

Book Reviews

Brewing

I.S. Hornsey; Royal Society of Chemistry, Cambridge, 1999, x + 231 pages, ISBN 0-85404-568-6, £16-95

Beer production has seen many changes over the centuries, and this volume combines an historical look at the process with some up-to-the-minute developments, covering the various stages of beer production. The overall aim of this seven-chapter volume is to provide an insight into one of the oldest forms of biotechnology on the planet, namely brewing. The opening chapter, entitled '*The Definition of Brewing*', charts the known history of brewing, from its historical origins with the Sumerians in southern Babylonia (c. 4000 BC), to the Egyptians, Romans, and medieval monasteries. The founders of fermentation science are also discussed, e.g. Robert Boyle, Antonj van Leewenhoek and Louis Pasteur, along with the foundation of important brewing institutions such as The Carlsberg Laboratory, The Bacterium Club, The Institute of Brewing, The Brewers' Guild, Brewing Research International, and The Brewers' Society.

The second chapter is devoted to '*Maltin*' and includes discussion of the barley plant, the malting process, the biochemical structure of barley, malting loss, milling and mashing, sweet wort, other cereals used in brewing (e.g. wheat, rice, oats, rye, maize, triticale, and sorghum), coloured malts, and commercial enzymes used in brewing. The third chapter is devoted to '*Hops*', and covers the plant (*Humulus lupulus*), processing, hop products, varieties, constituents, and diseases. Technically, any product flavoured with the hop is referred to as beer, whilst products using other flavourings are defined as ales. The fourth and fifth chapters deal with '*Wort Boiling and Cooling*' and '*Fermentation*', respectively, the latter covering yeast, nutritional requirements of yeast, and the physiological condition and vitality of yeast. The most widely used yeasts in the brewing industry are members of the fungal genus *Saccharomyces*.

The penultimate chapter, '*Beer — Post-Fermentation*', provides an overview of cask-conditioned beer, brewery-conditioned beer, nitrogenated beer, high-ravity brewing, low alcohol beer, ice beer, wheat beer, gravity and beer strength, bitterness, colour, foam, nitrosamines, and beer flavour. The final chapter covers '*Microbiology in the brewery*', and discusses ATP bioluminescence, the polymerase chain reaction (PCR), bacteria, wild yeasts, and spontaneous fermentations. In conclusion, this is a concise and extremely informative volume written by a practising brewer, which will appeal to

individuals within the brewing and food industries, students of food, chemical or biological sciences, and all beer-lovers!

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Enzymes for Carbohydrate Engineering

Kwan-Hwa Park, John F. Robyt, Yang-Do Choi (Eds.); Elsevier Science B.V., Amsterdam, 1996, VII + 215 pages, ISBN 0-444-82408-1 (US\$142.00)

The term carbohydrate is used to describe anything from a simple glucose molecule to very complex structures such as polysaccharides. The advancement of biotechnology in recent years has facilitated greater exploitation of carbohydrates for food and non-food applications. Consequently, research on carbohydrate enzymes was well established and documented by researchers from various disciplines.

Enzymes for Carbohydrate Engineering is a compilation of papers presented and discussed in two consecutive agricultural symposia, which were held in Korea in 1994 and 1995. The importance of carbohydrate engineering in agricultural biotechnology has grown, and the proceedings from the twelve presentations given in the agricultural symposia highlight the latest information and research achievements in enzymology in relation to carbohydrates.

Work on amylases isolated from microbial origins and the modification of carbohydrates by these biocatalysts is of great interest to scientists. Tremendous developments in the genetic engineering program have made the study of the overproduction of bacterial amylases possible. This