

BOOK AND FILM REVIEWS

GUS ZHU, MW: Behind the glass: The chemical and sensorial terroir of wine tasting

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Some books about wine may invite you to settle into a well-worn, vintage leather chair, pour a glass of aged Bordeaux into a Zalto glass, slip on some LL Bean moccasins, and enjoy the experience after the children have gone to bed. These are the kinds of books you read leisurely, without much effort. Then there are books which demand your full attention, necessitating focus and note-taking. Gus Zhu's book belongs to the latter category. While it is not a chemistry textbook, the author delves into topics that are indeed quite technical. *Behind the Glass* offers a captivating exploration of the chemical mechanisms behind what we smell and taste in wine. Though the subject matter occasionally ventures into complex territory, Zhu keeps it largely accessible to most readers, even those without a scientific background.

Starting with the basics of simply why is red wine red? Zhu explains that the anthocyanins from grape skins are responsible for the color—higher pH (lower acid) wines tend to be more purple colored while lower pH wines appear more red. He also touches on the role of sulfur dioxide in color loss when too much is added in the bottling process—this is called bisulfite bleaching. One common belief, widely taught, is that cofermenting certain white wines with red wines enhances color stability. The most exalted example of this is Viognier and Syrah in Côte Rotie. Zhu challenges this by presenting research that shows no evidence of improved color stability.

One of the more intriguing sections in the book is Zhu's discussion of the M&M color study, which demonstrates the powerful role that psychology plays in sensorial analysis. In a revealing experiment, participants were given brown and green M&Ms, with the brown ones being identified as significantly more chocolaty, even though all M&Ms taste the same. A similar experiment was conducted with a white wine that had flavorless red food coloring added. Participants, unaware that the wine was originally white, overwhelmingly described it using descriptors typically associated with red wine. This emphasizes the extent to which color can influence our perception of flavor.

Another common belief in wine education—the so-called “tongue map”—is also debunked in Zhu’s book. This map suggests that sweetness is primarily tasted on the tip of the tongue, bitterness at the back, and sourness along the sides. Zhu explains that this concept is misleading; taste buds are actually distributed throughout the tongue, with each receptor capable of detecting all basic tastes. While there are variations in taste sensitivity due to factors like age, disease, and other individual differences, Zhu maintains that the classic tongue map does not accurately reflect the complexity of taste perception.

Zhu offers a fascinating discussion on the smell of sugar. Like many people, I will smell a wine and think “oh this smells sweet.” While it turns out that pure sugar in solution does not have any smell, the aromas one detects are often associated with sweetness, but are not the sweet sugars themselves. This is also why certain wines, like Oloroso Sherry will smell sweet; the toffee and caramel-like aromas are often indications for sweetness, even when the wine is dry.

I am not a super taster. My wife might be, as she notices all sorts of things I fail to notice. Zhu discusses super tasters and their higher sensitivity to basic tastes like bitter and sweet, as well as the heat from alcohol. It turns out that being a super taster often will lead one to being less likely to enjoy very bitter beverages, or ones with higher alcohol, as very sensitive palates may find them unpleasant—a great example of this is black coffee.

Zhu thinks the term “hypertaster” is more fitting for these individuals, as it more precisely reflects their sensitivity toward tastes. On the other end, there are hypotasters, who are less affected by extremes, and therefore are more likely to prefer bigger wines or cask strength whiskies. These differences in sensory sensitivity do not dictate one’s ability to appreciate wine, but instead reflect personal physiological traits. Zhu references the classic 2003 argument around Château Pavie. Without mentioning Jancis Robinson or Robert Parker, Zhu suggests one will like this wine if one is closer to a hypotaster, while a hypertaster might eschew it.

While genetic differences in taste receptor density play a significant role, Zhu notes that one’s sensory sensitivity is not fixed. Scientific research has shown that through training, an individual can increase their ability to detect and identify subtle flavors that might otherwise go unnoticed. This ability to hone one’s senses challenges the notion that certain individuals are simply better at tasting.

The book is rich with captivating discussions. For example, Zhu introduces us to the two primary types of methoxypyrazines, one of which smells like green pepper, the other like earth and peas. He also explores the intriguing topic of TCA (2,4,6-trichloroanisole) and its unique impact on wine perception. Interestingly, Zhu posits that millennials may have developed a partial immunity to TCA, having grown up with its presence in baby carrots. The book also delves into the “foxy” aroma found in wines made from *Vitis labrusca*, which is attributed to methyl anthranilate.

Moreover, Zhu raises the question of whether wine reduction is a fault or a complexity, suggesting that the answer often depends on the degree of reduction and the individual taster’s perspective. The iconic petrol aroma in Mosel Riesling? That’s TDN (1,1,6-trimethyl-1,2-dihydronaphthalene). Premature oxidation, or *pre-mox*, which plagued many white Burgundy wines in the 1990s, is also discussed, with Zhu suggesting that excessive spraying of vineyards may have accelerated the process

due to the high concentration of metal ions. These topics represent just a glimpse of the book's extensive content.

Zhu completes the book by juxtaposing seven different pairs of wines, examining their contrasting aromas and tastes. For example, the differences between Prosecco and Champagne are dissected in terms of their chemical properties, illustrating how the Charmat and traditional methods result in distinct wines. On a final page, Zhu says that although we just spent over 200 pages discussing and breaking down wine into chemical components, the true essence of wine is in the drinking and enjoyment. He hopes the knowledge gleaned from his book elevates one's appreciation of wine, but emphasizes that when he drinks wine, he's not conducting a science experiment, he's simply savoring the moment.

Zhu successfully achieves his goal of elevating the reader's understanding of wine through chemistry and sensory analysis. I found many parts of the book fascinating, so the most challenging aspect of writing this review was deciding which sections to leave out. As someone who considers themselves a wine nerd, the book resonated with me on many levels. Though some sections were complex and required multiple re-reads, I attribute this to my background in the liberal arts rather than a fault in Zhu's writing. While I would not recommend this as an introductory text, it is a valuable addition to the library of anyone beyond the beginner level, from intermediate wine enthusiasts to experts.