

Science, Vine, and Wine in Modern France

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Introduction

This book deals with the role of science in the French wine world since the Enlightenment. France, historic center of the civilization and science of wine, is the central concern of the book. The Champagne, Burgundy, and Bordeaux (historically, synecdoche for the southwest) have given us great wines, along with an abundant, sometimes self-congratulatory, literature, much of it scientific. This literature is vital for arriving at an understanding of the historical and contemporary dominance of these wine models as well as for an analysis of the role that science has played in their evolution. The main argument of the book may be baldly stated: the modern or post-phyllorxic vine and its wine are the fruit of the sciences of viticulture and oenology, especially institutional science in Montpellier and Bordeaux. This argument is clearest and strongest in the cases of the reinvention of the vine in the late nineteenth century and the rise and long influence of the school of oenology in Bordeaux. Oenologists and viticultural scientists are being bashed these days in some popular wine guides. In a sense, this book is a *historical* counterthesis to the argument that the stronger the oenology, the more uninteresting and duller the wine – even if technically perfect. (But even Robert Parker finds good things to say about oenologists outside California.)

Part I of the book deals with the grape vine and the relation of varieties to quality of wine. Viticultural discourse today is about cultivars (*cultivated varieties*) and clones, the creation of a viticultural science that began its ascendancy over the plant world in the nineteenth century. Salvation of the vines essential for the production of quality wines came from viticultural science in Montpellier and Bordeaux. The slow death of the French vinifera vine began with the arrival of phylloxera in France in the 1860s. Part I sketches the fight to save the old vine along with futile attempts to find substitute hybrid vines. Both efforts finally faded in light of the triumph of the vinifera vine grafted onto resistant rootstocks of American vines.

It is difficult for writers and readers to get passionate about the vine (or about botany and botanists, who have now changed their name to plant

biologists and plant scientists in the hope of becoming as notorious as physicists and biologists). The vine has suffered from periodic neglect in both production and scientific literature. But since the mid-nineteenth century the vine has forced us to pay attention to it by catching various frightening diseases and then dying dramatically. The vine has also come to benefit from general recognition of a basic axiom that underlies the production of good wine: quality begins in the vineyard with the plant and its culture. A discussion of the vine, which has its own science of viticulture, must be an essential part of any serious history of oenological research and of wine.

Part II shifts from vine to wine, to the laying of the foundations of oenology by the chemists Jean-Antoine Chaptal and Louis Pasteur, two scientists of great importance in the history of agriculture. Many natural philosophers (later called scientists and more specialized names) have always been interested in plants and agricultural production. As a chemist, property owner, and powerful politician in the Napoleonic empire, Chaptal devoted much of his energy to agriculture, especially the production of wine. Perhaps he deserves his place in the history of oenology more because of his influence on winemaking practices than his research; but he did produce a classic in scientific literature. Pasteur recognized the importance of Chaptal as a worthy predecessor in oenology.

A modern American classic on wine presents Pasteur as a sort of patron saint of oenology, the man who applied the scientific revolution to the wine industry.¹ Pasteur spent much of his career dealing with agricultural problems, especially disease. The prevention and curing of wine diseases came into fashion at the same time (1860s) as the curing of many human diseases and for the same reason: the discovery of the role of specific bacteria in causing animal and human diseases. Pasteur's influence on the study and treatment of wine diseases was perhaps greater than in any other area of microbiology. The idea of curing wine diseases by heating, not original to him, was only part of Pasteur's *Etudes sur le vin*, which appeared in the 1860s. In his microscopic analysis of the composition and characteristics of wine, Pasteur began a whole new approach to the subject. His systematic, experimental team study of wine diseases and of killing bacteria by heating the wine led to a basic change in wine production that united science and technology in a new way. In his work on wine Pasteur worked closely with producers and professional wine tasters. He recognized that science, taste, and production cannot be separated. (It may be partly due to his influence that the Bordeaux school of oenology has usually kept this idea prominent in its teachings.) Pasteur's studies on

¹ Maynard A. Amerine and Vernon L. Singleton, *Wine: An Introduction*, 2d ed. (Berkeley, 1976), pp. 22–3.

wine united for the first time the science, technology, and aesthetics of wine in the interests of commerce.

Part III of the book examines the role of research in the production of wine in the Champagne, Burgundy, and the Languedoc. Champagne is one of the greatest commercial successes in the history of wine. Like fine wine, port, scotch, coffee, and chocolate, champagne became popular with well-heeled consumers in the eighteenth century.² The Champagne provides some good examples of the collaboration of capitalism with viticultural and oenological research. The special problems associated with the production of champagne, its bottling and storage, as well as the guarantee of its quality, seemed insoluble without the help of scientific research.

