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## Get Noticed

The mission of the American Homebrewers Association is to promote the community of homebrewers and empower homebrewers to make the best beer in the world. Promotion is all about getting homebrewers and homebrewing noticed so that our hobby grows and we can continue to benefit from great ingredients, innovative equipment, and favorable legal status. Getting noticed is what enables empowerment, and it happens in a number of ways.

When a member alerts AHA staff to proposed legislation that could affect homebrewers' rights and an elected official receives a phone call, we get noticed. When thousands of us gather in Baltimore, Minneapolis, or Portland to enjoy beer we made in our own kitchens and geek out on enzymes, we get noticed. When a consumer who always thought about homebrewing but never quite got around to it sees an AHA Member Deals decal in the window of a new brewery, we get noticed.

I bring this up because it's once again time for *Zymurgy*'s Best Beers in America survey. Viewed superficially, Best Beers might seem like another beer popularity contest, and heavens to Betsy if we don't have enough of those already. If you keep track of your commercial beers on an app or submit ratings to online databases, you might wonder why the annual AHA survey is relevant. After all, when then editor-in-chief Ray Daniels launched the first *Zymurgy* poll in 2003, American beer looked much different than it does today, as did the technology with which we evaluate it.

The *Zymurgy* survey remains important because it's not about convincing each other that beer A is better than beer B—we already understand that the best beer



is the one you've lovingly brewed at home. Instead, it's about showing the world that homebrewers matter. Stay with me.

Best Beers is one of the AHA's top media stories every year. In 2017, it generated more traffic than any other piece on our website. The results of the survey have been covered by MSN, CNBC, Business Insider, *Food & Wine*, the *Chicago Tribune*, and the National Beer Wholesalers Association, in addition to countless beer blogs and beer forums. It's one of the top ways that AHA members get noticed.

The *Zymurgy* survey is unique because it's more than a popularity contest: it represents the informed opinions of educated homebrewers like you. If you look back at the last 15 years of results, it's obvious that our tastes and preferences tend to remain more stable over time than those of the broader population. We evaluate commercial beer less on rarity and trade value than we do on what the brewer has achieved in the glass.

I invite you to vote for your favorite beers today at [HomebrewersAssociation.org/zym-best-beers](http://HomebrewersAssociation.org/zym-best-beers). Your opinion matters. It's time to get noticed.

**Dave Carpenter is editor-in-chief of *Zymurgy*.**



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WALL  
STAINLESS  
STEEL  
ENGINEERING  
BETTER BEER



# zymurgy

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### Historical British Ales

AHA member and Zymurgy contributor Steve Ruch set out to re-create some British recipes of yesteryear.

*By Steve Ruch*

To read this special, members-only online feature,  
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Find these homebrewing recipes and more on our website @ [HomebrewersAssociation.org/homebrew-recipes](http://HomebrewersAssociation.org/homebrew-recipes)



## >> GET THERE!

### 14TH ANNUAL SWEETWATER 420 FEST

For three days in late April, Centennial Olympic Park in downtown Atlanta will host the 14th annual SweetWater 420 Fest, a Southern-style hootenanny of live music, craft beer, and environmental sustainability. The 2018 live act lineup includes headliners Umphrey's McGee, Tedeschi Trucks Band, and Sturgill Simpson, plus an additional 40-plus performers spread across three stages. Expect everything from jam and alternative to hip-hop and EDM. Festivalgoers with two left feet will be delighted to know there are also comedy acts.

Oh, yeah!—there's also some beer to be had. Last year's 420 Fest featured SweetWater Brewery stalwarts like 420 Extra Pale Ale, SweetWater IPA, Hop Hash session IPA, and Blue blueberry wheat, as well as collaboration beers, cask ales, barrel-aged creations, and cellared specialties.

A general-admission ticket good for all three days of the festival is \$138, while the \$392 VIP "Big Fish" gets you an exclusive area at the main stage and up to five beverages with discounted drinks thereafter. A cornhole tournament rounds out the festivities and raises funds for local charity organizations.

For more information, head over to [sweetwater420fest.com](http://sweetwater420fest.com).

#### March 3

#### 2nd annual Biere de Femme Festival

Raleigh, NC

[bieredefemfest.com](http://bieredefemfest.com)

#### March 17

#### 8th annual Suwanee American Craft Beer Fest

Suwanee, GA

[suwaneebeefest.com](http://suwaneebeefest.com)

#### March 23–April 1

#### Central Coast Craft Beer Fest

Atascadero, CA

[centralcoastcraftbeefest.com](http://centralcoastcraftbeefest.com)

#### March 24

#### Honolulu on Tap

Honolulu, HI

[americaontap.com/event/honolulu-on-tap](http://americaontap.com/event/honolulu-on-tap)

#### March 31

#### Poudre Pour

Fort Collins, CO

[poudreheritage.org](http://poudreheritage.org)

#### April 6–7

#### Great Vegas Festival of Beer

Las Vegas, NV

[greatvegasbeer.com](http://greatvegasbeer.com)

#### April 20–29

#### Pittsburgh Craft Beer Week

Pittsburgh, PA

[pittsburghcraftbeerweek.com](http://pittsburghcraftbeerweek.com)

#### April 21

#### Hogtown Craft Beer Festival

Gainesville, FL

[hogtownbeefest.com](http://hogtownbeefest.com)

#### April 27–28

#### Newport Craft Beer Festival

Newport, RI

[newportcraftbeer.com](http://newportcraftbeer.com)

For more craft brewing events, go to [CraftBeer.com](http://CraftBeer.com)

## >> BEER TRAVEL BREW AND STAY ON LAKE MICHIGAN

The Hotel Saugatuck in Saugatuck, Mich., has teamed up with Saugatuck Brewing Company (SBC) to offer guests a weekend of brewing. Book the Brew and Stay package at Hotel Saugatuck, and you'll get a brew-on-premises experience at SBC as part of your stay. Guests will receive use of brewing equipment, personalized instruction, and ingredients for a batch of about 72 22-ounce bombers. To learn more, visit [thehotelsaugatuck.com](http://thehotelsaugatuck.com).



Photo © Dae Vann (SweetWater 420 Fest);  
courtesy of The Hotel Saugatuck

## >> VOTE FOR BEER!

It's time to vote for members of the American Homebrewers Association Governing Committee (AHAGC). The AHAGC guides AHA staff to ensure that member dues support the programs, products, and services that benefit you most. From suggesting Zymurgy content to National Homebrew Competition planning, the GC provides a crucial link between AHA membership and personnel. Log on to [HomebrewersAssociation.org](http://HomebrewersAssociation.org) to read candidate statements and cast your votes for members of the AHA Governing Committee. The GC election closes March 31, so vote today and make your voice heard.



It's also time for *Zymurgy* readers to name the best commercial beers in America. Last year, Bell's Two Hearted Ale topped Pliny the Elder's eight-year occupation of the top spot. Who will be number one in 2018? Navigate over to [HomebrewersAssociation.org/zym-best-beers](http://HomebrewersAssociation.org/zym-best-beers), sign in, and choose one to five commercial beers that you think deserve recognition. Voting ends March 20, and all members casting votes are entered in a drawing for fabulous AHA merchandise.

## >> HOLD MY BEER



### THE HALF PINT

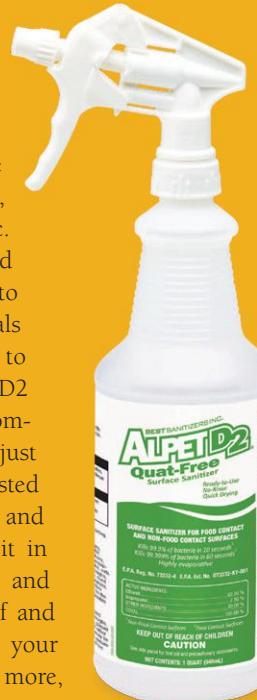
Sometimes you want a beer but just a half pint. For these occasions, we give you the clever Half Pint Glass. Sure, you could just use a smaller glass to begin with, but this is a much better conversation starter. Each Half Pint Glass holds half an imperial pint, which is three-fifths of an American pint. Bonus!



## >> GREAT PRODUCT:

### ALPET D2 QUAT-FREE SANITIZER

The new alcohol-based Alpet D2 no-rinse sanitizer from Best Sanitizers works great on hard, non-porous surfaces like stainless steel, copper, aluminum, and plastic. It comes pre-mixed and ready to use—no need to measure and mix chemicals on brew day. According to the manufacturer, Alpet D2 kills 99.9% of the most common spoiling bacteria in just 10 seconds. It is NSF-listed and is kosher, pareve, and halal certified. Look for it in quart-sized spray bottles and 5-gallon pails for yourself and in 50-gallon drums for your homebrew club. To learn more, visit [bestsanitizers.com](http://bestsanitizers.com).



## >> GREAT BOOK:

### 6 O'CLOCK BREWS



Peter Symons

In his previous book, *Bronzed Brews*, author and Homebrew Con 2017 speaker Peter Symons discussed Australian brewing from the early 19th century to the 1970s. Now, in *6 O'CLOCK Brews*, he continues the story. Drawing on historical brewing records from Tasmania, Western Australia, New South Wales, and South Australia, Symons delivers more stories from Australia's past, along with 54 recipes to re-create old beers.





# Select Ingredients



BSG  
Select Ingredients

[bsgcraft.com](http://bsgcraft.com)

By Gary Glass



# AHA Governing Committee Election

It's time to vote! The AHA Governing Committee election ballot is open on HomebrewersAssociation.org for AHA members to cast their votes through March 31, 2018.

The members of the Governing Committee play a critical role for your association by acting as a conduit between local homebrewing communities and the AHA, providing guidance for the AHA staff, and making decisions about the future course of your association.

Fourteen candidates are vying for five open seats. Please review the candidate statements found on HomebrewersAssociation.org

under the Membership section and linked from the Governing Committee pages, and then cast your vote for the candidates you feel will best represent the members.

My sincere thanks go to our outgoing Governing Committee members Drew Beechum, Chip Walton, and Kim Wood. Drew is term-limited and ineligible to run in 2018. Chip and Kim are voluntarily opting not to run due to personal time constraints.

Drew Beechum has served on the AHA Governing Committee since 2007, including multiple stints as vice chair. You are likely familiar with Drew

from his contributions as an author for Zymurgy magazine and from the *Experimental Brewing* podcast he co-hosts with fellow Governing Committee member Denny Conn. Drew's longtime involvement with the Maltose Falcons homebrew club (the oldest club in the country), along with his participation in multiple online homebrewers' forums (he's a volunteer moderator on the AHA Forum), mean that he is very well tied into the homebrewing community. His insight has been invaluable in his time on the Governing Committee. The AHA Radegast Homebrew Club of the Year Award was Drew's brainchild, which he originally proposed as the Awesome



## American Homebrewers Association® 2018 Governing Committee Election

Your AHA Governing Committee develops member benefits and programs  
and provides direction for the future of the organization.

### PLEASE CAST YOUR VOTE TODAY!

All ballots must be submitted before midnight Pacific time, March 31, 2018

#### Candidates

Please cast your vote today at [HomebrewersAssociation.org/vote](https://HomebrewersAssociation.org/vote).

For the 2018 election, there are fourteen candidates running for five open seats.



Jen Blair



Debbie Cerdá



Greg Burt



Sandy Cockerham



Shawna Cormier



Kevin Dill



Todd Fulton



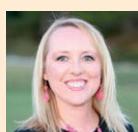
Michael Fry



Chris Hummert



Josh Ratliff



Erin Sasse



David Schumacher



Derek Springer



Elmer Steingass

Club of Awesomeness Award. Drew is also one wicked smart dude and, as far as I know, the only Governing Committee member to ever be a contestant on *Jeopardy!*

Chip Walton has served on the Governing Committee since 2015. Chip is well known within the homebrewing community through his *Chop & Brew* web show and past involvement with *Brewing TV*. Chip has been a tireless promoter of the AHA, and I know he will continue to

help spread the word about how the AHA serves the homebrewing community.

Kim Wood was originally elected in 2014 and has served as secretary of the Governing Committee since 2016. Kim has brought a unique perspective to the Governing Committee meetings and has often pointed out new ways of looking at the issues we've discussed. She's also extremely well organized, which has helped with the challenging task of managing the Governing Committee elections.

I will miss having Drew, Chip, and Kim on our monthly Governing Committee calls and at the annual in-person meeting at Homebrew Con, but I know we can count on their continued support. All three will continue to serve on various Governing Committee subcommittees. I also look forward to working with newly elected Governing Committee members—they always bring fresh perspectives.

Now, go vote! It won't take much time and you can come back to read all the super important things I've written below after you've completed your homebrew citizenry duty.

## AHA Advertising & Sponsorship Policy Change

Last year the American Homebrewers Association's parent organization, the not-for-profit Brewers Association (BA), whose purpose is "to promote and protect American craft brewers, their beers and the community of brewing enthusiasts," launched an independent craft brewer seal and a social media campaign promoting brewery independence. The goal of these efforts is to help beer lovers like you and me differentiate between independently owned breweries and those owned by large brewing conglomerates, such as Anheuser-Busch InBev (ABI).

