associated with affluence. This coincided with the early days of the nutritional sciences which led to the eventual elucidation of the role of ascorbic acid. Once again it is salutary to follow the paths of the 'great men and women' of this classical period of nutrition—and to see that they sometimes followed spurious lines conditioned by the scientific culture of the times. It is also clear that without the guinea pig the discovery of the vitamin would have been even more delayed.

Only in the final chapter does Dr Carpenter release himself from the standard he set originally to look back at the maze of observation and experiment and use modern knowledge to retrace the path from scurvy to vitamin C.

The book is excellently produced and the referencing is meticulous. It tells a fascinating story and should be required reading for the latter-day nutritionalists wrestling with other diseases where a nutritional factor is anticipated.

David Southgate

Membrane Separations in Biotechnology. Edited by W. Courtney McGregor, Marcel Dekker, New York, 1986. xx + 386 pp. ISBN 0-8247-7465-5.

This book contains 13 chapters, ranging from 10 to 54 pages, an index and an appendix, and is concerned with the applications of membranes in biotechnology. The chapter titles are: Selection and Use of Ultrafiltration Membranes; Protein Ultrafiltration—Some Neglected Considerations; Cell Harvesting; Recovery of an Extracellular Antibiotic by Ultrafiltration; Ultrafiltration Affinity Purification; a Process for Large-scale Biospecific Separations; Practice of Ultrafiltration–Diafiltration in the Plasma Fractionation Industry; Blood Plasma Processing by Electrodialysis; Membrane Separations in the Production of Alcohol Fuels by Fermentation; Membrane Separations in Food Processing; Membrane Bioreactors; Plant Tissue Culture using Membranes; The Application of Artificial Organs to Biotechnology; Waste Treatment with Reverse Osmosis Membranes. Thus the book gives a comprehensive coverage of the subject area. There are 21 contributors: 18 from North America, two from Sweden and one from the UK. The book is therefore biased toward the American market.

Some articles are very general whilst others are extremely specific. It is pleasing to see that full references are provided in most of the chapters. The standard of presentation is high and the text is relatively free of typographical errors: the main one noticed was the spelling of the word

fermenter. The diagrams, tables and photographs are clear and plentiful; there are many good photographs of equipment, products and analytical techniques, particularly gel electrophoretograms and electronmicrographs.

The chapter on food applications considers ultrafiltration and reverse osmosis in turn and divides the products into plant and animal products. It includes sugar and fruit juices, egg, gelatin, blood, vegetable proteins, natural food colours, milk and whey and alcoholic beverages; it contains over 100 references. Emphasis is placed on ultrafiltration of milk for cheesemaking, a research interest of the author. Electrodialysis applications, although few, are not mentioned in this chapter but are later described for blood processing applications. The chapter on membrane selection is well worth reading, but it should be pointed out that the selection of membranes whose characteristics and performance are reviewed is not comprehensive, and that ceramic membranes, which are hardly discussed, are becoming more widely available. The chapter on proteins contains much common sense and introduces additional problems encountered with these systems, such as protein adsorption on the membrane, protein aggregation, pH effects and solubility problems.

In conclusion, this book is worthy of consideration by anyone interested in food processing, downstream processing of fermentation broths or effluent disposal.

Mike Lewis