaneous foods and baby foods.

The data in *Miscellaneous Foods* are from the UK Nutrient Databank which is maintained by The Royal Society of Chemistry and the Ministry of Agriculture, Fisheries and Foods. A range of printed and computer-readable products is regularly produced from this databank. This is therefore a valuable source of information with easy access to anyone in the field.

John F. Kennedy

Isopentenoids and Other useful Products: Evolution and Function — ACS Symposium Series 562. Edited by W.D. Nes. American Chemical Society, Washington, DC, USA, 1994. viii + 255 pp. Price \$69.95. ISBN 0-8412-2934-1.

Compounds without biochemical precedent may derive from hitherto unknown or defunct biosynthetic pathways, or may in certain cases be geological transformation products. The diverse range of isopentenoids, including steroids, in sediments billions of years old demonstrates the antiquity of their biosynthetic pathways. This volume describes the evolution of pathway sequencing of natural products and critically examines the selection pressures that influence change in the structure of natural products. The structure and stereochemistry of a range of natural products, including isopentenoids, sterols, triterpenes, lignins and fatty acids is addressed in some detail.

Particular attention has been given to isopentenoids and sterols because of their importance in biology. Sterols are chiral natural products that form biomolecular complexes in cells. They have extremely widespread distribution in living organisms, e.g. in bacteria, algae, fungi and higher plants and animals.

The chapter on the evolution of lignan and neolignan biochemical pathways should be of some interest to carbohydrate chemists and biochemists. Some lignans and neolignans participate in lignin synthesis and hence have important roles in determining physicochemical

and mechanical properties of cell walls, whereas others act as antioxidants and biocides.

This volume was developed from a symposium at the 205th National Meeting of the American Chemical Society in Denver, Colorado, USA. It is an interesting and extremely well-referenced volume that is most suitable for graduates and professionals in all areas of natural product chemistry, biochemistry and phytochemistry.

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Bacterial Cell Wall. Edited by J.-M. Ghuysen and R. Hakenbeck. Elsevier, Amsterdam, 1994. xxiv + 581 pp. Price Dfl. 350; US\$200.00. ISBN 0-444-88094-1.

Prokaryotic and eukaryotic cells possess many differences between each other, especially differences in the walls of the cell which are not only morphological. Bacterial cell walls contain unique polysaccharides, proteins and lipids. Due to the lack of internal vesicles, the bacterial cell wall is the main organelle producing biomolecules which bacteria require. Thus, research of bacterial cell wall properties and functionality is of great interest to the pharmaceutical and biochemical industry.

Bacterial Cell Wall aims to provide an integrated collection of contributions from respected authorities on the subjects forming a fundamental reference book to the bacterial cell wall and consists of 27 chapters. The history of bacterial cell wall research is summarised in Chapter 1. Peptidoglycans, the basic matrix of the bacterial cell wall, are discussed from Chapter 2 to Chapter 8. The topics include structure and biosynthesis of the cell wall, related enzymes like penicilloyl serine transferase, and peptidoglycan hydrolases. Teichoic and lipoteichoic acids, lipoglycan, and cell-wall associated proteins are discussed relating to the cell wall of Gram-positive bacteria in Chapters 9–11. Lipopolysaccharide, lipoproteins, porin (outer membrane channel protein), and the secretion mechanism of Gram-negative bacteria are highlighted in Chapters 12–20. The periplasm, the trans-shipment region in the bacterial cell wall, is focused on in Chapter 21. Signal transduction pathways on the bacterial cell wall, which are important for bacteria to adapt to changing environmental conditions (Chapters 22–24) and acquired resistance to known antibiotics (Chapters 25–27) are discussed.

This book covers the basic concepts as well as virtually all subject areas involving the bacterial cell wall, even though no chapter is spared for the cell walls of *Mycobacterium tuberculosis* and *M. leprae*, as the Editors mention. This is undoubtedly a worthwhile purchase for research groups working on bacterial biology.

John F. Kennedy
Jiro Shimizu