In 2017, the BA ceased taking sponsorships from Big Beer-owned businesses for the Great American Beer Festival®. This year, the AHA is expanding upon this policy by no longer accepting advertising or sponsorship dollars from Big Beer-owned businesses. This means you will no longer see ads in *Zymurgy* from ABI-owned businesses like Goose Island and Northern Brewer/Midwest Supplies, or from Ballast Point, which is owned by Constellation Brands.

As a not-for-profit association, the AHA runs on a lean budget, and advertising and sponsorship represent our third-largest source of revenue behind member dues and event registration. Thus, limiting any source of revenue is not a decision we take lightly. In the interest of supporting independent breweries, we feel it is the correct decision to cease displaying advertising and sponsorship from Big Beer-owned businesses in our publications and events.

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I hope that you agree with this decision and continue your support for the AHA by renewing your membership before your next expiration date.

### **Radegast Club of the Year Award**

As mentioned, the Radegast Club of the Year Award is all about showcasing what makes homebrew clubs awesome.

March 31 is the deadline for submitting a club nomination in the fifth annual Radegast Club of the Year Award. Don't miss this opportunity to share with the world just how awesome your homebrew club is. Entries can be submitted via the nomination form in the Community section of HomebrewersAssociation.org.

Through your nomination, you can tell us what your club does to promote the hobby, educate your members, support your community, have fun, etc. The nomination form allows uploads of documents, PowerPoint presentations, videos, or whatever other materials you have to support your submission.

Entries will be judged by members of the AHA Governing Committee. The winner of the 2018 Radegast Club of the Year Award will be announced June 30 at the AHA Homebrew Con in Portland, Ore.

### **Homebrew Shop of the Year Award**

For most of us, the local homebrew supply shop is the focal point of our local brewing community. Local shops are also where most homebrewers get their start in the hobby. As such, those shops and their owners play a vital role in keeping homebrewing alive and well. The AHA wants to highlight the contributions homebrew shops make to homebrewing and their local communities with a new Homebrew Shop of the Year Award.

For this award, we want to hear from you, the AHA member. Does your local shop go above and beyond to support local homebrewers and promote homebrewing? Are the staff knowledgeable and helpful? Please consider giving that shop some recognition by submitting a nomination for the Homebrew Shop of the Year Award at

[HomebrewersAssociation.org/ShopAward](http://HomebrewersAssociation.org/ShopAward).

### **Homebrew Con 2018**

Registration for Homebrew Con Portland, which takes place June 28–30 at the Oregon Convention Center in Portland, aka Beervana, opens March 6. This is the 40th annual Homebrew Con and the first time in 20 years that Homebrew Con will be in Portland. It's going to be epic!

This year's Homebrew Con includes 60 different speaker sessions to choose from.

We'll video record all the sessions and post them as AHA members-only content on HomebrewersAssociation.org after the conference. The speakers list is chock-full of some of the most recognized names in homebrewing and craft brewing, so this is your chance to rub elbows with some beer celebrities (unlike Hollywood celebrities, beer celebrities are really nice people who will be happy to talk to you).

The annual Craft Beer Kickoff Party on Thursday night features a vast selec-

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JUNE 28-30  
PORTLAND, OR

tion of beers from local craft breweries. On Friday night, homebrew clubs from around the continent will showcase their best brews from creatively decorated booths during Club Night. Throughout Homebrew Con, you can visit the Homebrew Expo, where nearly 100 different vendors will show off the latest ingredients, homebrew equipment, and more, and within the expo hall is the Social Club, where a rotating list of homebrew clubs share their beers with attendees.

Throughout Homebrew Con week, you can check out locally organized events for Homebrew Con attendees taking place at many of Portland's amazing breweries and beer bars.

Homebrew Con includes final-round judging of the AHA National Homebrew Competition (NHC), as well as the NHC awards ceremony, where we'll announce the best of the best homebrewers. Homebrew Con concludes with the Knockout Party, featuring prize drawings (all registered attendees are automatically entered), tasty noshes, and, of course, beer.

Homebrew Con is the most fun event any homebrewer could possibly imagine. Check out the video on HomebrewCon.org to get a small taste. Space is limited, so be sure to register early!

### Festival de la Cerveza Artesanal

This past December, I was graciously invited to speak at the 10th annual Festival de la Cerveza Artesanal in La Plata, Argentina, organized by Somos Cerveceros, Argentina's national homebrewers association. This is the Argentine equivalent of Homebrew Con.

Argentina has a fast-growing homebrewing scene and some very talented homebrewers, many of whom are making the leap to pro and opening their own breweries. They also face some challenges; for example, malt extract and liquid yeast are unavailable to Argentine homebrewers. Probably the greatest challenge is that there are not many Spanish-language resources available to homebrewers. That absence led the AHA to start publishing Spanish translations of Zymurgy magazine last year for our growing membership in Latin America.



The Festival de la Cerveza Artesanal included seminars, exhibitors, and nightly beer-filled events. Of the ten seminars, five were by speakers from the US, including Pete Slosberg of Pete's Wicked Ale fame, Kara Taylor from White Labs, Michael Fairbrother from Moonlight Meadery, Scott Bickham from the Beer Judge Certification Program, and me.

Nightly events included a beer dinner; a craft beer festival on the banks of the world's widest river, the Parana River; and my favorite event, an outdoor barbecue, where they roasted a whole cow over hot coals while sharing homebrew and listening to a metal band. The whole experience reinforced my belief that homebrewers are the same all over the world (*son los mismos en todo el mundo*): friendly, sharing, enthusiastic people.

Muchas gracias a Somos Cerveceros for making me a part of their event and for their amazing hospitality!

Until next time, happy homebrewing!

**Gary Glass is director of the American Homebrewers Association.**





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# Anonymous Minimalist

Dear *Zymurgy*,

The Jul/Aug 2017 issue had an interesting article called “Follow the Path to Minimalist Homebrewing” that piqued my interest. I have been brewing for about four years and, like most homebrewers, I have upgraded my brewing system over time. Normally, it is no problem to whip up a 15-gallon batch of homebrew to get me through winter. However, due to job location, I do not currently have the luxury of openly homebrewing.

In an effort to remain anonymous, I am going to keep this vague. I currently work in a country in which the US military has a presence, and one isn’t allowed to have any type of alcohol. I could get in trouble for having beer. After reading the minimalist brewing article, I decided to relax, not worry, and have a homebrew. I quickly ordered some dried malt extract (DME), hops, yeast, 6 feet of tubing, a 5-gallon food-grade bucket, and an orange beverage cooler.

Brew day was much quicker than normal. I filled the cooler with boiling water from an electric teakettle, stirred in the DME, and made two hop additions with a 2" metal tea ball. I created a blow-off valve in the cooler by drilling a hole and inserting a length of hose that ran out to a half-filled water bottle. After removing the second hop addition, I sealed the cooler and let it rest overnight to cool before I added the yeast. Twenty-one days later, I siphoned my beer into the food-grade bucket and bottled with some corn sugar. As I sit here and type this, I am enjoying an ice-cold beer.

This is a very simple setup, and many people are probably pulling their hair out because there was no hour-long boil or rapid cooling. Either way, I have beer to



drink. The minimalist brewing method was very exciting to me and reminded me of the days when I first started. I just wanted to thank you for the article and remind everyone that it doesn't take much to make delicious beer.

Cheers,  
Anonymous Brewer



### Get a Grip

Dear *Zymurgy*,  
I've been a member and reader for years, and I've enjoyed seeing the creative member labels. I thought you might consider a similar feature for homemade tap handles. I suspect many brewers are crafty and have developed some interesting designs beyond the plastic stick.

I humbly submit the attached as an example. I turned the shaft from Pacific madrone wood, the grip is a stack of sanded wine corks, the rings are polished slices of aluminum tubing, and the vintage reel is courtesy of my uncle Peter, RIP.

Cheers!  
Mike Kotecki  
Brookfield, Wis.

### Gadget Pro

Dear *Zymurgy*,  
Thanks to Joe Darden for the mention in the homebrew gadgets article (Jan/Feb 2018). Our wort sample chiller was inspired by the heritage of our home, Franklin County, Virginia, also known as the moonshine capital of America. We have the infamous honor of having had the single largest moonshine bust in ATF history.

Joe was the best-of-show winner at the first Star City Brewers Guild Invitational Throwdown Competition in 2015, with an imperial stout aged in a red wine barrel. He brewed it with us on our 7-barrel pilot system, and it was released for distribution on draft! It was appropriately named Ink.

Having started as a homebrewer in 1996, I still enjoy reading *Zymurgy* for inspiration. Keep up the good work!

Sincerely,  
Joseph Hallock  
Owner, Chaos Mountain Brewing, LLC  
Callaway, Va.



### Of Cats...

I love the brew dog pictures in *Zymurgy* but you need some brew cats, too. Here are a couple of pictures of my brew cat Rocky. In the first picture, he's supervising the whole affair. In the second picture, he's inspecting my sanitation bucket.

Cheers,  
Gray Maxwell  
Office of Senator Ben Cardin, D-Md.  
Washington, D.C.



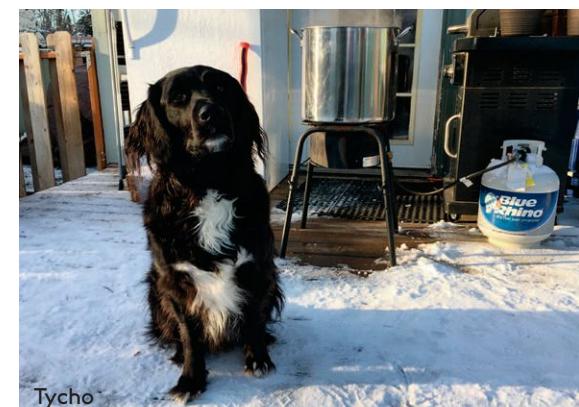
My cat Ollie loves to read your magazine when we are between brews. He likes to get ideas for recipes from articles and pictures. Thanks for all the good stuff!

Star Woodward  
Richmond, Calif.



So many brew dogs—how about a brew cat? Autumn says, "Happiness is a warm mash tun!"

Ed Myers  
Boulder, Colo.



**...and Dogs**  
Tycho is a four-year-old flat coat retriever mix who loves winter brew days in Alaska. He's always ready to sample

the grain selection and sniff the wort throughout the process. He's also an excellent grain vacuum when we spill during cleanup!

C. Dylan Lewald  
Anchorage, Alaska



I love seeing all the pictures in Zymurgy of faithful canine brew mates. This is Winston. He is a larcenous nine-year-old bulldog and reprobate spent-grain pilferer. Be warned that he spends his free time slinking around homebrew club meetings looking for his next mark and will stop at nothing to sate his ravenous appetite.

Valton Pichette  
Gardena, Calif.



These are my Goldadors, Strider and Garth. Their favorite part of brew day is the chill, during which they try to snitch some of my ice when I'm not looking. I think Strider wants to do quality control because I always catch him licking the drip tray on my keezer!

John Hornberger  
Bradenton, Fla.



This is our faithful mascot Kylie. She is a purebred Aussie that we got from a rescue shelter (she likes to bite). Every brew day, she guards the mash from all threats real and imaginary.

Ron Richardson  
Birmingham, Ala.

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By Professor Surfeit



## Gas Is Gas. Or Is It?

Dear Professor,

Our local newspaper recently had an article about a local gas distribution company that formed a special division to supply gases to area breweries. According to the article, "beer's not beer without [the] right gas." I've not heard this before. I use sugar to provide the effervescence for bottles and CO<sub>2</sub> when I keg. I am aware there are a few beers—Guinness, for example—that use nitrogen. If I remember my chemistry correctly, CO<sub>2</sub> is a colorless, odorless gas. Doesn't that make it tasteless too? Is there something to the article or is this just marketing hype?

John Landen  
Springboro, Ohio

Hello John,

You nailed it. I read your attachment with the article, which quoted a sales representative for the company as saying, "Beer becomes beer when oxygen hits the yeast. And that's when it creates the aroma, the smell, the flavor. And that's when beer is actually beer, when gas is supplied to it."

A gas company salesperson isn't necessarily the person I'd turn to for accurate information about beer brewing, unless they were a homebrewer. The first suggestion I'd have for that gas company is to hire an on-staff homebrewer if they are going to market to brewers.

CO<sub>2</sub> is a colorless and odorless gas. But, when dissolved in beer, CO<sub>2</sub> interacts with water (H<sub>2</sub>O) to form carbonic acid (H<sub>2</sub>CO<sub>3</sub>). Acids contribute a sour sensation that you can taste. Usually, beer drinkers don't talk about the taste of CO<sub>2</sub>, but it does contribute to the flavor of what most people associate with beer.



has been "nitrogenized." Nitrogen isn't very soluble in liquids, so any effervescence you feel on the tongue is actually from the small amount of carbon dioxide such beers have. The nitro beer won't have as much of the acid complexity that CO<sub>2</sub> contributes, and the flat beer will have virtually none at all.

