



FORSCHUNGSZENTRUM
WEIHENSTEPHAN
für Brau- und Lebensmittelqualität

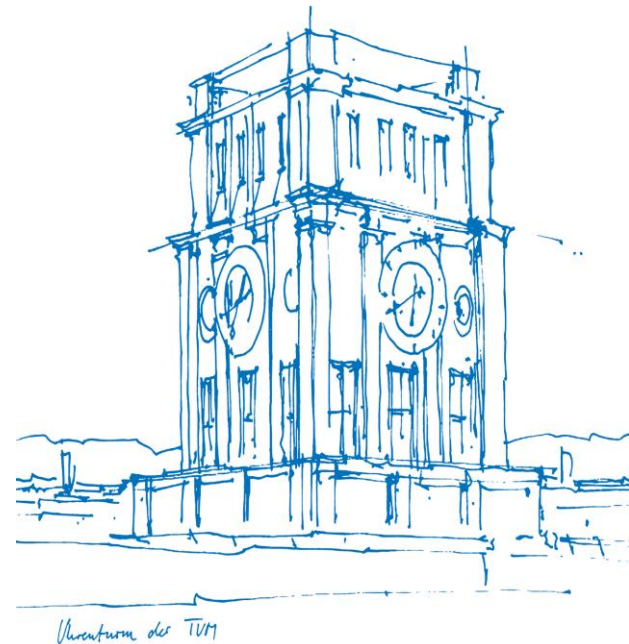


Hefebiodiversität traditioneller und moderner hopfenhaltiger Bierfermentationen - Yeast biodiversity of traditional and modern hop beer fermentations

PD Dr.-Ing. habil. Mathias Hutzler

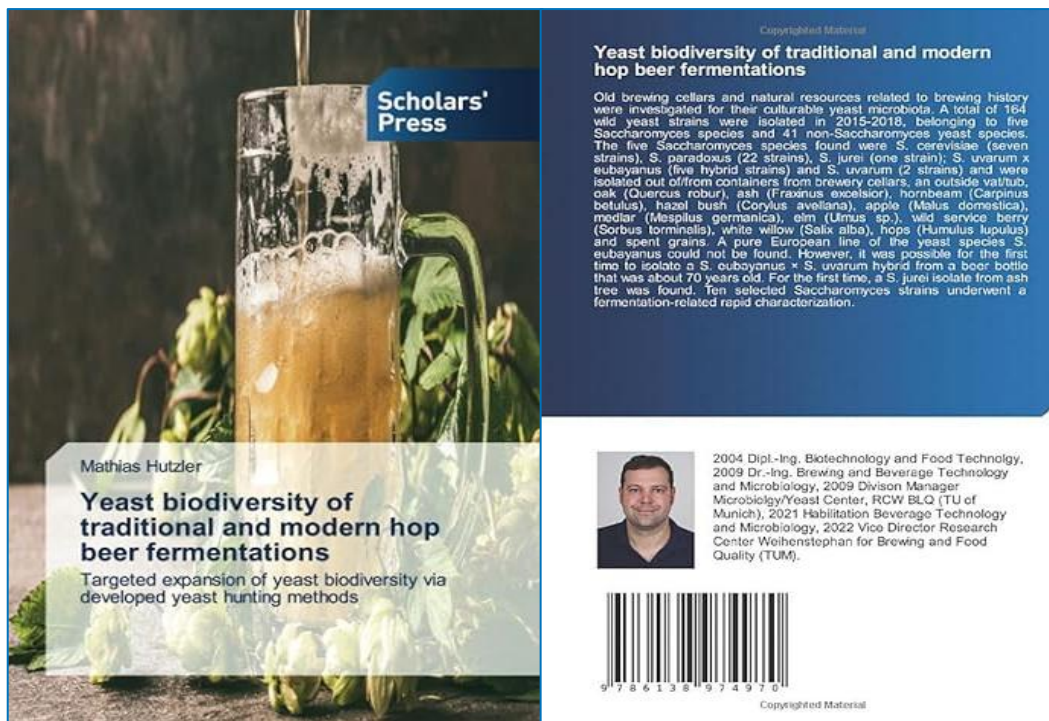


DBMB, Deutscher Braumeistertag, Erfurt, 7.-9. Juni 2024



Hefejagd – Hefe-Bioprospektion

Hefejagd seit 2016 – Anwendung der Hefebiodiversität



HUTZLER, M.: "Yeast biodiversity of traditional and modern hop beer fermentations – Targeted expansions of yeast biodiversity via developed yeast hunting methods", Scholars' Press, ISBN: 978-613-8-97497-0, 2022

