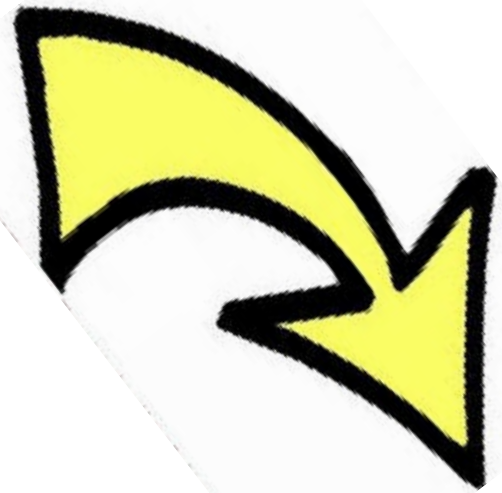


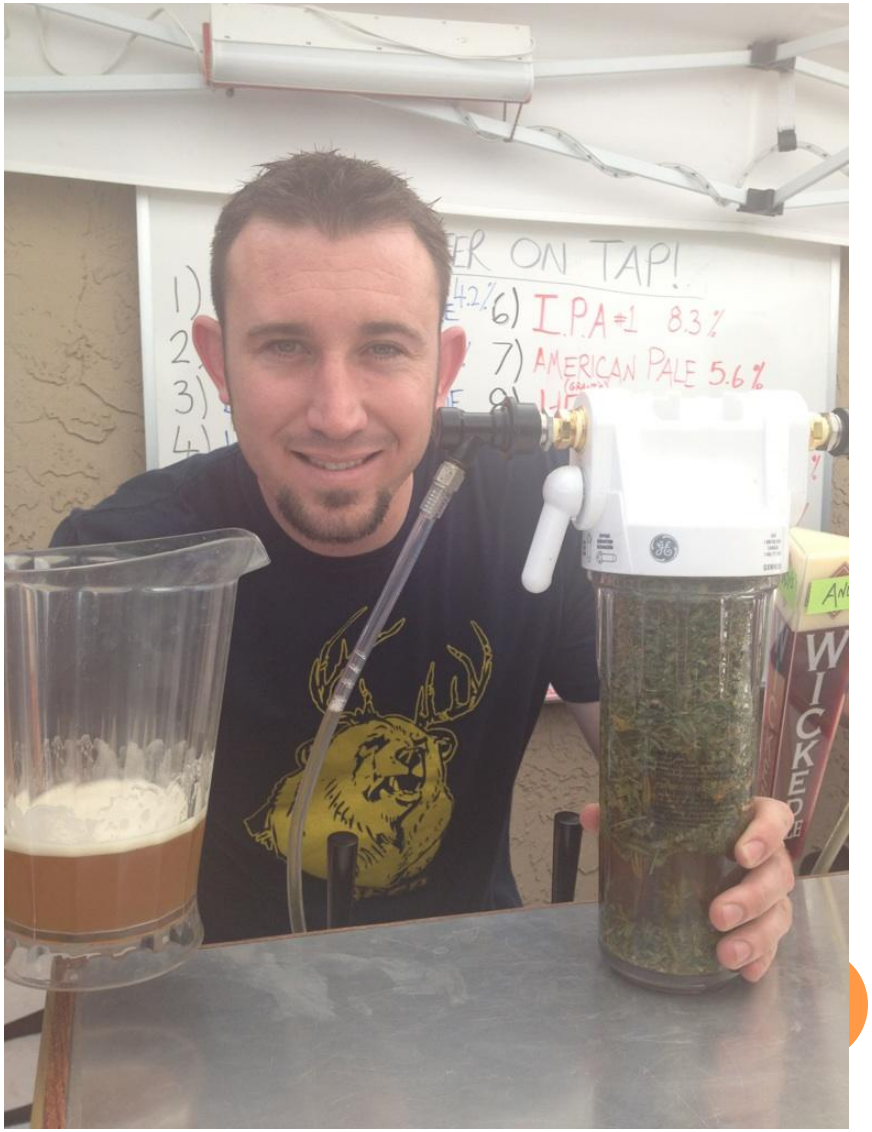
Backyard Brewing

How to craft your own brew

Andrew Carroll, Mike Conant &
Derek Wolfgram

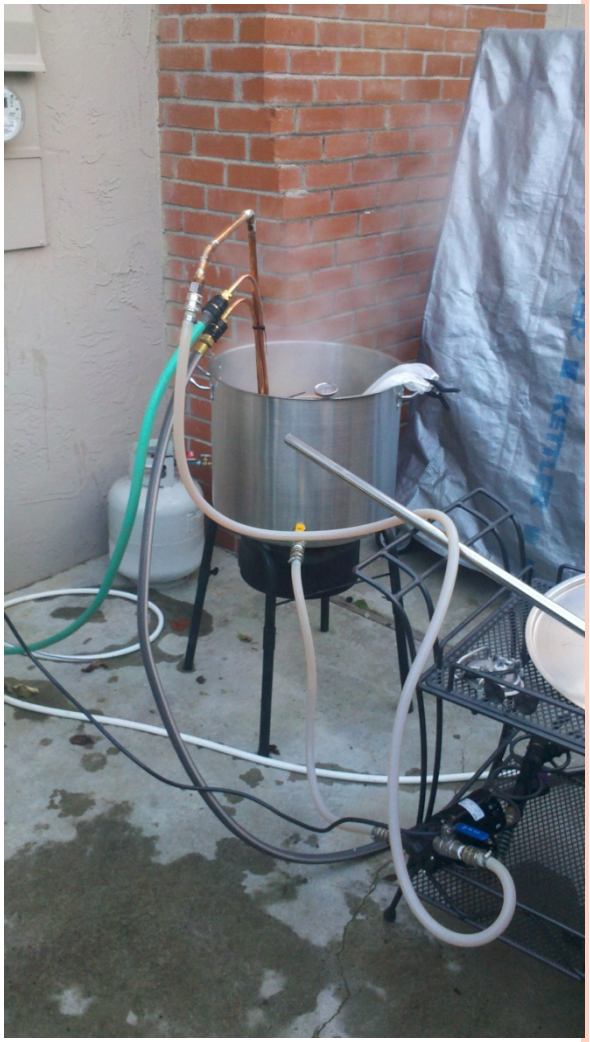
Andrew Carroll

- Andrew has been homebrewing for over five years, and in that time has managed to brew well over 100 batches. Mild-mannered construction foreman by day and beer enthusiast by night, Andy is continually trying to spread the good word of brewing and drinking better beer. He is a certified cicerone and the founder of The Headquarters homebrew club in Campbell, CA established in January 2012.