About that marketing hype: don't believe that part about oxygen hitting the yeast to make beer. Although you could stretch an argument to justify that statement, it is obviously misleading.

Good beer,  
The Professor, Hb.D.

### Degrees of Difference with Gluten-Reduced Beer

Dear Professor,  
In the Nov/Dec 2017 issue of Zymurgy, you replied to a question from Sara



Steve Ruch with his homebrewed creations.

Heath about the effect that Clarity Ferm has on beer. You stated that it "doesn't seem to affect head retention, aroma, flavor, or mouthfeel."

I respectfully disagree. In the Sept/Oct 2016 issue, the picture on page 37 (shown on previous page) clearly shows a difference in a batch I brewed that was half Clarity Ferm-treated and half Clarity Ferm-free. There was a difference in the two final gravities,

with the untreated batch exhibiting a fuller body and the treated beer having a slightly subdued hop character.

The taste and mouthfeel differences are somewhat subjective, so maybe they were at least somewhat wishful thinking, but the picture clearly shows a difference.

Respectfully,  
Steve Ruch  
Vancouver, Wash.



Hi Steve,  
Your picture tells a story. I've heard, too, from a knowledgeable beer friend that he sometimes prefers Clarity Ferm reduced-gluten beers because they are a bit lighter in body.

My own experience using Clarity Ferm (enzymes to reduce gluten protein) has been very good, yielding beer with excellent foam retention and stability. I have to admit I have not split a batch of beer in half and evaluated for differences. If you go down that path, you really need strict and absolutely flawless quality control. Also, before reaching conclusions, one would have to be able to repeat the exact same results, and that's hard to do as a homebrewer because repeating means much more than just duplicating the recipe. Water quality and pH would need to be identical, as would many other factors too numerous to go into here.

Theoretically, there should be reduced chill haze and, thus, more clarity to the beer. When our eyes see protein haze, that can send misleading signals to our brains that make us anticipate fuller body and mouthfeel. However, all the brewing literature I've ever read tells me that protein haze does not contribute to body or mouthfeel.

I think your approach and conclusions are heading in the right direction. If it mattered that much, brewing scientists would be exploring. But, as you mentioned, the beer is excellent and offers an opportunity for millions of people to enjoy beer who might not otherwise be able to.

For me, I'm not comparing. I just know that I'm very happy with my beers, both gluten-reduced and full-on with gluten.

Stay thirsty,  
The Professor, Hb.D.

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*Amoretti*

By Amahl Turczyn

# American-Style Black Ale

**W**hat's in a name? Finding the origins of this relatively new spin on India pale ale can be a dark, murky affair, but there are several theories. Some say the late, great Greg Noonan brewed the first example. In fact, Smuttynose Brewing calls its Noonan Black IPA a "New England original" that "originated in 1994, in Burlington, Vt., by brewer Glenn Walters and under the watchful eye of Greg Noonan." Noonan's and Walters' joint effort became what is (usually) now called *black IPA*.

Others claim it was John Maier of Rogue Ales in Newport, Ore., who brewed the progenitor of the new style, a 9.2% ABV black version of his Brutal Bitter IPA. This was made as a special release for the 2003 Oregon Brewers Festival. He dry hopped the beer with Amarillo and dubbed it Skull Splitter, although Scotland's Orkney Brewery was already brewing a wee heavy by the same name.

Still others say Matt Phillips was the father of this hopped-up black beer. Owner of Phillips Brewing in Victoria, B.C., he brewed an ale called Black Toque and called it an *India dark ale*. This beer inspired homebrewer and beer writer Abram Goldman-Armstrong, now owner of Cider Riot in Portland, Ore., and his friend Bill Wood to campaign for a new style, which Wood called *Cascadian dark ale*. The name refers to the proposed region of Cascadia, which centers on the Cascade Mountain Range and includes British Columbia, Washington State, Oregon, western Idaho, and northern California.

Then Widmer Brewing won a gold medal at the 2009 Great American Beer Festival® (GABF) for its W-10 Pitch Black IPA. This sparked several more Pacific Northwest



breweries to begin making their own interpretations. In 2010, Goldman-Armstrong gathered several writers and brewers, including Rob Widmer, to discuss the style at Portland's Belmont Station bottle shop. The group wanted to define style guidelines and submit them to the Brewers Association (BA) and Beer Judge Certification Program (BJCP) for inclusion as a new style. They suggested Cascadian dark ales have prominent Northwest hop aromas that focus on resinous pine and citrus, with sweet caramel flavors and mild chocolate or coffee to balance.

Meanwhile, the style continued to gain a following in Cascadia, with brewers like Deschutes' Larry Sidor releasing Hop in the Dark after extensive research and development. Deschutes brewed 22 test batches in its Bend and Portland locations and asked customers for feedback on which combinations of malt and hops worked best. They eventually settled on a blend of oats, dark Munich, and crystal malts accompanied by Cascade, Citra, and Centennial hops.

Sidor and others recognized that there was a potential for black malt and roast flavors to clash with hops rather than form a harmonious whole. Brewers began favoring debittered black malts like Carafa over black patent and roast to reduce grain bitterness and astringency—this was not, after all, stout or porter.

Other regions were picking up the style too. Stone Brewing in San Diego released its Sublimely Self-Righteous Ale, by rights an imperial black IPA at 9% ABV. Michigan's Founders Brewing came out with Dark Penance imperial black IPA, at 8.9% ABV, which used Midnight Wheat malt to provide color with minimal grain bite. Utah's Uinta Brewing produced an imperial black IPA called Dubhe that included hemp seed and checked in at 9.2% ABV. And Indiana's Three Floyds joined forces with Real Ale Brewing of Texas and Surly Brewing of Minnesota to concoct the 9.99% ABV Blakkr imperial black IPA, made with oats and Carafa Special, and hopped with Simcoe and

Centennial. With so many regions hopping onboard, the style no longer seemed like a Pacific Northwest-only phenomenon, and the Cascadian moniker began to lose favor.

Still, advocates of Cascadian dark ale (CDA) maintained that there was a difference between their beer and black IPA (BIPA). CDA supposedly offered a smoothness that BIPA did not: if you closed your eyes, they said, and took a sip of a true CDA, you wouldn't know it was dark. It would just taste like any other IPA, with citrus and pine hops and perhaps a mysterious herbal hint of wintergreen, spruce, or mint. Black IPA, on the other hand, was most definitely a black-tasting beer with a harsher edge.

Someone had to step in—these beers were growing too popular to ignore. In 2010, the BA adopted American-Style India Black Ale as an entry category in its GABF style guidelines. The follow-

ing year, India was dropped and the name changed to American-Style Black Ale, which it remains today. Bartenders likely applauded this change, as well as the decision not to go with India Dark Ale—imagine trying to distinguish “I’ll have an IPA” from “IBA” or “IDA” in a noisy taproom. In the past five years, the majority of entries that have medaled in this category have been black IPAs.

Craft brewers are, of course, free to continue producing spins on the style, blissfully calling it whatever they want to, but the current GABF guidelines place some boundaries on the category if it’s to be entered for competition. Low to medium caramel malt and dark roasted malt flavors are fine, but “astringency and burnt character of roast malt should be absent.” Medium-high to high hop aroma, flavor, and bitterness (50 to 70 IBU) should be perceived, with no restrictions on the type—“hops of all origins” are acceptable. Color is “very dark to black,”

alcohol in the 6.3 to 7.6% ABV range, and color 53 SRM or more. That said, several medalists in the category since 2011 have won with black IPAs possessing alcohol in excess of 7.6% ABV.

The BJCP also decided not to adopt the Cascadian dark name, and they didn’t appear to be bothered by the apparent contradiction of a black pale ale. They adopted black IPA into their 2015 style guideline update as 21B Specialty IPA. As such, it wasn’t even granted Style Knighthood—specialty IPAs are competition entry categories rather than distinct styles. To deal with the aforementioned issue of 6% ABV BIPAs being judged against 8% ABV BIPAs, the organization mandated that entrants specify a strength classification of Session (3 to 5% ABV), Standard (5 to 7.5%), or Double (7.5 to 10%) for competition. Stats are pretty much in line with BA guidelines, with 50 to 90 IBUs allowed, a lower color threshold of 50 to 90 SRM, and help-

## AMERICAN-STYLE CASCADIAN INDIA DARK DOUBLE BLACK IPA (ASCIIDDBIPA)

**Batch Volume:** 5.5 U.S. gallons (20.8 L)

**Original Gravity:** 1.070 (17° P)

**Final Gravity:** 1.010 (2.5° P)

**Bitterness:** 75 IBU

**Color:** 28 SRM

**Alcohol:** 7.8% by volume

### MALTS

**11 lb.** (4.99 kg) pale 2-row malt

**1 lb.** (454 g) corn sugar

**12 oz.** (340 g) 525° L Carafa III

**12 oz.** (340 g) 80° L crystal malt

### HOPS

**1 oz.** (28 g) Columbus/Tomahawk/Zeus, 12% a.a. @ 60 min (33 IBU)

**1 oz.** (28 g) Cascade, 4.4% a.a. @ 10 min (4 IBU)

**1 oz.** (28 g) Centennial, 10% a.a. @ 10 min (10 IBU)

**1.5 oz.** (42 g) Chinook, 13% a.a. @ 5 min (10 IBU)

**1.5 oz.** (42 g) Cascade, 4.4% a.a., steep/whirlpool 20 min (5 IBU)

**1.5 oz.** (42 g) Centennial, 10% a.a., steep/whirlpool 20 min (12 IBU)

**3 oz.** (85 g) Cascade, 4.4% a.a., dry hop 3 days

**3 oz.** (85 g) Chinook, 13% a.a., dry hop 3 days

### YEAST

American/Chico ale yeast (2L starter)

### WATER

1 g/gal. calcium sulfate added to reverse osmosis or distilled water

### BREWING NOTES

Mash grains at 150° F (66° C) and allow to rest one hour. Apply heat or boiling water to increase temperature to 168° F (76° C) over 20 minutes. Hold at 168° F (76° C) for another 10 minutes to mash out. Sparge at 168° F (76° C). Boil 60 minutes. Chill to 65° F (18° C) and oxygenate. Pitch yeast starter. Ferment at 65° F (18° C) for two days, or until high kräusen, and then allow fermentation temperature to ramp up to 68° F (20° C) until terminal gravity is reached. Dry hop 3 days in primary at 68° F (20° C), rack to secondary, and package.

### EXTRACT VERSION

Substitute 8.5 lb. (3.86 kg) pale malt extract syrup for pale malt. Steep specialty grains in reverse osmosis water at 155° F (68° C) for 30 minutes. Then dissolve extract and sugar completely in reverse osmosis water and top off to desired boil volume. Proceed as above.

ful style comparison notes to distinguish them from other styles: “Overall impression of an American IPA...with restrained roast similar to the type found in Schwarzbiers. Not as roasty-burnt as American stouts and porters.” They still have to taste like an IPA, and strongly roasted or burnt flavors are out of character. Drinkability is important, and you can use any hops you want, as long as you use a lot.

So, armed with this often conflicting information and a tongue-in-cheek nod to all the regional claims and name waffling, we’re finally able to hammer together a recipe with a name that’s sure to please everyone.

Base malt can be anything really, so we’ll go with domestic two-row pale. Some may wish to trade a portion of that base malt for some Munich malt, but since we’re aiming for minimal malt intrusion, I’m going to stick with all pale malt colored with just enough Carafa to cross the minimum BJCP color threshold of 25 SRM. An equal amount of 80° L crystal malt should be enough to add sweetness and a bit of heft to stave off the anticipated hop madness. As a dry finish is also important, in keeping with West Coast IPA tradition, about 7 percent corn sugar should do the trick.

Hops are traditional Pacific Northwest “C” standbys, added mostly late, with lots of whirlpool and dry additions, to around 75 calculated IBUs. This is just outside the GABF guidelines’ maximum but well within the BJCP’s. We’ll go with gypsum-treated reverse osmosis water to really bring these out.

Good old American/Chico ale yeast will get the kind of attenuation necessary without introducing too many esters. To the same end, we’ll pitch relatively cool at 65° F (18° C) and let things warm up once we’re clear of high kräusen. Once attenuation slows, maintain the same temperature and dry hop for three days before racking and packaging.

Serve fresh, blindfolds optional.

**Amahl Turczyn** is associate editor of *Zymurgy*.

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# Ingredient Science

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# MALT

Effects of  
Barley Variety and *Terroir*  
on Beer Flavor



Compiled and edited by the editors of *Zymurgy* from work originally authored by Amanda Benson, Daniel Carey, Luis Cistue, Scott Fisk, Tanya Filichkin, Patrick Hayes, Laura Helgerson, Dustin Herb, Rebecca Jennings, Yueshu Li, Christopher Martens, Brigid Meints, Robert Monsour, Matthew Moscou, Andrew Nguyen, Aaron Onio, Ignacio Romagosa, Randy Thiel, William Thomas, Sean Tynan, Veronica Vega, and Kristi Vinkemeier.