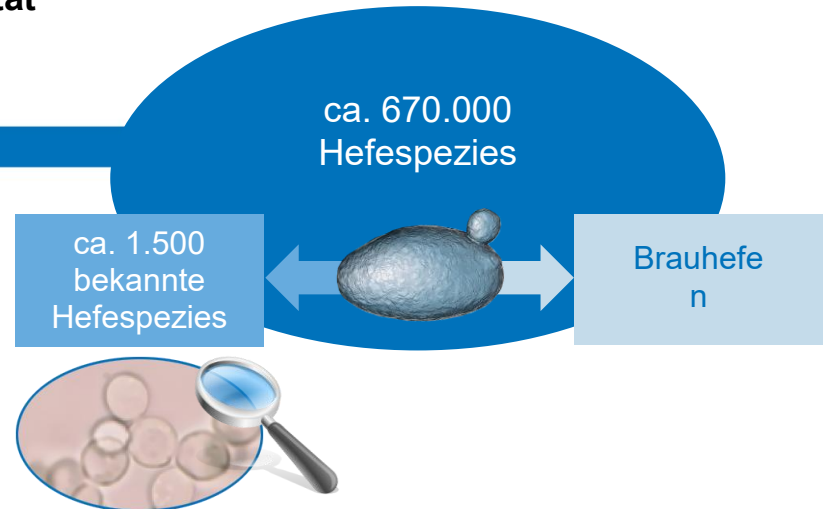
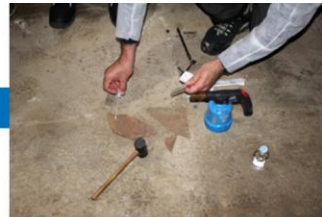
HUTZLER, M.: "Yeast biodiversity of traditional and modern hop beer fermentations and their targeted expansion via developed yeast hunting methods", **Habilitation**, Fakultät 3 Prozesswissenschaften, TU Berlin, 2021

