

Book & Media Reviews

edited by

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Beer: Tap Into the Art and Science of Brewing, second edition

by Charles Bamforth

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reviewed by Addison Ault

The author, who is Anheuser-Busch Endowed Professor of Malting and Brewing Sciences at the University of California, Davis and previously Deputy Director-General of Brewing Research International in Surrey, England, states that "This book is about facts", and that "The aim of this book is to give the non-specialist a feel for the science and technology that underpin a truly international beverage." He succeeds wonderfully well. There are lots of facts, really interesting facts, and it is easy to appreciate the way in which every step of the brewing process depends upon chemical, physical, and biochemical principles. The book is a perfect combination of an interesting topic and excellent science. Almost every chemistry teacher will find examples to use in class.

The story is presented in ten chapters, and concludes with an appendix that presents "Some Scientific Principles". Almost every page includes some science, and I have indicated some of each chapter's scientific highlights. The first chapter, From Babylon to Busch. The World of Beer and Breweries, presents a history of brewing along with stories and statistics about production and consumption of beer, and discusses Pasteur's studies of beer, the origin of the pH scale, and the development of the t-test. The second chapter, Grain to Glass. The Basics of Malting and Brewing, includes descriptions of beer styles: ales, stouts, and lagers; weizenbier, lambic, rauchbier; ice beers, dry beers, light beers, draft beers, nitrogenated beers, and NAB/LABs (No Alcohol Beers and Low Alcohol Beers). The science presented in this chapter includes concentration by freezing and reverse osmosis.

Eyes, Nose, and Throat. The Quality of Beer, the third chapter, introduces us to the sciences of foam, color, haze, and flavor, including taste and aroma, flavor balance, mouthfeel, and flavor stability. This chapter ends with a consideration of the questions: Is beer good for you? Is beer safer to drink than

water? What is the relevance of beer strength? Consequently, it discusses the chemical composition and nutritional qualities of the beverage. In The Soul of Beer. Malt, we learn how barley, the grist component of more than 90% of the world's beer, is prepared for brewing. The process includes germination (to activate the synthesis of enzymes), followed by drying, or "kilning", to arrest germination and to stop the enzymatic reactions. Next comes The Wicked and Pernicious Weed, Hops, Chapter 5, which presents the role of the constituents of hops in determining the taste of the beer.

Cooking and Chilling, The Brewhouse, Chapter 6, describes the "hot end" of the production of beer, the stage in which the malt and any other substances, the "adjuncts", are converted to wort (pronounced wert), which is the feedstock for conversion to alcohol by yeast. The "cold end" is then described in Goddisgoode, Yeast and Fermentation. This is the stage in which the sugars of the wort are converted to the alcohol of the beer. The result is the "raw" or "green" beer. This chapter includes a discussion of DNA fingerprinting. Chapter 8, Refining Matters, Downstream Processing, describes techniques for keeping beer clear and stable upon storage, and the methods of packaging in bottles, cans, and kegs. The technical processes include precipitation of yeast with collagen, pasteurization, and sterile filtration.

Measure for Measure, How Beer Is Analyzed concentrates on the analysis of the final product. Characteristics measured include alcohol content, carbon dioxide content, dissolved oxygen content, pH, color, clarity, prediction of stability, bitterness, diacetyl (a butter-flavored substance that is produced and then consumed during fermentation), foam stability and cling, metals and other ions, microbes, and, finally, *drinkability*. The analytical techniques used include atomic absorption spectroscopy and the use of ATP bioluminescence. The final chapter, To the Future, Malting and Brewing in Years to Come, speculates about the future of the malting and brewing processes, including the use of gene technology.

The whole is a refreshing read, and perhaps could be enjoyed best with, yes, a glass of beer!

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