TOP FLOR

Winemakers are utilizing the art and science of film-forming yeast to culture diverse wine styles.

BY STACY BRISCOE

It's a defining feature in Fino, Manzanilla and Amontillado Sherries, gives dry Szamorodni an extra layer of complexity; is the core of Jura's vin jaune and Italy's Vernaccia di Oristano DOC—and it's what's inspiring a new wave of U.S. vintners to craft truly unique expressions of well-known grape varieties.

What all of these wines have in common: time spent maturing under the film-forming yeast called flor.

Flor is a strain of *Saccharomyces cerevisiae*, the same yeast species responsible for brewing beer, making sake, baking bread and, of course, fermenting wine. "But all yeasts have evolved differently, depending on their environment," explains Dr. Ana Hranilovic, yeast specialist at Laffort. "Each strain has specific evolutionary characteristics based on origin, which is, in fact, related to domestication. Just like any other crop or livestock, we have also domesticated yeast."

Flor yeast's specific genetic make-up includes a trait that allows it to float. With enough headspace for oxygen interaction, flor propagates, forming a thick enough layer to completely cover maturing wine.

"The distraction of the fruit falls away. What you're left with is the core of the wine."

Shielding the wine from the effects of oxidation, the flor imparts its own imprint that affects aromas, flavors and texture. "All sugars [during fermentation] go from pyruvate into acetaldehyde into ethanol," explains Hranilovic. "Here, the ethanol is actively metabolized by the flor." That metabolization is how the token aldehydic notes of bruised and dried apple, blanched almond, salt and brine are formed.

Glycerol, another by-product of primary fermentation, is also affected. "Flor develops [post primary fermentation] when no sugars are available," says Hranilovic. "So, they seek alternative carbon sources—ethanol, glycerol, malic acid in some cases. Flor has developed mechanisms to sustain themselves on these alternative sources." Glycerol levels of a flor-aged wine can decrease from 7 grams per liter (g/L) to as low as 0.3 g/L, resulting in wines with a very thin, lightweight mouthfeel.

Today, producers beyond the historic regions known for this winemaking technique are utilizing the science of flor yeast to produce wines expressive of terroir, cultural lineage and artistic creativity.

Taming Terroir

"To what extent is microbiology a reflection of terroir?" That is the question traveling winemaker Alex Rosanelli asked himself when he became intrigued by natural winemaking in general and flor-aging specifically.

"As a winemaker, consumer and taster, it's always bothered me when you stick your nose in the glass or take a sip and all you smell or taste is winemaking," says Rosanelli. "That's obscuring the true sense of place."

How to capture that "true sense of place" came from inspiration tasting aged Chardonnays from Long Island, where Rosanelli was working at the time. "In these aged expressions, all the fruit was stripped; all that was left was a briny, saline quality," he says, noting the terroir of Long Island is

"Just like any other crop or livestock, we also have domesticated yeast."

often described as "salty," "maritime" and "mineral." In these older vintages, because the flesh and fruitiness had dissipated, that "distraction" falls away. "What you're left with is the core of the wine," says Rosanelli.

Long Island, Rosanelli explains, experiences very little diurnal range, thus higher average growing degree days, meaning extremely ripe fruit with high potential alcohol is a frequent hurdle for a producer looking to create leaner, mineral-driven expressions. He tried different techniques—from picking earlier to using alternative barrels—but never got the results he sought.

Having traveled to and studied the wines of Jerez, Rosanelli began thinking about the microbiology of flor metabolism as a natural solution to his problem. "When flor metabolizes those other non-fermentable sugars, it takes away that perceived fruitiness and perceived sweetness," he says.

In 2018, Rosanelli conducted his first flor experiment. The Chardonnay aged under flor for just two years, mitigating any overwhelming aromas and flavors associated with acetaldehyde. "I liked the tension of just a little bit of primary fruit—and to see how that primary fruit shifted. Ripe, baked pear and stone fruits evolved into a more cut Granny Smith apple—a leaner, tarter expression. By removing some of the aromatic compounds, the wine had a stronger sense of focus."

