

## Book Reviews

Author, Title	Reviewer
Gordon M. Shepherd <i>Neuroenology: How the Brain Creates the Taste of Wine</i>	Neal D. Hulkower
Peter Hellman <i>In Vino Duplicitas: The Rise and Fall of a Wine Forger Extraordinaire</i>	Richard E. Quandt
Peter M. F. Sichel <i>The Secrets of My Life: Vintner, Prisoner, Soldier, Spy</i>	Morton Hochstein
Jamie Goode <i>I Taste Red: The Science of Tasting Wine</i>	Denton Marks

GORDON M. SHEPHERD: *Neuroenology: How the Brain Creates the Taste of Wine*. Columbia University Press, New York, 2017, 224 pp., ISBN: 978-0231177009 (hardback), \$24.95.

Let's start at the end where it all began. In 2003, Yale School of Medicine professor of neuroscience Gordon Shepherd was invited to a private tasting with Jean-Claude Berrouet at the headquarters of Château Pétrus, the crown jewel of the Pomerol Appellation d'origine contrôlée (AOC) on the Right Bank in the Bordeaux region. Berrouet, at the time the chief wine maker and technical director, assembled ten bottles from four vintages ranging from one to thirteen years old to tutor his guest in wine evaluation. The appendix of the book contains descriptions of four of the wines, representing each of the vintages that were tasted in ascending order of age. Shepherd records his observations of color, bouquet, taste, and *longueur* or finish and includes a summary of his impressions. Berrouet's remarks, invariably more detailed and precise, are also recorded. Although Shepherd's "basic judgments ... turned out to be in line with Jean-Claude's" (p. 182), he concludes that he "lacked the linkage between the sensory impression and the appropriate vocabulary" (p. 182). On the train back to Paris, he reflects on the tasting and asks himself, "Could this lead to a book on the brain and how it creates the taste of wine?" (p. 183).

The title of the resulting volume was apparently coined by Shepherd. Building on his earlier book, *Neurogastronomy: How the Brain Creates Flavor and Why It*

*Matters, Neuroenology* specifically focuses on wine tasting. This three-part exposition describes “Fluid Dynamics of Wine Tasting,” “How Sensory Systems Create the Taste of Wine,” and “How Central Brain Systems Create the Pleasure of the Taste of Wine.” Shepherd’s main point in the first part is that to understand how wine tasting works, we have to go with the flow: “[A]ll the sensations created by the brain are due to movements of the wine in our mouth and throat and the movement of the volatile molecules released into the air in our respiratory tract” (p. 7). Throughout the text, he builds on figures of the human head in cross section to illustrate how and where wine travels and is perceived. Aiming at nonspecialists, he includes boxes that summarize fundamental facts in nontechnical terms. For example, the first one lists “The Main Steps in the Fluid Dynamics of Wine: Taking a sip, mixing with saliva” (p. 9), and so on. We learn about orthonasal and retronasal olfaction: the former occurs when sniffing the wine through the nose, while the latter, which is more critical for creating the taste of wine, happens once the liquid is in the mouth and swallowed. “[R]etronasal smell is a new frontier in the science and art of wine tasting and therefore should be a central focus of neuroenology” (p. 128), he asserts. The five chapters of Part I go deeper and broader to explain the physiology, anatomy, biochemistry, and, of course, fluid dynamics of what happens once wine is sipped and eventually swallowed.

Combining wine with saliva begins the process of breaking it down. “Since the amount of saliva varies substantially among individuals, this can be a significant variable in wine tasting” (p. 20), Shepherd advises. My immediate reaction is that this factor alone should cast doubt on the usefulness of wine critics, whose state of saliva is never reported. Furthermore, Shepherd declares that “swallowing is one of the most critical functions for wine tasting” (p. 48). It is necessary for the creation of the aroma burst, the “initial strong perception” (p. 53) of the wine taste, and for the finish. This assertion begs the question as to what a wine critic should do when faced with a couple of dozen wines that have to be evaluated over a few hours. If the samples are spit out, are the assessments complete? If they are not, how reliable are the observations as intoxication increases?

In Part II, Shepherd lays out the current understanding of how the senses combine to create the flavor of wine. We see the color of the wine. Olfaction is orthonasal and retronasal, and each contributes differently. We sense the mouthfeel of the wine. Our taste buds react to its constituents. Each sensation creates images in the brain. Referencing a study by researchers at Stockholm University, Shepherd notes that “the ability to form mental images is weaker for smell [than sight], and there is more individual variation. Those with more experience and who possess a richer vocabulary for describing odors are best at olfactory imagery” (p. 95). Through multiple levels, the brain merges these images to create the flavor of the wine.

But as we learn in Part III, many other factors influence our reaction to wine. Effects of age and gender on smell are briefly summarized. Memory and language each merit a short chapter. Shepherd calls pleasure “The Final Judge in Wine Tasting” (p. 162) and explains the status of research into how the brain creates it. The final chapter, “Practical

Applications of Neuroenology to the Pleasure of Wine Tasting,” looks at what wine makers do to attract consumers to their products. The literature he cites focuses on alcohol content, price, and expertise. A Spanish team monitoring brain activity while high and low alcohol wines were consumed observed that, contrary to their expectations, the low-alcohol wine was perceived as more intense. “[T]heir results ‘seem to support the intuition of some professional wine experts’ that lower-alcohol content wines ‘have a better chance to induce greater sensitivity to the overall flavor expressed by the wine’” (p. 170). Shepherd cites a widely publicized study that “showed that the high-priced wines were judged to be more pleasant, even though they were the same wines as the lower priced one” (pp. 170–171), as an example of a phenomenon studied in neuroeconomics. (This relatively new field spawned its own professional organization, the Society for NeuroEconomics [<https://neuroeconomics.org/>]). So our perception and opinion of a wine result from a complicated synthesis of sensory images and extrinsic factors. “[W]hen our brain creates the taste of wine, it combines the integration of sensory inputs with the complex top-down modulation by our central brain systems” (p. 171), Shepherd concludes.

Attempting to educate nonexperts in a topic that is inherently technical and involves multiple disciplines and their terminologies is fraught. By breaking down the subject, and using illustrations and sidebars, Shepherd endeavors to do so in this book. The result is imperfect. Frequent repetition of material serves to break up the flow rather than facilitate it. The reader is continuously sent to figures in earlier chapters or promised deeper discussion in the text ahead, thereby creating a disjoint narrative of complex processes. In one case, a typo (Figure 7.3 on p. 112 should be 7.2) in the midst of a description of taste receptors is disorienting. A descriptive list of figures with page numbers and a glossary of terms would have been helpful. The tone of the exposition vacillates between what would be expected in an academic journal or trade magazine and what you might see in a wine tasting 101 course. Because this book synthesizes the results of research across a number of disciplines, specialists in any of the fields might be interested in seeing how their work contributes to a new discipline and in learning about open questions. An extensive index aids in navigating the text, and the bibliography lists some of the primary sources that serve as the foundation of the discussion.

On the other hand, the benefits for the wine taster who is not a specialist are scant. Discussions are filled with jargon, and in some cases, the advice can even be naïve. Would a likely reader need two reminders that wine glasses should not be filled to the top? Certainly an understanding of what happens from the time wine is sniffed and sipped until its finish fades can inform us of ways to do our sampling to maximize pleasure. I suspect, though, that for many of us, this level of understanding could be gained from reading a popular article.

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