

A JOURNEY THROUGH IPA



Robert Percival – Lallemand Brewing

Content

- The origins and evolution of IPA
- The craft beer revolution
- IPA styles and variations
- IPA Solutions: the role of yeast



The origins of IPA

- 1700s in Britain and the Industrial Revolution
- Rise of commercial brewing industry
 - Pub/estate brewing > rise of cities and commercial production
- Technological advances of the age
 - steam production, hydrometers, thermometers



The influence of malt

- **Malt Kilning**
 - Straw/wood > Coke
- Lower temperatures and clean flavor
- Advent of Pale Malt in 1700s
- Rise of new beer styles
 - Pale Ale, October Ale



Beer & Boats: Export

- Development of exporting in 1700 & 1800s
- Sailors beer ration
- Commercial exports from British ports:
 - Primarily America (London)
 - Also Australia, West Indies (Bristol)
 - India (London)
 - Baltic/Russia (via London, Burton breweries)
- **Varying quality**
 - Sour, flat, turbid/hazy
 - Stronger beer survived better, hops a key preservative



October beer and stock ale

- Brewed with fresh pale malt and hops
- “Harvest Beer”
- High gravity and high hops
- Aged in wood (up to 2-3 years)
 - Secondary fermentation (brett?)
- Precursor to IPA?



Stock ale brewed using Nottingham Long-Ear malt, Beer Nouveau

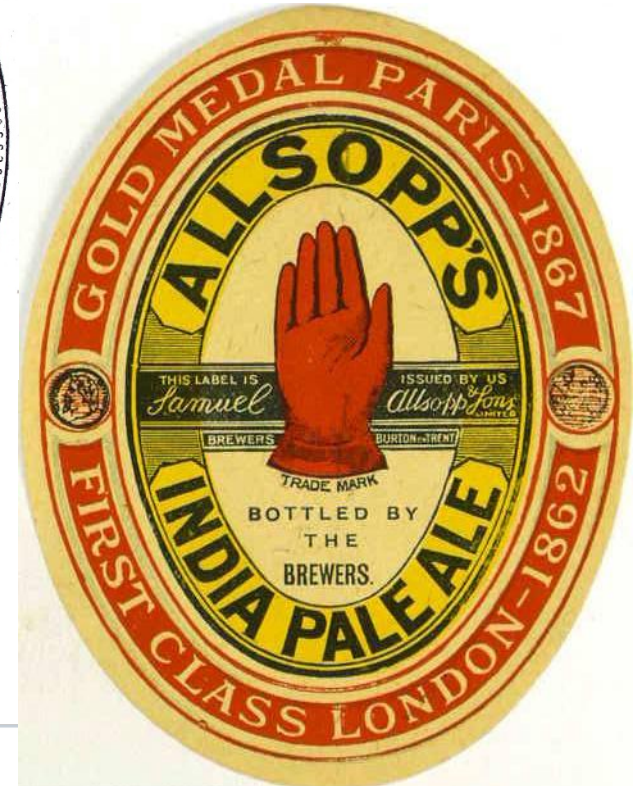
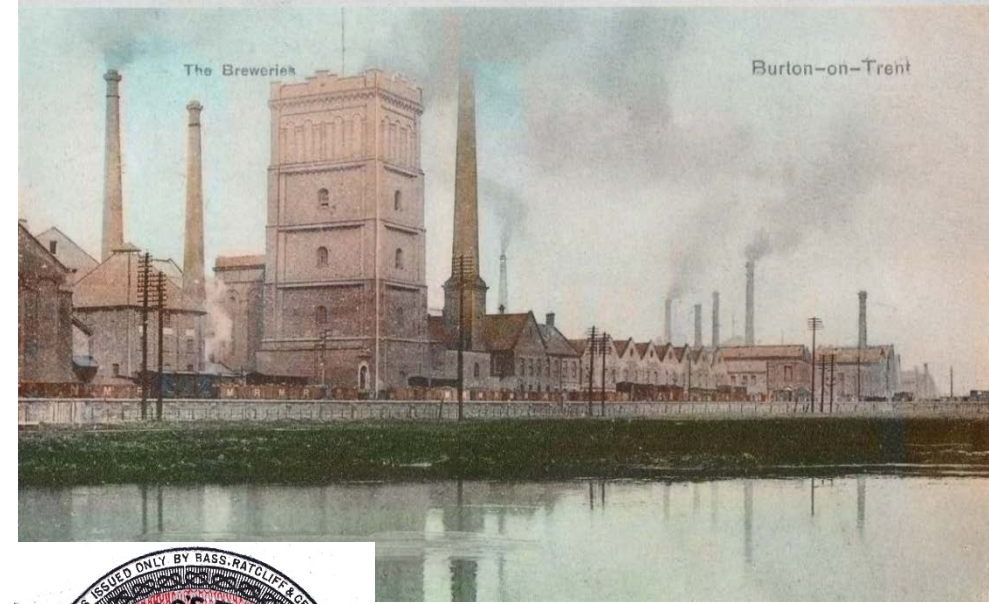
Hodgson's Bow Brewery

