

The Living Gut. By W.N. Ewing and D.J.A. Cole, Context Publications, Dungannon, 1994. viii + 220 pp. Price £39.50. ISBN 1-899043-99-4.

The absorption of nutrients from the diet is the result of a series of complicated processes in the gastro-intestinal tract. In its simplest form it can be considered as the process of hydrolysis and fermentation, with the end products of each being absorbed through the gut wall. The form of the gastro-intestinal tract will determine the nature of its digestion, the main sites of microbial fermentation differing from species to species.

This volume seeks to present a detailed introduction to the identity, location and activity of the gastro-intestinal microflora, particularly bacteria, and is composed of nine chapters and an exhaustive set of scientific references. Techniques for the manipulation of gut function and consequent effects on the health and performance of the animal are also considered.

While the species which make up the flora and fauna of the gastro-intestinal tract are numerous, bacteria play a key role. Consequently, it is relevant to give particular consideration to the form and function of the bacterial cell. Bacterial cells occur in a variety of shapes and sizes depending on the type of organism and on the way in which they have been grown. They are smaller than animal cells and are more susceptible to osmotic and environmental changes. Different bacteria attach preferentially in different organs. Consequently, cell recognition is important to bacteria. It is suggested that carbohydrates (specifically oligosaccharides) are the primary markers for cell recognition with all cells carrying a sugar coat.

Manipulation of the diet has long been of interest in order to benefit the health and well-being of the animal concerned. In both man and animals the health of the digestive tract is of importance. The composition of the diet, in terms of its nutritional value, can influence the working of the digestive system. Various forms of enteritis and diarrhoea are common in man and animals. In this book two particular organisms, *E. coli* and *Salmonella*, have been chosen for detailed consideration because of their widespread involvement in problems in the digestive tract.

The overall presentation quality of this book is high, the diagrams being particularly well laid out. The appendix provides useful information in the form of a geographical index of culture collections throughout the world, and the bibliography is extremely comprehensive with over thirty pages of references. This is undoubtedly an invaluable book for animal scientists, producers and veterinarians alike, as well as biologists and biochemists, and is thus highly recommended.

**John F. Kennedy
Charles J. Knill**

The Alcohol Textbook. Edited by T.P. Lyons, D.R. Kelsall and J.E. Murtagh, Nottingham University Press, Nottingham, 1995. vii + 332 pp. Price £40.00. ISBN 1-897676-557.

The production of alcohol has been acknowledged since the earliest recorded history. The modern sciences of microbiology, enzymology, chemistry and biochemistry have added depth to the empirical knowledge of distillers in the previous millennia. Many people still confuse the production of alcohol with a purely chemical process in which starting material A reacts with reagent B to yield product C. This is most definitely not the nature of alcohol production, where complex microbiological and biochemical processes, along with the application of chemical engineering principles, have inter-related roles in the overall outcome of the process.

Processes for making alcohol are broadly divided into four steps; (1) feedstock preparation, (2) simple sugar fermentation, (3) alcohol recovery, and often (4) non-alcohol residue recovery. The feedstock may already contain the free sugars, as in the case of molasses, sugar cane juice or whey; or may contain sugar based polymers such as cellulose, hemicellulose or starch, which can be depolymerised to yield fermentable sugars on hydrolysis.

This textbook has been produced to fill a void in the scientific literature available for distillers, and is based on an annual course held in Kentucky for distillery managers and chemists which is directed towards the fermentation and distillation of ethanol for all sectors concerned with this product, including fuel, beverage and industrial alcohol.

The first few chapters discuss the use of a variety of carbohydrate based feedstocks, such as molasses, whey and cellulotics. Whey is the by product of cheese production, and is the liquid left when the milk protein and fat have been coagulated by enzymes and removed to make cheese. Production of ethanol from cellulosic feedstocks is of growing interest world-wide. Potential utilisation of large volumes of primary and secondary cellulosic wastes to produce fuel and chemical feedstocks presents significant technical and economical challenges.

A number of subsequent chapters are devoted to the production of specific alcoholic beverages, such as Scotch and Irish whiskies, American whisky, Canadian rye whisky, rum, and neutral spirits. Such chapters also include information on production set-ups, still designs, boilers, cooling, etc. Individual chapters on fermentation, distillation, the role of enzymes, and alcohol biochemistry are also presented and provide a wealth of interesting and important information.