Mike Conant

- Mike has been a homebrewer since 1994, with a penchant for big, hop-forward IPAs, well before they became a west coast phenomenon. During the day he is a Director at Agilent, a company focused on chemical and biological test and measurement systems. He is a member of the Silicon Valley Sudzers, where he was 2011 Homebrewer of the Year and past Chief Events Officer. Mike is also a member of the Santa Cruz Zymurgeeks and lives in Aptos, CA



Derek Wolfgram

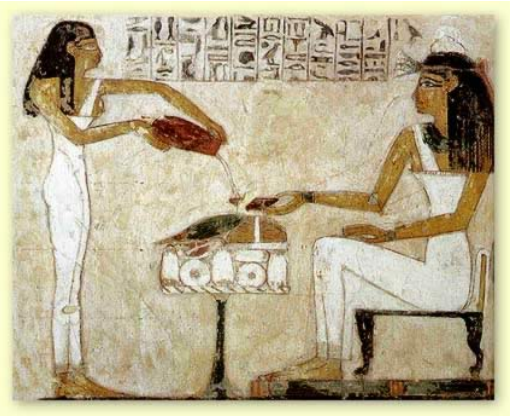
- Derek has been a librarian since 1996, and a homebrewer since 2001. This program is his opportunity to bring those two passions together. Library-wise, Derek is Director of the Redwood City Public Library. Homebrew-wise, he is Past President and current Treasurer of the Silicon Valley Sudzers homebrew club and was the 2010 club Brewer of the Year, primarily for making plenty of coconut porter. Derek is a BJCP Certified Beer Judge and also writes a monthly column on California beers for the Los Altos Town Crier newspaper.

Homebrew Rounds

Round 1 – Where Beer Comes From

A BRIEF HISTORY OF BEER

~10,000 – 4, 000 BC Egyptians are credited with discovering beer, but the agricultural revolution was most certainly tied to beer in most civilizations of the fertile crescent, where grains were produced, stored, and consumed – and where people hung out together!

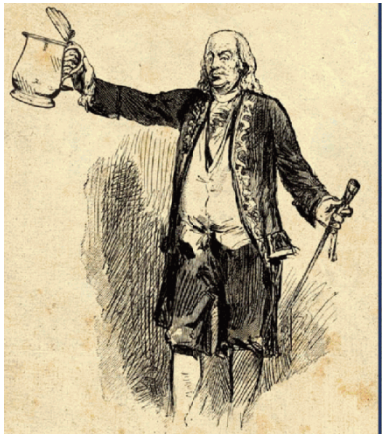


768 AD Weihenstephan Abbey was a Benedictine monastery in Bavaria, is credited as being the world's oldest still-operating brewery.

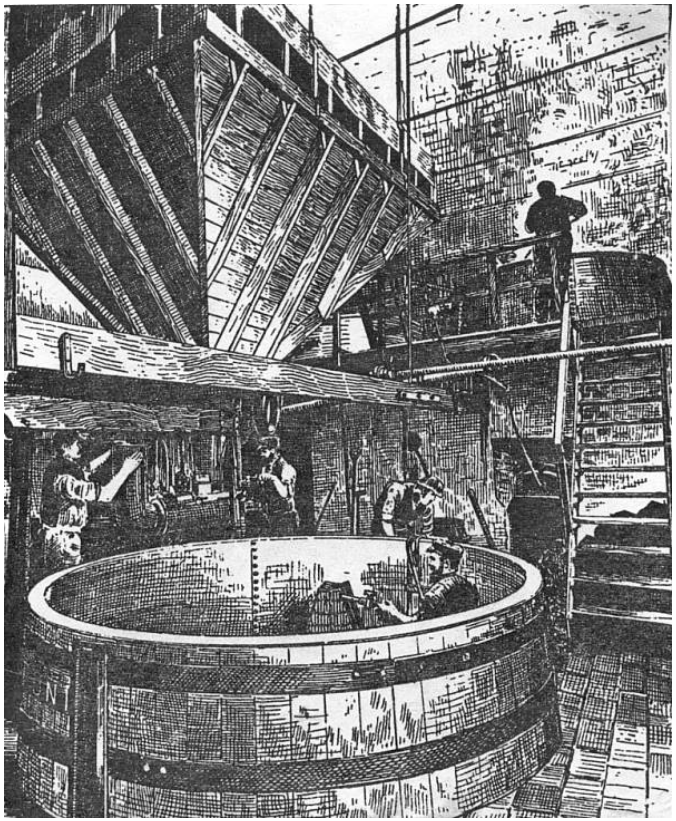
1587 AD In colonial Virginia, Europeans produced the first homebrew made from Corn.

Homebrewing was a standard practice by colonists, with beer becoming the staple beverage in the 17 and 18th centuries.

The Brits tried to export their Porter, but it didn't catch-on here in the states



Beer and the Industrial Revolution



- The **Industrial Revolution** helped define beer as we know it today
  - Mass production
  - Controlled malting and toasting of barley (pales)
  - Creation of economic glass (clarity)

- **Scale** and **trade** allowed brewers to export to markets and helped them create and refine their specialties, for example:

