Zymology

Zymology, also known as **zymurgy** (from the Greek: ζύμωσις+ἔργον, "the workings of fermentation") is an applied science which studies the biochemical process of fermentation and its practical uses. Common topics include the selection of fermenting yeast and bacteria species and their use in brewing, wine making, fermenting milk, and the making of other fermented foods.

Beer fermenting at a brewery

Contents

Fermentation

Fermentation can be simply defined, in this context, as the conversion of sugar molecules into ethanol and carbon dioxide by yeast.

$$C_6H_{12}O_6 \rightarrow 2CO_2 + 2C_2H_5OH$$

Fermentation practices have led to the discovery of ample microbial and antimicrobial cultures on fermented foods and products. [1] [2]

History

French chemist Louis Pasteur was the first *zymologist* when in 1857 he connected yeast to fermentation. Pasteur originally defined fermentation as *respiration without air*.

Pasteur performed careful research and concluded,

> "I am of the opinion that alcoholic fermentation never occurs without simultaneous organization, development and multiplication of cells . . .. If asked, in what consists the chemical act whereby the sugar is decomposed . . . I am completely ignorant of it."

The German Eduard Buchner, winner of the 1907 Nobel Prize in chemistry, later determined that fermentation was actually caused by a yeast secretion, which he termed *zymase*.

The research efforts undertaken by the Danish Carlsberg scientists greatly accelerated understanding of yeast and brewing. The Carlsberg scientists are generally acknowledged as having jump-started the entire field of molecular biology.

Products

- All alcoholic drinks including beer, cider, kombucha, kvass, mead, perry, tibicos, wine, pulque, hard liquors (brandy, rum, vodka, sake, schnapps), and soured by-products including vinegar and alegar
- Yeast leavened breads including sourdough, salt-rising bread, and others
- Cheese and some dairy products including kefir and yogurt
- Chocolate
- Dishes including fermented fish, such as garum, surströmming, and Worcestershire sauce
- Some vegetables such as kimchi, some types of pickles (most are not fermented though), and sauerkraut
- A wide variety of fermented edibles made from soy beans, including fermented bean paste, nattō, tempeh, and soya sauce

References

1. Kombucha Fermentation and Its Antimicrobial Activity Guttapadu Sreeramulu, Yang Zhu, and Wieger Knol Journal of Agricultural and Food Chemistry 2000 48 (6), 2589-2594 DOI: 10.1021/jf991333m
2. Demain, A., Martens, E. Production of valuable compounds by molds and yeasts. J Antibiot 70, 347–360 (2017). https://doi.org/10.1038/ja.2016.121

External links

- Winemaking: Fundamentals of winemaking: zymology (http://www.makewine.com/winemaking/general/yeast/)
- Life Sciences: List of life sciences