

Craft Beer 101



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Goal of this presentation

- How beer is made
- The 4 ingredients of beer
 - Malt
 - Water
 - Hops
 - Yeast
- How these ingredients vary around the world and how this leads to different styles of beer

How beer is made

“The Mash”

▪ **MALT + WATER**



Enzymes turn starch into various sugars

“The Boil”

▪ **Sweet WORT + HOPS**



Maillard reaction, isomerization of hops

“Fermentation”

▪ **WORT + YEAST**



Sugar into alcohol, yeast metabolites

“Conditioning”

▪ **BEER + Time**



Carbonation, clarifying

Drink, Imbibe, Quaff, etc.

▪ **“Beer Time”**

MALT – Germany

- Grain (typically barley) is sprouted, dried (*kilned*), and sometimes toasted, roasted or caramelized
- Sprouting (*modification*)
 - starch from insoluble to soluble
 - enzymes that convert starch into sugar
- Malt differs between locations due to growing conditions, grain variety, and malting or “cooking” technique



<http://www.ukmalt.com/roast-malt-ring-check>

WATER – United Kingdom

- The mineral content of ground water is dependent on the geology of the area.
 - Burton-on-Trent = hard water (sulphates, gypsum)
 - Enhances flavor of hops and allows for firm bitterness
 - **Bitters** and **IPAs** were developed
 - Ireland = very hard water (carbonates, limestone)
 - High buffering capacity so highly roasted malts (acidic) taste best
 - Black **Stouts** were developed
- The absence of minerals (surface water) has a different effect
 - Pilsen = very soft water (snow melt)
 - Low buffering capacity so pale malts taste best
 - **Pilsners** were developed

HOPS – North America

- The female inflorescence (cone) of *Humulus lupulus* L.
 - Perennial bine native to Europe and North America.
- There are a number of important flavor compounds in the cones
 - Alpha-acids (primary bittering component)
 - Beta-acids (secondary bittering component)
 - Essential oils (responsible for the hop aroma and flavor in beer, volatile)
- Different hop varieties have unique ratios of these compounds.
 - Noble hops (German)
 - ~1:1 ratio of alpha:beta-acid (α : β)
 - High content of spicy essential oils and low content of citrus essential oils
 - “C” hops (PNW)
 - Developed for higher humulone (α) and citrus essential oil content and low cohumulone levels (α)
 - Typify North American beers

YEAST – Belgium

- Two different brewers yeasts:
 - Ale yeast (*Saccromyces cerevisea*) is top and warm fermenting
 - Lager yeast (*Saccromyces pastorianus*) is bottom and cool fermenting
 - German: very clean, higher attenuation
 - Wild yeasts (*Brettanomyces* sp.)
- Ale yeasts vary depending on region of “culture”
 - English: malty and slightly fruity, lower attenuation
 - German: very fruity (Weisen), very clean (Kölsch)
 - American: very clean, med-high attenuation
 - Belgian/French: very fruity and spicy

Summary

- Malt:
 - Different grains, roasted to varying degrees, imparts colour to beer
- Water:
 - Mineral content influences which grains are used (limits colour of beer)
- Hops:
 - Varieties with different characters influence the local beers
- Yeast:
 - Flavor of beer is significantly impacted by yeast strain

Cheers!



**Questions and
Comments?**