

# ON FERMENTATION

**W**INE IS infinitely more interesting than grapes. What happens, what causes this simple fruit (tasty as it may be) to become that mysterious liquid, the object of so much curiosity, passion and desire, that we call *wine*?

Even if you don't add yeast—at Cain we don't—if you're patient, the grapes will ferment. We find the results are more interesting, more subtle, more complex and altogether more satisfying due to the slow evolution of stages through which the fruit slowly transforms itself into wine.

Before the native yeast and bacteria on the fruit can begin to awaken and divide, once in the tank and starved of oxygen, the metabolic processes within the fruit itself begin a transformation, converting sugar to alcohol and carbon dioxide, and releasing vivid pigment and exotic perfume into the nascent wine.

Then, after a few days, slowly and eventually, the microbes multiply, ultimately overwhelmed by one yeast, *Saccharomyces*, the main fermentation takes off, the grapes and juice heat up, the surface appears to boil and carbon dioxide (the same as in the bubbles in beer or champagne or soda water) comes flooding out of the tank. This is what



winemakers call the primary fermentation.

As the ancients observed, it is a magical moment. The aromas are heady with carbon dioxide, alcohol, and the divine perfume of the young wine in the process of becoming. There's a lot going on—more than science can explain.

Fermentation continues well after the wine has been drained and pressed. The young wine is cloudy with minute particles of grape and teeming with yeast and bacteria. Now we put it "to bed" in barrels where the fermentation can proceed more quietly, for weeks, months, and sometimes even years. Here, the *élevage* begins (See *On Élevage, Notes from Cain*, Summer 2017).

The transformation is really never complete, it is always in the process of becoming, though it goes slower and slower. First the sugars are consumed, and then some of the acid, as malate is transformed to lactate. Finally, other yeast, *Brettanomyces*, living in tiny populations over many months and years, might consume minute quantities of sugar, producing aromatic esters and phenols, all of which contribute to the savory complexity of the wine—transforming it from the fresh, raw fruit into that magical elixir we call wine.

—Chris Howell

*The Pleasures of Punching Down: Marc Troyan puts heart into our first Malbec of 2017. By mixing the floating berries with the fermenting must, perfume, color and tannin are released into the wine.*



# THE ORIGINS OF FERMENTATION

*Ferment (v.): from Latin fermentare "to leaven, cause to rise or ferment," fervere "to boil, seethe"*

**F**ERMENTATION, and quite likely wine, has been with humanity as long as there has been civilization. Once crushed, grapes will ferment. It seems to be the simplest thing, and yet it would be mysterious, were it not so commonplace. How is it possible that a simple fruit could appear to boil, and its sweetness become transformed into a volatile and intoxicating spirit? And then, this spirit can be distilled from the wine, yielding "eau de vie," literally, the water of life.

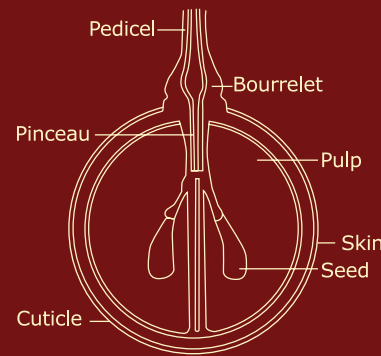
Of course it is mysterious. It seems to be revealing some essential truth.

People must have known, or at least guessed, that the active agent in wine, the ferment, was the same or similar to that

which ferments beer, and also to that which makes bread rise. In other words, these were all aspects of the same phenomenon. And there are other fermentations, such as those of yogurt and cheese, or pickles and kimchi, or kombucha, or cured meats...the list goes on. They're not all the same—some ferments are yeast, some are bacteria, some produce alcohol, some produce acid, but they all begin with something relatively simple and ultimately yield something magically complex.

Until the late 18th century, this transformation remained inexplicable, and fermentation became a major focus of the scientists of the Enlightenment. For many people this fermentation was a natural process, a kind of natural breaking down, that was not necessarily a living process. It was not until about 1860, that Pasteur and others had finally resolved that fermentation was mediated by microscopic, organized beings, that is, living, reproducing, multiplying organisms, that we call yeast.

—Chris Howell



## MACERATION

Red wine derives its color from the skin of the grape—but there's more, much more: there is the perfume, the tannin, and most important, the texture.

At the same time as the biological fermentation proceeds, so too, does a process of maceration, extraction, and infusion, as

elements from the skins, pulp and seeds move into the juice and interact with each other. It is akin to making coffee or tea, and yet, because we're working with living grapes and yeast and bacteria, it is infinitely more complex.

The time of maceration could be hours, days, weeks, or even months. At Cain, with grapes that are reasonably ripe, we usually find that a couple of weeks are sufficient to give us all we need. And then we press. First we drain as much of the new wine as possible—the free run. Then we empty the tank, pulling out the soggy, now collapsed grapes to squeeze out still more of the fermenting juice. This press wine will be intense—even to the point of being undrinkable—but it will be rich in the substance of the grape. A judicious amount returned to the free run (think of squeezing a tea bag) can contribute to the balance and completeness of the whole.