Ants in the pants?

Bugs IN BEER

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Sour is as Sour Does

Sour beers are everywhere. As beer drinkers explore the variety of different styles, they eventually find themselves facing their first glass of sour beer. Often, that first taste is shocking; almost repellent. But like a moth to a flame, they carefully go in for a second sip, and guess what: it isn't as bad, and another sour beer fan is born.

One would not normally describe proper brewing as having beer "... become infected with various bacteria and wild yeast." However, that is exactly what happens in the production of sour beer.

For the purpose of this article, "sour beer" refers to both spontaneously fermented, traditional Lambic, as well as other sour types like Berliner Weisse, Flanders Red, and Flanders Brown. These styles share some of the same microbes, but each has a unique production process. There are also more general "wild ales," and these often contain some of the same critters as discussed below.

BREWING REVIEW

Humans have been making fermented food and drink for thousands of years. However it has been only about 150 years since Louis Pasteur discovered that yeast were responsible for fermentation. Fast forward to today, when we not only know a lot about yeast, but also about many other microorganisms that contribute to the aromas and flavors of beer.

In general, "brewer's yeast" refers either to a strain of yeast that is predominately ale (for example, Saccharomyces cerevisiae) or lager (for example, Saccharomyces pastorianus). We can simply use "Saccharomyces" to indicate normal brewing yeast.

Historically, sanitation and cleanliness were not as important, or even as possible, in a brewery as they are today. Oftentimes, there were other microorganisms involved in the production of beer, either intentionally or not.

BASICS ON BUGS

In general, "spoilage organisms" have always been in beer. In this article, we are going to primarily focus on those types of organisms that are intentionally used in the brewing process. The best example is the production of spontaneously fermented Lambic. However, there are other styles of beer that are intentionally made sour, and we will touch on those.

Using wild yeast and bacteria complicates an already complicated process. These organisms are less precise and less predictable than Saccharomyces, which is typical brewer's yeast. They are slower and more finicky. They might also yield varying results each time.

With Lambic beer, the source of these organisms is nature. That is, after the wort is boiled, it is pumped into a large shallow pan ("coolship") and allowed to cool overnight. The microorganisms in the air of the Senne Valley in this part of Belgium are allowed to inoculate the freshly made wort. The wort is then transferred to oak barrels, environments rich with their own supply of souring agents, and fermentation begins. The beer is allowed to age and develop for several years.

There are certain bugs employed in the production of Lambic beer. They warrant a closer look because they interplay with each other in a remarkable way. If any part of the process gets altered, the end result will not be the same.

Empty coolship.

Wort cools overnight in the coolship. Outside air drifts through open rafters, and wild yeast and bacteria inoculate the wort.

LET'S MAKE LAMBIC

To make the beautifully complex, mouth-tingling joy of Lambic beer, things have to happen in a certain order. The main organisms, in order of appearance, are enteric bacteria and Kloeckera apiculata (3-7 days), Saccharomyces yeast (2 weeks), Lactic acid bacteria (3-4 months), and Brettanomyces yeast (8+ months).

Both enteric bacteria and Kloeckera apiculata are minor players in the overall process. However, Lambic would not taste the same without them. These are active for a short time before the alcohol level increases and the pH level drops (acidity increases). Some of the flavors they produce are smoky, moldy, vegetal, and other body-aroma-type characteristics. Those flavors might not sound appetizing on their own, but they contribute to the overall effect.

The next organism that begins working in new Lambic beer is the real workhorse, the traditional brewer's yeast, Saccharomyces. In Lambic beer, the particular strain of brewer's yeast is not important. It should be a fairly neutral ale strain so the yeast itself does not produce unique flavors. The uniqueness is left to the bacteria and wild yeast. Saccharomyces will ferment the majority of the sugars in the wort over the course of a week or two.

After the wort is fermented, the slow, plodding process of changing from young to old Lambic begins. Pediococcus bacteria begin their task. They have particular nutritional requirements, and therefore are not high in cell count in spontaneously fermented Lambic. Pedio, as it is known for short, produces lactic acid, and is in fact more of a contributor of that acid in Lambic beer than Lactobacillus. Pedio is also responsible for turning cabbage into sauerkraut, to give an idea of their flavor profile. Along with the lactic acid, Pedio also produces diacetyl (butterscotch flavor) and acetoin (sweet buttery), both important flavor components in Lambic.

By this time Lambic beer has had its initial bacteria do some work, then is fermented by the brewer's yeast, and it begins to develop some tart and sour flavors from Pediococcus. However, there remain certain kinds of sugars that are not as easily broken down and consumed. These are commonly known as "unfermentable sugars" because Saccharomyces cannot consume them. This is when the "wild" yeast Brettanomyces reports for duty. It slowly breaks down and consumes most of the remaining sugars, and contributes its own unique flavors and aromas.