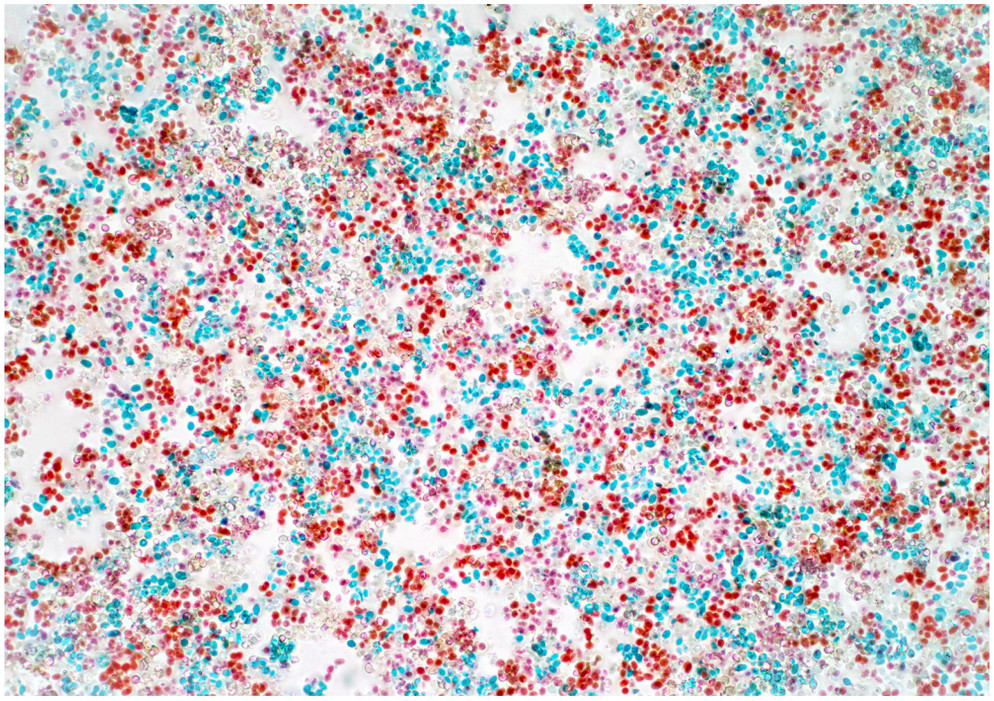
Complex-Deliciousness

Chad Stock, winemaker at Willamette Valley's David Hill Winery and proprietor of his own brand, Minimus, experimented with flor in various AVAs with "mixed success." "But the successes that I've had have been identical in two distinct areas," he says, naming the Van Duzer Corridor and the Tualatin Hills. "They are the two highest rainfall, most oceanic-influenced sub-AVAs of the Willamette Valley. I think the success of culturing flor has to do with barometric pressure and humidity, as well as grape chemistry."

Stock works with Sauvignon Blanc, a grape with strong varietal character, even when picked on the edge of ripeness. "If you're aging under flor at sub 3.2 pH and 11% alcohol with a grape that has pyrazines—or any kind of strong DNA imprint—you alter the process and *that*'s where the opportunity truly lies to make something regionally distinct." Using a more neutral variety, like Savagnin, Palomino or even Chardonnay, "If they're pushed too far, they become more interesting than delicious," Stock comments. "They're intellectual wines, beautiful but challenging because they're so austere and punishing in a way that I wish there was still some kind of flavor element other than the winemaking process."

With Sauvignon Blanc, on the other hand, the grape is able to preserve its own imprint among the strong aromas and flavors associated with flor. "It's less austere and integrates the process *with* the grape variety and, to me, it's more complex but also more generous and more delicious."

Further to this complex-deliciousness is the specific flavor profile of Oregon Sauvignon Blanc in particular. The damp climate means increased disease pressure, so growers typically keep an open canopy, providing ample sunlight and UV exposure. This, notes Stock, takes away the token "green" character of the variety, and opens to a "tropical exotic-fruit monster." "And with the acid so high, when you get that extra layer of oxidation after three to four years in barrel under flor, those fruits meet those aging characteristics, and it just works," he says. "It's the context that Sauvignon Blanc provides for those flavors to build; instead of dominating the grape, you're folding the grape into the process."



Light micrograph of brewer's yeast (*Saccharomyces cerevisiae*) budding cells. *Saccharomyces cerevisiae*, of which flor yeast is a strain, is the same yeast species responsible for brewing beer, making sake, baking bread and, of course, fermenting wine.

GETTY IMAGES/ISTOCKPHOTO (2)

Meredith Bell founded Statera Cellars with partner Luke Wylde in 2014 as a brand dedicated solely to Chardonnay. "Chardonnay is so diverse and so broad in its expression. We can make 20 different wines with this one variety—not many grapes can do that," comments Bell.

Like Rosanelli, Bell and Wylde started with a "terroir-focus thing," but then dove deep into winemaking style. "We wanted to get as creative as possible, discover all the stylistic iterations we can play with through the lens of Chardonnay," she says.

While working alongside Chad Stock at Craft Wine Company, Bell was inspired by his experimental flor-aged Sauvignon Blanc and—with permission—racked a barrel of her own Chardonnay into his used one to capture the yeast culture. It took—and aged for seven years under the film.

Bell finally bottled her wine in January 2024. "Remarkably, it tastes very much like vin jaune," she says. "Aromas of toffee nut, dried pear, fennel, and a very salty-saline quality with a really long finish."

Art and Identity

Gustavo Sotelo, winemaker at Scribe in Sonoma, California, celebrates his heritage with his personal brand Sotelo, focusing on Spanish grape varieties and winemaking. "The California industry is very Francophile-focused … a lot of tradition and techniques from Spain haven't made their way over yet. That's my focus and excitement," he says.

Oxidized rosés put a stamp on the stylistic reputations of Rioja and Navarra in Spain. But with increased use of stainless-steel ferments and maturation, that tradition—particularly outside the domestic market—has waned. Still, there are a few reputable producers who've honed the oxidation craft and produce high-quality, sought-after wines. It was the work of Rioja's López de Heredia, whose blend of Grenache, Tempranillo and Viura that ages for five years under flor (followed by another five in bottle), that truly spoke to Sotelo. "It's a unique rosé because it's savory, food friendly and ageworthy," he says. "I didn't want to create another rosé that's full of red fruit. I wanted something unique that talks about winemaking techniques that are classical to Spain."

Sotelo asserts that it's a myth flor develops only in certain climates: "In Sherry they say because it's so close to the coast, there's the right moisture and salt and all these things make it unique so it can only grow in Sherry. But that's not really true." What he's learned is that the key is maintaining an ambient cellar temperature that's slightly warmer than normal (70–75°F vs. 58–65°F). Also important is keeping an eye on wine chemistry throughout the process: Alcohol should maintain the "sweet spot" of 13–14% abv; acidity can't get too high, nor should SO_2 levels—both of which would inhibit yeast development. And he is constantly checking his volatile acidity (VA) levels.

Sotelo's rosé, a blend of Grenache, Tempranillo and Godello, doesn't see the extensive 10-year aging as López de Heredia, but it still has clear notes of biological aging. "Texture is the coolest thing flor aging does," he says. "It's a certain textural element: Our rosé has no tannin when it finishes primary, but part of the aldehydic character and the fact that flor takes out unfermentable sugars gives the wine more structure."