

## Book Reviews

**Modern Dairy Technology: Vol. 1. Advances in Milk Processing. 2nd Edn.** Edited by R. K. Robinson. Chapman & Hall, 1994. 485 pp. ISBN 0-412-53520-3. Price £39.95.

The second edition of *Modern Dairy Technology: Vol. 1* is sufficiently updated from the first edition (1986) to warrant its title and includes an additional chapter by O. Skov on protection against fire and explosion in spray driers. As the title suggests the book is intended to be a reference for the practical dairy technologist with an emphasis on manufacturing principles and the effects of processing on product differentiation and quality. Scientific aspects are discussed in a general, readable manner, as a basis for understanding manufacturing principles. References and additional reading lists are, in general, sufficiently complete and appropriately selective.

This first volume of a two volume set describes three general subject areas: (1) The processing of liquid milk including heat treatment and membrane processing; (2) manufacturing technology of cream, butter, and both concentrated and dried milk products; and (3) processing and utilization of milk components including caseins, whey proteins and lactose. In addition to these subjects, the final chapter, 'Automation in the dairy', by W. M. Kirkland, is an introduction to plant automation, process languages, and process control from an operations point of view.

The first of nine chapters, 'Heat treatment of milk' by M. J. Lewis considers raw milk quality, the general theory of the effect of heat on microorganisms, pasteurization technology, and both continuous (ultra-high temperature) and in-container sterilization of milk. Quality aspects discussed include microbiological, sensory and nutritional. 'Membrane processing of milk' (A. S. Grandison & F. A. Glover) is discussed in Chapter 6. The general principles of the principal membrane processes (reverse osmosis, ultrafiltration, microfiltration and electrodialysis) and their applications to milk processing are clearly presented. However, some of the information on membrane applications is out of date and now invalid (e.g. some information on cheddar manufacture from ultrafiltered milk needs to be modified in the light of more recent information) and other recent developments have been omitted. The references listed for this chapter also suggest that the information is somewhat dated.

Chapters 2 and 3 on cream processing (C. Towler) and butter and dairy spreads (R. A. Wilbey), respectively, provide an overview of cream separation, cream

products, and dairy spreads. The chapter on spreads is particularly useful, providing much recent information on low fat spreads and butter fat/vegetable fat blends. I think other information on manufacture and utilization of other butter products (e.g. ghee), butter fat fractions and other butter fat ingredients such as flavours should also have been included. Knipschildt and Andersen in Chapter 4 have provided a concise but quite complete review of concentration and drying of milk, infant formula, buttermilk and whey, preceded by a discussion of unit operations in evaporation and drying.

A review on whey processing and utilization in Chapter 7 by J. G. Zadow contains much useful information and is generally up to date. Discussion of whey protein utilization includes many products including isolates enriched with  $\alpha$ -lactalbumin or  $\beta$ -lactoglobulin but barely more than mentions recent developments in highly concentrated (>95%) whey protein isolates. Products derived from lactose are considered in much detail. C. R. Southward reviews the manufacture and utilization of caseinates in Chapter 8. Coverage is complete relating functional properties of caseinates to specific food and industrial products.

My overall evaluation of this book is very positive. The second edition of *Modern Dairy Technology: Vol. 1*, is a worthwhile update which will prove useful to dairy processors and those dairy scientists with an interest in practical dairy technology.

Art Hill

**Technological Advances in Improved and Alternative Sources of Lipids.** Edited by B. S. Kamel & Y. Kakuda, Blackie Academic & Professional, Glasgow. 1993. xiv 397 pp. Cost £69.00. ISBN 0-7514-00017.

This book describes some of the modern developments in the science and technology of edible oils with emphasis on the sources and nutritional quality of edible oils and fats.

After a short introduction, nutritional aspects and biotechnological advances in sources of edible oils are discussed. This is followed by chapters covering plant sources with emphasis on commodities other than the major commercial oil crops including herbaceous crops, tropical fruits, nuts, fruit and vegetable by-products, palm and forest products. Chapters covering microorganisms, animal and marine sources, oxidised oils and enzymes in lipid technology complete the book.

The main sections give very useful information about

sources of edible oils, much of which is not readily accessible elsewhere. The wide range of crops being assessed as oil sources, microbial lipids and the rapid advances in biotechnological techniques for modifying oil crops are well reviewed. Amongst the many references, a good proportion are from the 1990s, including at least one from 1993, and the topical nature of the contributions makes the book particularly valuable.

The obvious errors in this book are few and far between, but the chemical structure of cholesterol is wrong, and Shukla describes linolenic acid (C 18:3 n-6) as one of the major polyunsaturated fatty acids of plant lipids, whereas it should of course be C 18:3 n-3.