**Barley has always played second fiddle to hops and yeast when it comes to flavoring beer. Now the grain is ready for its solo. In two studies published in the *Journal of the American Society of Brewing Chemists*, a research team led by Oregon State University (OSU) found notable differences in the taste of beers malted from barley varieties reputed to have flavor qualities.**

"We started this project with a question: Are there novel flavors in barley that carry through malting and brewing and into beer? This is a revolutionary idea in the brewing world. We found that the answer is yes," said OSU barley breeder Patrick Hayes. "These positive beer flavor attributes provide new opportunities for brewers and expanded horizons for consumers."

This project received funding from Bell's, Deschutes, Firestone-Walker, New Glarus, Russian River, Sierra Nevada, and Summit breweries. The Brewers Association, parent organization of the American Homebrewers Association, also contributed financially. Mecca Grade Estate Malting and OreGro Seed hosted the field trials.

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**Editor's Note:** This article is published under a Creative Commons BY 4.0 license with permission of the American Society of Brewing Chemists (ASBC) and offers a broad summary of research originally published in the *Journal of the American Society of Brewing Chemists*. To read the original articles and learn more about ASBC, please visit [asbcnet.org](http://asbcnet.org).

Herb, D., T. Filichkin, S. Fisk, L. Helgerson, P. Hayes, B. Meints, R. Jennings, R. Monsour, S. Tynan, K. Vinkemeier, I. Romagosa, M. Moscou, D. Carey, R. Thiel, L. Cistue, C. Martens, and W. Thomas. "Effects of Barley (*Hordeum vulgare L.*) Variety and Growing Environment on Beer Flavor." *J. Am. Soc. Brew. Chem.* 75, no. 4 (2017): 345-353. <http://dx.doi.org/10.1094/ASBCJ-2017-4860-01>.

Herb, D., T. Filichkin, S. Fisk, L. Helgerson, P. Hayes, A. Benson, V. Vega, D. Carey, R. Thiel, L. Cistue, R. Jennings, R. Monsour, S. Tynan, K. Vinkemeier, Y. Li, A. Nguyen, A. Onio, B. Meints, M. Moscou, I. Romagosa, and W. Thomas. "Malt Modification and Its Effects on the Contributions of Barley Genotype to Beer Flavor." *J. Am. Soc. Brew. Chem.* 75, no. 4 (2017): 354-362. <http://dx.doi.org/10.1094/ASBCJ-2017-4976-01>.

**B**arley, in its malted form, is the main source of fermentable sugars for most beers and some spirits. Malted barley provides an excellent source of nutrition for yeast and a suite of color and flavor properties. The range of malts available from base (e.g. Pilsen and pale) to specialty (e.g. Vienna, Munich, crystal, caramel) to roasted (e.g. chocolate, coffee, and roasted grains) offers the brewer a palette of potential flavors.

Because brewing relies on barley malt, rather than raw barley grain, flavor contributions to beer are usually ascribed to the malt rather than to the barley variety itself. A single barley variety can make a full spectrum of malts from pale to roasted, and more emphasis has traditionally been placed on the suitability of barley cultivars for malting than on their potential flavor contributions to the final product. Indeed, the variety of barley used to produce the malt rarely appears on a beer label. At most, the types and sources of malt might be featured.

### Barley Selection

Despite the general lack of barley visibility to beer consumers, potential barley varieties undergo extensive and rigorous assessment for agronomic and malting quality attributes prior to their release. In the United States, the American Malting Barley Association (AMBA) ensures recommended varieties meet their quality specifications. Comparable agencies are found in other countries where malting barley is an important crop.

Maltsters and brewers ultimately decide which recommended varieties will enter their value chains. Their decisions are based on a host of considerations, including a spectrum of malting quality parameters. These parameters, in turn, depend on barley variety genetics, production environment, and the malting regime.

Rarely do such considerations include contributions of the barley variety itself to beer flavor. Maris Otter and Golden Promise, both released in the 1960s, are notable exceptions. Even though agronomic performance and malting quality—in terms of specifications and yield—of these varieties is not at the same level as those of more recent varieties, they continue to be grown, malted, and used due to real, or perceived, contributions to the flavor of beers and/or spirits made from them. Occasionally, newer varieties such as Full Pint attract the interest of the craft malting, brewing, and/or distilling industries based on their perceived unique contributions to product flavor.

Barley production is largely driven by a desire to maximize productivity, consistency, and profitability across as extensive a geographic area as possible. This approach contrasts with the *terroir* concept, where growing environment is of paramount importance. Considerable progress has been made in characterizing contributors to *terroir* in terms of viticulture practices, winemaking practices, and environmental factors. However, *terroir* remains elusive in the beer industry. Only recently has the term appeared with refer-

ence to cereal grains and is now starting to affect the Scotch whisky and Irish whiskey markets.

### Designing the Test

To test the hypothesis that barley variety contributes to beer flavor, varieties reported to contribute unique flavors to beer (Golden Promise and Full Pint) were selected as parents, the parents were crossed, and 200 progeny were made from the cross. Beer flavor contributions were evaluated by sensory assessment of nano-beers made from micro-malts of the parental varieties, a sample of 34 of their progeny, and a malting variety standard (CDC Copeland) grown at three locations in Corvallis, Lebanon, and Madras, Oregon. The multi-location assessment allowed us to compare the relative importance of variety and location on sensory descriptors.

A pool of panelists was selected based on prior experience in beer sensory analysis. Panelists were further screened to determine their ability to identify specific compounds using triangle tests of diluted solutions of samples for basic taste (sour, sweet, bitter, and salty), dimethyl sulfide (DMS), and diacetyl. Selected panelists were trained on the reference beer and flavor samples to identify descriptors. Panelist performance was assessed after each tasting session to determine consistency.

Nano-beers were brewed using a “commercial” beer recipe developed by New Glarus and a research beer developed by

**Table 1: Selected crop management and climatic information for the three locations in Oregon where barley was grown for this experiment.**

Environment & Climate					Crop Management			
Location	Soil Type	Temp range (°C)	Precip (mm)	Day length (hours)	Planting date	Fertilizer rate (kg N/ha)	Irrigation	Harvest date
Corvallis	Woodburn silt loam	13.4–28.1	1,086	>15	Jan 31, 2015	81	No	Jul 6, 2015
Lebanon	Malabon silty clay loam	14.2–29.3	1,178	>15	Feb 17, 2015	44	No	Jul 7, 2015
Madras	Madras loam	12.3–29.7	309	>14	Apr 9, 2015	65	Yes	Aug 3, 2015



**Flavor Fields, Lebanon, Ore.**

Rahr Malting, and separate sensory assessments were conducted at those locations. At New Glarus Brewing, sensory experts used free-choice descriptive analysis during several blind tastings. At Rahr, the sensory assessment was based on comparison-to-reference descriptive analysis using 17 sensory descriptors: color, grainy, cereal, malty, toasted, toffee, honey, roasted, fruit, floral, grass, vegetable, chemical, sweetness, bitterness, astringent, and body.

Each sample was compared to a reference beer (Miller High Life) to characterize flavors and to estimate variability between samples. Miller High Life was used as the reference because it is a commercially available beer exemplary of an American lager with a consistent flavor profile. All brewing sessions included an internal control, Rahr Pils, which was made with Pilsner and crystal malts and Amarillo and Cascade hops.

### Sensory Results

Analyzing the sensory descriptor data confirmed that barley variety had a signif-

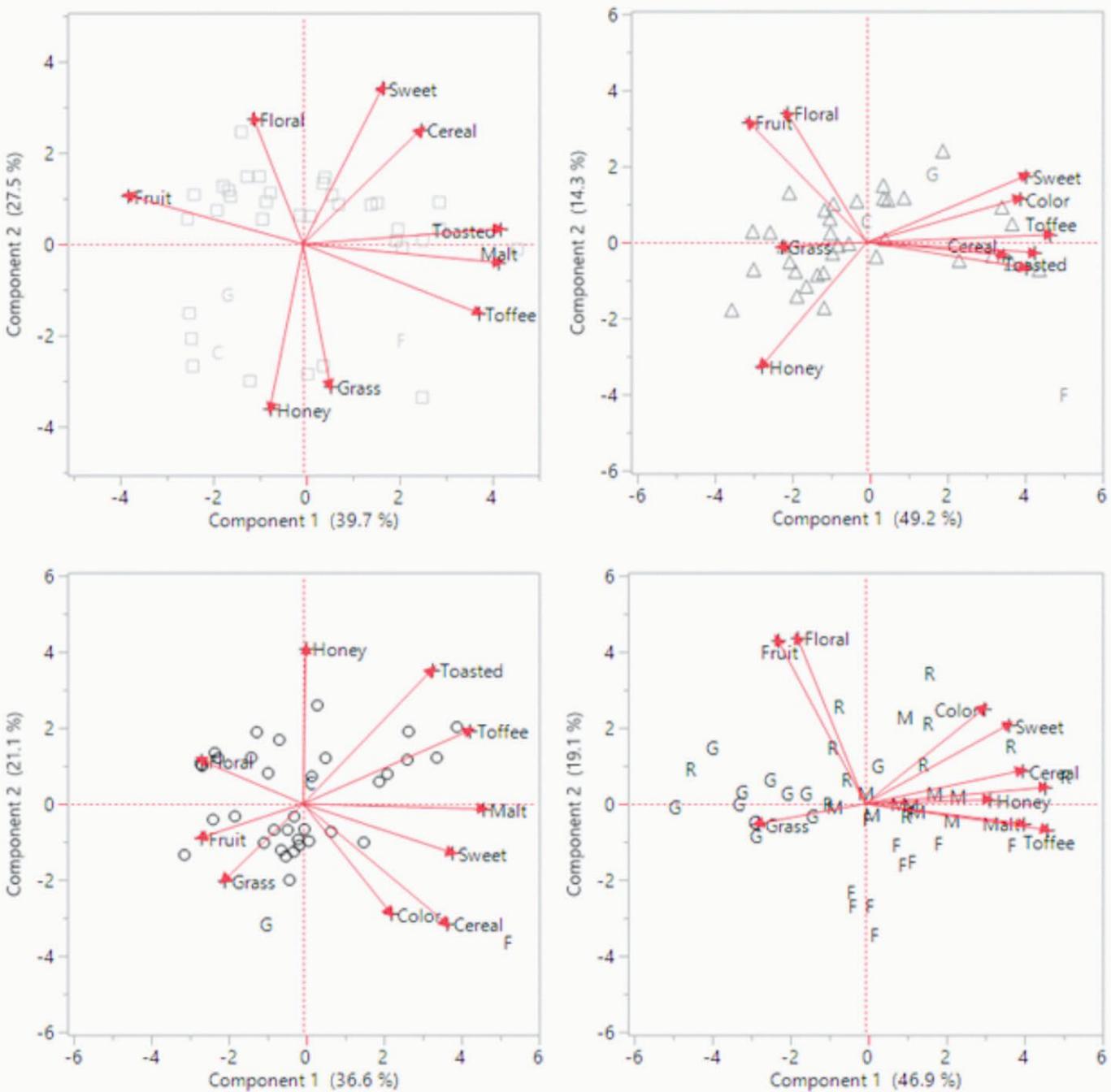
icant effect on beer flavor and that some sensory descriptors depended on growth environment. Keep in mind, though, that these results are based on research malts and beers that would not be commercially acceptable. Therefore, the flavor differences detected, and the significance of these differences, might be different if these malts had been optimized for each variety tested.

Golden Promise and a subset of its progeny were associated with floral and fruity notes, whereas Full Pint and another subset of its progeny were significantly higher for malt, sweet, toasted, and toffee descriptors. Miller High Life was neutral and relatively consistent across all sensory descriptors, thus proving its value as the reference beer for flavor difference assessments. Rahr Pils usually had the highest scores for all nine descriptors and therefore established an “upper limit” for flavors in a beer brewed using base malt, specialty malts, and hops. CDC Copeland was most similar to the Golden Promise

grown at Corvallis and the least associated with specific descriptors at Lebanon and Madras.

Descriptor relationships were similar across environments, with the highest associations among malt, toasted, and toffee vs. floral and fruit. Location effects were most pronounced for grassy and honey descriptors. Most sensory descriptors had the highest values at Corvallis, with notable exceptions being cereal and sweet. Offspring with values higher or lower than the parents were observed for all descriptors at Corvallis, for all descriptors except grass at Madras, and for all descriptors except cereal, grass, and honey at Lebanon. Minimum values for color, grass, honey, malt, sweet, toasted, and toffee observed in the progeny were significantly lower than the lowest values observed in the parents for those descriptors. Maximum values were significantly greater than the highest parent values for cereal at Corvallis and for honey, toasted, and toffee at Madras.