→ PDF in Research Gate

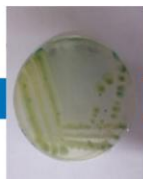
Hefe-Bioprospektion

Hefejagd seit 2016 – Anwendung der Hefebiodiversität

Ablagerung,
Oberfläche,
Flüssigkeit,
Flasche,
Luft

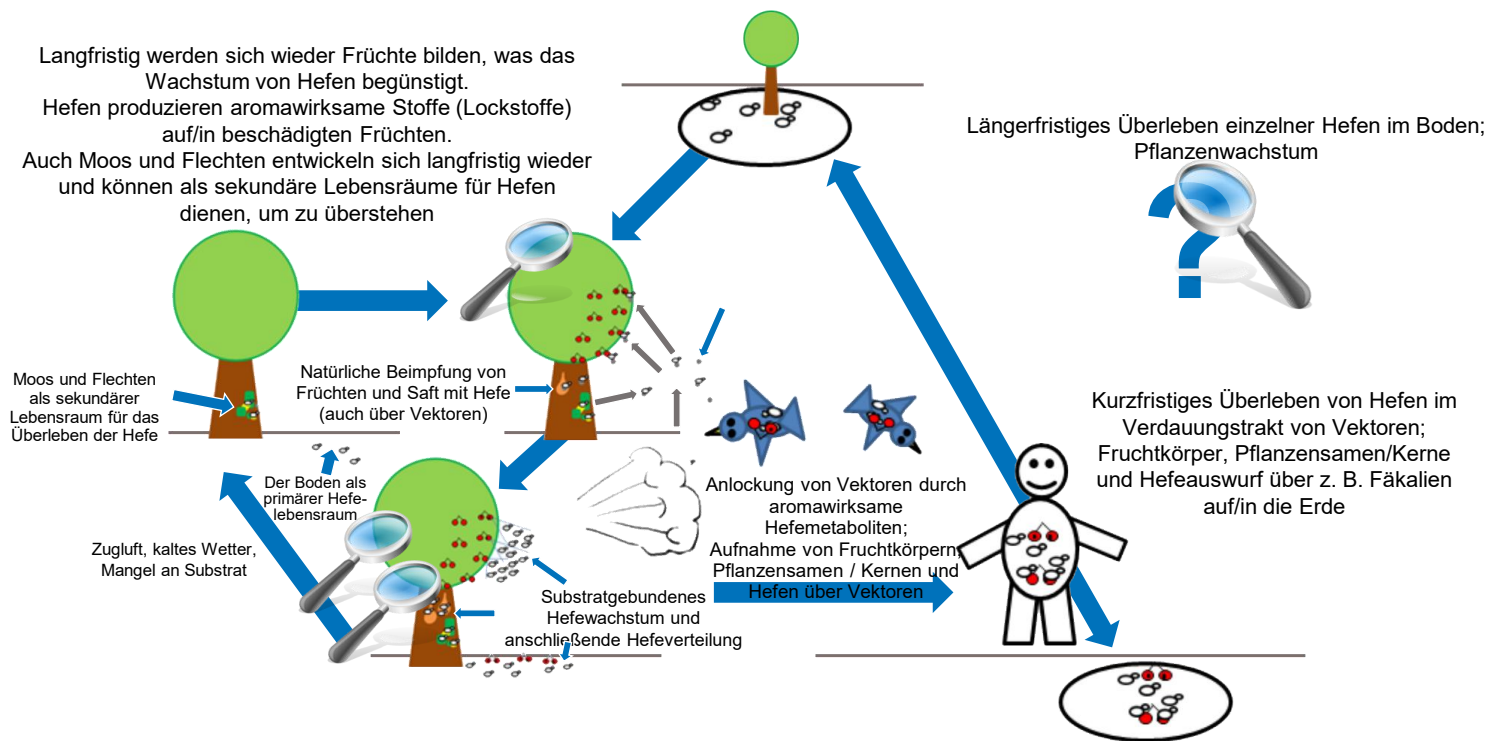


natürliche Quellen im Zusammenhang mit der Brau- und Gärungsgeschichte

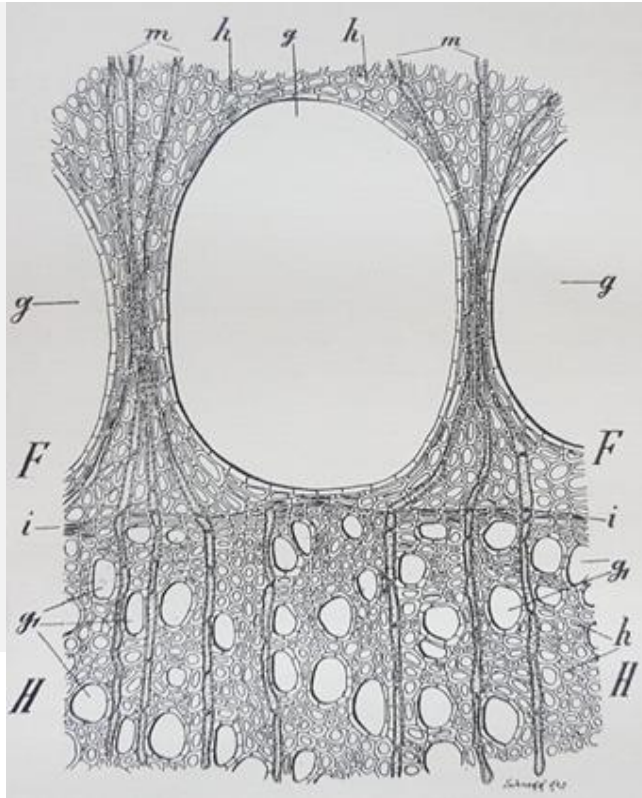


Hefejagd – Hefe-Bioprospektion

Hefelebenszyklus (Hansen, E. C. 1879, 1882, 1903, 1905) [erweitert von Hutzler]



Hefejagd – Hefe-Bioprospektion



(Schnegg H. 1921)
Eichenholz
F = Frühlingsholz
H = Herbstholz

Hefejagd – Hefe-Bioprospektion

Verfahren der Hefejagd

Natur



Probe (Frucht, Rinde, Boden, Baum, Baumsaft usw.)

Labor

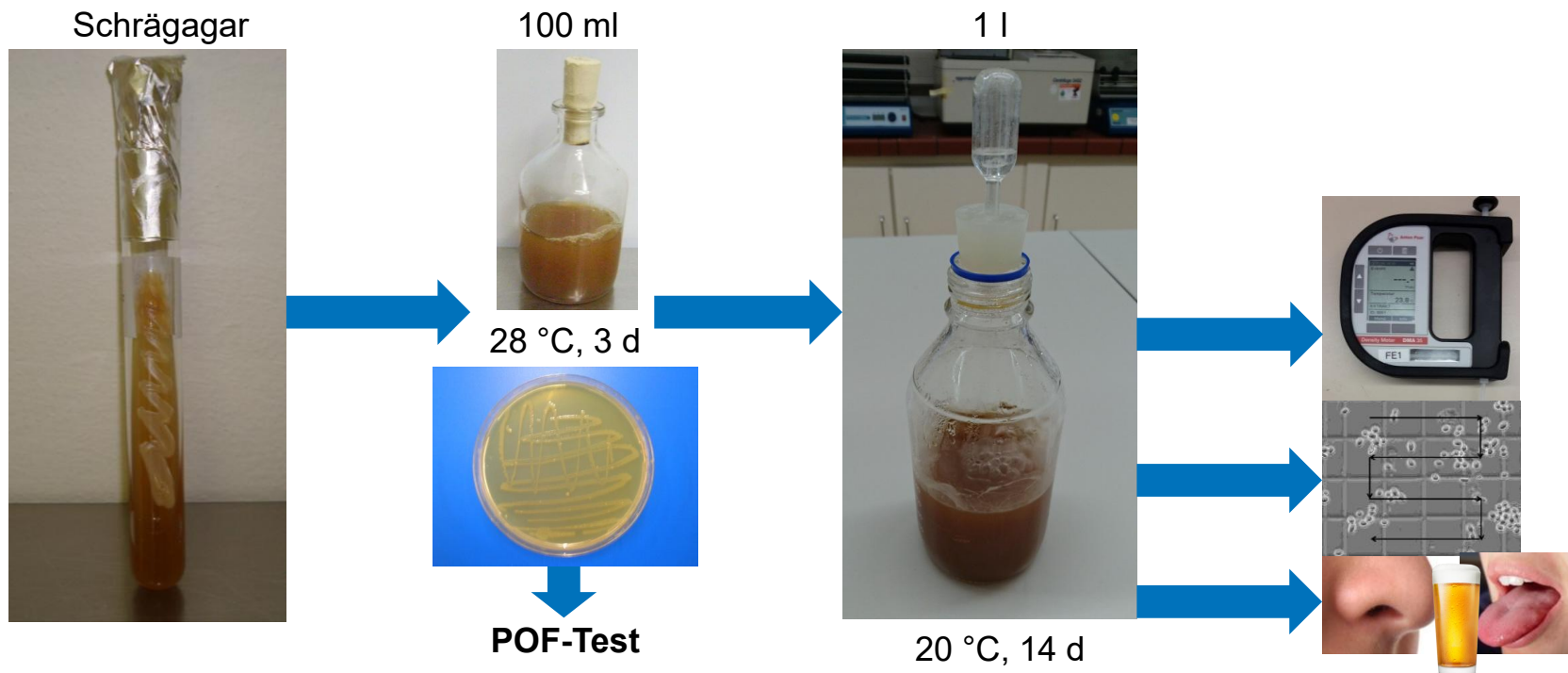


Ziel: identifizierte Isolate mit bekanntem Ursprung

Hit No.	Hit Quality	Sample Name
1	0.294997	Saccharomyces cerevisiae ze80312
2	0.414482	Saccharomyces cerevisiae WSYC D19
3	0.503783	Saccharomyces cerevisiae ca80606a
4	0.522479	Saccharomyces cerevisiae on80408
5	0.525181	Saccharomyces cerevisiae WSYC G1383

