

# You can thank diverse yeasts for that coffee and chocolate

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Credit: George Hodan/public domain

Humans have put yeast to work for thousands of years to make bread, beer, and wine. Wild strains of yeast are also found in the natural fermentations that are essential for chocolate and coffee production. But, as new genetic evidence reported in the Cell Press journal *Current Biology* on March 24 shows, the yeasts associated with coffee and cacao beans have had a rather unique history.

In comparison to the yeasts found in vineyards around the world, the new work shows that those associated with coffee and [cacao beans](#) show much greater diversity. The findings suggest that those differences may play an important role in the characteristics of chocolate and coffee from different parts of the world.

"Our study suggests a complex interplay between human activity and microbes involved in the production of coffee and chocolate," says Aimée Dudley of the Pacific Northwest Diabetes Research Institute in Seattle. "Humans have transported and cultivated the plants, but at least for one important species, their associated microbes have arisen from transport and mingling in events that are independent of the transport of the plants themselves."

Coffee and [cacao trees](#) originally grew in Ethiopia and the Amazon rainforest. They are now widely cultivated across the "bean belt" that surrounds the equator. After they are picked, both cacao and coffee beans are fermented for a period of days to break down the surrounding pulp. This microbe-driven process also has an important influence on the character and flavor of the beans.

Dudley and her colleagues wanted to know where the yeasts in these human-associated fermentations came from. Had coffee- or cacao-specific yeast strains been unknowingly transported along with the plants? Or, do particular regions of the world harbor novel yeast populations?

To find out, the researchers bought unroasted coffee and cacao beans grown in Central and South America, Africa, Indonesia, or the Middle East and isolated the associated yeast in their Seattle laboratory. Genetic analysis of those yeast strains revealed that yeasts from coffee and cacao beans were substantially more diverse than the wine yeasts. Interestingly, the genetic signatures of the yeast strains strongly clustered according to

the geographic origin of the beans. In fact, Dudley says, this association was so strong that they were able to accurately determine the origin of the beans solely from the DNA sequences of their associated yeasts.

The findings show that the yeast strains associated with coffee and cacao have multiple, independent origins. In other words, not all coffee strains are related, nor are all cacao strains. What's more, the yeast strains associated with coffee or cacao in specific places appear to be hybrids that resulted from the mixing of strains from different parts of the world. In fact, one of those strains is closely related to the yeast used to make wine.

"The ancient and continuing global traffic in yeasts associated with wine fermentation may have set the stage for subsequent mingling and admixture events that gave rise to the yeasts that are now associated with the production of coffee and chocolate," Dudley says.

The researchers say the findings could lead to improvements in chocolate and coffee. Studies of wine production have shown that the yeasts associated with fermentation significantly influence the properties of the wine, including its flavor and aroma.

"Given that the [yeast](#) strains associated with coffee and cacao fermentations are substantially more genetically diverse than the wine strains, they could play an even larger role in the properties of [coffee](#) and cacao produced in different regions of the globe," Dudley says.

**More information:** *Current Biology*, Ludlow et al.: "Independent Origins of Yeast Associated with Coffee and Cacao Fermentation" [dx.doi.org/10.1016/j.cub.2016.02.012](https://doi.org/10.1016/j.cub.2016.02.012)

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