The discussions of nutritional aspects of oils are rather brief overviews. The section on regeneration of used oils does not mention the effects of extended use on tocopherol levels and this should be an important consideration in the useful life of an oil. Antioxidants other than vitamin E are not discussed. However, despite these limitations the main sections in the book are very well written by eminent contributors.

This book is highly recommended for scientists and technologists interested in potential sources of edible oils and the methods currently being investigated for developing alternative oils or oils with modified composition.

M. H. Gordon

**Recent Developments in Flavor and Fragrance Chemistry.** Proceedings of the 3rd International Haarmann and Reimer Symposium. Edited by R. Hopp & K. Mori. VCH, Weinheim, Germany, 1993.

It is a common reaction when reading conference proceedings to be thankful that one has not expended vast sums on the registration fee in order to attend. This is not the case with the present volume. The conference must have been absolutely fascinating and the obvious charms of Kyoto (Japan) would have provided a considerable bonus.

The proceedings take the form of sixteen sections, with eight contributions from the sponsor (Haarmann and Reimer) and eight from academic scientists. It is further subdivided into eight chapters on fragrance chemistry and four chapters each on flavour chemistry and biochemistry. The perfumery section begins with an excellent and very timely account from Noyori on the use of BINAP-transition metal complexes as catalysts in the industrial production of terpenes. Asymmetric hydrogenation and isomerisations are described en route to (R)-citronellal (1500 tons per year!), (-)-isopulegol (1100 tons per year!) and (-)-menthol (9 tons per year) amongst others. It is pleasing to see synthetic elegance alongside industrial practicality.

The second chapter, by Hopp, should really have come first, because it provides a fascinating account of the history of Haarmann and Reimer from 1874 to the present. This allows the reader to compare the early

synthesis of vanillin from the cambial sap of fir trees (5000 trees provided 20 kg of coniferin and from this 7 kg of vanillin) with the recently devised biotransformation of eugenol to vanillin) with the recently devised biotransformation of eugenol to vanillin. Along the way, the random synthesis of 10 000 potential perfumery chemicals was accomplished, and a range of interesting products are discussed. Pelzer *et al.* then describe another facet of the modern perfumery industry in their use of computer modelling to identify the basic structures necessary for a lily of the valley fragrance. Their modelling allowed a rationalisation of existing floral compounds, and suggested the synthesis of many new ones. Several rather more exotic structures have been isolated, identified and synthesised by Weyerstahl and coworkers, and these three chapters provide a valuable insight into the strategies and techniques employed by the scientists at Haarmann and Reimer.

Mori then provides another timely review of his extensive use of enzymes (lipases, Bakers' yeast, etc.) in the synthesis of floral compounds, insect pheromones, juvenile hormones, etc. At one point he shows a pictorial summary of 15 diverse structures that have all been obtained from the achiral compound 2,2-dimethylcyclohexan-1,3-dione following stereoselective reduction using Bakers' yeast. The perfumery section concludes with three chapters on various aspects of isolation procedures, analysis and formulation, including an interesting insight into the evolution and composition of several well-known brands of perfume.

The section on flavour chemistry commences, perhaps predictably, with a review of the Maillard reaction (Tressl *et al.*), in which details are given of some model studies of the reaction between 1-<sup>13</sup>C-glucose and various amino acids, especially cysteine and proline. The other three chapters in this section all involve heterocyclic compounds (mainly furans, thiophenes and other oxygen and sulphur heterocycles) that are produced during cooking. P. Werkhoff describes the isolation and characterisation of flavour compounds from cooked or roasted beef, pork and chicken, whilst M. Guntert *et al.* discuss the results of model studies in which thiamine was heated in the presence of various amino acids to produce compounds with a typically meaty flavour. Finally, H.-J. Bertram *et al.* describes their synthesis of alkylmercaptofurans and thiophenes.

The biochemistry section commences with a review by Croteau on the biosynthesis of the thujane system, a topic near to this reviewer's heart, since I studied the biosynthesis of thujone some 25 years ago. This article is mainly concerned with very recent experiments to determine the stereospecificity of the key stages catalysed by the enzymes sabinene cyclase and sabinene hydrate cyclase. A very useful summary of the present state of knowledge concerning signal transduction in the olfactory system is provided by Reid, and Williams *et al.* show how certain flavours appear during processing due to the hydrolysis of glycosides of monoterpenes, norisoprenoids and shikimate metabolites. Finally, Gatfield & Sommer describe the biotransformation of