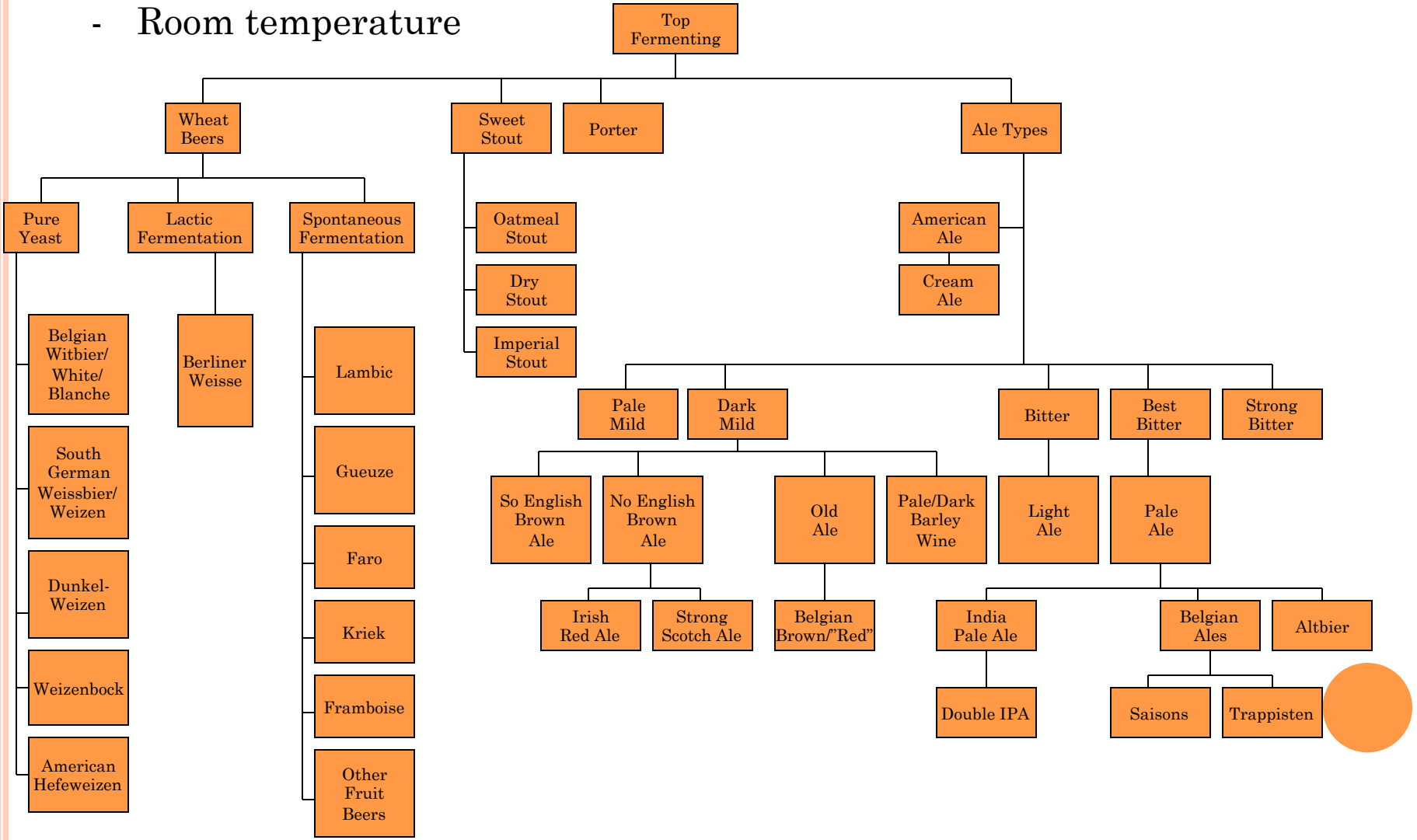
Region	Character	Style
Dublin	Highly alkaline water	Dry Stout (Guinness)
Burton on Trent	High sulfates	Pale Ale, IPA
Pilsen	Soft water	Pilsner

The varieties of beer styles are a result of regional differences in water, ingredient availability, and technical evolution…but we can emulate the differences while home brewing!

Ale Styles

Ales are the traditional form of beer making

- Top fermenting
- using *Saccharomyces cerevisiae* yeast (primarily)
- Room temperature



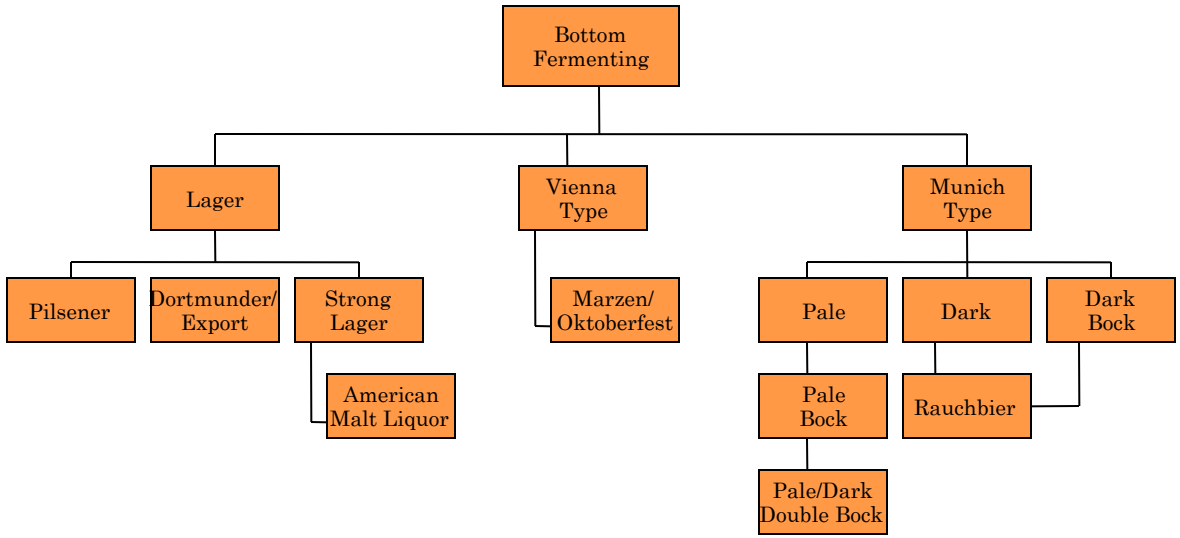
Lager Styles

Lagers resulted from the central European practice of storing (lagering) beer at low temps

-"Bottom fermenting" *Saccharomyces pastorianus*

-Cool temperatures (~40° F)

- Lagering takes a bit more time and work for the home brewer



Primary Ingredients of Beer

Malted Barley – base ingredient of beer, supplying sugars, starches, and starch-to-sugar enzymes needed for mashing. Barley grain is sprouted and toasted in a process called "malting". Other grains may be added for giving a beer its character.

Hops – *Humulus lupulus,* provides the bittering component (*lupulin*) to beer and other hop flavors and aromas, which balances the malt sweetness and helps preserve the beer

Water – essential to the chemistry of extracting sugars from the malted barley, yeast fermentation, and makes up ~90% of your beer!

Yeast – Actually, they make your beer, we just make their food, the *wort*)

Grain Guide

Malt supplies most of the flavor and sugars for the beer. The base malts are combined with the other forms of grain or malt to create the beer character. The color of malt (darkness) is described in degrees Lovibond (°L).

