

cellar scene



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Myths of Minerality

Fruit and oak have their place in great wine, but the top prize among wine attributes probably goes to minerality—the expression of rocks and soil in the aromas and flavors that end up in the glass. But for all its desirability and status, minerality is only vaguely defined and not well understood. In fact, the one thing we do know is that it has very little to do with minerals.

The great Rieslings of Germany's Mosel Valley are almost always described in terms of the slate soils they come from; for Sauvignon Blanc from Sancerre and Pouilly-Fumé from France's Loire, it's "flint" that shows up in most every tasting note. New World wine regions aiming to match the Old World

HIGHLIGHTS

- ☛ The desirable wine characteristic of minerality is only vaguely defined and not well understood. In fact, the one thing we do know is that it has very little to do with minerals.
- ☛ Part of the difficulty in finding a reliable, standard mineral reference is that, by and large, minerals don't have much smell at all. The scent of a rock-strewn patch of the great outdoors may be memorable; a single, clean rock in your hand is almost guaranteed to be odor-free.
- ☛ Another line of explanation links the perception of minerality with high acidity. Besides thinking minerality has little to do with "sucking on stones," Dr. Ann Noble suspects acidity may be involved.

benchmarks—the Finger Lakes or New Zealand—often feel they have arrived when they, too, can boast of mineral character. Even some reds bask in the warm, stony glow.

Expressing minerality is not exactly the same thing as revealing *terroir*, but the two concepts are certainly intertwined. Distinctive *terroir* can show up as peaches or eucalyptus or creosote, not rocks. But claims that a particular wine captures the taste of a place—the *goût de terroir*—often revolve around vineyard geology and the subtle differences in soil composition between neighboring plots.

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One would expect that an attribute this celebrated would be well documented, but one would be wrong. I started my research by whipping out my handy Wine Aroma Wheel, only to discover to my genuine surprise that no trace of "mineral" can be found therein. I fired off a quick e-mail to Dr. Ann Noble, creator and keeper of the wheel, asking how that could be, and she responded, "Minerality is a concept which could never be consistently defined in words or physical standards. If someone could come up with a stone or metallic solution that had an aroma that could be used to define minerality, it could be on the wheel. But the criterion for being on the wheel is that it is objective, analytical and nonsubjective, nonevaluative, nonhedonic."

She also put her personal view a little more bluntly: "Sucking on stones doesn't give any sensation akin to wine flavor."

The same concern about the slipperiness of the descriptor came from UC Davis flavor chemist Dr. Sue Ebeler: "As far as I know, there are no clear correlations of any specific

compounds with a 'mineral' aroma. It is likely a complex mixture of compounds which we associate with the smell of soils or rocky areas. To really understand the use of this term, we would have to carefully define it with the use of some reference aroma/taste compounds that we could all agree on. Otherwise, two individuals may be describing the same physical or chemical stimulus with very different descriptive terms—your 'mineral' may be my 'salty.' Maybe then, once we've agreed upon a sensory descriptive reference and terminology, we could begin to identify the chemical compounds associated with the aroma or taste."

Part of the difficulty in finding a reliable, standard mineral reference is that, by and large, minerals don't have much smell at all. The scent of a rock-strewn patch of the great outdoors may be memorable; a single, clean rock in your hand is almost guaranteed to be odor-free. Deposits of individual minerals and agglomerations of minerals into rocks rarely contain volatile aromatic compounds. This helps explain why, when I Googled the phrase "mineral aroma," the results all had to do with body lotions and spa treatments, not rocks.

Devotees of minerality may admit that dry rocks have little smell, but go on to clarify the sensory concept as the aroma that rises when rain falls on thirsty stone. Turns out there is even a word for this phenomenon—petrichor—coined by two Australian researchers in 1964. The source of the smell, they determined, is that water liberates aromatics contained in complex, multi-compound oils that are given off by vegetation during dry spells and find their way onto the soil. (I happened across the term on Robin Garr's Wine Lovers Page; for more information, go to worldwidewords.org.) In other words, the smell of rain on stone is the smell of plants.

Assuming we could all agree on a definition of minerality in wine, we would still need to figure out how it is produced. What Master of Wine and popular wine-science writer Jamie Goode calls the "literalist"



Does so-called minerality mean there really are minerals in your wine?

school holds that minerality comes more or less directly from the vineyard soils: slate in the vineyard produces slatey-type mineral character in the bottle. The implicit mechanism is that little molecules of slate journey from the soil through the roots and the xylem into the berries, and somehow manage not to fall out during fermentation. This, alas, is not how grapevine physiology works.

Even though chunks of slate (or clay or sandy loam) don't make their way into the grapes, some elementary minerals and mineral compounds do get taken up from the ground and end up in the juice. They arrive in small quantities, not enough to

independently influence flavor, one way or another. They do, however, play an important role in yeast nutrition and metabolism during fermentation. And they are not particularly glamorous minerals, not the stuff of lyrical tasting notes: potassium, magnesium, sodium and calcium are the major players, none of them with noteworthy aromatic properties, particularly in such low concentrations. Wine flavors and aromas overwhelmingly come from compounds created either inside the berries during maturation or in the cellar during processing, not from substances transported from the soil.

The leading candidate in ongoing research for an explanation of

minerality is, in fact, part of the mineral kingdom, one of the few downright famous for its odor: sulfur. In his recent book, *The Science of Wine* (University of California Press, 2005), Jamie Goode pulls together the findings and hypotheses from a number of European researchers suggesting that what is called minerality is likely related to low levels of a number of sulfur-based compounds, especially likely to occur in reductive (highly oxygen-restricted) winemaking or under conditions of nutrient stress in yeast during fermentation.

Another line of explanation links the perception of minerality with high acidity. Besides thinking minerality has little to do with "sucking on stones," Ann Noble suspects acidity may be involved: "I personally think it (minerality) implies 'austere.' Flavor with 'tight fruit,' high acid. Temporally, the aroma and taste are sharp, quick in onset and do not linger."

It seems hardly coincidental that Germany, known for high acid wines, reductive winemaking and chronic nutrient deficiencies in wine musts, should also be the source of so many wines identified by those who love them as highly mineral.

Without an agreed-upon standard, theories about where minerality comes from are bound to remain speculative. But the possibility that minerality stems not from the fixed characteristics of the vineyard but from compounds that can be controlled in the cellar should be cause for optimism. If emanations of slate can only be derived from slate soils, most of the winegrowing world is out of luck. But if this desirable property is due to the level of acidity or the presence of one or another sulfur compound that can be encouraged or discouraged, so much the better.

The prospect: less romance, more minerality. ■

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