Hefejagd – Hefe-Bioprospektion

Vorscreening-Test (Bierherstellung)



Hefejagd – Hefe-Bioprospektion

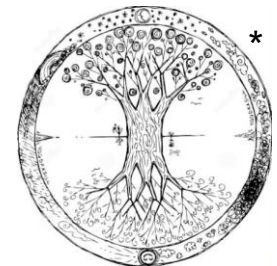
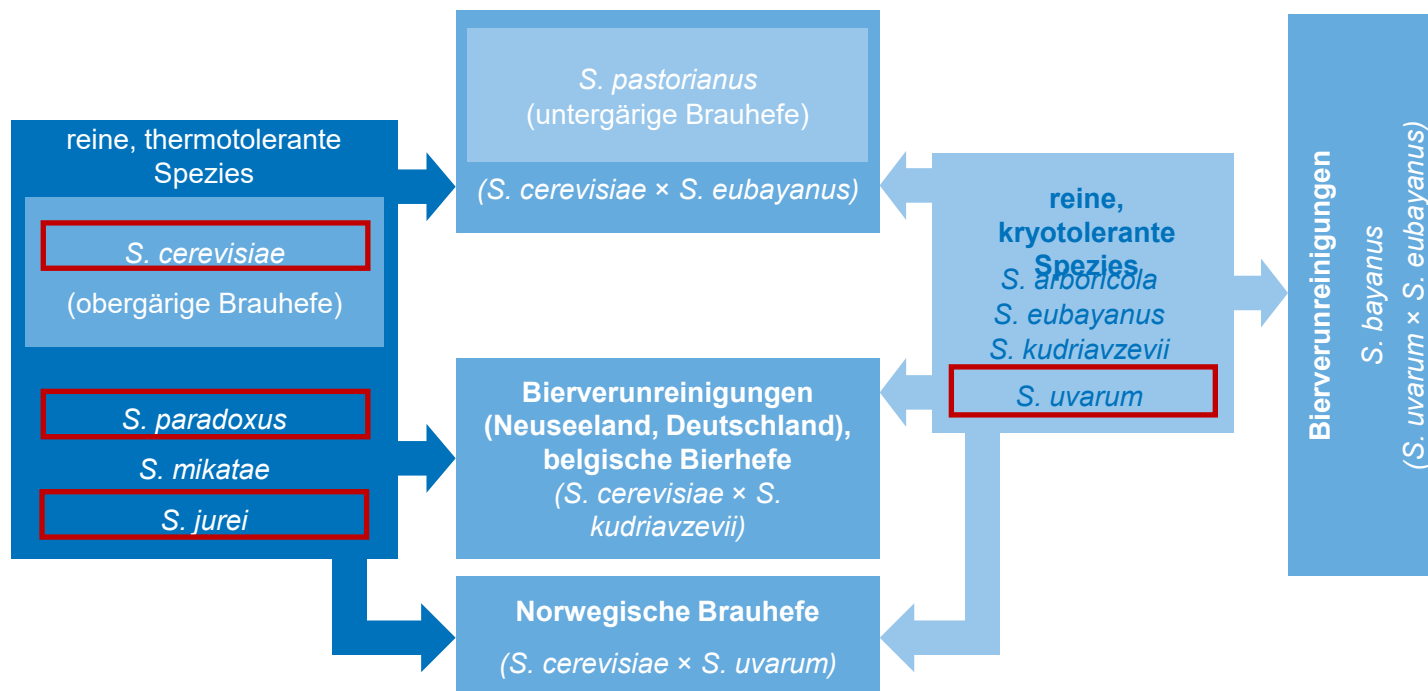
Vorscreening-Test und Hochskalierung

Probe	Identifizierung	POF-Test		Fermentation				Sensorische Beurteilung	
		POF (YM+FA)	POF (YM+CA)	Alc. [% v]	E [m]	AA [%]	pH	akzeptiert	Beschreibung der Flavorattribute
Eichenrinde 2015	<i>S. paradoxus</i>	++	+	4,07	4,9	62	4,5	+	Vanille, Honig, Blume, Würze, Nelke, Malz, trocken
Alte Flasche # 861A	<i>S. eubayanus</i> × <i>uvarum</i>	+	–	5,55	4,1	72,5	4,4	+	Pflaume, trocken, neutraler Geschmack