- **East India company founded 1600**
 - Goods from India > U.K.
 - Dominated trade in the region
- **Bow Brewery founded 1752 (George Hodgson)**
 - Close proximity to EIC in East London
- **Porter and October Beer production**
- **Close relations resulted in dominant monopoly in beer exports to India**
 - Favourable credit terms with EIC officers
- **Stock Pale Ale gained favour**
 - Shipped one year after ageing & matured on ship
 - The first IPA??



IPA POWERHOUSE: 19TH CENTURY BURTON

- Important trading town renowned for its beers
 - Trent Canal (1698) Mersey Canal (1777)
- Water composition specific to Burton brewing
 - High calcium and sulphates
- 1700s: dominated by trade to Russia
 - Export allowed breweries to flourish
- 1800s: Looking for new outlets for export
 - Burton brewers seize initiative from London Brewers
- Burton become a powerhouse for IPA production in 1800s
 - Allsopp, Bass, Salt, Worthington and many more



TYPICAL RECIPE: REID'S 1839 IPA

- Malt: 100% Pale Ale (British)
- Mashing:
 - Single Infusion 70C (158F) for 60 mins
 - Liquour:Grist 3.46/1
- Kettle:
 - 75 minute boil
 - 11.5g/l fuggles (5.5%AA) at three stages; start, 30 mins, 15 mins
- Fermentation:
 - Nottingham Ale Yeast
 - 19.4C (67F) fermentation
 - 1.87g/L dry hop (fuggles)

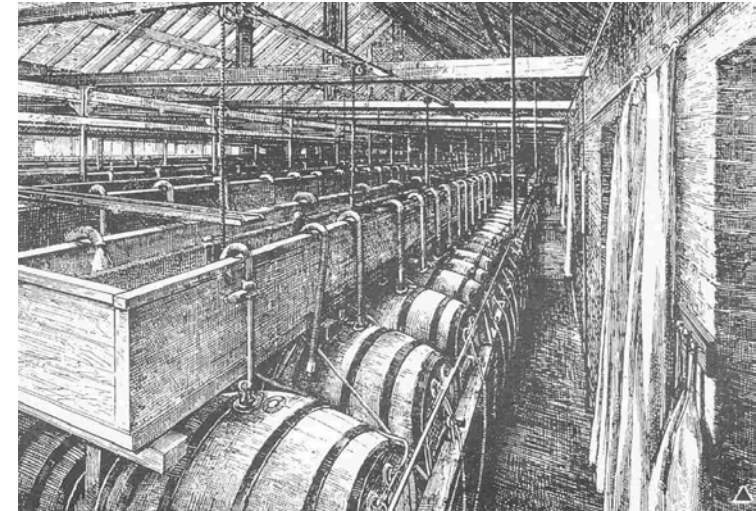
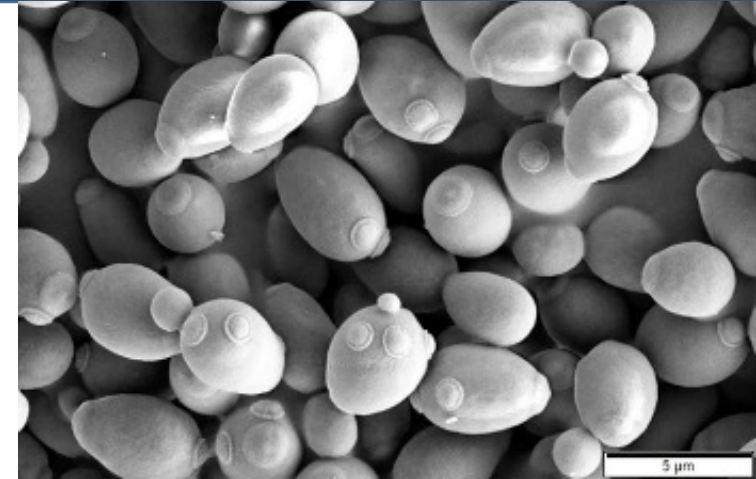


OG: 14.25 P (1.057 SG)
FG: 3.75 P (1.015 SG)
ATT: 73.7%
IBU: c.120 IBU
ABV: 5.8%
Colour: 4 EBC (2 L)



What about yeast?