Malt Extracts

Use for extract brewing, creating yeast starters, or to adjust target gravity of beer.

- **DME – Dry malt extract, very stable**
- **LME – has 80% of water removed, there are more varieties available.**

Base Malts

- **2 row pale malt – primary base malt for brewing (6 row is typically used for whisky) 2L**
- **Pilsner – smoother, lighter, sweeter than pale 1L**
- **Wheat – for wheat beers**

Specialty Malts

Add color, flavor, and/or body to the brew. Some can be steeped when extract brewing

- Carapils – for head retention and stability w/o affecting color, flavor
- Munich – increases body, aroma, malt sweetness
- Rye – Must be mashed, adds a spicy, fruity flavor
- Rauch – smoked malt used in Rauchbiers, with peat flavor 25L
- Special Roast – Imparts a toasty or biscuity flavor 50L

Crystal Malts

Sugars are caramelized and non-fermentable, used to add color, flavor, and head retention

- **Crystal 15L to 120L – L denotes darkness of roast**
- Caramunich – 70L
- Caravienne – 25L from Belgium
- Carastan – British version, 30L

Roasted Malts

For porters and stouts

- Chocolate Malt – has a chocolaty bitter flavor
- Black Patent Malt – very dark and bitter

Adjuncts

- Corn – lightens body, and adds corn taste
- Flaked Barley – added to stouts for head retention
- Black Roasted barley – Very dark grain (500L) used in stouts, very strong bitter flavor
- Flaked Maize – add to lighter American pilsners for lightening color and body
- Honey – adds fermentable sugars, some flavor and aroma
- Oats – adds a silky texture
- Rice – used in light colored beers for a dry or crisp flavor, very little taste

Adapted from http://www.brew-monkey.com/brewschool/maltguide.php

Hop Guide

Hops are selected and added to boiling wort to impart specific qualities to a beer. Some hops are considered best for bittering or

-**Bittering** : added early in the boil, 90 to 30 mins boil time

-**Flavor**: 30 to 0 mins boil time

-**Aroma**: 0 mins, or after fermentation, called "dry hopping"

VARIETY	ACID RANGE (ALPHA %)	FLAVOR PERCEPTION	COMMERCIAL EXAMPLE
Amarillo®	8-10%	A flowery, citrus-like aroma with medium bittering value that is gaining acceptance as a substitute for Cascade due to its hardy nature.	Ales, IPAs
Cascade	4-7%	Flowers, citrus & spice with grapefruit the noticeable fragrance quite often. This medium aroma balances the low bittering value. Very popular hop among craft brewers.	Pale Ales, IPAs, Porters
Centennial	8-11%	Flowers & citrus most evident. A medium aroma with mid to high bittering value makes it a dual purpose choice.	Ales, IPAs
Chinook	11-13%	A pine forest washed with exotic spice and infused with grapefruit. This alluring aroma and a high bittering value has gained this hop full respect from craft & major brewers.	Most beer styles from Pale Ales to Lagers
Columbus	14-17%	High on the bittering scale yet also valued for its oil content creates a hop that is an interesting dichotomy of sharp and herbal.	American IPAs & Pale Ales, Stout, Lager
Crystal	3-5%	Genteel, continental lady meets American belle with a delicate blend of spices and flowers. Low bittering value adds to the charm. Craft brewers love her style.	German-style Pilsner, Lager, Kölsch, ESB, Belgian Ales
Fuggle	4.0-5.5%	Classic English aroma hop with moderate bittering value. Pleasant wood and fruit tones will have you heading off to the hunt.	English-style beers (particularly Stout), American Ales
Hallertau	5-6%	Named for its origins in the Hallertauer region of Germany, this is a noble aroma hop with ever-so-subtle flower and spice fragrances defining its "über alles" superiority. Very low bittering value.	Pilsner, Bock, Lager, Wheat
Kent Golding	3-5%	The refined older English gentleman with his flowery tones that have produced some of England's best bitters.	All English-style beers (Ales, ESB, Bitter), Belgian-style Ales
Liberty	2-6%	American cousin to Hallertau with very similar flower and spice characteristics. Best used as a finishing hop in German-style lagers.	Lager, Pilsner, Bock, Kölsch
Magnum	12-17%	A German thoroughbred with limited Pacific Northwest plantings. Prized for its high bittering value, the aromatic nature is one of spice and citrus.	Pale Ales, IPAs, German-style Lager
Mt. Hood	4-5%	Hybrid of Hallertau with similar mild flower/spice aroma characteristics with a hint more of the forest. "Clean" commonly describes it.	Lager, Pilsner, Bock, Wheat

Hop Guide (continued)