Hefejagd – Hefe-Bioprospektion

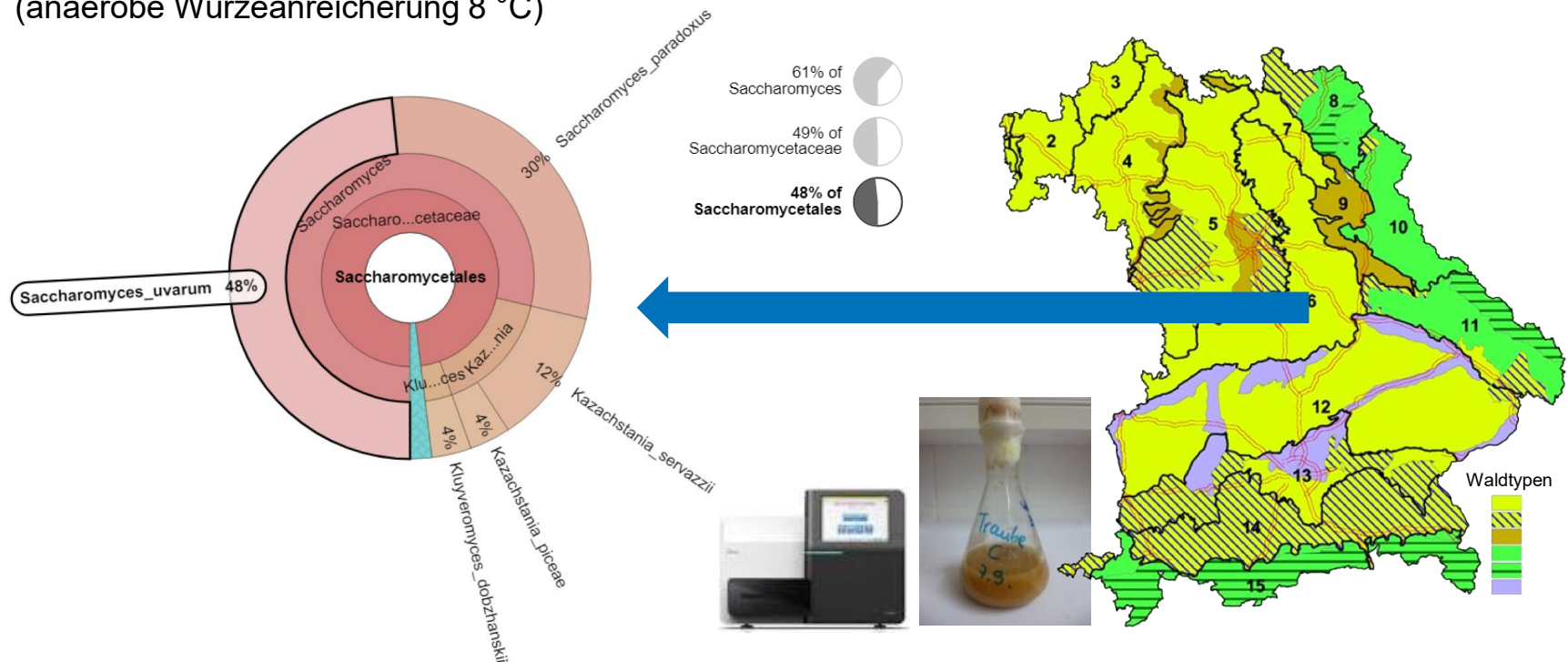
Ergebnisse 2019 (Saccharomyces-Spezies in Mitteleuropa)



*Quelle: www.stockfreeimages.com

Hefejagd – Hefe-Bioprospektion

Ergebnisse 2019 COX2-Region Hochdurchsatz-Sequenzierung Poolproben/ Bodenproben Region 1
(anaerobe Würzeanreicherung 8 °C)



Hefejagd – Hefe-Bioprospektion

Besondere Hefen von besonderen Orten



frontiers
in Microbiology

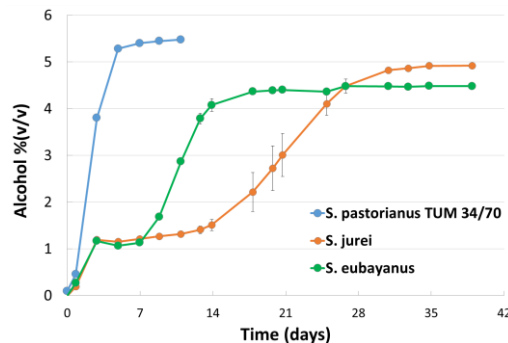
ORIGINAL RESEARCH
published: 31 March 2021
doi: 10.3389/fmicb.2021.645271



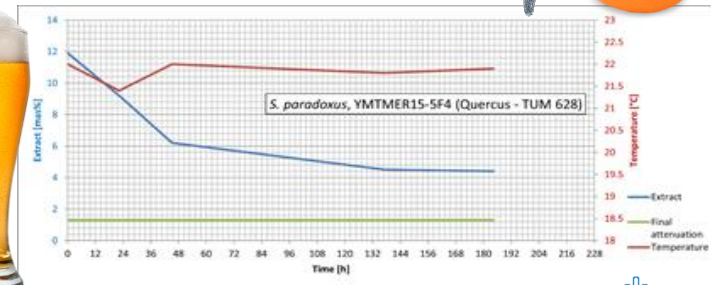
Unique Brewing-Relevant Properties of a Strain of *Saccharomyces jurei* Isolated From Ash (*Fraxinus excelsior*)

Mathias Hutzler^{1†}, Maximilian Michel^{1†}, Oliver Kunz¹, Tiina Kuusisto^{2,3}, Frederico Magalhães⁴, Kristoffer Krogerus⁴ and Brian Gibson^{4*}