- Little known about yeasts until mid-late 1800s
- What yeasts would have been used in IPA?
 - High attenuation
 - Good alcohol tolerance
 - “Clean” flavor/aroma?
- **Brewery dependent**
 - Complex multi-strain “house” cultures
 - Shared between breweries
- **Historical cultures and character gradually die out**



ADVANCES IN MICROBIOLOGY

...only yesterday

Mid-1800s, Louis Pasteur discovered that yeast was a living microorganism

Only on the November 12, 1883, Emil Christian Hansen in the Carlsberg Laboratories developed pure culture techniques.

Today, most of the brewers use single strain pure culture yeast!



IPA DECLINE

- Decline of IPA in later 1800s and in to 1900s
- A range of factors
 - Temperance movement
 - Lower alcohol and OG
 - WWI (rationing and tax)
 - Rise of Lager breweries (India)
 - US: Prohibition
- IPA production continued in UK
 - Changes in flavor, process, ABV



THE CRAFT BEER REVOLUTION

Brewing market consolidated => beers were “homogenous”

In the 70-80’s a counter movement started in the US

- Anchor, Sierra Nevada, Bert Grants



Reviving old beer styles and recipes

Experimenting with new raw materials



IPA STYLES AND VARIATIONS

Explosion in diversity:

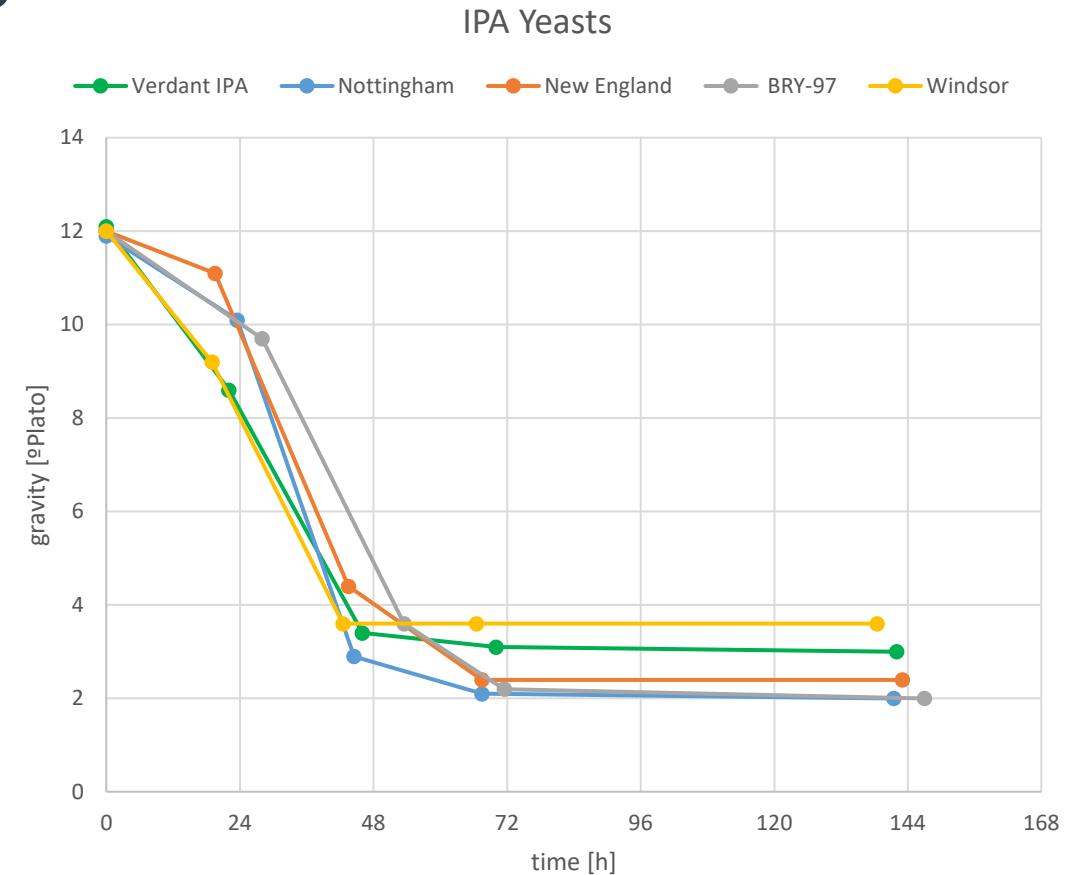
- English IPA
- American IPA
- West Coast IPA
- East Coast IPA
- Double IPA
- Triple IPA
- Belgian IPA
- White IPA
- Fruit IPA
- Sour IPA



???