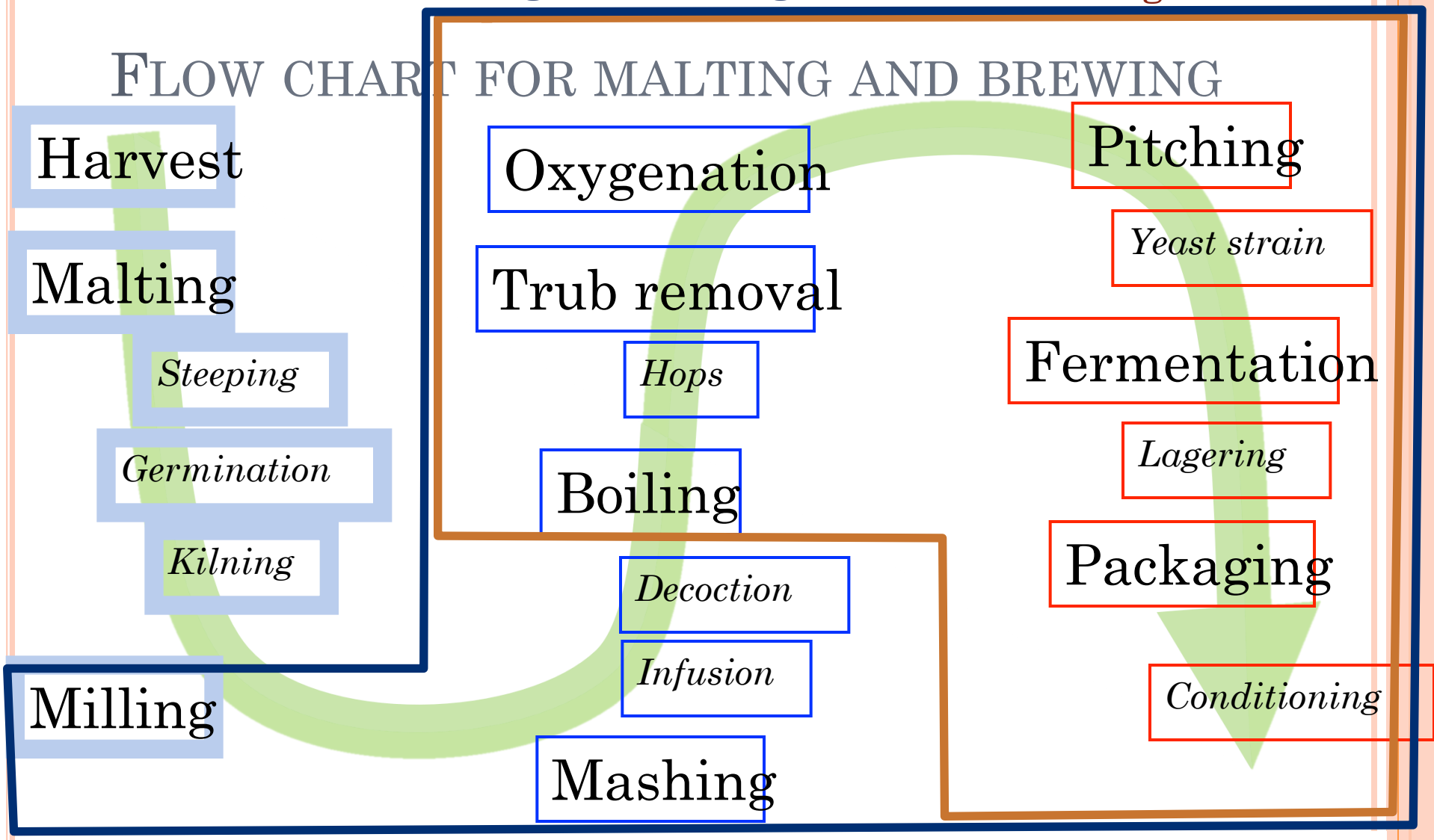
IBUs: stands for **I**nternational **B**ittering **U**nits, denotes the amount of bitterness in the beer. The Alpha Acid concentration of the hops (AAUs), quantity of the hops, and length of boil determines how many IBUs go into the beer.

VARIETY	ACID RANGE (ALPHA %)	FLAVOR PERCEPTION	COMMERCIAL EXAMPLE
Northern Brewer	7-11%	A plucky American filly found herself an affable English suitor and the happy union was this well-adapted hop with its neutral, clean aroma and slightly higher-than-average bittering value. Dual purpose.	English-style Ales, ESB, Bitter, Porter
Nugget	11-16%	Strong herbal/slight spice aroma and high bittering value (along with desirable growing traits) has brought this hop variety to the forefront of the industry.	All Ales, Stout
Perle	7-8%	A palate-pleaser with its moderate, clean bittering qualities and refreshing, spicy aroma.	A wide range from Pale Ale to Lager to Stout
Saaz	3-5%	The Old World steadfast standby made famous by Pilsner Urquell possesses the aromatic blend of earth and spice notable in European nobles. Low bittering value.	Pilsner, Lager, Wheat, Belgian-style Ales
Simcoe®	12-14%	A hop variety less than 10 years old that is quickly finding its way into the hearts of bitter-loving craft brewers. Intense pine aroma adds to the fresh, youthful vigor. Dual purpose but generally considered a bittering hop.	American Ales, IPAs, Double IPAs
Sorachi Ace	13-16%	A Japanese winner by all counts with its powerful lemon aroma, high bittering value and flavorful personality.	American Ales, Pale Ales, Wheat
Sterling	6-9%	Herbs and spices dominate, flowers and citrus around the fringes. Moderate bittering values with a mix of Saaz and Mt. Hood properties.	Ale, Pilsner, Lager
Summit (Dwarf)	17.5–19.5%	Quite new on the scene (2003) but the consensus is very positive with its "peak" bittering value coupled with robust citrus notes of orange, tangerine and grapefruit. Receiving accolades as an ideal hop for the ultimate Pale Ale.	*Drifter Pale Ale*, Widmer Brothers
Warrior	14.5- 17.0%	Its high bittering value and very mild aroma offers new dimensions to IPA & Double IPA brewers.	Three Floyd's *Dogfish Head IPA*
Willamette	4-6%	The king of aroma hops in the U.S. with its modest bittering value and the joyous harmony of flowers, fruit, earth and spice.	American Pale and Brown Ales, English-style Ales

