

Book Reviews

Protein Structure – Function Relationships in Foods. Edited by R. Y. Yada, R. L. Jackman & J. L. Smith, Blackie Academic & Professional, London. ISBN 07514 01862. pp. 202 + xi.

This well produced book is one of the series arising out of the 8th World Congress of Food Science & Technology, held in Canada in 1991 and attended by over 1400 delegates. Although the Congress was held over 3 years before the book was published several of the contributors have obviously been able to update their chapters since a few of them refer to work published or carried out in 1993 and even 1994. This is important since several of the chapters deal with techniques and concepts that are developing rapidly. The book consists of eight chapters on a range of topics concerning aspects of protein structure – function relationships which fall into two distinct categories, namely, those that use a variety of foods to demonstrate the intricacies of the relationships between protein structure and function and those that describe techniques used to study these relationships or elucidate protein structure.

Chapter 1, by Kinsella, Rector & Phillips is a short review of current knowledge regarding the relationship between molecular structure and functional properties with particular emphasis on their own work. This article could be a useful starting point for researchers moving into the area.

Chapter 2, by Hermansson is again mainly a summary of her own work in the area of microstructure of protein gels related to functionality and is primarily concerned with microscopic (TEM & SEM) techniques. The author acknowledges the possible formation of artefacts during preparation and suggests techniques that should eliminate these problems.

Chapter 3, by Swaisgood, Chen, Oh & Catignani discusses the potential of using controlled (limited) proteolysis to study structural changes and selected domains in proteins. I found this chapter fascinating since I had not previously considered the potential of this approach to the problem.

Chapter 4, by Osuga, Van der Schaaf & Whitaker is a wealth of information about the large number of different polyphenol oxidases to be found in nature. Though these differ widely in amino acid composition and molecular size there does appear to be a good deal of homology around the active site. The authors discuss how polyphenol oxidase activity may be controlled using a catalytic mechanism.

Staff from the University of California are also major contributors to Chapter 5 (Ho, Yin, Filho, Lajola & Whitaker) which is a concise and comprehensive

account of the numerous natural α -amylase inhibitors to be found in nature. Our knowledge in this area is still very limited and this chapter summarises current knowledge but acknowledges that much work still needs to be done to determine the mechanisms of recognition and binding between the α -amylase inhibitors and α -amylases.

Chapter 6, by Nakai, Aishima & Yada discusses the application of multivariate analysis in the study of food protein functions and clearly the approach has much to offer.

Chapter 7, by Fuller & Roscoe describes the use of a platinum electrode to investigate the surface adsorption of β -lactoglobulin A using cyclic voltammetry, again a technique I am not familiar with but one with obvious applicability to any situation where surface adsorption of proteins needs to be studied.

Chapter 8, by Li-Chan, Nakai & Hirotsuka describes the use of Raman spectroscopy to probe protein structure, a technique I would expect food scientists to resort to more frequently since it can look at structural features, primarily backbone structures, in concentrated systems.

Overall a useful and valuable addition to the literature.

D. A. Ledward

Protein Functionality in Food Systems. Edited by Navam S. Hettiarachchy & Gregory R. Ziegler. Marcel Dekker, New York. inc. 1994. pp. xii + 519. ISBN 0 8247 9197 5. US\$ 150.00.

This book covers the proceedings for the 17th Basic Symposium held by the Institute of Food Technologists (IFT) and the International Union of Food Science and Technology (IUFoST). This topic was selected to meet the demands of the Food industry, to serve as reference material on protein functionality in food systems, and to enhance the teaching of advanced courses on proteins.

The first chapter gives a very good general overview of the structure–function relationship of food proteins. This chapter covers the surface-active properties (adsorption and film formation), foaming, emulsifying, and gelling properties of food proteins.

Chapter 2 deals in some detail with molecular modelling techniques for developing structure–function relationships such as the solubility of proteins concerning protein–salt–water interactions. The following chapter (3) gives a good and useful outline on protein separation and analysis of some skeletal muscle proteins (titin, nebulin, calpastatin, μ - and m-calpain). Principles and techniques include chromatography, differential centrifugation, gel

electrophoresis, Western blots, and confocal microscopy. Computer-aided techniques for quantitative structure-activity relationship (QSAR or SAR) of peptides and food proteins are discussed in Chapter 4.