IPA FERMENTATIONS - CONSIDERATIONS

- Yeast Strain Selection
 - Flavour
 - Aroma
 - Attenuation
 - Alcohol tolerance
 - flocculation
- Fermentation temperature and profile
- Conditioning
- Dry hopping and Yeast & Hop interactions





BEST PRACTICES IPA SOLUTIONS



OUR PRODUCTS



LALBREW® PREMIUM
BREWING YEASTS



WILDBREW™ YEAST
AND BACTERIA



ENZYMES



YEAST NUTRIENTS



PROCESS AIDS



SENSORY KITS



LALBREW® PREMIUM BREWING YEASTS



ABBAYE

BELLE
SAISON

BRY-97

DIAMOND

KÖLN

LONDON

MUNICH
CLASSIC

NEW
ENGLAND

NOTTINGHAM

VOSS

WINDSOR

WIT

CBC-1



LALLEMAND

LALLEMAND BREWING



LALBREW® PREMIUM BREWING YEASTS



ABBAYE	BELLE SAISON	BRY-97	DIAMOND	KÖLN	LONDON	MUNICH CLASSIC
NEW ENGLAND	NOTTINGHAM	VERDANT IPA	VOSS	WINDSOR	WIT	CBC-1



BEER STYLES

NEIPA, English IPA, American Pale, English Bitters, Sweet Stouts, Sours

ATTENUATION

Medium to high

FERMENTATION RANGE

18 - 23°C (64 - 73°F)

PITCHING RATE

50 – 100g/hL to achieve a minimum of 2.5 – 5 million cells/mL

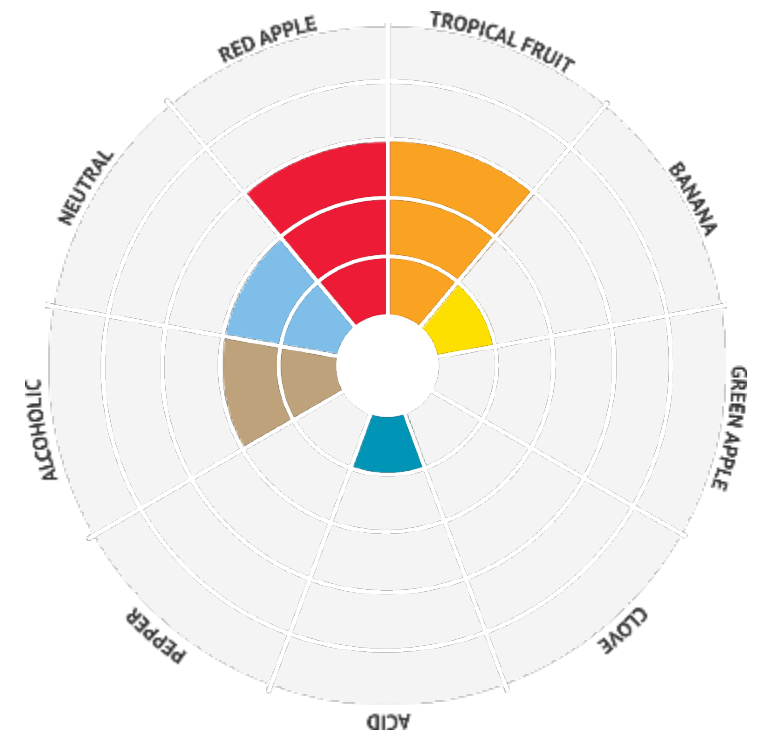
FLOCCULATION

Moderate

ALCOHOL TOLERANCE

10% ABV

FLAVOR & AROMA CHARACTERISTICS



ADDITIONAL INFORMATION

LalBrew® Verdant IPA was specially selected in collaboration with Verdant Brewing Co. (UK) for its ability to produce a variety of hop-forward and malty beers. Prominent notes of apricot and undertones of tropical fruit and citrus merge seamlessly with hop aromas. With medium-high attenuation, LalBrew® Verdant IPA leaves a soft and balanced malt profile with slightly more body than a typical American IPA yeast strain.

Other considerations?