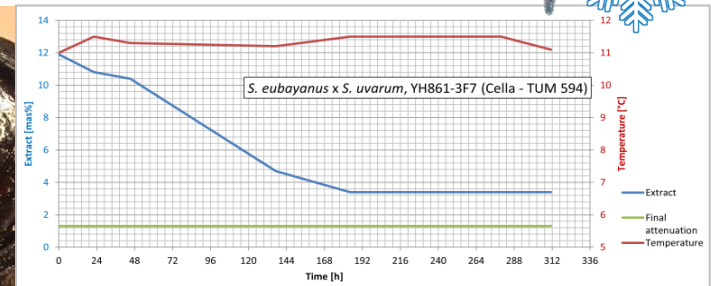
¹ Research Center Weihenstephan for Brewing and Food Quality, Technical University of Munich, Freising, Germany, ² VTT Technical Research Centre of Finland Ltd., Espoo, Finland, ³ Faculty of Science, University of Copenhagen, Copenhagen, Denmark, ⁴ Chair of Brewing and Beverage Technology, Technische Universität Berlin, Berlin, Germany



S. paradoxus (Quercus – TUM 628)

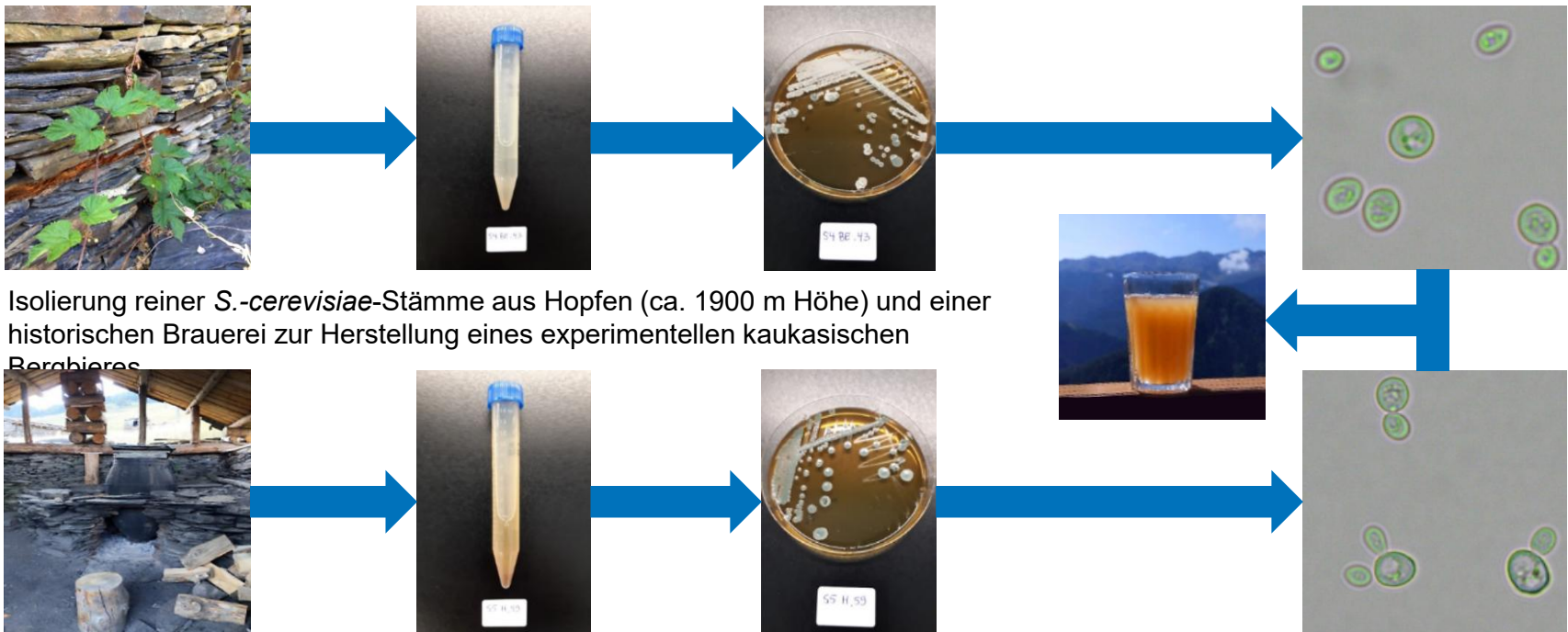


S. eubayanus × *S. uvarum* (Cella – TUM 594)



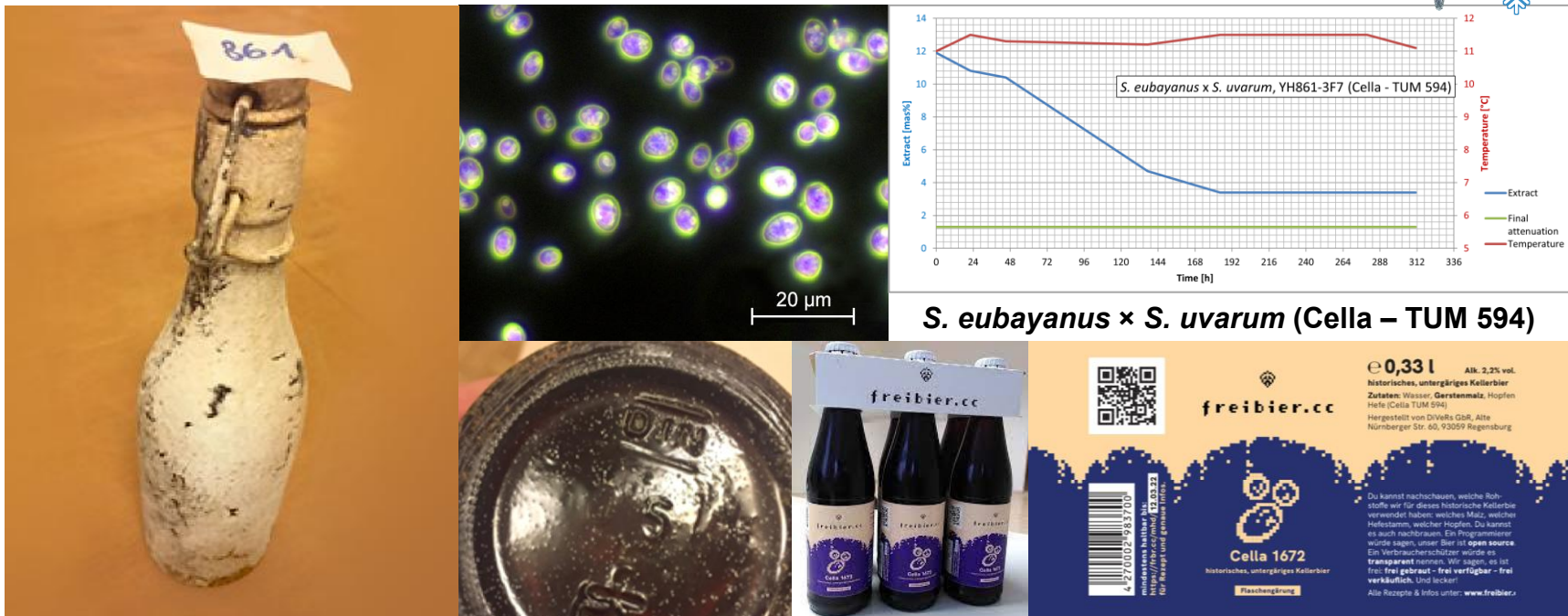
Hefejagd – Hefe-Bioprospektion

Besondere Hefen von besonderen Orten (Hefejagd in Georgien 2022)



Hefejagd – Hefe-Bioprospektion

Erfolgsgeschichten – Hefejagdstamm für historische Biere



Hefejagd – Hefe-Bioprospedition

Erfolgsgeschichten – Hefejagdstamm für historische Biere