Chapter 5 reviews the forces involved in emulsion formation and relates these to the forces that govern protein-lipid interactions. The mechanism of emulsion destabilisation and the interactions involved are also well discussed. The following chapter (6) covers foam structure, foam stability and relates these to the forces that govern protein-gas phase interactions. Protein interaction in gels is discussed in chapter 7. This gives a rather detailed account of protein gelation as a series of biochemical events and focuses on some of the biochemical mechanisms involved in the heat-induced gelation of thermally irreversible gels.

Chapter 8 is devoted to protein-polysaccharide interactions and discusses the different types of interactions in detail. An excellent review is given on the use of these interactions in food systems.

In chapter 9, four methods are discussed in detail on chemical and enzymatic modification of proteins with emphasis on changes in their functional properties. The methods covered include, (i) enzymatic hydrolysis of proteins to produce controlled-size peptides, (ii) deamidation of protein-bound asparagine and glutamine residues, (iii) the effect of charge on proteins before and after deglycosylation and dephosphorylation of proteins, and (iv) recombinant DNA-derived proteins.

Chapter 10 briefly reviews the various types of soy protein ingredients and products available commercially, methods for their preparation, their physicochemical and functional properties, and the current and possible functional applications of these ingredients. There is also an interesting chapter (11) on whey protein functionality. This chapter outlines the types of whey products currently available in the market. The factors affecting composition or characteristics of whey products are examined as well as the functionality of such products. The correlations between composition and functionality are discussed, followed by the uses of whey protein products in various foods.

Chapter 12 gives an interesting overview on colour as a functional property of proteins. Sections include light-scattering effects, role of proteins in browning and enzymatic reactions, followed by a short description of myoglobin, flavoproteins and cytochromes. Protein gel ultrastructure and functionality is dealt with in chapter 13. This chapter covers meat and dairy proteins, and the use of proteins as a wall material for microencapsulation. This review is designed to highlight some of the relationships between protein gel structure and functionality and to demonstrate some techniques used in studying these relationships.

The following chapter (14) is devoted to the use of protein-based fat mimetics instead of fat in various foods. The sections cover approaches to fat replacement in food products, requirements for a fat-replacement system, and compares protein-based fat-replacement ingredients such as Simplese[®], Dairy-Lo[™], LITA[®] and Trail-

blazer. The final chapter (15) reviews the development of edible films, permeability measurements, and type of edible protein coating and film.

Overall, there is a good selection of references associated with each chapter, which provides further reading in the subject areas. The index, design and layout of the chapters is good. The book is well produced, provides fundamental information and is a sound basis for understanding the basic principles involved in food protein functionality.

Vanda B. Galazka

Biochemistry of Milk Products. Edited by A. T. Andrews & J. Varley. Royal Society of Chemistry, Cambridge, 1994. pp. viii + 182. ISBN 0 85186 702 2. £39.50.

This book is the Proceedings of a one day Symposium organized by the Food Chemistry Group of the RSC Industrial Division, and held on 14 December 1993 at Reading University. It comprises set piece papers delivered by invited speakers during what must have been a very full day, and others deriving from poster presentations.

The former are, for the most part, well referenced reviews and the latter, mainly from the University of Reading, present new work. Altogether, the authors are representative of centres of dairy research in the UK, Ireland, the Netherlands, and Finland. The emphasis is heavily on starter cultures, enzymes, and the associated proteolysis, but the other active research area, the functional behaviour of milk proteins is by no means neglected.

Of the reviews, possibly the most detailed is that from Cork on the proteolysis of cheese during ripening. Only three of the 159 references, pre-date the mid-1970s, and just over half are to work published in the past 5 years. It is an up to the minute account of the current situation. This is followed by a shorter, but no less detailed (78 references), discussion by workers at Groningen of the manipulation of proteolysis in *Lactococcus lactis*, an example of what now may be accomplished with the enzymes in dairy fermentations.

A short, but succinct, review from Reading of new starter cultures for cheese ripening precedes three reviews on aspects of lactococcal proteolysis. The first, from NIZO, discusses the genetic engineering of pivotal proteins. It describes engineering studies on 'the cell envelope-located proteinases that initiate casein degradation, and the intracellular amino-peptidase N that has debittering capacity'. The second, from Birkbeck College and V.T.T., Finland, 'describes progress round the protein engineering cycle using chymosin as an example'. There is considerable experimental detail, but it points the way to the future. The third, from Reading, deals with peptidases from lactococci and the secondary proteolysis of milk products. Though only nine pages long, this covers more than fifty references to, mostly, recent literature.

The final two reviews are concerned with the func-