**Figure 1: Flavors consistently significant across three production environments in Oregon, USA (Corvallis, Lebanon and Madras) including parents and field check. Biplots: A, Corvallis (square) environment; B, Lebanon (triangle) environment; C, Madras (circle) environment; D, replicated sensory checks. G=Golden Promise; F=Full Pint; R=Rahr Pils; and M=Miller High Life.**



### Research Conclusions

Multiple lines of evidence generated by this research indicate that there are significant differences in beer flavor due to barley variety and that these differences have a genetic basis. There is also evidence that location contributes to beer flavor. The confirmation of flavor differences between nano-brews made from

Golden Promise, Full Pint, and CDC Copeland malts provides crucial evidence that barley variety can contribute significantly to beer flavor. This finding supports the popular perception that Golden Promise can contribute unique flavors to beer and the accumulating evidence that Full Pint can also make unique and significant contributions.

Comparing sensory descriptors across locations suggests that environment can also affect the flavor contributions of a barley variety. While these results are based on one year of data, this suggests that attributes of individual environments may promote specific flavors over others. These environmental factors include, but are not limited to, climate, soil type, irri-

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gation, nutrients, pest control, and other management practices.

Harvest and storage conditions—including moisture content, temperature, and timing—can influence the germination capacity of barley and therefore its suitability for malting and brewing. Harvest and storage conditions were standardized for these experiments to reduce them as sources of variation.

*Terroir* can be a marketing advantage for specialty malts and locally based maltsters, but it can complicate efforts to produce uniform malts from large quantities of barley sourced from multiple environments when the objective is to produce a consistent product. Whether or not the differences in sensory descriptors observed across locations in this study are intrinsic effects characteristic of these environments or are due to seasonal variation cannot be answered with the available data. However, based on these preliminary results a deeper

characterization and analysis of the role of environment in barley contributions to beer flavor seems warranted.

The coincidence of associations for malting quality and sensory traits at the same genomic regions suggests that flavor is not an intrinsic variety characteristic independent of malting but rather that flavor develops during malting. However, there does not appear to be a direct causal relationship between malting quality parameters and sensory descriptors.

For example, CDC Copeland had the “best” overall malting profile and yet was “flavor neutral.” The Golden Promise and Full Pint malting quality profiles did not meet AMBA specifications, yet these varieties had unique and distinct flavor attributes. A working hypothesis is that the genetic variation observed for differences in flavor contributions to beer is due to the quantity and composition of substrates, generated during steeping and germina-

tion, for the flavor-producing reactions that occur during kilning. Differences in degree of modification are reported to affect malt and beer flavor.

It is important to note that in the case of flavor, “positive” terms such as malty are not always a case of “more is better” and “negative” terms such as astringency are not always best when absent. Rather, a balance of flavors may be the goal. Experiments are underway engaging maltsters and brewers in larger scale pilot malting and brewing trials to validate the nano-brew results and assess the flavor attributes of selected Oregon Golden Promise offspring in commercial beers.

In summary, the results of these experiments show that barley varieties can contribute to differences in beer flavor and that these differences are not simply due to degree of modification of the malts used to produce test beers. Based on the results of this study and the inevitable



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challenges of malt-based research, genetic characterization of, and selection for, barley contributions to beer flavor may be possible even with under-modified malts.

Beer sensory profiling of a limited number of varieties, in contrast, will be most relevant when properly modified malts are made for each variety. In the final analysis, the contributions of barley variety to beer flavor—be

it a contemporary variety, an heirloom variety, or an exotic landrace—will likely be modest compared to the effects achieved by manipulating Maillard reactions in malting, using liberal amounts of hops with intense aromas, and brewing with different yeasts. Nonetheless, in certain beer styles and for some maltsters, brewers, and consumers, the barley contributions to beer flavor will be worth pursuing.

#### Nano-brewing at Rahr Malting Co.

Zymurgy's editors are grateful to the following researchers for allowing us to share their work with members of the American Homebrewers Association: **Dustin Herb, Tanya Filichkin, Scott Fisk, Laura Helgerson, Patrick Hayes**, Crop & Soil Science Dept., Oregon State University; **Brigid Meints**, Dept. of Crop & Soil Science, Washington State University; **Rebecca Jennings, Robert Monsour, Sean Tynan, Kristi Vinkemeier**, Rahr Malting Co.; **Ignacio Romagosa**, Agrotecnio, University of Lleida; **Matthew Moscou**, The Sainsbury Laboratory; **Daniel Carey, Randy Thiel**, New Glarus Brewing Co.; **Luis Cistue**, Estación Experimental Aula Dei; **Christopher Martens**, Cereal Crop Research Unit, USDA-ARS; **William Thomas**, The James Hutton Institute; **Amanda Benson, Veronica Vega, Andrew Nguyen, Aaron Onio**, Canadian Malting Barley Technical Centre.



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# HOPS

Revisiting the IBU



By Petr Novotný

**W**e all want to make great beer, even on the first attempt. To achieve such a goal, we must carefully develop and execute every recipe. Even with limited tools, often nothing more than kitchen scales, a hydrometer or refractometer, and a timer, we still want to be able to predict our results.

Our success depends on many calculations and experience with our equipment. Estimating beer bitterness is one of those calculations. The final bitterness of a beer, expressed in International Bittering Units (IBU), depends on many factors: the quantity of hops added, hop varieties used, boil duration, wort temperature, wort density, wort composition, and many others. Even losses to cold break and fermentation play a role.

Hop alpha acids and their products, iso-alpha acids, undertake an extraordinarily complicated journey from the hop cones to our glasses. In this article, I aim to describe this process in detail and demonstrate its relationship to the IBU calculations we use today, as well as to IBU calculations we might use in the future.

### What Is an IBU?

The IBU measures the concentration of iso-alpha acids that make up much of what we perceive as bitterness in beer. Iso-alpha acids are produced in hot wort from hop alpha acids through a chemical reaction called isomerization. By definition, 1 IBU is equal to 1 mg of iso-alpha acid per 1 liter of beer.

It is a mistake to strictly equate bitterness and IBUs because perceived bitterness includes many other contributions beyond the IBU itself, such as hop polyphenols, residual sugar, malt composition, and water chemistry. Nonetheless, a beer's IBU value correlates well with its perceived bitterness and thus remains a good parameter for developing a beer with a desired bitterness level.

One of the most commonly used IBU estimates is based on Glenn Tinseth's equation, which he published back in 1997.<sup>1</sup> Twenty years after this IBU milestone, today's hopping practices often differ wildly from those used in the late 1990s. Over the last two decades, several new hopping techniques have appeared and earned their place in the brewer's repertoire. Extensive late hopping, first-wort hopping, and whirlpool hopping are all common practice now.

Most of these techniques employ a considerable amount of hop material that is added at a temperature below the boiling point. By contrast, Tinseth's equation was developed for boil additions only; it is therefore less effective for these newer hopping techniques, at least without some adjustment.

Brewers typically deal with this reality in one of two ways. The first one is simple—sometimes you can ignore the contributions of no-boil additions or treat them as usual with the equation you already have. The second option is much more complicated and usually employs adjustment constants based on your experience and the recommendations of your choice of brewing software. Both approaches can work in some cases; unfortunately, both can fail in others.

### First-Wort Hopping

First-wort hopping (FWH) is the name for adding a large portion of the finishing hops to the boil kettle as the wort is run off from the mash tun or lauter tun. Hops remain in contact with hot wort longer than they would have if they'd been added at the start of the boil. One might, then, expect an increase in alpha acid utilization, but it's not that simple.

Utilization approaches its maximum at around an hour of boiling, which means that if a FWH addition is followed by a traditional boil of 60 minutes or longer, you can treat it as a regular 60-minute addition. But what if you don't follow traditional

practices? Many brewers like to experiment with timesaving measures, including shorter boils. With today's high-alpha hop varieties and late-hopping techniques, short boils often make sense. In these cases, the actual temperature conditions of FWH hops could significantly affect the final IBU value.

### Late Hopping

Late hopping involves adding a large portion of the hops within the last 30 minutes of the boil to retain greater hop aroma and flavor. Even during a short boil, the alpha acids still undergo significant isomerization, which increases the overall IBUs. You can simply calculate these contributions by the Tinseth equation. But doing so can be insufficient because it ignores the post-boil treatment of the wort. When massive late hopping is used, plenty of alpha acids can survive and further isomerize during cooling and whirlpooling.

### Whirlpool Hopping

Whirlpool hopping involves adding a large portion of the hops after the boil while the wort is still warm or hot. Whirlpooling practices differ from one brewer to another. Because of the lower-than-boiling temperature, the rate of isomerization of alpha acids decreases. If the temperature of the whirlpool is below 60° C (140° F), or the hop addition is small, you can pretty much ignore its contribution.

For many modern IPAs, though, the whirlpool hop addition is not small and cannot be ignored. New England IPAs, for example, are massively hopped in the whirlpool and achieve much of their bitterness after the boil. Some brewing software addresses whirlpool additions via a user-specified factor that expresses whirlpool utilization as a percentage of the same quantity of hops boiled traditionally. Perhaps you have the same question as I had: "How am I supposed to know which factor to use for all possible whirlpool conditions?"

The answer is simple: you can't! What works for an addition at 85° C (185° F) for 20 minutes won't work for an addition at 70° C (158° F) for 20 minutes, and so on. Therefore, you must rely on experience with your procedure and adjust according to your observations. Or, you must rely on the experiences of other brewers who use different procedures and equipment; obviously this is an even less dependable option.

### Reviewing IBU Calculations

Now, you probably agree with me that neither of these approaches is ideal. The best approach should be reliable, should be general, and should allow the brewer to estimate the IBU level of every possible hop addition (even those that have not yet been developed) consistently and without further need of user-defined factors. Instead of trying to bend the traditional approach to new methods, I took a step back to fundamentals. Focusing on iso-alpha acids in next few paragraphs, I will briefly review where they come from and what affects their final level in beer.

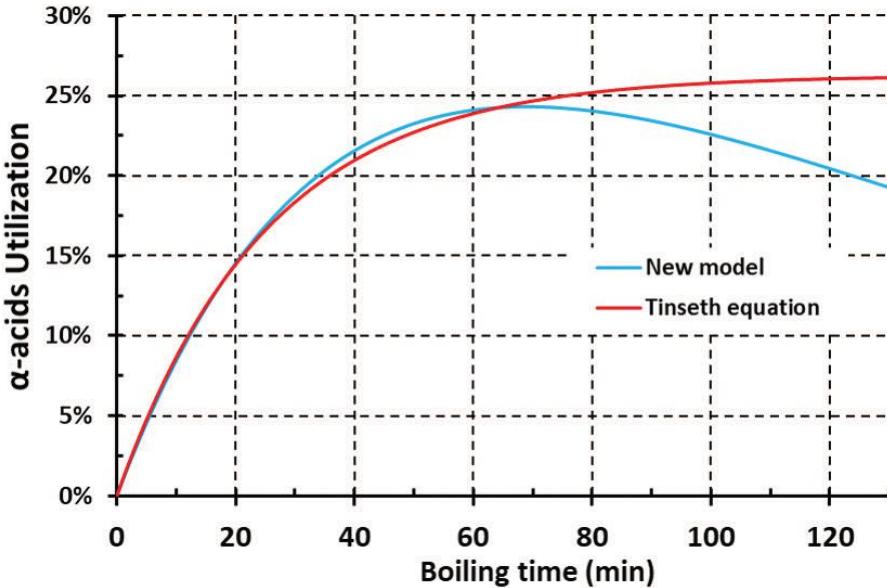
### Isomerization

The journey of iso-alpha acids begins in our hops. Hops contain alpha acids that usually make up 4 to 12 percent of their mass. After alpha acids are extracted from hops in hot wort (or water), they undergo isomerization and become iso-alpha acids. Isomerization is believed to be the rate-limiting step of this process.<sup>2,3</sup> This means that if you have multiple reactions and/or processes that share the same pathway, the overall rate of the process depends on the rate of the slowest step.

Imagine a road trip on a narrow highway where no passing is possible. Your speed will depend on the slowest car on the road, no matter how fast your car is. Isomerization is a rate-limiting step on the pathway from hop alpha acids to iso-alpha acids in wort that allows us to neglect extraction in the description of the process.

In fact, there is more going on than that, because iso-alpha acids also undergo degradation.<sup>2,3,4</sup> Occasionally, you will find a source that says degradation starts after 60

**Figure 1: The Self-Limiting Nature of Isomerization. Data calculated by Tinseth equation (red curve) and the new model presented in this article (blue curve). Results contain correction for losses.**



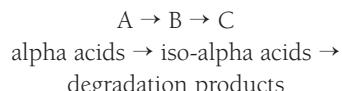
minutes of boiling. In fact, this unwanted reaction begins when the first iso-alpha acids are formed and ends when all of them have been degraded. What these sources mean to say is that the rate of isomerization is greater than the rate of degradation in the first 60 minutes of the boil, roughly speaking. Thus, iso-alpha acid concentration increases at the beginning, reaches its maximum when the overall rate of isomerization and degradation equals, and then starts to decrease when little alpha acid is left to isomerize and the rate of degradation outpaces that of isomerization.