**3 *Saccharomyces*-
Stämme von 3
verschiedenen heiligen
keltischen Pflanzen –
Tree thieves celtic beer**



S. pastorianus Franconia – TUM 35

69 March / April 2019 (Vol. 72)

BrewingScience

M. Hutzler, L. Narziß, D. Stretz, K. Haslbeck, T. Meier-Dörnberg, H. Walter, M. Schäfer, T. Zollo, F. Jacob and M. Michel

Resurrection of the lager strain *Saccharomyces pastorianus* TUM 35

Freigabe seit dem 9. März 2023 bei Bräugler Berlin



Geschichte des Lagerbieres und seiner Hefe



FEMS Yeast Research, 2023, 23, 1–17

DOI: 10.1093/femsyr/foad023

Minireview

A new hypothesis for the origin of the lager yeast *Saccharomyces pastorianus*

Mathias Hutzler^{1,*}, John P. Morrissey², Andreas Laus¹, Franz Meussdoerffer^{1,†}, Martin Zarnkow¹

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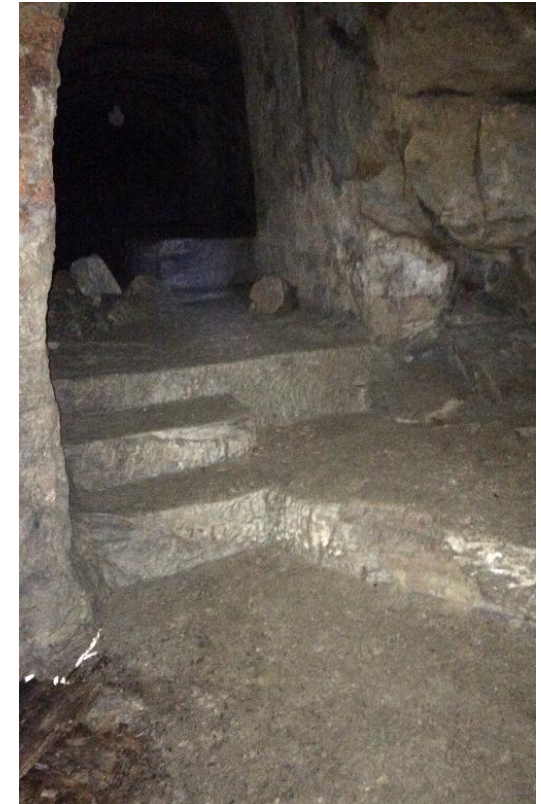
†Author note: deceased