Brettanomyces, or Brett for short, is the tireless workhorse of yeasts. It is yeast and not bacteria, but is considered "wild" in the sense that it is not usually wanted in "normal, clean" beer. It can produce flavors described as smoky, goaty, rustic, horsey, and funky, and is the source of the famous "horse blanket" descriptor. These flavors and aromas are wanted in Lambic and other wild ales, but not in a Pale ale or Pilsner, for example.

An interesting ability of Brett is that it can take components in the Lambic, produced earlier in the fermentation by other bacteria and normal yeast, and process them into new esters. For example, Brett takes ethyl alcohol produced by Saccharomyces and the acetic acid produced by enteric bacteria, and forms ethyl acetate. But this would not be possible if the enteric bacteria did not do its thing first, and Saccharomyces second. If the order of organisms was different, the beer would not be the same.

Bugs taste good. So they say in Asia.

OTHER SOUR, TART OR FUNKY BEER

Perhaps the most complex and best example of a sour beer is a finely blended Gueze, which is a blend of 3-year-old and 1 Lambic. This is a more common type of Lambic to find for purchase than a "straight, unblended" 3-year-old Lambic. But Lambic is not the only sour beer style that you can find for sale in good liquor stores.

It's no surprise to learn that Belgium is also home to additional sour beer styles such as Flanders Red and Flanders Brown. Flanders Brown, also known as Ouid Bruin, could be a year old or more, and is generally not aged in oak. It has a decent malt character, some sweetness, and the sour flavors from lactic acid are restrained. Examples you might find are Ichtegem Old Brown or Liefman's Goudenband.

Flanders Red has a stronger sour character, probably a result of lactic acid being combined with acetic acid. Oak barrels are often used to age the beer, which impart additional tannins. The tannins and sharp sourness causes some people to refer to this beer as wine-like, a term also applied to Lambic. Examples of Flanders Red you might see are Duchesse de Bourgogne, Rodenbach Grand Cru, or New Belgium La Folie.

Last but not least on the bonus sour beer list is Berliner Weiss from Germany. It is a pale, sour, low alcohol (~3%) refreshing wheat ale. It is sometimes sweetened with syrup, but then, of course, the sourness is compromised. Berliner Weiss is fermented with normal top-fermenting ale yeast, but in conjunction with Lactobacillus delbruckii. The bacteria produces lactic acid, which provides the sharp sourness. German and U.S. examples are sometimes available.

A homebrewed Lambic-style beer develops a funky pellicle from bacteria and wild yeast.

TRY THIS AT HOME

You don't have to be in the Senne Valley to be able to use these microorganisms when making beer. Either at the commercial, or homebrew level, it's as easy as a trip to your local homebrew store. Homebrewers might have the better scenario in which to experiment. They don't have to end up with a commercially viable beer. As long as it is drinkable, whatever sour or funky concoction they produce can be enjoyed at home.

Both of the major yeast companies make a variety of strains available for purchase. Wyeast carries two different Brettanomyces strains, as well as both Lactobacillus and Pediococcus.

White Labs, on the other hand, seems to have made more of an effort to supply a wider variety of bacteria and wild yeast. They have three different strains of Brett, and also "blends" that include Brett as part of a traditional and wild yeast mix. White Labs has a Berliner Weisse Blend that includes both a weizen yeast, and Lactobacillus. They even have an enticing Belgian Sour Mix with just about everything—Brett, Saccharomyces, Lactobacillus, and Pediococcus.

ALLAGASH BREWING COMPANY

It is sometimes implied that the only place one can make spontaneously fermented beer is the hallowed Senne Valley of Belgium. To date, not many U.S. breweries have tried it, but in 2008 Allagash Brewing Company started down the path of doing just that. They built a coolship at their brewery and started making beer fermented with nothing other than whatever critters were in the Maine air. Now, years later, some of these beers are being leaked out at brew fests, the brewery, or winning a Silver Medal at the GABF.

Resurgam is their name for the blend of old and new sour beer, aged in oak, with no fruit additions. It has a musty aroma and a very complex taste. Barnyard funk mixes with zesty citrus notes. Hints of both lactic and acetic acid are sharp and sour, but not puckering. An oaky quality mingles with perhaps the drying effects of a Brettanomyces-like wild yeast. The total effect is both impressive and encouraging. It is a very worthy entry into a scene that one can only hope will grow—spontaneously fermented U.S. beers.

Gotta Have That Funk

It's true that there are bugs in your beer, and not just the gnat looking for a sip of something sweet. Wild yeasts and bacteria have been a part of beer for thousands of years. With the ever-growing popularity of the loosely defined "American Wild Ale" category, they will be around for many more. Some of these beers are funky, leathery, or musty. Some include souring microbes for tart and sour qualities. These are not usually spontaneous fermentations like the Lambics of Belgium, but they are a complex and interesting part of beer culture.

Thank you: *Allagash Brewing Company for sample bottles of their Lambic-style beers. Jeffrey Halvorson for photo contributions. Learn about his sour and wild beer festivals: http://www.wherethewildbeersare.com/*

Do these bugs make you itch?