Maximum iso-alpha acid formation is achieved after 60 to 80 minutes of boil time. This is the reason that a drop in IBUs is usually not much of a concern, but degradation could have negative effects if the boil is allowed to continue. Degradation itself plays an important role in the self-limiting behavior of alpha acid isomerization. It is a natural constraint that makes 100 percent utilization impossible.

Tinseth's equation assumes isomerization and neglects degradation. The solution takes the form of an exponential function, which is the basis of Tinseth's formulae. Because it neglects degradation, limits must be forced by artificial correction in

the form of a factor that restricts utilization.

But we can go a step further and account for degradation in a form that makes fewer assumptions about the processes and yields more general results. In such a formulation, the chemical pathway of the process has the following reaction scheme:



In terms of chemistry, this process represents one of the most popular problems that every student of chemistry encounters in kinetics classes. This problem forms a set of differential equations that have a mathematical solution. For the sake of simplicity, it is enough to understand that this problem has a relatively simple solution for those who are trained chemists and mathematicians. It is even relatively simple to account for temperature, and necessary data can be found in the literature.<sup>2,5</sup> At the end, from the numerical solution of this problem, you can find the desired result: iso-alpha acid concentration. In other words, IBUs.

### Losses of IBUs in the brewing process

Unfortunately, our bittering compounds also experience losses, which we must take into account. Some iso-alpha acids

are lost through adsorption from trub (20 to 30 percent) and adsorption from yeast (10 to 30 percent).<sup>6</sup> Therefore, we can expect the final IBU equation to take a general form:

$$IBU = (1-TF) \cdot (1-YF) \cdot c_B$$

where  $c_B$  is a concentration of iso-alpha acids after the boil, which is found kinetically as described above. Two unknown factors, YF and TF, account for losses in yeast and trub (cold break), respectively. Not surprisingly, our next goal is evaluate those parameters.

This is actually the hardest part of the problem because literature data are very limited. The IBUs lost to adsorption by cold break depends on the amount of trub itself and, therefore, ultimately on wort concentration. This leads us to consider the effect of beer gravity on hop utilization.

At this point, it is reasonable to use Tinseth's work as the source. In Tinseth's formulae, this effect is hidden in a relatively complicated power function that can be simplified to a linear function with no harm to overall accuracy. That type of dependency also has support in the literature<sup>5</sup>. In this case, the effect of adsorption on cold break can be described as follows:

$$1-TF=1-0.028 \cdot P$$

The last pieces of the puzzle are losses due to the adsorption on yeast biomass. Even with literature data available, it is hard to find a general trend in this matter. For some yeast strains, loss depends on wort gravity (in other words on the amount of yeast biomass), while for other strains, it does not.<sup>7</sup>

Literature sources agree that losses from yeast biomass can be anywhere from roughly 10 to 30 percent, and most often near 20 to 25 percent. Therefore, it makes the most sense try to match results of a new approach with Tinseth's formula again, specifically for traditional hopping regimens for which the Tinseth equation is valid. The factor YF was found as a result of such a matching process, and its value of 0.23 agrees well with the expected value of 20 to 25 percent.

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## THE FULL IBU MODEL

For completeness' sake, here is the full model for those who are interested.

$$IBU = (1 - 0.23) \cdot (1 - 0.028 \cdot {}^{\circ}P) \cdot c_B$$

where  $c_B$  is the concentration of iso-alpha acids after the boil and is a (usually numerical) solution to the following set of ordinary differential equations (ODEs):

### Equation

$$\begin{aligned}\frac{dc_A}{dt} &= -k_1 c_A + (c_A^{addition}) \\ \frac{dc_B}{dt} &= k_1 c_A - k_2 c_B \\ \frac{dc_C}{dt} &= k_2 c_B \\ \frac{dT}{dt} &= f(t)\end{aligned}$$

### Initial condition at $t = 0$

$$c_A(0) = c_{A0}$$

$$c_B(0) = c_{B0}$$

$$c_C(0) = c_{C0}$$

$$T(0) = T_0$$

$$k_1(T) = 0,02085 \cdot e^{-11858 \left( \frac{1}{T} - \frac{1}{373,15} \right)}$$

$$k_2(T) = 0,00952 \cdot e^{-12994 \left( \frac{1}{T} - \frac{1}{373,15} \right)}$$

The activation energies are obtained from the literature, with rate constants for hop pellets refitted from published data.<sup>2,5</sup> Hop additions are introduced at certain times as their corresponding concentration,  $c_A^{addition}$ . If there's no addition at that time, then this variable is zero. The temperature profile  $f(t)$  is user input and must be specified prior to calculation.

The basic and appropriate procedure is to set up a table of important temperatures during hopping and then use a linear interpolation for everything that falls between specified points (see Table 1 for an example). It is also possible to use a user-defined temperature function that describes a particular brewing system, for example, cooling. At this level of accuracy, basic ODE numerical methods like the Euler method can be used, but higher order methods like Runge-Kutta can be used as well.

Concentrations of alpha acids are calculated as  $c_A = \frac{m \cdot \alpha}{V}$ , where  $m$  is hop mass,  $\alpha$  is alpha acid content of the hop variety, and  $V$  is volume of cold wort after the boil (before removing cold break and trub). This model is based on using hop pellets. One may estimate the result for hop cones by multiplying the final result by 0.909.

implies that we might have found an appropriate model because the new method describes the full iso-alpha acid journey. For traditional hopping schemes, the new model yields almost the same result as Tinseth's method, demonstrating backward compatibility. For less than 60 minutes of boiling, the methods agree to within 2 percent. The strengths of the new method will become apparent when we introduce hop additions below the boiling point and in shorter or longer boils.

In other words, the new method is a generalization of Tinseth data. It is based on a fundamental understanding of the process

and is general enough to be used for any hopping scheme without further need for user-defined factors. The chemistry-based form is a backbone of the method. If better literature data become available in future, kinetic parameters can be simply adjusted, and the method would be independent of the Tinseth formula.

### Case study

The advantages and strength of this model can be demonstrated with an example of a hopping scheme involving FWH and whirlpool hops. Fortunately, using this method doesn't mean you need to solve a complicated mathematical problem.

Two possible user-friendly options are available. I developed an Excel-based spreadsheet that automatically calculates IBUs and other variables from user input. The code is open and available for anyone to use. A friend of mine also recently developed a web-based calculator on his site [homebrewmap.com](http://homebrewmap.com). I highly encourage readers to try out one of these options to get a feel for it.

The following example was calculated using the spreadsheet. The recipe is based on 20 L (5.28 gal.) of final kettle volume, following cooling but before draining. The hopping scheme can be found in Table 1 and represents the required user input.

Each row in the table represents an important event: either a hop addition or a temperature step. Between rows, a linear temperature profile is assumed. Therefore, it is appropriate to also use data points without hop additions to further refine the temperature profile.

To record the influence of whirlpool temperature, the original scenario was modified and calculated for different temperatures. For example, the difference in the scheme for whirlpooling at 95° C (203° F) is shown in Table 2.

It is obvious that Tinseth's formula gives us virtually the same result at the end of the boil (Fig. 2). During cooling and whirlpool hopping, a 9 IBU increase was achieved for the original scenario, which could represent a significant difference in the taste of the final beer. The temperature of 65°C (149° F) can be assigned as a cut-off temperature: the IBU contribution at lower temperatures is negligible.

In comparison, a popular brewing software package was also used to estimate IBUs for the same beer, which yielded 51 to 56 IBUs. The Tinseth formula was employed using the default 50% correction coefficient for whirlpool additions. This approach is meant to be appropriate for whirlpool additions above 85° C (185° F), while those under 85° C can be neglected. If we consider whirlpooling at 85° C exactly with our

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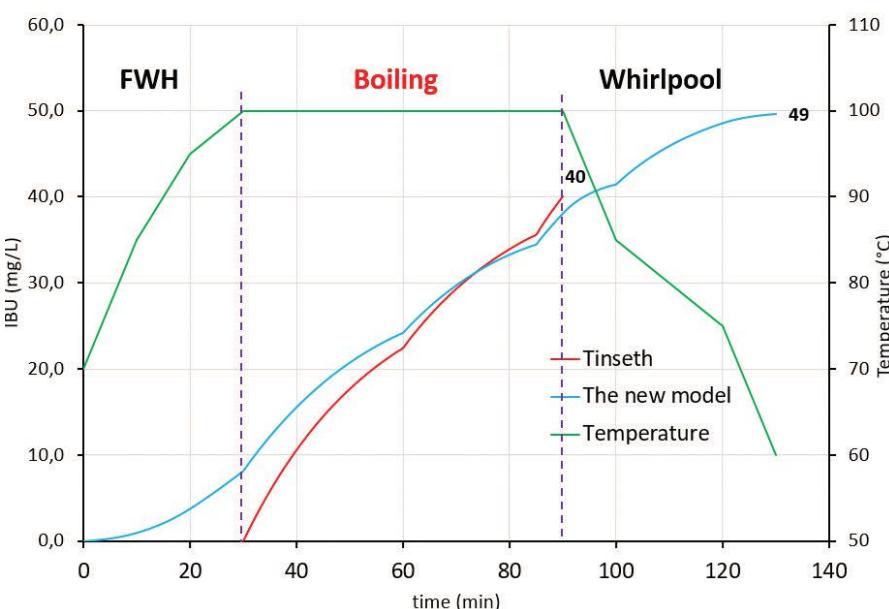
**Table 1: Sample Temperature Profile with Hop Additions**

	Time (min)	Hops mass (g)	Hop alpha acid (%)	Temperature (°C)
FWH	0	15	10	70
	10	0	0	85
	20	0	0	95
Boil	30	10	8	100
	60	10	8	100
	85	10	12	100
	90	0	0	100
Whirlpool	100	30	11	85
	120	0	0	75
	130	0	0	60

**Table 2: Whirlpool at 95° C**

	Time (min)	Hops mass (g)	Hop alpha acid (%)	Temperature (°C)
Whirlpool	100	30	11	95
	120	0	0	95
	130	0	0	60

**Figure 2: IBU and Temperature Profiles for Original Scenario Using the New Model and Tinseth's Formula.**

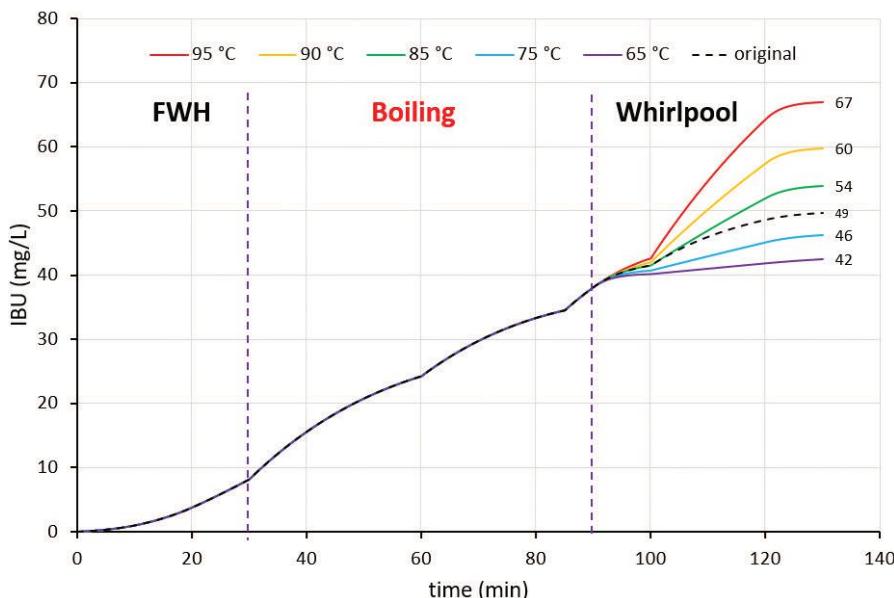


new model, we get 54 IBUs, which is virtually identical to that predicted by the software. This suggests the software approach is valid at 85° C, but changing the whirlpool conditions yields a wide range of calculated results.

## Conclusion

It might appear that this is a rigorous and final answer to beer bitterness, but it is not. IBUs are just a part of the whole bitterness equation that includes a variety of other contributions from other hop compounds

**Figure 3: Whirlpool Hopping at Different Temperatures.**



(polyphenols, alpha acids, etc.) and from other ingredients like water and malt. Unfortunately, it is impossible to quantify all contributions to any comprehensive variable that could help brewers with recipe formulation. Therefore, the IBU remains a useful metric because it usually correlates well with perceived bitterness.

