



YEAST “BEASTIES” (Naughty & Nice)!

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In the 1990's Julie and I took a week-long course in German wine while cruising up the Rhine and Mosel. Four tastings a day, each of 6 wines, often at world renowned wineries and always with a 7th unknown to be identified as a test after the tasting (how very German of them). Upon reaching the Rheingau (near Wiesbaden) and the village of Rudesheim, widely held to produce the greatest Rieslings, we heard the legend of King Pepin the Short and his son Charles (later Charlemagne). Reportedly in early Spring ca. 765 AD they stood on the Rhine's south bank in snow up to Charles knees (and maybe Pepin's waist). Pepin pointed across to the North bank (now Rudesheim), already green with grass free of snow, and said, "Chuck my son, over there is where you plant the grape vines." And so Charlemagne did, as evidenced by the wonderful vineyards all around Schloss Johannisberg estate. Deep in their enormous cellar, is a huge barrel head inscribed in four languages (Hebrew, Greek, Latin, and German) as a tribute to God's love of us -- "And wine to gladden the heart of man."¹ Cannabis, Prozac or Valium did not exist. But the way grape juice was mystically filled with a calming spirit as it became wine took on religious significance. Pagan, Jewish and Christian credited it to their own God, and wine was incorporated into the ritual of religions. Yet unknown were the little yeast beasties which actually imbued the grape juice with "spirits" (not necessarily Holy) by converting sugar into alcohol and carbon dioxide by the fermentation process. The ancients only knew this magic liquid relieved so many troubles of the day.



Today we know that Yeast is the hero, and our creator's gift is the convenient natural presence of *Saccharomyces cerevisiae* on the surface of grapes. *S. cerevisiae* is often taken as synonymous for yeast but is actually only one of at least 1500 known species of yeast.² Beyond its usefulness in winemaking, yeast fermentation is remarkably useful in preserving grain, through beer production, and in baking by fermentation of sugar in the dough resulting in carbon dioxide leavening. Yeast is also used in industrial production of alcohol as a fuel. A wonderfully friendly and useful microorganism to be sure is *S. cerevisiae*.



But if *S. Cerevisiae* is the "nice" yeast, are there "naughty" ones? Oh yes. -- *Candida albicans*, and *Cryptococcus neoformans*, are well known opportunistic human pathogens usually infecting those with some immune compromise. And other yeasts such as *Zygosaccharomyces* and *Brettanomyces*, in wine can result in wine spoilage.

At a recent dinner Julie and I shared a 2008 Zinfandel, of which the producer's great pride was evidenced by 1) it's price and 2) the fancy painted bottle with gold detailing. We hoped this held promise of a great food pairing. Julie noted immediately that although it had a nice nose and balance with complex fruit, on the late palate there was a "chemically, metallic, off taste". I thought this was likely "**Brett**," as spoilage by *Brettanomyces bruxellensis* is called. "Brett," growing in wine, produces an array of metabolites such as volatile phenolic compounds. These volatile phenolics cause the "Brettanomyces character", often described as "antiseptic" or "barnyard" type aromas. *Brettanomyces* is a significant contributor to wine faults within the wine industry.³

This perked my curiosity. So, after a bit of digging I learned that when "*Brett*" infests a batch of red wine the problems are only beginning for the unfortunate winemaker (and his equally unfortunate consumer).

The yeast actually invades into the pores and channels within the oak staves of the barrel. With normal barrel cleaning, “Brett” would still re-immerge and the next vintage would become tainted. Many things were tried to salvage expensive barrels for future vintages. Traditional disinfectants like sulfites, phenols and other chemicals were tried, but proved unable to eliminate it. Steam and hot water worked sometimes but often failed to kill and remove the “Brett”. WSU Professor Charles Edwards recently studied oak from infected barrels using scanning electron microscopy. He discovered the “Brett” organisms went much deeper into the wood than previously thought.



His solution was to heat barrels more thoroughly by increasing the current 3 to 5 minutes of steam in barrels, to 10 to 12 minutes.⁴

In thousands of years of winemaking there have been many improvements. Today we are the beneficiaries and enjoy a finer version of our creator’s gift of yeast and grape than any previous generation. Improvement may come in giant steps, as when Dom Perignon introduced systematic improvements in Champagne with better vineyard practices, careful harvest selection, and replaced foot trading of grapes with presses in the 18th century.⁵

But small incremental improvement is more common and is driven by ongoing research, such as that by Prof. Edwards. He has shown winemakers how to get the “naughty” yeast out so that the “nice” yeast can better “gladden the heart of man”¹ and woman.

So thanks and praise to Yeast -- *S. cerevisiae* -- for putting the “spirit” in our grape juice, and thus into us!

REFERENCES

- 1) Psalms 104 v15, Holy Bible.
- 2) Kurtzman CP (1994). ["Molecular taxonomy of the yeasts"](#). *Yeast*. **10** (13): 1727–1740.
- 3) Lamar J., “*Brettanomyces (Dekkera)*”, *Vincyclopedia*. 28 November 2009
- 4) “WSU researchers discover new methods to fight invasive yeast in red winemaking”, CAHNRS News, (College of Agricultural, Human, and Natural Resource Science), Washington State University, 12/22/2020.
- 5) “Come quickly, I taste stars”, Snow on Wine, The Wineminder, December 2020.