The Trilemma of Primary, Secondary and Tertiary Aromas

by Deborah Parker Wong

IT'S GENERALLY ACCEPTED THAT we have three choices when defining wine aromas, they are categorized as primary, secondary or tertiary. Yet in practice, many common aromas can be attributed to two of these categories. Primary wine flavors (the combination of aromas and tastes) come from the grape variety itself and are almost always fruity except when they're not. Secondary aromas are those associated with post-fermentation winemaking and include yeast, lees, yogurt, cream, butter or cheese and a full spectrum of flavors derived from oak. Tertiary flavors are defined as deliberate oxidation, fruit development, bottle age or any combination thereof.

Petrol, for example, which is most commonly detected in Riesling and attributed to the compound 1, 1, 6, -trimethyl-1,2-dihydronapthalene (TDN), can be present in new-made Riesling and in increasingly higher amounts in bottle-aged wine due to the hydrolysis and rearrangement of TDN precursors over time.

The conundrum or trilemma that students of wine encounter when using a tasting rubric like the Systematic Approach to Tasting developed by the Wine & Spirit Education Trust (WSET) or the Court of Master Sommeliers' Deductive Tasting Grid becomes apparent when defining petrol. The WSET categorizes it as a tertiary flavor attributed to bottle age in white wines and the Court as inorganic earth/mineral.

Knowing that TDN is present as precursors in all internationally important varieties but only exceeds a sensory threshold of 2 ppb under certain winegrowing and winemaking conditions solves this trilemma. Technically, petrol is a primary flavor that's inherent to the grape and it's also a tertiary flavor attributed to bottle age.

Many of the aroma molecules found in wine cannot be detected by tasting the grapes themselves, but they emerge from precursor molecules during fermentation. Primary or fruity flavors in wine are attributed to interactions between esters, alcohols and acids. Esters can be found within the grape itself, and they can be produced during fermentation.

The importance of esters in white wines is clear, but the role they play in red wines is still the subject of research. Using gas chromatography/ mass spectrometry, researchers have identified the ester ethyl cinnamate, which has the aroma of cinnamon and balsamic in Pinot Noir from Bourgogne. Ethyl cinnamate is one of four esters that are characteristic of Pinot Noir from this region, and at 16 ppb it has a low flavor threshold that we can readily identify in young wine that has been aged in stainless steel or cement.

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Brown spice flavors like cinnamon and nutmeg are typically characterized as secondary flavors attributed to oak aging and as tertiary flavors in white wines as a result of bottle age. If we can taste cinnamon in Pinot Noir from Bourgogne that has never seen the inside of an oak barrel, it would be considered a primary flavor inherent to the grape that was released during fermentation but not a secondary flavor as a result of oak aging.

In a scenario where Pinot Noir from Bourgogne is being evaluated blind and without any knowledge of the winemaking behind it, a taster would be accurate in saying that cinnamon is both a primary and a secondary flavor characteristic.

Esters play a key role in another red grape, Pinotage. This variety has the potential to develop a pungent, banana aroma from isoamyl acetate, which is found in the grape itself and is produced during fermentation. Here's a case where finding a primary tropical fruit aroma, however unlikely in red wine, would be an accurate descriptor.

Mauzac, the grape variety indigenous to Southern France that forms the basis of Blanquette de Limoux, has the unique varietal flavors of dried apple peel or baked apple built into the grape. Like petrol, these flavors are also considered to be tertiary, in this case from fruit development, and the result of maturation. Again, we're faced with a trilemma of naming two categories—primary and tertiary flavors—that are polar opposites in terms of how we characterize wine style from our three choices.

And so it goes for dozens of other flavors. To truly evolve an understanding of the sensory evaluation of wine requires pushing past the obvious, asking questions and looking to research in search of answers. While tasting rubrics like the Systematic Approach and the Deductive Tasting Grid are valuable tools, they're constantly being refined and are open to interpretation. As such, wine professionals are better served using them as guidelines rather than gospel. SJ

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