

during biscuit dough processing, the types of equipment used for mixing, sheeting, laminating, moulding and cutting the dough, the effects of standing the dough between mixing and machining and the types of experimental techniques used by the industry to investigate the biscuit making process.

The greatest scientific input into biscuit making must be in the use of sulphur dioxide and the sulphites, proteases, etc., as dough conditioners, while the 'blackest art' must lie in understanding and controlling the changes that occur in the product during baking, cooling and storage. Clear diagrams, black and white photographs and photomicrographs aid the reader to comprehend both the science and the art.

This is an excellent very useful little book.

**Barbara Brockway**

**Review of Advances in Cereal Science and Technology.** Vol. IX. Edited by Y. Pomeranz. The American Association of Cereal Chemists, St. Paul, MN, USA, 1988. ISBN 0-913250-51-1. 345 pp. Price: US\$66.00.

Volume IX of the Advances in Cereal Science and Technology series is an excellent book containing a well balanced mixture of topics, ranging from a chapter reviewing the different methods used for determining the crispness of cereal products to chapters describing the application of quite advanced immunological and biochemical techniques to the complex questions asked about cereals.

Y. Pomeranz, as the editor, has gathered together contributions from American, Canadian, French and Australian authors, who between them have produced eight interesting and very useful chapters.

The first chapter in this volume discusses crispness. Crispness is a food characteristic that we use for judging quality, especially in foods like biscuits and certain vegetables. Often it is the consumer's only criteria for judging quality. Despite the relative ease with which we perceive crispness we find tremendous difficulties in designing suitable equipment for measuring this characteristic. The author of this chapter, Z. M. Vickers, concentrates on mechanical and acoustical techniques for measuring crispness and she explains how cereal products make noise.

The resurgence of interest in reducing water activity in foods to improve their storage characteristics has inspired the fourth chapter in this volume. The authors, P. S. Taqukis and W. M. Breene, review both the historical and the modern developments in the techniques used for producing intermediate-moisture foods. They also consider the savings that can be made in terms of energy costs and speculate about the future of intermediate-moisture foods.

The regulation of the expression of hydrolase genes in cereal seeds is reviewed by G. R. Chandra while the role of the cereal alpha-amylases in grain research and technology is discussed by R. D. Hill and A. W. MacGregor. These three authors, along with a fourth author, H. W. Gardener, who reviews lipoxygenase pathways in cereals, thoroughly cover their enzyme topics and introduce us to the world of molecular biology. The synthesis, regulation, mode of action and inhibition of cereal alpha-amylases, as well as the mechanisms which control the expression of cereal hydrolase genes, are considered in great detail. The role of plant growth regulators, calcium ions, and proteinaceous inhibitors as regulators is discussed. All the authors review our current knowledge and stress the technological importance of these enzymes and direct our attention to where we need to concentrate our future research. Lipoxygenase pathways are reviewed in respect to their subcellular location, properties and role in wheat dough rheology with respect to bread and pasta making. The author looks at the enzyme in barley, maize, rice, rye and oats.

Chapter two is an excellent review stressing the importance of cross-link reactions in proteins, by R. E. Feeny and J. R. Whitaker. Undoubtedly protein cross-linking reactions are of the greatest importance in determining the mechanical properties of most foods. Naturally occurring cross-links, chemically synthesised cross-links and cross-links formed through the action of enzymes are considered along with the modifications that may occur when materials deteriorate.

The immunochemistry of cereal grain storage proteins and grain enzymes are covered in two separate chapters. The authors, J. Daussant and D. Bureau, introduce the reader to the techniques employed by the immunologist and they briefly explain the principles behind these techniques as well as their applications and limitations when they are applied to cereal enzymes and their inhibitors.

The immunochemistry of cereal grain storage proteins is reviewed by J. H. Skerritt. This chapter concentrates on the application of immunological techniques to the study of the structure and function of cereal storage proteins.

This volume will be of interest to the researcher, the advanced student, the experienced technologist and all of us interested in applying the recent developments in molecular biology to problems associated with cereals.

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