Adapted from http://www.freshops.com/hops/variety_descriptions

All-grain Brewing Extract Brewing

FLOW CHART FOR MALTING AND BREWING



Barley and Malt processes

Wort production

Conversion of Wort into Beer

Method of homebrewing #1

Beer Machine

a. Pour water in
b. Add prepackaged beer kit
c. Wait 7-10 days

Homebrewing Method #2

Extract Brewing

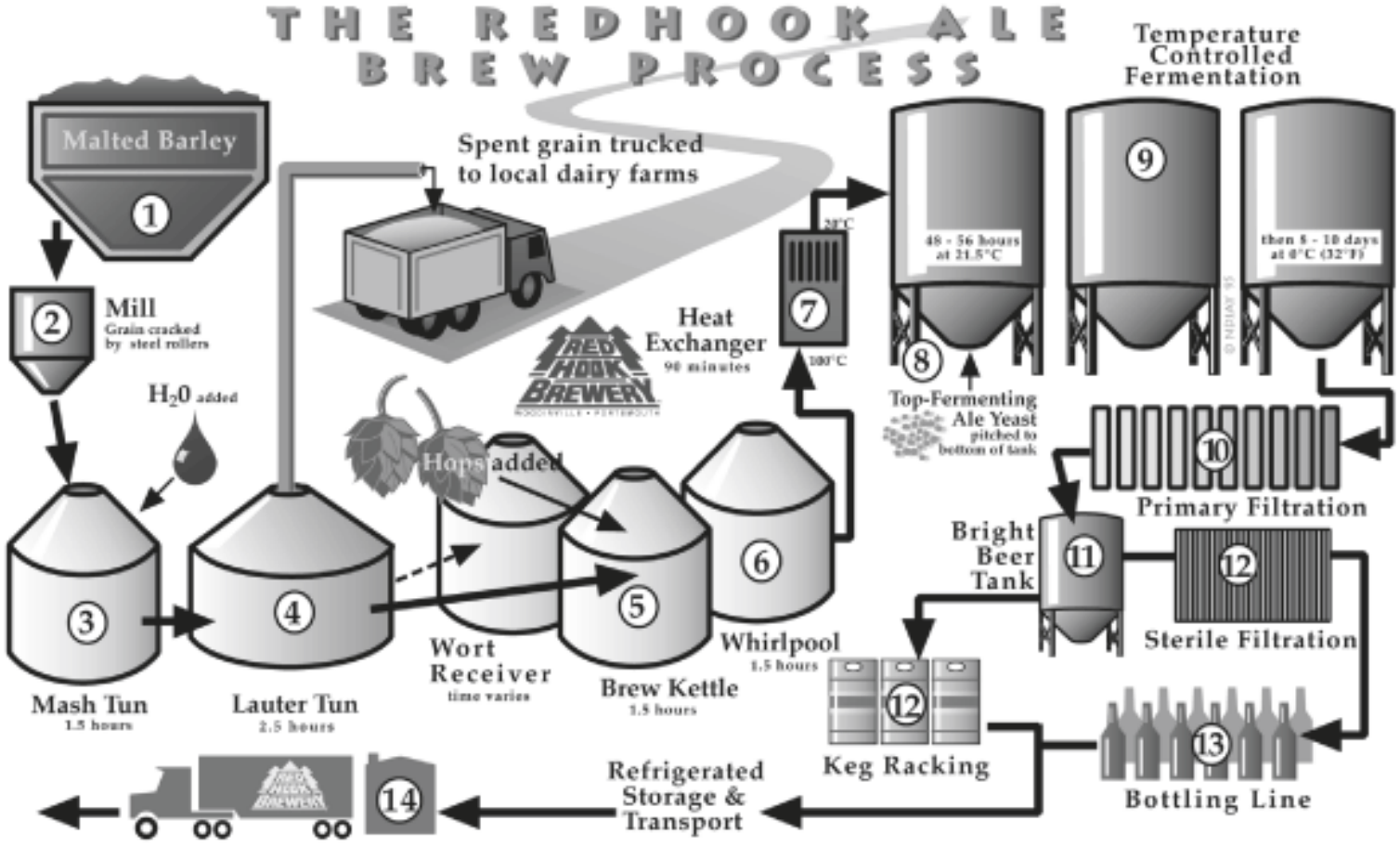
- Easy to get started
- Kits readily available
- Can be done on stovetop with 2 gallon boil
- Takes 2-4 hours to brew
- Can make quality beer
- Can always scale later

Homebrewing Method #3

All-grain Brewing

- Requires additional mashing steps
- More control over process
- Better selection of malts
- Requires full boil (7 gallons for 5 gallon batch)
- Takes 4-6 hours

Brewing at volume – for larger budgets



Round #2

Equipment and Process

The Homebrewer's twelve-step program

- 1- Formulate your recipe, What do you want to brew?, What is your goal?
- 2- Water, If your water tastes good, the beer should!
- 3- Malt Extract vs. all grain brewing
- 4- The Mash
- 5- Sparging
- 6- The boil, hop additions and specialty ingredients
- 7- cooling the wort
- 8- Pitching Yeast and fermentation, Temp control!
- 9- Take your readings and write everything down(in case it turns out good!)
- 10- Cleanliness is next Godliness and Sanitation is King!
- 11- Bottling vs. kegging
- 12-Most importantly, Have fun!, its a *hobby* not a job.....yet!

Round #3

Recipes and Resources

Derek's Coconut Robust Porter

Ingredients

10.8 lbs American Two-Row
1.2 lbs American Crystal 60
.6 lbs British Chocolate Malt
.6 lbs British Roasted Barley

.5 oz. Magnum hops (13.1% AA) for 60 minutes
1 oz. Willamette hops (4.6% AA) for 30 minutes
1 oz. Cascade hops (6% AA) for 5 minutes

Safale US 05 Dry American Yeast

2 pounds packaged flaked unsweetened coconut, toasted at 275 degrees until golden brown

Directions

Mash grains at 154 degrees with 3.5 gallons of water for one hour. Mash out at 170° F and sparge with 5.5 gallons of water. Collect 7.5 gallons of runoff and bring to a boil. Add hops as indicated in the recipe. After a 60 minute boil (which should leave about 5.75 gallons of wort), chill wort to 70° F and transfer to fermenter. Pitch yeast and aerate well. Ferment at 68° F for one week, then rack to secondary fermentation bucket. Add toasted coconut in a sterile grain sack for one week. Remove coconut with sterile tool and rack beer into keg for force carbonation.

Original Gravity: 1.054
Final Gravity: 1.012
Alcohol by Volume: 5.5%
IBU: 40
SRM: 40

Pliny the Elder Double IPA (part 1)

Ingredients for 6.0 gallons (22.7 L) [Net: 5 gallons (18.9 L) after hop loss]

13.25 lb (6.01 kg) Two-Row pale malt
0.6 lb (272 g) Crystal 45 malt
0.6 lb (272 g) Carapils (Dextrin) Malt
0.75 lb (340 g) Dextrose (corn) sugar
3.50 oz (99 g) Columbus* 13.90% A.A. 90 min.
0.75 oz (21 g) Columbus* 13.90% A.A. 45 min.
1.00 oz (28 g) Simcoe 12.30% A.A. 30 min.
1.00 oz (28 g) Centennial 8.00% A.A. 0 min.
2.50 oz (71 g) Simcoe 12.30% A.A. 0 min.
1.00 oz (28 g) Columbus* 13.90% A.A. Dry Hop (12 to 14 days total)
1.00 oz (28 g) Centennial 9.10% A.A. Dry Hop (12 to 14 days total)
1.00 oz (28 g) Simcoe 12.30% A.A. Dry Hop (12 to 14 days total)
0.25 oz (7 g) Columbus* 13.90% A.A. Dry Hop (5 days to go in dry hop)
0.25 oz (7 g) Centennial 9.10% A.A. Dry Hop (5 days to go in dry hop)
0.25 oz (7 g) Simcoe 12.30% A.A. Dry Hop (5 days to go in dry hop)
White Labs WLP001 California Ale Yeast or Wyeast 1056 American Ale Yeast

