

## Researchers find an elusive European parent of lager yeast in Ireland

A new paper in *FEMS Yeast Research*, published by Oxford University Press, reports that for the first time in Europe, scientists have discovered the ancestor of the yeast species necessary for the production of lager beer.

Brewing is one of the oldest human industries. Scientists have uncovered evidence of fermented beverages from China from at least 7,000 years ago, and from Israel from up to 13,000 years ago. Modern brewing developed in Europe, where, until the Middle Ages, most beer brewing was associated with a yeast called *Saccharomyces cerevisiae*. This is the same species of yeast that is still used today to make ale-style beer, wine and indeed bread.

Most beer made nowadays, however, is lager beer, not ale, and there is considerable interest in understanding the historical shift from ale to lager in Europe. Lager brewing, which first appeared in the 13<sup>th</sup> century in Bavaria, uses a different species of yeast, *Saccharomyces pastorianus*. *S. pastorianus* is a hybrid of two parents, only one of which is *S. cerevisiae*. The identity of the second parent was a mystery until 2011, when *Saccharomyces eubayanus* was discovered in the Patagonian Andes in South America. Like *S. pastorianus*, *S. eubayanus* is cold-tolerant and scientists believe that the lager-style of cold brewing selected for the formation of the *S. pastorianus* hybrid yeast from an ale strain of *S. cerevisiae* and a wild *S. eubayanus* isolate.

Although the records show that the first use of *S. pastorianus* was in breweries in southern Germany, the *S. eubayanus* parent was never found in Europe. Instead, researchers have discovered the yeast in South America, North America, China, Tibet and New Zealand. This curiosity caused some researchers to wonder whether *S. eubayanus* had, in fact, ever been in Europe, and, if not, where the lager yeast *S. pastorianus* had come from? But now, in this landmark paper, researchers at University College Dublin discovered and isolated *S. eubayanus* in a wooded area of their own campus in Ireland.

The Irish researchers isolated two different *S. eubayanus* strains from soil samples collected on the Belfield campus of University College Dublin, as part of undergraduate research projects to identify wild yeasts and sequence their genomes. The isolates came from soil on two sites on the university campus, about 17 meters apart, collected in September 2021. The genome sequences of these two isolates showed that they are related to the ancestral *S. eubayanus* strain that initially mated with *S. cerevisiae* to form *S. pastorianus*.

The exciting discovery of *S. eubayanus* in Ireland shows that this yeast is native to Europe and it seems likely that it has lived in other parts of the continent. This new study supports the view that there were natural populations of the yeast in southern Germany in the Middle Ages and these provided the parents of the first lager yeast. The question of whether these ancient populations still remain hidden somewhere in the forests of Bavaria remains to be answered.

Researcher quote: “This discovery is a fantastic example of research-led teaching. Our undergraduates have found more than a hundred yeast species in Irish soil samples over the past five years, and we’re delighted to stumble across *S. eubayanus* on our own doorstep. We’re hoping to find a commercial partner to brew with it so we can find out what it tastes like!” Geraldine Butler, lead author of the study

The paper “Identification of European isolates of the lager yeast parent *Saccharomyces eubayanus*” will be available (at midnight on December 7<sup>th</sup>) at:  
<https://academic.oup.com/femsyr/article-lookup/doi/10.1093/femsyr/foac053>

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