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Book and Film Reviews

RONALD J. CLARKE and JOKIE BAKKER: *Wine Flavour Chemistry*. 2nd ed. Wiley-Blackwell, Oxford, UK, 2011, 440 pp., ISBN 978-1-4443-3042-7 (cloth), US$199.95.

Would it be useful to learn about wine flavor chemistry? From the standpoint of the professional involved in winemaking, student of enology, or those who wish to follow the winemaking literature, this is undoubtedly an important topic. Maynard Amerine, a University of California at Davis professor and pioneer in viticulture and enology stated late in his career that if he were a young man who wanted to become a winemaker, he would first study chemistry. The secrets of many a mystery of wine's flavors are being discovered at a rapid pace through advances in wine chemistry. Despite the fact that winemaking might always remain an art, science has contributed greatly to the improvement in winemaking, and today's wines are much less likely to have sensory faults. Thus wine chemistry science clearly has benefits for the consumer as well. This second edition of *Wine Flavour Chemistry*, by Jokie Bakker and Ronald J. Clarke, attempts to present the important concepts and research on this topic to give us a better understanding of the fundamental components of wine flavors. In fact, in the Preface to the first edition

of this book, the authors indicate that it is "aimed to be of interest to consumers with an inquisitive mind about wine, and all those involved with the production and trade in wines with an interest in the chemical and technical aspects of wine flavor."

The authors have approached the topic of wine flavor chemistry from backgrounds with considerable experience in the field and the wide scope of the book reflects that. Dr. Jokie Bakker has worked as a researcher in food flavor and color and as a wine industry consultant. Dr. Ronald J. Clarke, a writer and food industry consultant, spent some 40 years studying the manufacture of coffee, on which he has written or co-edited several books. He offers useful insights on wine flavor with coffee and wine comparisons that are scattered throughout the book. This book is organized into seven broad-based chapters and includes two appendices. The introduction covers the vinification process and includes a short discussion of the physiological aspects of wine. Chapter 2 presents important grape varieties and their growing regions and also summarizes the wine appellation or other classification systems of six major wine-producing countries. Three chapters form the book's core. Chapter 3 presents basic taste and stimulant components, Chapter 4 discusses the volatile components, and Chapter 5 includes wine-tasting procedures and overall wine flavor concepts. A separate chapter is devoted to Sherry, Port, and Madeira. There is a concluding chapter on wine chemical formation pathways during fermentation, which would have been much better placed in an introductory chapter.

What are the highlights of this book? Each topic presented is relatively well referenced as each chapter concludes with an extensive bibliography that includes references to both general texts and specific research publications. The seven chapters and two appendices feature more than a hundred useful tables . The many detailed tables remind one of a reference book such as the *CRC Handbook of Chemistry and Physics*. These tables are so extensive and informative that they represent the highlight of the book. There are also several excellent discussions including those on the important role that compounds such as SO2 play in winemaking, CO2 in young wines and champagne, and O2 throughout the vinification, aging, and bottling process. The importance of reduction/oxidation reactions throughout the wine process is also well presented.

What are this book's failings? Unfortunately, even the reader with considerable chemistry background will likely find this book frustrating, not because of its complexity but because its design is suboptimal. First, and most strikingly, the book lacks illustrations. Although the cover of the book beautifully and sensually illustrates newly poured red wine sloshing in a wine glass, with flavor almost jumping out at the reader, none of that sort of illustration is in the interior of the book. Images of processing sequences, graphs, and chemical structures are offered, but far too few to illustrate the important concepts that the text attempts to describe. Only a single spider-plot illustration graces the entire book! (A spider-plot illustration shows the intensity of multiple characteristics of a given component,

e.g., flavor, on a single plot and resembles a spider web.) Such plots would be much more effective in presenting the flavor profiles of different grape varieties than simply listing the characteristic components in a table.