Original Gravity: 1.072
Extract Efficiency: 75 percent
ABV: 8.2%

Final Gravity: 1.011
IBUs: 90-95 (actual/not calculated)
SRM: 7

Recipe by Vinnie Cilurzo, Russian River Brewing. From *Zymurgy*, July/August 2009 issue, page 25

Pliny the Elder Double IPA (part 2)

Directions
Mash grains at 151-152° F (66-67° C) for an hour or until starch conversion is complete. Mash out at 170° F (77° C) and sparge. Collect 8 gallons (30 L) of runoff, stir in dextrose, and bring to a boil. Add hops as indicated in the recipe. After a 90 minute boil, chill wort to 67° F (19° C) and transfer to fermenter. Pitch two packages of yeast or a yeast starter and aerate well. Ferment at 67° F (19° C) until fermentation activity subsides, then rack to secondary. Add first set of dry hops on top of the racked beer and age 7-9 days, then add the second set. Age five more days then bottle or keg the beer.

Extract Substitution
Substitute 6.5 lb (3.0 kg) of light dry malt extract for two-row malt. Due to the large hop bill for this recipe, a full wort boil is recommended. Steep grains in 1 gallon (3.8 L) of water at 165° F (74° C) for 30 minutes, then remove and rinse grains with hot water. Stir in dextrose and top up kettle to 8 gallons (30 L), and bring to a boil. Add hops as indicated in the recipe. After a 90 minute boil, chill wort to 67° F (19° C) and transfer to fermenter. Pitch two packages of yeast or a yeast starter and aerate well. Ferment at 67° F (19° C) until fermentation activity subsides, then rack to secondary. Add first set of dry hops on top of the racked beer and age 7-9 days then add the second set. Age five more days then bottle or keg the beer.

Recipe Formulators

- BeerSmith (Mac, PC, Linux, iOS, Android) – www.beersmith.com
- Brewer's Friend (web, iOS, or Android) – www.brewersfriend.com
- Beer Alchemy (Mac or iOS) – http://www.beeralchemyapp.com
- Brewtoad (web-based) – www.brewtoad.com

Style Guidelines

Beer Judge Certification Program (BJCP)

- Online at http://bjcp.org/docs/2015_Guidelines_Beer.pdf
- Descriptions of 104 distinct “styles” of beer in 34 categories
- Used in describing beer, judging beer competitions

22A. Double IPA

Overall Impression: An intensely hoppy, fairly strong pale ale without the big, rich, complex maltiness and residual sweetness and body of an American barleywine. Strongly hopped, but clean, dry, and lacking harshness. Drinkability is an important characteristic; this should not be a heavy, sipping beer.

Aroma: A prominent to intense hop aroma that typically showcases American or New World hop characteristics (citrus, floral, pine, resinous, spicy, tropical fruit, stone fruit, berry, melon, etc.). Most versions are dry hopped and can have an additional resinous or grassy aroma, although this is not absolutely required. Some clean malty sweetness may be found in the background. Fruitiness, either from esters or hops, may also be detected in some versions, although a neutral fermentation character is typical. Some alcohol can usually be noted, but it should not have a “hot” character.

Appearance: Color ranges from golden to light orangecopper; most modern versions are fairly pale. Good clarity, although unfiltered dry-hopped versions may be a bit hazy. Moderate-sized, persistent, white to off-white head.

Flavor: Hop flavor is strong and complex, and can reflect the characteristics of modern American or New World hop varieties (citrus, floral, pine, resinous, spicy, tropical fruit, stone fruit, berry, melon, etc.). High to absurdly high hop bitterness. Low to medium malt flavor, generally clean and grainy-malty although low levels of caramel or toasty flavors are acceptable. Low to medium fruitiness is acceptable but not required. A long, lingering bitterness is usually present in the aftertaste but should not be harsh. Dry to medium-dry finish; should not finish sweet or heavy. A light, clean, smooth alcohol flavor is not a fault. Oak is inappropriate in this style. May be slightly sulfury, but most examples do not exhibit this character.

Mouthfeel: Medium-light to medium body, with a smooth texture. Medium to medium-high carbonation. No harsh hopderived astringency. Restrained, smooth alcohol warming acceptable.

Comments: A showcase for hops, yet remaining quite drinkable. The adjective “double" is arbitrary and simply implies a stronger version of an IPA; “imperial,” “extra,” “extreme,” or any other variety of adjectives would be equally valid, although the modern American market seems to have now coalesced around the “double” term.

History: An American craft beer innovation first developed in the mid-late 1990s reflecting the trend of American craft brewers “pushing the envelope” to satisfy the need of hop aficionados for increasingly intense products. Became more mainstream and popular throughout the 2000s, and inspired additional IPA creativity.

Characteristic Ingredients: Clean 2-row malt is typical as a base grain; an excessively complex grist can be distracting. Crystal-type malts often muddy the hop flavors, and are generally considered undesirable in significant quantities. Sugar or other highly fermentable adjuncts are often used to increase attenuation, as are lower-temperature mash rests. Can use a complex variety of hops, typically American or New World, often with cutting-edge profiles providing distinctive differences. Modern hops with unusual characteristics are not out of style. American yeast that can give a clean or slightly fruity profile.

Style Comparison: Bigger than either an English or American IPA in both alcohol strength and overall hop level (bittering and finish). Less malty, lower body, less rich and a greater overall hop intensity than an American Barleywine. Typically not as high in gravity/ alcohol as a barleywine, since high alcohol and malt tend to limit drinkability.