A significant feature of the book is the incorporation of the 'Alcohol Alphabet', a comprehensive glossary of

the technical terms used in the industry. Overall this is a well presented volume, with an abundance of clear diagrams, and is thus thoroughly recommended.

Charles J. Knill
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Aging: A Natural History. By R.E. Ricklefs and C.E. Finch, Scientific American Library, New York, 1995. xi + 210 pp. Price \$32.95. ISBN 0-7167-5056-2.

Although aging is an extremely complex and fundamental aspect of life, scientific investigations are gradually transforming our knowledge of its sources and our ability to intervene in its ultimately terminal processes. This volume aims to enlighten its readership to the reasons behind such complexities by discussing the aging patterns of humans and many other species, providing an authoritative treatment of the aging process, drawing on biomedical research and the natural history of animals and plants to describe this 'dreaded' biological phenomenon in fascinating detail.

Contemporary theories of aging and their implications for the future prospect of extending the human life span are presented, all of which have implications for polymeric carbohydrates. Specific topics discussed include genetic mutations, cellular degeneration, body wear and tear, gradual deterioration of the immune system, and environmental causes of aging. Many older people suffer from elevated blood sugar levels which can result in dramatic consequences for how they age. This is due to the loss of insulin effectiveness in promoting muscle glucose uptake. Such increased glucose levels are responsible for a whole host of chemical interactions which can result in the glycation and subsequent cross-linking of long-lived proteins, such as collagen and elastin, causing decreased flexibility and elasticity of the eye lens and connective tissues in the joints, afflictions generally associated with old age. Such phenomena, of course, involve glycoproteins, proteoglycans, and hyaluronic acid.

The desire to attain even greater human life spans continues to grow, and evidence suggests that future biomedical advances will delay and may even eliminate some afflictions associated with advanced age. Indeed, one of the most revolutionary changes in human lifestyles this century has been the gradual increase in human longevity with an ever growing number of individuals receiving their telegrams from Her Majesty The Queen. Three score years and ten is no longer considered to be a ripe old age.

Such aspects of human society raise a number of important issues which impinge on all aspects of our life, such as the medical challenge of improving the quality of life for the elderly, and the economic challenge of supporting an ever increasing population of

retired men and women. The ability of society to resolve such issues relies to some extent on an understanding of the aging process.

In conclusion, this is a well written and extremely informative tome that provides many new insights into the aging process, from laboratory and clinical studies, and also confronts the fundamental issues of how environmental factors have differing influences on the genetic bases of aging patterns in different species. It is therefore highly recommended for those interested in a different viewpoint of the processes, deeply associated with the molecules which they research, which are so often forgotten.

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Food Additive Toxicology. Edited by J.A. Magu and A.T. Tu, Marcel Dekker, Inc., New York, 1995. viii + 542 pp. Price \$175.00. ISBN 0-8427-9245-9.

Food additives have become an intrinsic part of modern foodstuffs, and if many were banned from use, dramatic changes in our food supply and subsequent eating habits would result. A food additive can be defined as any component (single substance or mixture), other than a basic foodstuff component, that finds its way into a food during any stage of its production, processing, packaging, storage or preparation for consumption. The use of food additives is therefore not a recent application, indeed, alcohol, salt, vinegar, spices and smoke have traditionally been utilised to extend the 'shelf-life' of a wide variety of foodstuffs for hundreds of years. Nevertheless, increasing consumer demand for the development of new, and modification of existing, food products with improved characteristics, e.g. texture, flavour, nutritional quality, etc., has resulted in a dramatic increase in the utilisation of natural and synthetic food additives over the last quarter of a century.

This thoroughly up-to-date volume provides both historical information and the latest toxicological data on various classes of food additives by examining the production, application and safety of numerous compounds used to enhance and preserve the quality of foods. A detailed description of the classes of food additives is initially provided, covering the roles of a variety of additive classes including anticaking and antibrowning agents, curing and drying agents, emulsifiers, enzymes, and fumigants and humectants. In-depth discussions of the hazards and safe usage of additives in food, including food acidulants, antimicrobial agents, food colourings, flavourings, antioxidants, etc., are provided. The roles of incidental and/or unintentional food additives are also discussed.

A comprehensive chapter dealing with the use of