- IPA fermented with Kveik
- Belgian IPA
- White IPA (using Wit yeast)





LALBREW® PREMIUM BREWING YEASTS



ABBAYE

BELLE SAISON

BRY-97

DIAMOND

KÖLN

LONDON

MUNICH CLASSIC

NEW ENGLAND

NOTTINGHAM

VOSS

WINDSOR

WIT

CBC-1



BEER STYLES

Norwegian farmhouse ales, fast-fermented neutral ales

ATTENUATION

Medium to high

FERMENTATION RANGE

25 – 40°C (77 – 104°F)
Optimal: 35 - 40°C (95 - 104°F)

PITCHING RATE

50 – 100g/hL to achieve a minimum of 2.5 – 5 million cells/mL

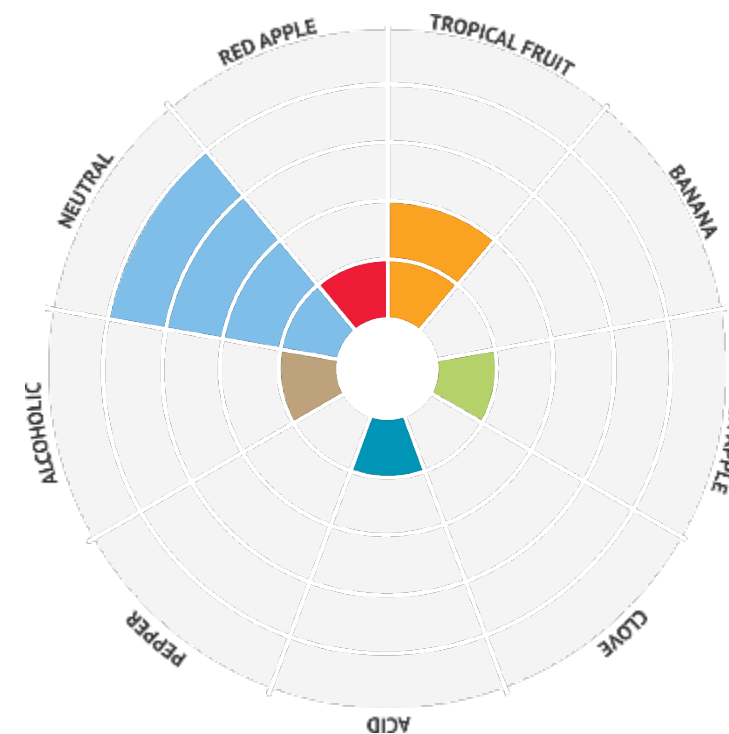
FLOCCULATION

Very high

ALCOHOL TOLERANCE

12% ABV

FLAVOR & AROMA CHARACTERISTICS



ADDITIONAL INFORMATION

The LalBrew® Voss strain was obtained from Sigmund Gjernes (Voss, Norway), who has maintained this culture using traditional methods since the 1980's and generously shared it with the wider brewing community.

Kveik is a Norwegian word meaning yeast. In the Norwegian farmhouse tradition, kveik was preserved by drying and passed from generation to generation. Kveik is the original, traditional dried yeast!



LALBREW® PREMIUM BREWING YEASTS



ABBAYE

BELLE SAISON

BRY-97

DIAMOND

KÖLN

LONDON

MUNICH CLASSIC

NEW ENGLAND

NOTTINGHAM

VOSS

WINDSOR

WIT

CBC-1



BEER STYLES

Belgian

ATTENUATION

High

FERMENTATION RANGE

17 – 25°C (63 – 77°F)

