Brewing Beer with Sourdough

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GigaYeast Inc.
Brewing Beer with Sourdough

- The history of sourdough
- The microbiology of sourdough
- Brewing with sourdough

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Professional Grade Liquid Yeast For Brewers
Sour myth #1

“The lower the pH, the more sour it tastes”
“...hydrogen ions and protonated organic acids are approximately equal in sour taste on a molar basis. “

Da Conceicao Neta ER et al. 2007

\[
\text{ACID} - H + H^+ = \text{SOURNESS!}
\]
Sour Myth #2
Sour taste is located in discreet locations of the tongue
Receptors for various tastes, including sour, are distributed throughout the tongue!
What is sourdough?

A delicious tangy bread with a hard crust and soft chewy middle!
Brewing Beer with Sourdough

The history of sourdough

The microbiology of sourdough

Brewing with sourdough

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Sourdough is the first bread

The first leavened breads ever made were likely sourdough

Yum!
Brewing Beer with Sourdough

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Sourdough is a microbial ecosystem of wild yeast and bacteria called a starter.

A sourdough starter is formed when yeast and bacteria from the flour, water, air and the baker inoculate a mixture of flour and water.
Sourdough starters can become stable over time

Repeated re-use of the starter creates a stable ecosystem dominated by a small number of different species of yeast and bacteria that grow well together but keep intruding microbes at bay.
The sourdough microbiome

The lactic acid bacteria create acetic and lactic acids to sour the bread and the yeast create CO2 and esters to leaven the bread and add character.

**Yeast**—one or more species including. Species found including *S. cerevisiae*, *Candida milleri*, *C. humilis* and *S. exiguous* 

*Pulvirenti A* et al. 2004

**Bacteria**—one or more species especially a

Lactic acid bacteria *L. sanfranciscensis* 

*T. F. Sugihara* et al. 1971
The Sourdough Microbiome

Yeast

Bacteria

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Elegant symbiosis

T. F. Sugihara et al performed the first real scientific explorations of sourdough in the early 1970’s

They found that most sourdough cultures contained just one dominant species of wild yeast and one of lactic acid bacteria

Remarkably, they found that in most cases, the yeast were unable to metabolize maltose while the bacteria relied almost solely on the maltose to create glucose and lactic acid
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The history of sourdough

The microbiology of sourdough

Brewing with sourdough
Uhhh. That’s interesting. What about beer?

- Attenuation
- Sourcing
- Beer Profile
Attenuation of sourdough cultures

- GY001
- GB035
- GB036
Add an ale yeast and sourdoughs attenuate well!
Souring of sourdoughs

The two most familiar lactobacilllus sp. to brewers are *L. delbrückii* and *L. brevis*. *L. Sanfranciscensis* is a whole different animal... in fact the first time it was discovered was by Sugihara in 1971!
How does *L. Sanfranciscensis* compare to typical brewers lactobacillus?

[Graph showing the comparison of Lactic Acid production over days for GB035, GB036, and GB110.] 

- **% Lactic Acid**
  - Days: 0, 5, 10
  - Levels: 0.00%, 1.00%, 2.00%, 3.00%, 4.00%, 5.00%

- **Total Acid**
  - Days: 0, 5, 10

- **Fold Acidification**
  - Days: 0, 5, 10
  - Levels: 0, 5, 10, 150, 200, 250

[Logo: GigaYeast, Inc. - Professional Grade Liquid Yeast For Brewers]
Hop sensitivity?

Inhibition of Total Acid by Hops

Inhibition of Acidification by Hops

GB035
GB036

% Lactic Acid

IBUs

Fold Acidification

IBUs
Flavor profile

Very interesting! Floral, sweet esters. Sour. Different than most ale yeasts and tasty.
Final Notes

Three (of many) ways to brew with sourdough

- Pitch alone to primary
- Kettle sour and pitch an ale strain
- Co-pitch with an ale strain
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