Another frustration is the inconsistent presentation of topics both from an organizational viewpoint and from a conceptual one. The poor organization results in useless repetition and incomplete discussions of the topic. For example, Chapter 3 explains the location of polyphenols within grapes without an accompanying illustration. However, in the final chapter the topic is represented and includes a figure that shows the location of extractable chemical compounds, including polyphenols. One example of inconsistency in concept presentation is the discussion of the role of alcohol in the flavor of wine. An early chapter cites literature that suggests that ethanol concentration, at least over a limited range, does not affect the sweetness, acidity, aroma, or flavor perception of a Riesling wine. In a subsequent chapter, in which wine balance and suppleness are discussed, a well-known and conceptually useful empirical concept known as the Suppleness Index (SI) is presented. The relation is:

$$\text{Suppleness Index} = \text{Alcohol} - (\text{Acidity} + \text{Tannin})$$

This relation indicates that higher concentrations of alcohol (including sugars) are needed to balance higher acidity or tannins for a wine to have an SI within a desirable range. The authors neither mention the discordance in presentations nor offer an explanation for these discordant findings.

Technological innovations have improved our ability to determine the chemical compounds responsible for flavor, and some can help in determining the optimal maturity of grapes, but the authors fall short in describing the details of some of the recent technologies. Although gas chromatography remains the most important tool for evaluating volatile compounds, it involves relatively large, immobile, and expensive equipment. A new technology often referred to as the electronic nose is relatively inexpensive and portable and might revolutionize how one can determine optimal grape maturity. It is based on changes in the electrical resistance of its metal oxide sensors caused by the volatile chemicals produced by grapes. Although the authors mention the device, they give short shrift to details of the progress in its use and potential.

The writing style includes awkward phrasing and occasional spelling errors, which are also frustrating for the reader. From a publisher like Wiley-Blackwell, one would have expected the book to receive some attention from an editor to simplify complex run-on sentences and eliminate spelling errors. Here is an example of a sentence that includes both: “The receptor proteins for sweet, bitter and umami are available for tastant compounds to bind to, this resulting very specific binding leads in a number of steps to the stimulation of neutron activation, giving the information to our brain.” We can only be thankful that, unlike as is stated in that clumsy sentence, neurons, not neutrons, are activated.

Wine Flavour Chemistry is not essential reading for all those involved in commercial winemaking, as stated in the blurb on the book's back cover. Neither is it a useful textbook for teaching the concepts of wine flavor chemistry except as a reference book, as it is far too dry, lacks illustrations, and is relatively poorly organized. A far better book for less than half the price is *Concepts in Wine Chemistry*, by Yair Margalit (2nd ed., paperback, 2010). It is eminently better organized and is more readable, understandable, and illustrated. It is surprising that the authors, Bakker and Clarke, did not reference this text by Margalit. Perhaps they would not have written *Wine Flavour Chemistry* had they been aware of it! Although Bakker and Clarke offer many useful references, they have perhaps overreferenced authors such as the French Pascal Ribereau-Gayon at the expense of some top-notch American researchers such as Bruce Zoeklein of Virginia Tech, who has done much pioneering work in enology and wine flavor chemistry. Other books that discuss wine flavor chemistry that I would also recommend include *Wine Science*, a textbook by Ronald Jackson. For the beginner and for wine lovers who do not necessarily have a background in chemistry, I recommend *Winetaster's Secrets*, by Andrew Sharp. Finally, those who really want to have fun challenging their olfactory discriminatory ability and also wish to learn some of the fundamental compounds of wine flavor and specific wine varieties should buy a 54-bottle set of basic smells that can be found in wine titled *Le Nez du Vin*, by Jean Lenoir. Although hundreds of smells in wine are described in it, you will find the identification of even this simple set of 54 difficult but also entertaining and informative.

Lawrence R. Coia, MD
Outer Coastal Plain Vineyard Association
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References

Jackson, R., and Jackson, R.S. (2008). *Wine Science: Principles and Applications*. 3rd ed. Amsterdam and Boston: Elsevier Academic Press.

Lenoir, J. (2010). *Le Nez du Vin, Red Wines (Les Vins Rouges): Wine Aroma Kit*. Carnoux en Provence, France: Jean Lenoir.

Margalit, Y. (2010). *Concepts in Wine Chemistry*. San Francisco: Wine Appreciation Guild.

Sharp, A. (2001). *Winetaster's Secrets: A Step-by-Step Guide to the Joy of Winetasting*. Toronto: Warwick.

KEN BURNS and LYNN NOVICK (Directors): *Prohibition*. PBS/Florentine Films, 2011, DVD $39.99.

Because of their length and definitive-sounding titles, Ken Burns's films can leave the exhausted viewer wondering, "What more could I possibly learn about this subject?" Critics have often answered, "Plenty." Jazz music did not end in the 1940s,