PITCHING RATE

50 – 100g/hL to achieve a minimum of 2.5 – 5 million cells/mL

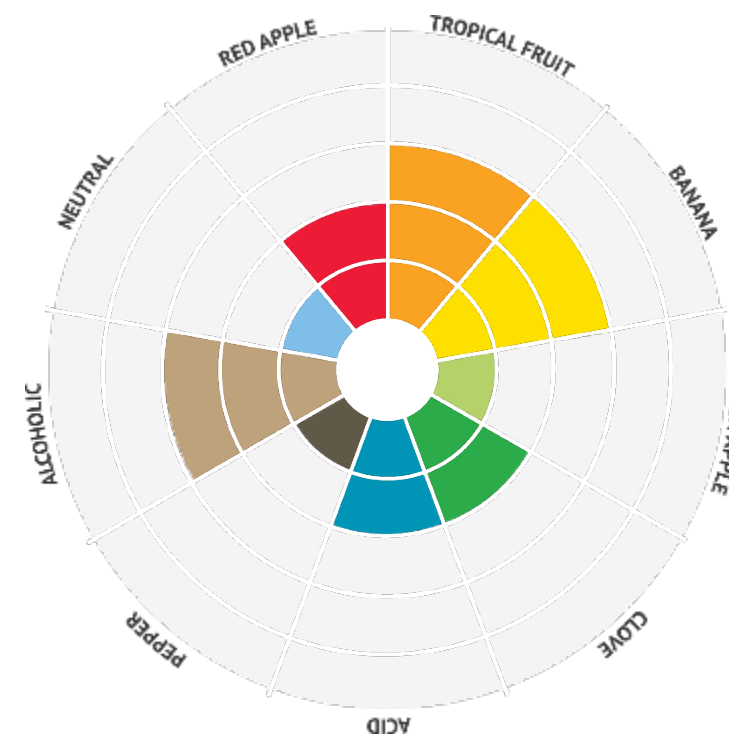
FLOCCULATION

Medium to high

ALCOHOL TOLERANCE

14% ABV

FLAVOR & AROMA CHARACTERISTICS



ADDITIONAL INFORMATION

LalBrew® Abbaye is an ale yeast of Belgian origin. Selected for its ability to ferment Belgian style beers ranging from low to high alcohol, LalBrew® Abbaye produces the spiciness and fruitiness typical of Belgian and Trappist style ales. When fermented at higher temperatures, typical flavors and aromas include tropical, spicy and banana. At lower temperatures, LalBrew® Abbaye produces darker fruit aromas and flavors of raisin, date and fig. Fermentation rate, fermentation time and degree of attenuation depend on inoculation density, yeast handling, fermentation temperature and nutritional quality of wort.



LALBREW® PREMIUM BREWING YEASTS



ABBAYE

BELLE SAISON

BRY-97

DIAMOND

KÖLN

LONDON

MUNICH CLASSIC

NEW ENGLAND

NOTTINGHAM

VOSS

WINDSOR

WIT

CBC-1



BEER STYLES

Belgian White, American Wheat, Berliner Weiss, Gose...

ATTENUATION

Medium to high

FERMENTATION RANGE

17 – 22°C (63 – 72°F)

PITCHING RATE

50 – 100g/hL to achieve a minimum of 2.5 – 5 million cells/mL

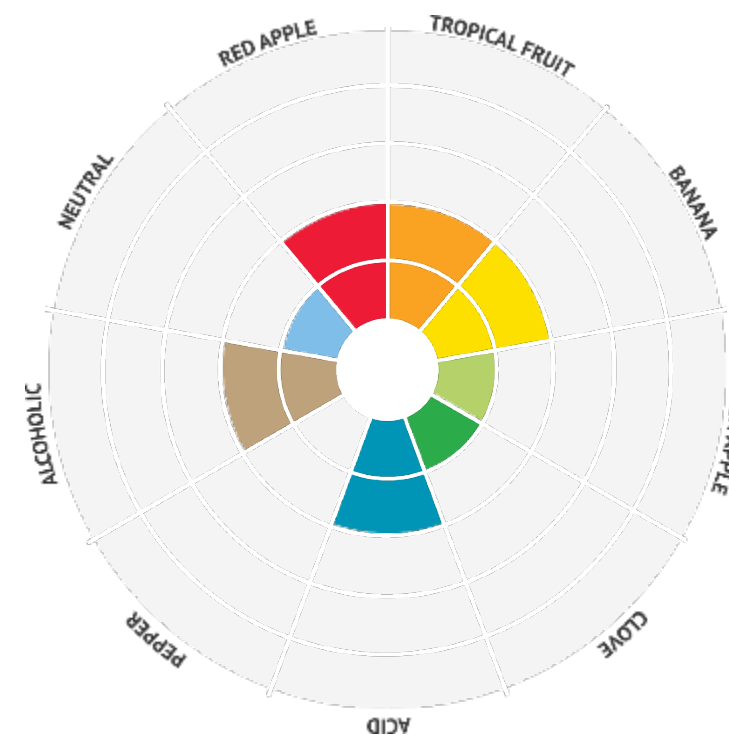
FLOCCULATION

Low

ALCOHOL TOLERANCE

12% ABV

FLAVOR & AROMA CHARACTERISTICS



ADDITIONAL INFORMATION

LalBrew® Wit yeast is a relatively neutral strain which can be used to produce a wide variety of wheat beer styles. This yeast provides a baseline profile of banana and spice aromas, but leaves space for the brewer to showcase other spice additions.

Traditional styles brewed with LalBrew® Wit include but are not limited to Belgian White, American Wheat, Berliner Weiss, Gose, Hefeweizen, and Dunkelweiss.

