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The Science of Good Taste: The Intersection of Wine, Geology, and Geochemistry

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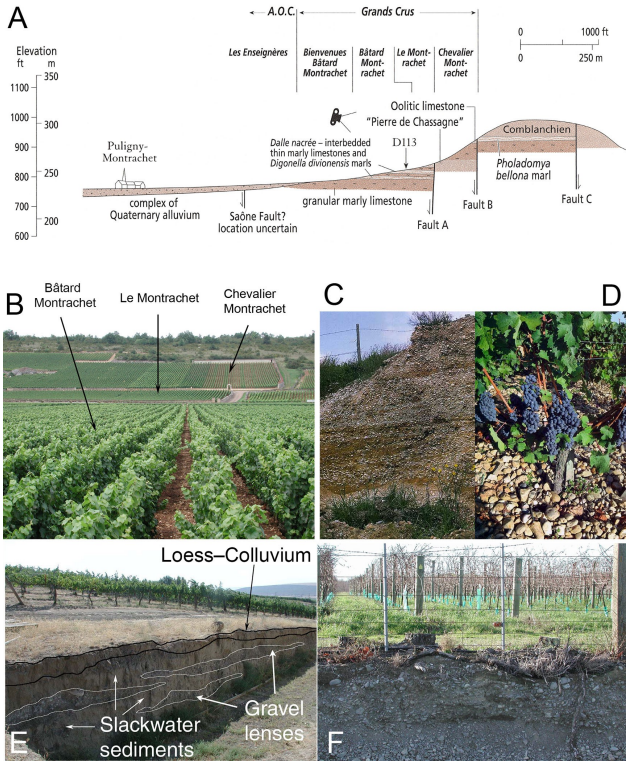

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Due to its storied gastronomic history, there is not likely to be a more appropriate setting for a discussion of the interplay among wine, geochemistry, geology, and food than Lyon, France, site of the 33rd Goldschmidt Conference. But what makes for great wine? Climate, soil, grape variety, and winemaking technique all play a part but within an overall favorable climate, foremost is water availability during vineyard growth and grape ripening (Meinert, 2018). Too much or not enough water at the right time can make or break a successful harvest. Water availability is moderated by soil characteristics such as drainage and clay content. This is a major factor in the “terroir effect” whereby vineyard “X” produces wine of vastly different quality than a nearby vineyard “Y” that otherwise has similar climate and cultivar characteristics. In contrast, the chemical composition of soil and bedrock has little impact on wine quality, even though many winewriters like to wax poetic about “minerality”, “flintiness”, or the taste of limestone, shale, granite, or volcanic rocks in a particular wine. To be clear, no mineral or rock is transported through the roots to the vine to the grapes and ultimately into the resulting wine. The distinctive crispness that characterizes some Chablis or German Rieslings is not due to the presence of a particular limestone or slate bedrock, but rather to the acid balance that - among other factors - results from overall vineyard terroir. Although it is true that trace elements and isotopic variations can be used to fingerprint the origin of some wines, these components have almost no effect on wine flavor or quality. Rather, it is plant physiology that controls grape ripening and the resulting sensory characteristics of the wine. Using examples from Europe and North and South America, I will illustrate terroir factors that affect wine quality. Surprisingly, some of the great vineyards of Bordeaux, Chile, and Washington State have more in common due to their geologic history than one might think.

Meinert, L.D. (ed.), 2018, Terroir: Science Related to Grape and Wine Quality: Elements, v. 14, p. 153-190.