If used properly, the presented method can offer brewers a reliable estimation of IBUs for a variety of different hopping practices, including first-wort hopping, extensive late hopping, and whirlpool hopping. With developed calculators, the estimation itself requires similar user input as other common calculation practices. In addition to commonly required variables, the temperature profile must be specified or estimated. This is data that brewers already have or can simply obtain during brewing.

Any IBU calculation—and this method is no exception—is only an estimate with a variable level of accuracy, and no one claims otherwise. The level of accuracy is influenced by many factors. We can improve some of them with our brewing practices, such as accurate measurement of volume, time, mass, temperature, condition of hops storage, etc. Other factors can vary from brewer to brewer, but the IBU is not a lie! It is an estimate that helps us design and brew great beers. We should not overthink its meaning, but we should not underestimate it either.

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**Petr Novotný is a Ph.D. candidate in Chemical Engineering at North Carolina State University, an AHA member, and co-founder of the Czech Homebrewers Guild.**

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# WATER

Home Water Analysis Kits:  
Comparisons to Laboratory Methods  
and Implications for Homebrewing



By Dr. Nick Flynn,  
David Reasoner,  
Jared Read, and  
Dr. Paul Baumgardner

**T**here are as many variables associated with brewing great beer as there are opinions on how to do it. Some of these opinions are based more on anecdotal evidence than on scientific knowledge. This is certainly true when it comes to brewing water quality and pre-treatment. Homebrewers understand this and sometimes seek out kits for testing brewing water quality.

Several commercially available kits are available to test for ion content of water samples (see Table 1). Some kits utilize colorimetric test strips to estimate ion concentrations. Other more comprehensive kits rely on the addition of reagents using a dropper, followed by a calculation using kit instructions. In some cases, ion concentrations are implied from the measurement of other ions or characteristics of the sample (e.g. hardness or alkalinity).

Some homebrewers rely on these kits because certain ions can dramatically affect flavor and fermentation profiles.<sup>1</sup> Specific ions that these kits test for

include calcium, magnesium, chloride, sulfate, and sodium ions; alkalinity and water hardness can be determined from most available kits. Let's take a look at how these ions affect brewing.

### Important Ions for Beer

Calcium is important to brewers for several reasons.<sup>1</sup> Along with magnesium, calcium reacts with malt phosphates to influence mash pH. Calcium supports alpha amylase activity, which helps convert grain starches to sugars, in addition to precipitating malt-based oxalic acid that can wreak havoc with dispensing systems. Calcium also supports yeast flocculation by influencing cell-to-cell interactions.

Magnesium is also known to help support healthy yeast metabolism, including alcohol production, by helping enzymes do their magic in the wort.<sup>6</sup> High concentrations of magnesium (more than 50 ppm), however, can give beer a sour, bitter aftertaste.

Chloride ions may provide fullness and sweetness to beer, while sulfate ions may

impart dryness.<sup>1</sup> Furthermore, many brewers pay close attention to the chloride-to-sulfate ratio. Modification of this relationship depends upon the type of beer that is being produced. A chloride-to-sulfate ratio of 1:2 is suggested for bitter style beers, while a chloride-to-sulfate ratio range of 2:1 to 2:3 is suggested for mild ales; stouts and porters are said to taste better at 3:1.<sup>2,3</sup>

Finally, sodium helps impart mouthfeel to beers, and concentrations can be adjusted using sodium chloride (table salt) or baking soda. Like magnesium, however, sodium can impart undesirable taste characteristics if present in high concentrations.<sup>1</sup>

### Water Adjustment

Two primary methods are available to modify ion concentrations. The first method is dilution using reverse osmosis (RO) or distilled water. "Brewing salts" can also be used to modify select ion concentrations. In fact, "Burtonization" of brewing liquor is intended to match a water profile that dates to 13th-century Burton-on-Trent, England.<sup>1</sup>

Common brewing salts include gypsum (calcium sulfate), calcium chloride, Epsom salts (magnesium sulfate), and sodium chloride. Beer style often dictates what ions require modification. Lime or baking soda, for example, is a necessary addition for making dark beers in water that is lacking alkalinity; magnesium sulfate in small quantities will improve hop bitterness of pale ales due to the sulfate addition.<sup>4</sup>

Another unintentional modification of ion concentrations in brewing involves

**Table 1: Partial List of Water Testing Options for Homebrewers.**

Method	URL for supplier (Accessed August 18, 2017)
Private Lab	<a href="http://wardlab.com/BrewersKitOrder.php">wardlab.com/BrewersKitOrder.php</a>
Test strip based	<a href="http://sensafe.com/smart-brew-Starter-kit">sensafe.com/smart-brew-Starter-kit</a> <a href="http://sensafe.com/smart-brew-advanced-kit">sensafe.com/smart-brew-advanced-kit</a>
Dropper based	<a href="http://lamotte.com/en/browse/7189-01.html">lamotte.com/en/browse/7189-01.html</a> <a href="http://accidentalis.com/using-ghkh-hardness-test-kits-in-brewing/">accidentalis.com/using-ghkh-hardness-test-kits-in-brewing/</a>
Combined methods (dependent on ion)	<a href="http://hach.com/craft-brewing-test-kit/product?id=21481774051">hach.com/craft-brewing-test-kit/product?id=21481774051</a>

boiling water for approximately 20 minutes to reduce hardness and alkalinity. This is also done in areas where chlorine concentrations are high since chlorine in brewing water is known to play a role in forming the off flavor chlorophenol in beers (think mouthwash); successful removal of chloramines by this method, though, is debated. While boiling can help remove chlorine, it also affects calcium and bicarbonate content.<sup>2</sup> De-chlorination using activated carbon is actually preferred for these very reasons.

### Using Kits

Given the importance of ion modification to beer production, we compared the accuracy of a commercially available brewer's water analysis kit to well-established Environmental Protection Agency (EPA) methods used in environmental laboratories. We believed that determining some ion concentrations would be relatively accurate, while those based on secondary calculations or subjective determination would not be as accurate. A secondary objective was to determine

**Table 2: Kit Method of Analysis for Each Ion**

Ion	Method of Determination	Brewing Range <sup>4</sup>
Calcium	Reagent/Dropper	50–150 ppm
Magnesium	Direct calculation involving two reagent/dropper results	10–30 ppm
Sodium	Back calculation by subtraction of anions and cations	0–150 ppm
Chloride	Reagent/Dropper	0–250 ppm
Sulfate	Turbidity test (subjective)	50–150 ppm for bitter beers 150–350 ppm for very bitter beers

ion values in different water sources or treatments that may be used for brewing.

Members of the High Plains Drafters homebrewing club in Amarillo provided water samples for analysis. One sample of tap water was boiled since some brewers do this to reduce hardness and alkalinity. Other samples included com-

mercial RO, well, bottled, and one from a vending machine that dispenses water in 1-gallon increments. Samples were shaken for 30 seconds in their original containers and placed in a clean sample bottle for laboratory analysis. Water samples were also analyzed using the brewer's test kit instructions, in triplicate and averaged.

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Table 2 describes the kit determination method and brewing ranges for each ion. Calcium and chloride determination use a reagent/dropper method. Sulfate ion determination uses a turbidity test and a subjective grayscale chart. Magnesium concentrations utilize a calculation method by which calcium hardness is subtracted from total hardness. Sodium concentrations are also calculated by subtracting the sum of cation values (total hardness) from the sum of anions, including sulfate, chloride, and alkalinity values.

With the exception of sulfate, ion concentrations are calculated using one or more multipliers based on recorded test results. These multipliers are presumably based upon known conversion factors for common waters, sample amounts, and reagent concentrations. Kit resolution for calcium, magnesium, sodium, and chloride was 10 ppm, whereas kit resolution for sulfate was 50 ppm.

For laboratory analysis, metal and anion concentration values were determined using EPA method 200.7 for met-

## “...Be aware of occasional changes in municipal water ion values, because water sources often change due to seasonal or climate changes.”

als and EPA method 300.0 for anions.<sup>7</sup> Inductively Coupled Plasma (ICP) was used for metals analysis by EPA method 200.7.<sup>5</sup> Detection limits ranged between 0.003 ppm and 0.017 ppm for common tap waters, and quality control was operated at 90% accuracy minimum, with 96 to 98% being the typical accuracy rating. Figures 1 (page 50) and 2 (page 52) show the results of metal and anion analysis. Calcium and magnesium concentrations are very similar between the kit and lab determined values. Chloride values are relatively close while no sodium values are close. Sulfate values are not similar between kit and lab results for samples that actually have sulfate in them. Boiling water does reduce calcium concentrations but not magnesium. This may be due to the lower solubility of calcium carbonate compared to magnesium carbonate.

So what does all of this mean? You can confidently rely on calcium and magnesium values from analysis kits. Chloride values are less reliable but do provide a fair indication of levels. Sulfate results from the kit were not reliable, so consider

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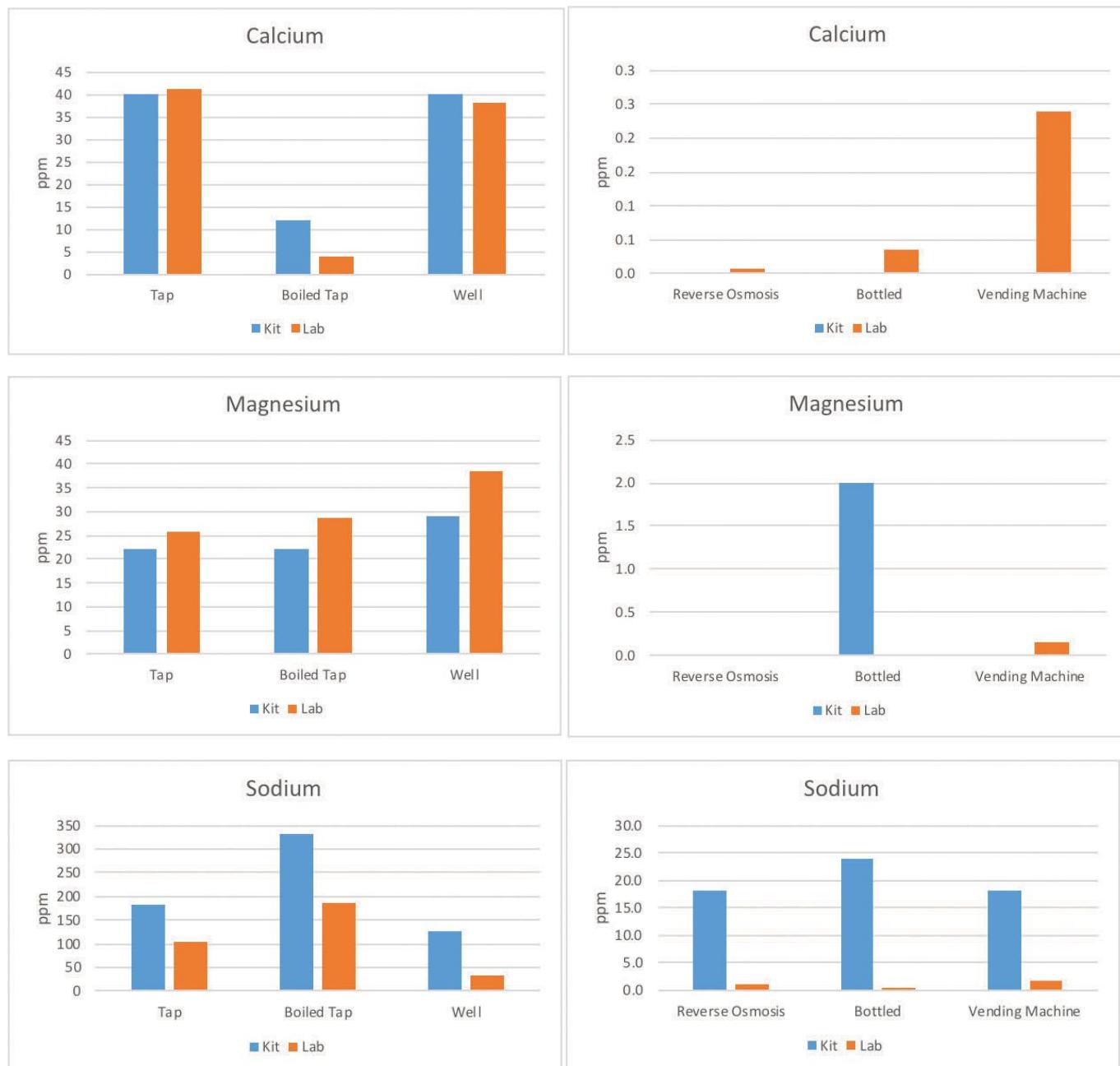


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R0217

**Figure 1: Results of metal analysis for kit and laboratory methods**

All values are expressed on the basis of mg/L (ppm)

this if you modify your chloride-to-sulfate ratios based on kit results. Similarly, sodium adjustment based on kit values may not be recommended.