Potential combinations



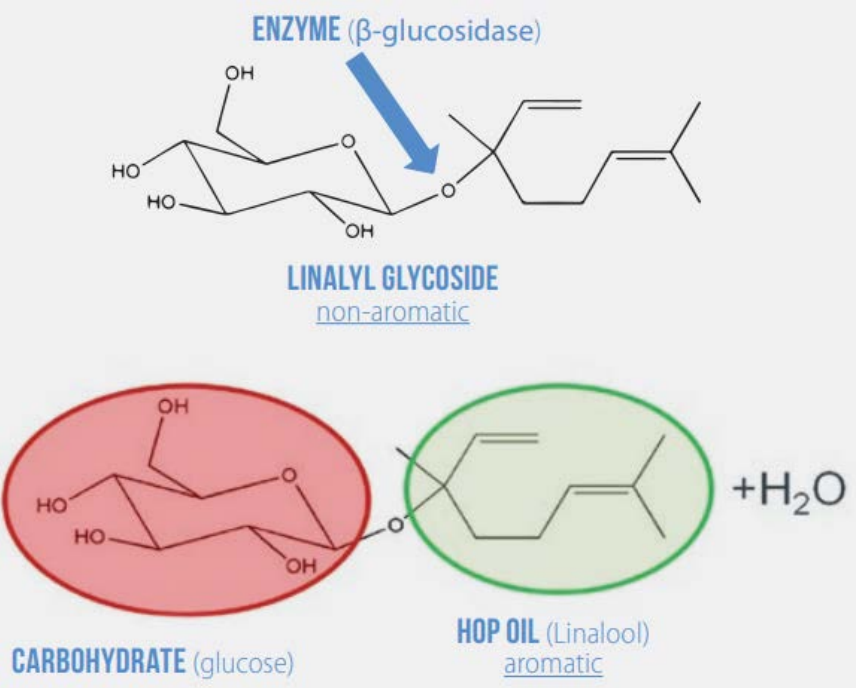
Co-fermentation

Vocation Brewing – Sour IPA

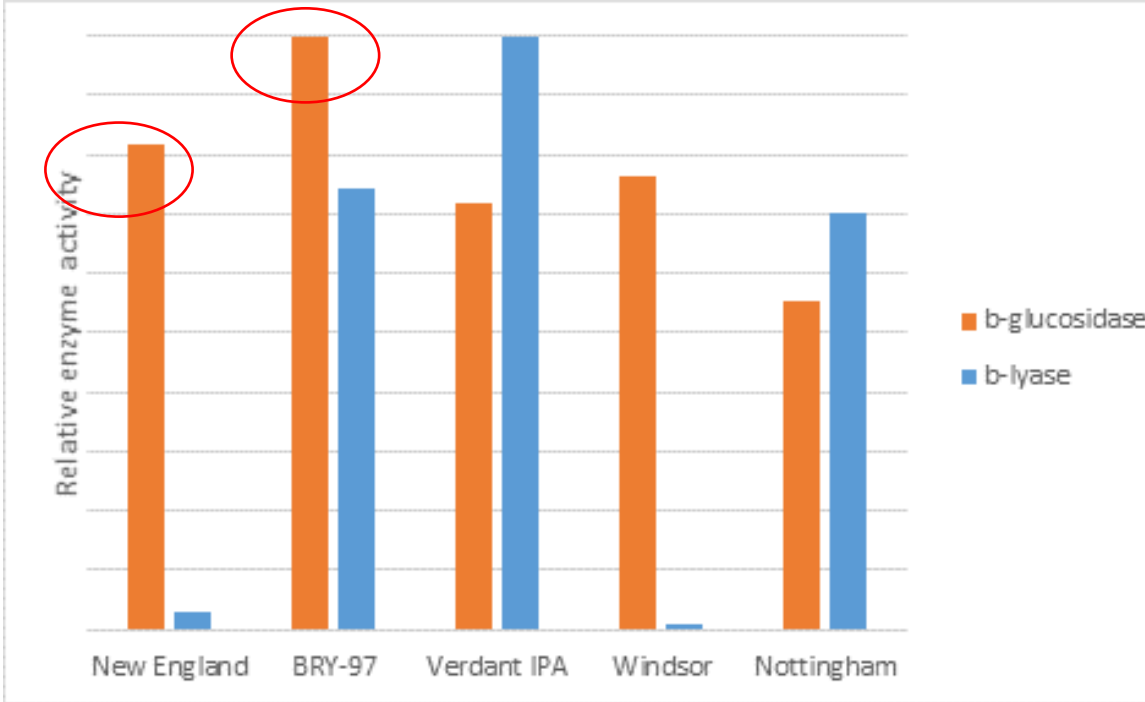
- Modern sour IPA style
- Co-Fermentation in FV: WildBrew Sour Pitch + Lalbrew Voss
- No hop wort
- Transferred to FV @ 35C
- Sequential inoculation: SP pitch day 1, Voss 24 hours later
- Soured and fermented within 48 hours
- Substantial dry hop (inhibit bacteria)