Editor: Isak Pretorius

Abstract

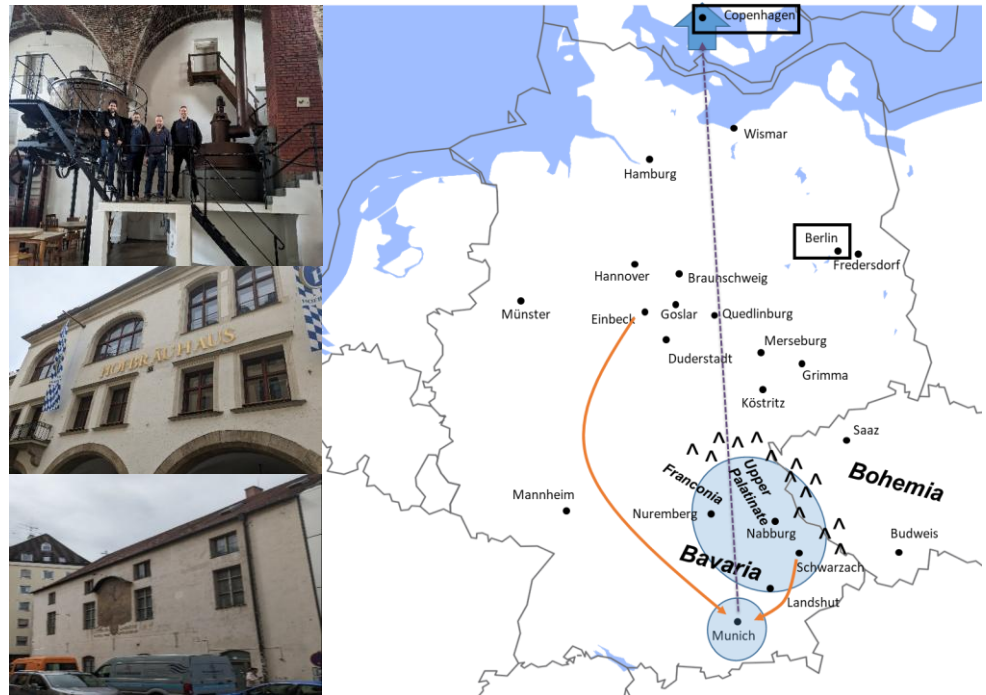
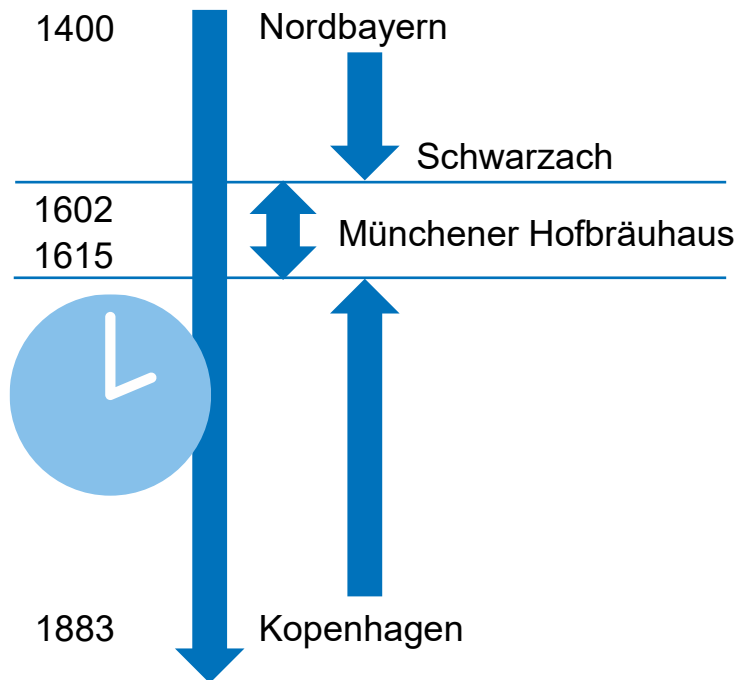
Saccharomyces pastorianus, which is responsible for the production of bottom-fermented lager beer, is a hybrid species that arose from the mating of the top-fermenting ale yeast *Saccharomyces cerevisiae* and the cold-tolerant *Saccharomyces eubayanus* around the start of the 17th century. Based on detailed analysis of Central European brewing records, we propose that the critical event for the hybridization was the introduction of top-fermenting *S. cerevisiae* into an environment where *S. eubayanus* was present, rather than the other way around. Bottom fermentation in parts of Bavaria preceded the proposed hybridization date by a couple of hundred years and we suggest that this was carried out by mixtures of yeasts, which may have included *S. eubayanus*. A plausible case can be made that the *S. cerevisiae* parent came either from the Schwarzach wheat brewery or the city of Einbeck, and the formation of *S. pastorianus* happened in the Munich Hofbräuhaus between 1602 and 1615 when both wheat beer and lager were brewed contemporaneously. We also describe how the distribution of strains from the Munich Spaten brewery, and the development by Hansen and Linder of methods for producing pure starter cultures, facilitated the global spread of the Bavarian *S. pastorianus* lineages.

Keywords: *S. pastorianus*, *S. cerevisiae*, *S. eubayanus*, lager yeast, ale, wheat beer, history, hybridization, top-fermenting, bottom-fermenting, brewing



Geschichte des Lagerbieres und seiner Hefe

Chronologische Rekonstruktion vor-/nach 1602–1615 (Vergangenheit und Zukunft)





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Danke!



Technische Universität München

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Prof. Franz Meussdoerffer
(1949–2019)

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