The second chapter of Part III struggles with the elusive history of oenology in Burgundy, where the connections between science and winemaking are less evident than in the Champagne and the Bordelais. After the late eighteenth century, the idea of a decline in the reputation of the *grand vin* of Burgundy was not uncommon; at the same time, the reputation of bordeaux improved. In the nineteenth century, red burgundy had the reputation of being a less reliable commercial commodity than red bordeaux, unless burgundy was stabilized through heating, which was Pasteur's panacea for Burgundy's problems. In recent years, better control of production and more attention to sanitation, combined with shipping in appropriate refrigeration, has made it possible to drink good burgundy nearly anywhere. It is tempting if somewhat simplistic to see the explanation for the better reputation of bordeaux, at least in foreign markets, in the rise of oenological science at the University of Bordeaux, whereas the faculty of sciences in Dijon remained surprisingly peripheral to either old or new oenology, at least until after the Second World War.

The last chapter of Part III deals with the Narbonnais school of oenology, little known outside specialized texts, though everyone seems to know about its most notorious subject of research: carbonic maceration or vinification without crushing the grapes – except those that are crushed by the weight of the other grapes! It seems difficult to become well known for oenological research without plugging into high-level mainstream science as Montpellier and Bordeaux did, and it helped even more, as in the case of Bordeaux, to have a reputation for the production of quality wine.

In Part IV the narrative moves to Bordeaux, where we find the greatest success story in the history of oenology. The first chapter treats the development of Pasteurian oenology in Bordeaux. In the late nineteenth century, Pasteur's student, disciple, and collaborator, the chemist Ulysse Gayon, took a position in the faculty of sciences at Bordeaux and became

² Wolfgang Schivelbusch, *Tastes of Paradise: A Social History of Spices, Stimulants, and Intoxicants*, translated from German by David Jacobson (New York, 1993).

the area's leading agricultural scientist. With his botanist colleague Alexis Millardet, he perfected the famous Bordeaux mixture for the treatment of downy mildew, a fungus disease that threatened to ruin the wine industry in the 1880s. Thus the young oenology could claim some credit in saving a great industry from disaster. The popularity of Gayon's course on grape growing and winemaking helped to establish a formal program designed to cater to agricultural interests. More important, Gayon, chiefly through his work on fermentation, went on to create the oenology of fine wines, which was continued and developed by his students. They extended the Pasteurian paradigm to the limits of its usefulness.

The second chapter of Part IV reveals the development of a new oenology in Bordeaux during the 1920s and 1930s with introduction of the theory of ionization, or electrolytic dissociation, into research on the composition of wine. The theory also entered oenology in Montpellier, where it was the creature of the faculty of pharmacy rather than the school of agriculture. The key figure in Bordeaux was the biochemist Louis Genevois, a prominent if unloved figure in the history of oenology. Jean Ribéreau-Gayon and Emile Peynaud were the most prominent of his students to apply the physical chemistry of solutions to develop a new model of wine in order to understand exactly what goes on in the making and subsequent aging of wine.

Although the evolution of different models of wine was evident in Roman antiquity, it seems to have accelerated in the eighteenth century. Montesquieu noted the existence of many models of Bordelais wines catering to a wide range of consumer tastes. Scientists entered into the business of creating new models of wine for commerce after the Chaptalian revolution. The most widely imitated wine model has been the one created by the Bordelais school of oenology, conveniently symbolized for the media by the peripatetic oenologist Emile Peynaud, who has done as much to promote the fortune of Bordeaux as it has done to promote his. The new model wine, less tannic and less acidic, and therefore drinkable young, may not be to everyone's taste, but it is the wine that has been universally adopted from Piedmont (Italy) to the Hunter valley (Australia) as the best model of marketing success. The second chapter of Part IV reveals the scientific foundations of the new model wine in the work done by Ribéreau-Gayon and Peynaud about a half-century ago.

The third chapter of Part IV deals with the integration of oenology into higher education with the eventual birth of an oenological institute in Bordeaux. Ribéreau-Gayon, assisted by Peynaud, worked in a laboratory of the famous old wine firm of Calvet in Bordeaux. A connection, however tenuous, existed between science and commerce, and it was later extended to education through the faculty of sciences. In moving to the University of Bordeaux in 1949, Ribéreau-Gayon and Peynaud were able

to achieve a gradual transformation of oenological practices by training dozens of oenologists, who went into the wine business in one capacity or another. Oenology drew on a wide range of sciences from analytical chemistry to plant physiology. Combined, after the 1950s, with a real technical revolution at the level of production, the use of this new scientific knowledge transformed the vinification of fine wines, and eventually the *petits crus*. The gospel of Bordeaux emphasized that the vinification process must be carried out within the context of general scientific principles, technical know-how, and the artistic sense of the winemaker – wine must be a *Gesamtkunstwerk*.