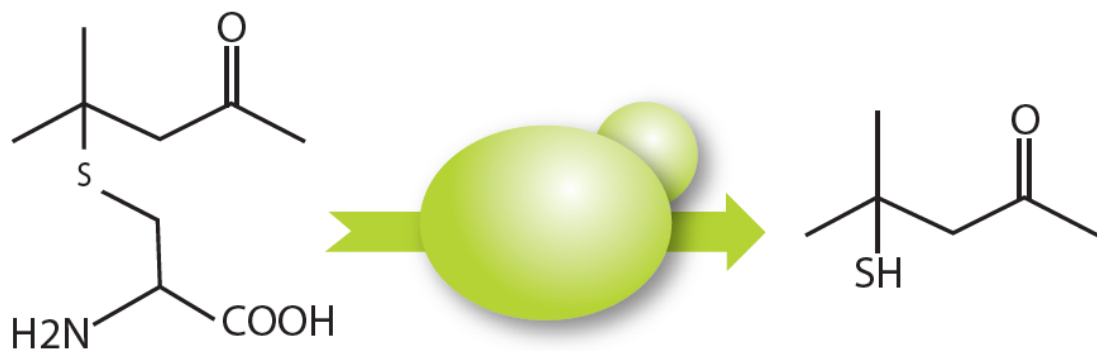
Bio-transformation



Linalyl glycoside hydrolysis releasing a fermentable sugar and a terpene



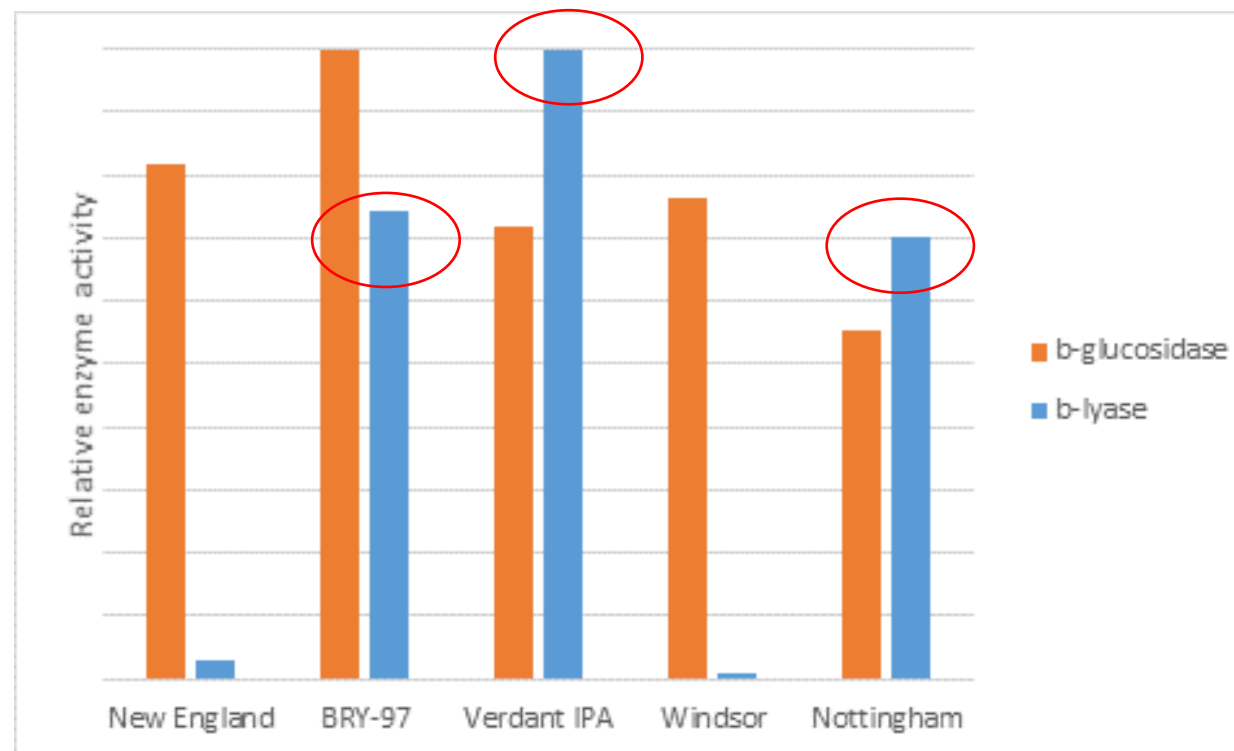
Bio-transformation



Cys-4MSP

Volatile 4MSP

Example of conversion from an inodorous precursor into a volatile thiol by yeast



Conclusions – Past, Present & Future

- **Rich history**
 - Evolved as an export beer
- **Revival in style following decades of decline**
 - Craft beer movement
- **Yeast strain critical to modern IPA styles**
 - Strain selection and characterization
- **Much more research and development to continue**
 - Yeast and hop interactions





LALLEMAND BREWING

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