

making repetition unavoidable when reviewing scores of similar wines. By and large, Cole performs well above average in keeping things varied, interesting, and occasionally amusing. However, in keeping with the vinous verbal zeitgeist, Cole frequently uses “minerality” in her tasting notes. As there is no consensus on what exactly this means (Parr et al., 2018), an entry into the glossary giving her definition would be welcome. Another term that should be included in the glossary as well as the index is *remuage* (riddling in English), used on page 195 in notes on a sekt. It is described on page 20 of the chapter that Cole says is not required reading.

Cole “tasted hundreds upon hundreds [of sparkling wines] during [her] nine frantic months of research and writing” (p. 10). The result is part personal assessment with other experts’ opinions deftly infused and part reportage from a master of both. Cheeky, breezy, and fun to read, Cole’s latest is loaded with up-to-date information about the burgeoning world of wine bubbles that everyone can learn from. And Cole’s quips help the more arcane material go down in the most delightful way. Plus it has so many lovely pictures!

References

- Hulkower, N. (2018). Review of champagne: The essential guide to the wines, producers, and terroirs of the iconic region by Peter Liem. *Journal of Wine Economics*, 13(3), 358–361, doi: 10.1017/jwe.2018.45.
- Liem, P. (2017). *Champagne: The Essential Guide to the Wines, Producers, and Terroirs of the Iconic Region*. Berkeley, CA: Ten Speed Press.
- Parr, W., Maltman, A., Easton, S., and Ballester, J. (2018). Minerality in wine: Towards the reality behind the myths. *Beverages*, 4(4), 77, <http://dx.doi.org/10.3390/beverages4040077>.

doi:10.1017/jwe.2022.36

Jamie Goode: *The Science of Wine from Vine to Glass*, 3rd Edition

University of California Press, Oakland, 2021, 224 pp., ISBN 978-0-520-37950-3 (hardback), \$39.95.

Neal D. Hulkower

Independent Scholar, McMinnville, OR, USA

Email: nhulkower@yahoo.com

As evidenced by *I Taste Red: The Science of Tasting Wine* (Goode, 2016), *Flawless: Understanding Faults in Wine* (Goode, 2018), and now the third edition of *The Science of Wine from Vine to Glass*, Jamie Goode is a master author of wine books that occupy the space between popular and technical expositions. “This is not meant to be a textbook, covering the whole of wine science in a methodical manner. ... I have set out to tell wine science stories in a way that would engage people who

are not overly scientifically literate” (p. 7), he assures us. While this is generally the case, he cannot help exposing his Ph.D. in plant biology along with his command of chemistry throughout this important volume. Nevertheless, the acclaimed blogger and wine writer successfully accommodates the less knowledgeable through his engaging style while offering insights and opinions that should appeal to the more informed reader.

The first and second editions of *The Science of Wine* appeared in 2005 and 2014. Regarding the latest edition, “Overall around half the book is new” (p. 7), Goode tells us. The material covered in his two books mentioned previously is included in an abridged form.

Section 1, In the Vineyard, contains seven chapters covering the biology of the grapevine, terroir, soils and vines, climate, and caring for vines. Section 2, In the Winery, comprises 12 chapters including such topics as microorganisms, flavor chemistry, phenolics, extraction and maceration, sulfur dioxide, wine faults, *élevage*, sweet wines, and differences among tasters. Color photographs are sprinkled throughout. A seven-page glossary defines many important terms, occasionally in more depth than in the main text. An otherwise helpful seven-page index suffers from inconsistent indentation due to entries being listed in four narrow columns, resulting in some confusion as to which subentry is associated with which main entry. Surprisingly, there is neither a bibliography nor a reference section.

In addition to displaying considerable proficiency himself, Goode incorporates quotations and examples gleaned during interviews with or from papers by an array of international experts, most of whom are on the frontlines of research or practice, to illustrate and reinforce points. The lack of dates left me wondering about the currency of the information, particularly important since knowledge is rapidly advancing. The absence of citations in the literature leaves the reader without a way of delving deeper into a topic. In any case, I certainly learned a lot and appreciate Goode’s erudition, thoroughness, and readability. I also applaud him for taking positions, even when I do not agree with them.

Chapter 2, “Terroir: how do soils and climate shape wines?” contrasts insights from Australian winemaker, Jeffrey Gosset (“I don’t see winemaking as part of terroir but rather that poor winemaking can interfere with its expression and good winemaking can allow pure expression.” (p. 27)) with anti-terroirist California winemaker Sean Thackery (“My objection is simply that [terroir is] so ruthlessly misused... It’s very true that fruit grown in different places taste different. In fact, it’s a banality, so why exactly all this excess insistence?” (p. 29)). Whether one can actually taste the soil in wine is one of the most fascinating issues tackled. Goode weighs in: “As a scientist who has a working knowledge of plant physiology, I find this notion, which I call the ‘literalist’ theory of terroir, implausible” (p. 30). This perspective is reinforced by viticulturist Richard Smart and Professor Jean-Claude Davidian of the *École Nationale Supérieure d’Agronomie*, but a fuller consideration of the subject is given in the next chapter.