Vital Statistics: OG: 1.065 – 1.085 IBUs: 60 – 120 FG: 1.008 – 1.018 SRM: 6 – 14 ABV: 7.5 – 10.0%

Commercial Examples: Avery Maharaja, Fat Heads Hop Juju, Firestone Walker Double Jack, Port Brewing Hop 15, Russian River Pliny the Elder, Stone Ruination IPA, Three Floyds Dreadnaught Tags: very-high-strength, pale-color, top-fermented, northamerica, craft-style, ipa-family, bitter, hoppy

Sources for More Information

Local Homebrew Clubs

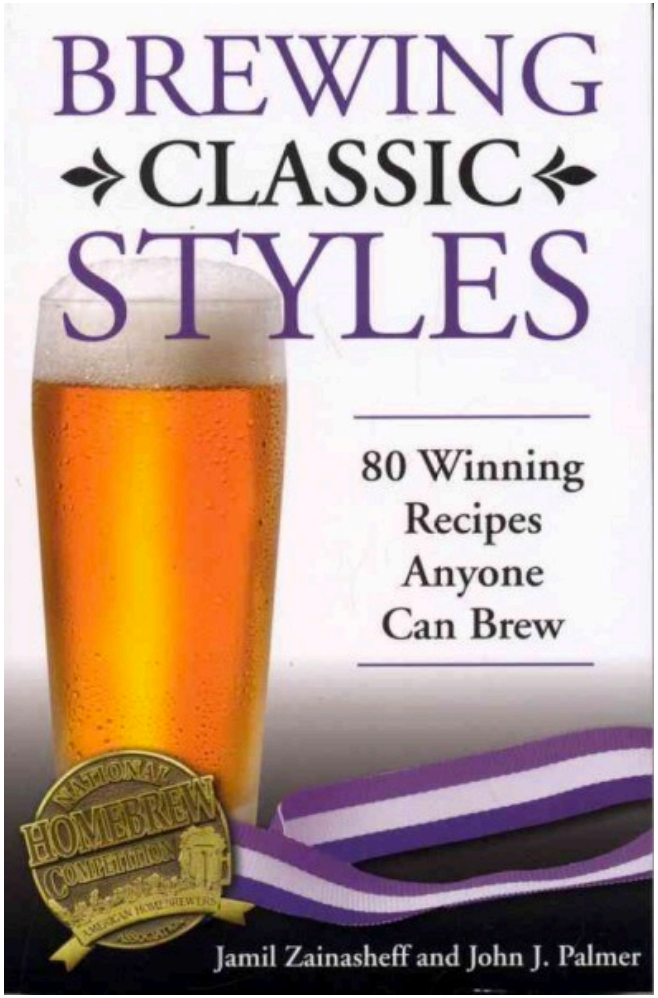
- Almaden Brewers (www.almadenbrewers.org)
- The Grain Trust (www.thegraintrust.com)
- The HeadQuarters (https://sites.google.com/site/hqhomebrew/home)
- Silicon Valley Sudzers (www.sudzers.org)
- Worts of Wisdom (www.wortsofwisdom.org)

Local Homebrew Supply Stores

- Beer and Wine Makers of America (San Jose – www.beerandwinemakers.com)
- Fermentation Solutions (Campbell – www.fermentationsolutions.com)
- MoreBeer (Los Altos - www.morebeer.com)

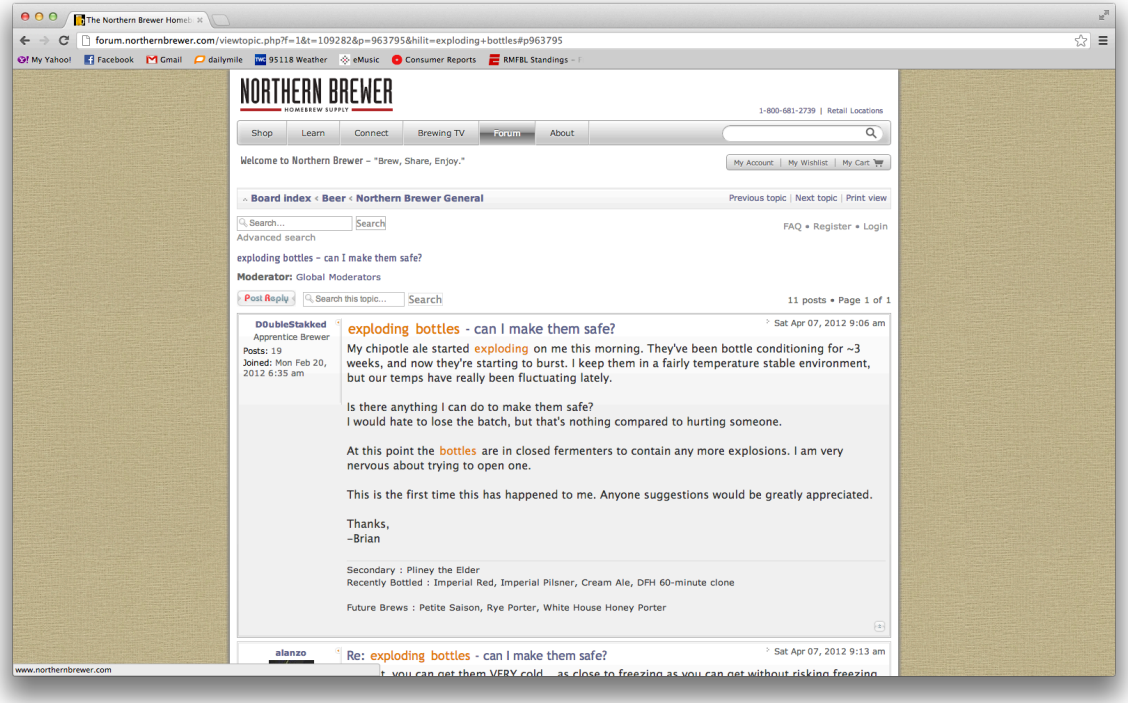
Books and eBooks from your Library

- https://is.gd/G1nFr2 (items owned by Palo Alto City Library)



Online Forums

- www.homebrewtalk.com
- forum.northernbrewer.com
- www.homebrewersassociation.org/forum/index.php



Other Online Resources

- American Homebrewers Association (www.homebrewersassociation.com)
- Brew Your Own magazine (www.byo.com)
- Homebrew Talk Wiki (www.homebrewtalk.com/wiki/index.php/Beer)

Events

- Homebrew Competition Calendar: https://www.homebrewersassociation.org/aha-events/calendar/
- Northern California Homebrewers Festival: www.nchfinfo.org
- San Francisco Beer Week: www.sfbeerweek.org
- Silicon Valley Beer Week: www.svbeerweek.com
- AHA Events
  - AHA Big Brew (first Saturday in May)
  - National Homebrewers Conference (last weekend in June)
  - Mead Day (first Saturday in August)
  - Learn to Homebrew Day (first Saturday in November
  - Learn more at: www.homebrewersassociation.org/business-tools/homebrew-events/

Thank you! Cheers!

We hope to see you shortly at Dan Gordon's, 640 Emerson Street, for more discussion of beer and brewing

Visit www.sudzers.org/?p=2774

To download or print a copy of this presentation