In Chapter 3, “Soils and vines,” Goode considers the question, “How is it that soils seem to be so important for the wine quality, when science indicates that they are only playing a limited role in influencing the flavor of grapes?” (p. 39). He mentions a 2011 paper, sans citation, by Claire Chenu et al. on the role of microorganisms, a hot topic

that is bringing us closer to understanding what actually gets into the vine and grapes that affect the flavor of the wine. One wonders why more recent work is not discussed.

Inevitably, the term “minerality” emerges. While calling it “a really useful descriptor” (p. 50), Goode acknowledges that “it’s also a term that means different things to different people” (p. 50), begging the question: what does he mean by useful? He quotes a couple of wine writers who claim that the term did not appear until sometime in the 1980s or later. As I have previously noted (Hulkower, 2019), I used “mineral finish” in a tasting note in 1976, a term that I must have picked up from somewhere. The subsections on “How Experts Use the Term,” “Taking Minerality Literally,” “Reduction as Minerality,” and “The Taste of Terroir” offer additional insights to those that I gained from the work of Alex Maltman (Maltman, 2018) and Parr et al. (2018), neither of which are mentioned. In a victory of his right brain over his left, Goode admits, “I used to favor the more established scientific viewpoint, assuming that volatile sulfur compounds could explain much of minerality. But I’m increasingly drawn to the idea that minerals in wine, derived from soil, could be affecting wine flavor in interesting ways...” (p. 54). We will see.

Chapter 8, “Yeasts and bacteria,” contains the best overview of the role of these microbes I have seen. Topics include cultured and spontaneous fermentations, wild yeasts versus cultured yeasts, and seemingly oxymoronic cultured wild yeasts. The table on page 110 relates classes of compounds produced by yeasts with their impact on flavor. The subsection, “Malolactic Fermentation,” is especially good.

Goode largely maintains accessibility for nontechnical readers by defining terms and acronyms along the way and employing his well-honed conversational writing style. He does tend to repeat himself frequently, which on the surface might seem unnecessary, but on reflection can be helpful in keeping important points at the forefront. But then there is this from Chapter 9, “Wine flavor chemistry” that will surely bring nods of recognition from chem-nerds of a feather: “...Marlborough Sauvignon shows quite high levels of methoxy-pyrazines. These are a group of compounds including 2-methoxy-3-isobutylpyrazine (MIBP; known widely as isobutyl methoxy-pyrazine [though not by me]), 2-methoxy-3-isopropylpyrazine (MIPP; known as isopropyl methoxy-pyrazine), and 2-methoxy-3-secbutylpyrazine (MSBP; known as sec-butyl methoxy-pyrazine)” (p. 134). Thankfully, these outbursts are few in number and can be scanned or skipped without losing the gist of the discussion.

Goode shines in Chapter 10, “Phenolics,” in which he tackles the “fiendishly complicated topic [...] ...one where our understanding is incomplete” (p. 140). His explanations of the various chemicals, including tannin and anthocyanins that are part of the group labeled phenolics, are essential reading for anyone regularly using those names.

I work in the tasting room of a small winery in Oregon that specializes in 100% whole cluster fermented Pinot noir and was impressed by a piece by Goode (2012) that is the best I have read on the subject. So I was pleased to see that Chapter 12, “Whole-cluster and carbonic maceration” incorporates parts of the article while elaborating on the current thinking and practice of this still controversial but increasingly popular approach. After presenting the pros and cons, he concludes: “What was once regarded as an outmoded practice – including stems in red-wine ferments – is now becoming a fashionable winemaking tool for those seeking elegance over power”

(p. 160). I, too, have noticed that the technique has been increasingly embraced by winemakers in the Willamette Valley over the last decade, with delicious results.

Chapter 14, “Wine faults: where are we, and when is a fault a fault?” provides a valuable summary of the material in *Flawless*. Chapter 15, “The evolution of élevage: oak, concrete, and clay,” is an excellent comparison of the various vessels used to age wine. The table on page 181, “Flavors from oak,” is especially helpful. I was impressed that Goode mentions the Oregon winemaker and creator of terracotta amphora, Andrew Beckham, in the subsection “Clay Around the World,” since his work is not all that well known even in his own state.

Even though a lot of the material covered may be too detailed and nerdy for the novice, *The Science of Wine* is not suitable for those wanting to master viticulture or enology as a profession. Instead, its value lies in providing a less formal but still in-depth overview of the main areas in each of these two disciplines and serving as an excellent reference. As such, Goode’s book belongs on the shelves of everyone involved in any aspect of the wine industry, from producer to writer to consumer.

References

- Goode, J. (2012). Stemming the tide. *The World of Fine Wines*, 37, 90–97.
- Goode, J. (2016). *I Taste Red: The Science of Tasting Wine*. Oakland: University of California Press.
- Goode, J. (2018). *Flawless: Understanding Faults in Wine*. Oakland: University of California Press.
- Hulkower, N. (2019). Book review: Vineyards, rocks, & soils: The wine lover’s guide to geology by Alex Maltman. *Journal of Wine Economics*, 14(2), 217–220, doi:10.1017/jwe.2019.19.
- Maltman, A. (2018). *Vineyards, Rocks, & Soils: The Wine Lover’s Guide to Geology*. New York: Oxford University Press.
- Parr, W., Maltman, A., Easton, S., and Ballester, J. (2018). Minerality in wine: Towards the reality behind the myths. *Beverages*, 4(4), 77, <http://dx.doi.org/10.3390/beverages4040077>.