Furthermore, the assumption that sodium concentration is equal to differences in cation and anion concentrations may be incorrect for some waters. Because sodium calculations rely on sulfate values, a more robust method of quantifying sulfate concentrations would also result

in greater accuracy of sodium concentrations. One possible improvement would be to provide a sulfate solution that users could adjust to prior to analyzing their own water with the kit.

Calcium and magnesium concentrations are sufficiently reliable for homebrewers, which means you can make hardness and alkalinity adjustments based on kit results. This is important for producing low-calcium beers such as lagers,

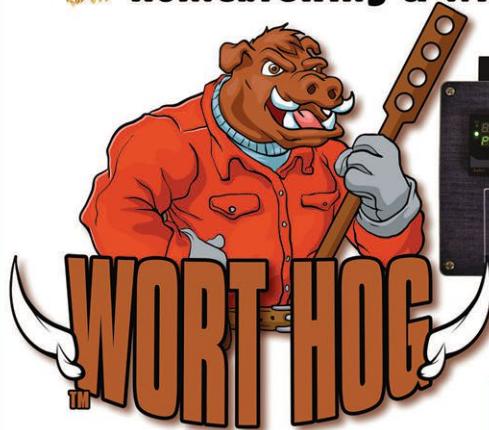
which use yeast strains that may flocculate prematurely. Reverse osmosis or distilled water can be used to reduce high magnesium concentrations if necessary. Adjustments to sodium or sulfate concentrations need to be made with care in order to avoid affecting the flavor or overall fermentation process.

Similarly, the tendency of chloride kit values to be similar or elevated compared to lab values needs to be considered when



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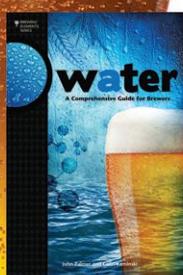


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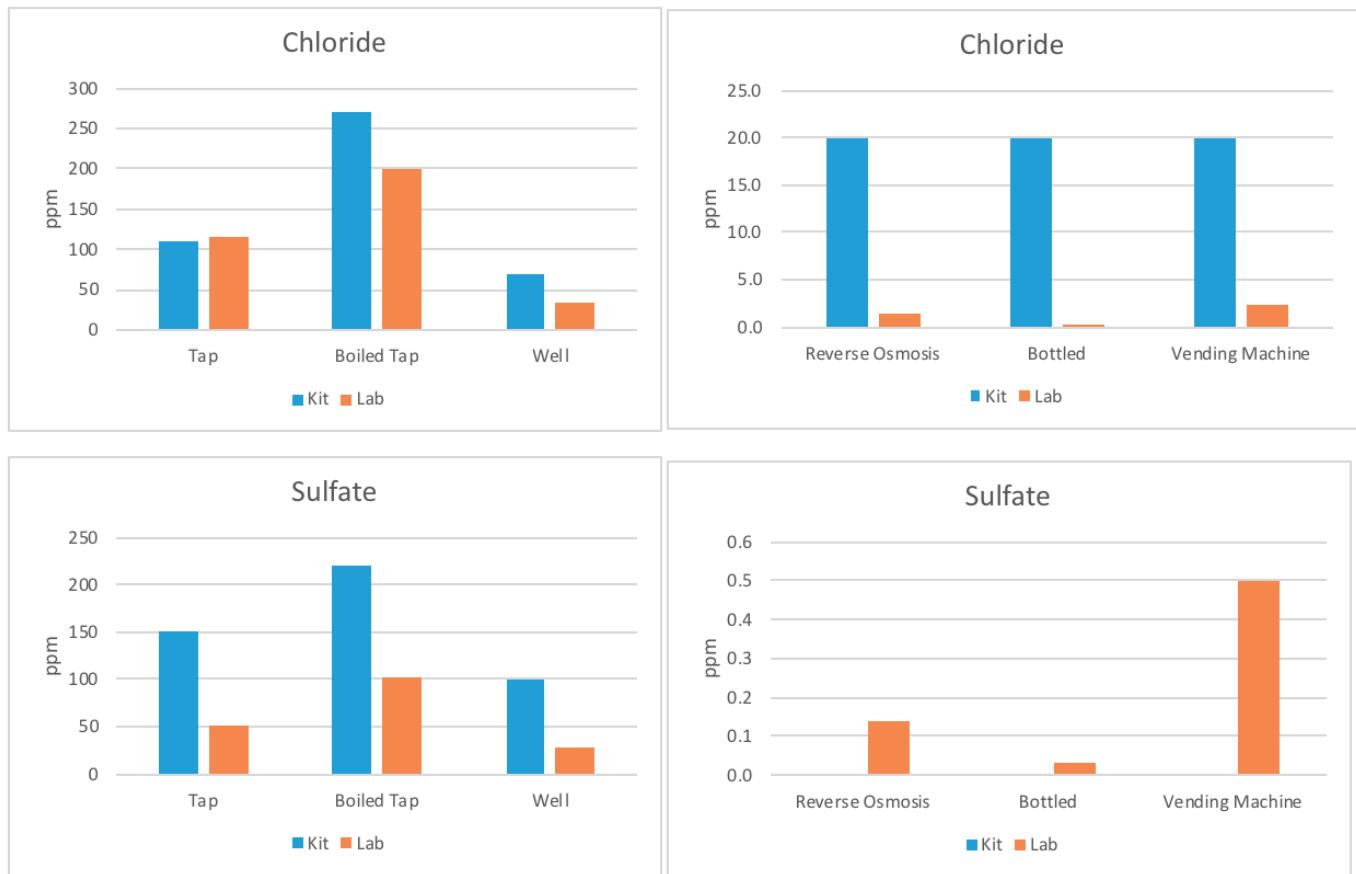
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**Figure 2: Results of anion analysis for kit and laboratory methods**



sulfate values are also elevated. The best way to handle this is to use RO water to reduce the values of each to acceptable levels and brewing salts to increase calcium or magnesium levels if needed.

You also need to be aware of occasional changes in municipal water ion values, because water sources often change due to seasonal or climate changes. It is a good idea to review annual city water reports. In fact, the use of a water kit to compare ion concentrations over a period of time may also be very helpful in this regard. It is also important to note that the ingredients to produce beer also provide some of these ions in acceptable quantities to support fermentation in and of themselves. This can be especially true for both calcium and magnesium.

There are some additional things to think about here. Boiling some water sources can significantly affect concentrations of ions that are important to homebrewing, with the possible exception of magne-

sium. The increase in chloride and sulfate concentrations in boiled water could cause an issue with chloride-to-sulfate ratio adjustments prior to wort production. We suggest analyzing boiled water prior to adjusting your ion concentrations. If you use a pre-boil step, allow the water to cool overnight while covered, and make sure not to transfer the precipitate at the bottom to your brewing vessel. Lack of sufficient calcium due to calcium carbonate precipitation from pre-boiling could affect both the amount of fermentable sugar produced in the mash tun, and yeast flocculation in the fermenter.

Before everybody thinks we are “anti-kit” we want to emphasize the actual value that these kits can provide to homebrewers. Brian Schneider, a member of the High Plains Drafters club said, “Water testing can be a great way to take your beer to the next level, but there are some things you need to be aware of. If you’re going to modify your brewing water, you have to have good information to start. It

is good to know what these kits are actually capable of telling you.”

Using a kit as a starting point is an excellent way to start improving your homebrew. It is important to restate that brewers who use municipal water can obtain a copy of the most recent water quality report. These kits could then be used to monitor ion concentrations between reports. Furthermore, if brewing water sources are unique (e.g. well water or home water treatment systems), then professional analysis paired with a test kit can provide important information about past or current ion concentrations.

Producing beer without knowing the concentration of ions in the water makes it much more difficult for brewers to isolate issues with the beers that they produce. A perfect example of this is changing the bittering charge in a recipe without knowing sulfate or magnesium concentrations, as both of these ions can affect the perception of bitterness in

beer.<sup>8</sup> This also helps explain why some brewers avoid producing certain styles of beer or gravitate toward certain styles based on prior successes.

It is, indeed, very possible that part of this success or failure is due to the characteristics of the water used to produce each beer style, rather than a brewer's particular expertise or experience. We hope these results will encourage home-brewers to consider the characteristics of their brewing water when brewing. Similarly, we hope manufacturers will consider improving certain aspects of water analysis kits in the future to eliminate subjective determinations.

We appreciate funding by the Welch Foundation through a WT departmental grant (Grant # AE-0025) and the High Plains Drafters homebrew club for providing samples. We also want to recognize the ACS Panhandle Plains local section for supporting presentation of part of this work at the 2016 Spring National ACS Meeting.

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**Dr. Nick Flynn is a professor of biochemistry at West Texas A&M University and vice president of BioGenetics and Life Sciences LLC; David Reasoner is manager of the City of Amarillo Environmental Laboratory; Jared Read is an owner and brewer at Long Wooden Spoon Brewing and president of the High Plains Drafters homebrewing club; and Dr. Paul Baumgardner is president of Advanced BioGenetics and Life Sciences LLC.**





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# YEAST

The Origin of (Ale Yeast) Species



# By Loren Miraglia

**Editor's Note:** This article presents results first published in Cell. See the Resources at the end of the article for a full citation.

In 1831, Charles Darwin took his vessel HMS Beagle on a journey around the world, visiting one exotic land after another, including Australia and the Galapagos Islands. Darwin's travels were key to his groundbreaking study *On the Origin of Species*, a seminal work that proposed the theory of evolutionary biology and the ideas that populations evolve through survival of the fittest and natural selection.

Today, with the help of advances in molecular biology, automation and bioinformatics, and a vessel of a different kind—one from which we enjoy beer—another groundbreaking study has resulted in the characterization of 157 different strains of *Saccharomyces cerevisiae*. These strains were sourced from beer, wine, sake, spirits, and bioethanol, and in September 2016, the results were published in the scientific journal *Cell*. This expedition had its origins, as all collaborations do, from at least two sources, in this case one in Belgium and another in San Diego. The thread that brought the groups together was a curiosity and fascination with the world of brewer's yeast.

## A Big Team

### Tackles a Bigger Question

The project got its start in November 2013 at a beer and wine vendor show for molecular and cellular biologists in Carmel Valley, Calif. Fittingly, the guest speaker was Charles Bamforth, who used the opportunity to extol the virtues of beer over wine. I ran into a colleague with whom I had previously worked, Brian Steffy, who had moved to Illumina, one of the top next-generation DNA sequencing companies in the world, conveniently located in San Diego. Brian ran the training sequencer at the facility, which meant he focused on learning how to use the instrument, not necessarily the strain or species of DNA utilized for the sequencing.

After 10 minutes of catching up, I told Brian about an earlier project I had initiated with White Labs, which examined RNA expression of brewer's yeast under fermentation and respiration conditions. This led to the big question: could he sequence different strains that I provided to compare genotype (genetic makeup) with phenotype (observable characteristics)?

I was particularly interested in my house brewing strain, which my brewing partner Mark and I had isolated from a bottle of Duvel in 1994. I had isolated the strain initially and then threw out the petri dish when it became contaminated. Mark then spent almost

a year trying to isolate viable yeast from Duvel bottles before we succeeded.

Brian returned with a thumbs-up and put me in contact with Clotilde Telling, the microbiology specialist at Illumina. I immediately contacted another friend, Andy Bass, to ask if he was willing to join the collaboration and play a role in the DNA isolation from the yeast strains, which was ultimately performed by Maryann Taylor. My original thought was to do a small-scale experiment to ensure that all the protocols were in place but this was soon put aside as Clotilde asked if the number of strains could be expanded to 96, which was the capacity that the sequencer could handle



## DUVEL'S DEVIL OF A YEAST

Brouwerij Duvel Moortgat was founded in 1871 by Jan-Leonard Moortgat and his wife on a farm in the town of Puurs, Belgium. Jan-Leonard's two sons joined the growing business in 1900, Albert as the brewer and Victor as the delivery person. Later, to commemorate the end of World War I, a special beer was created called Victory Ale. Legend has it that during a tasting session, a local stated, "This is a real devil." From 1923 on, Victory ale became known as Duvel, which is the word for devil in the local dialect.

Duvel is the original Belgian golden strong ale and remains the standard for that style. (See Style Spotlight in the Jul/Aug 2016 issue of *Zymurgy* for more on Belgian golden strong ale.) Its uniqueness can be traced back to the yeast. It wasn't until Albert Moortgat traveled to the United Kingdom and obtained yeast for his brewery that Duvel began to set the course for its namesake beer. Acquiring yeast proved challenging due to resistance from English brewers, but Albert managed to bring home a sample from Scottish brewery McEwan's.

The sample proved to be a workhorse in the brewery, but it was actually a mix of between 10 and 20 strains. This amalgam of yeasts was narrowed down to two strains by the great brewing scientist Jean De Clerck, in collaboration with the Moortgat Brewery via isolation, separation, and, ultimately, test fermentations. Additional production trials and tasting resolved this to one strain, which is still used in Duvel Moortgat beers.

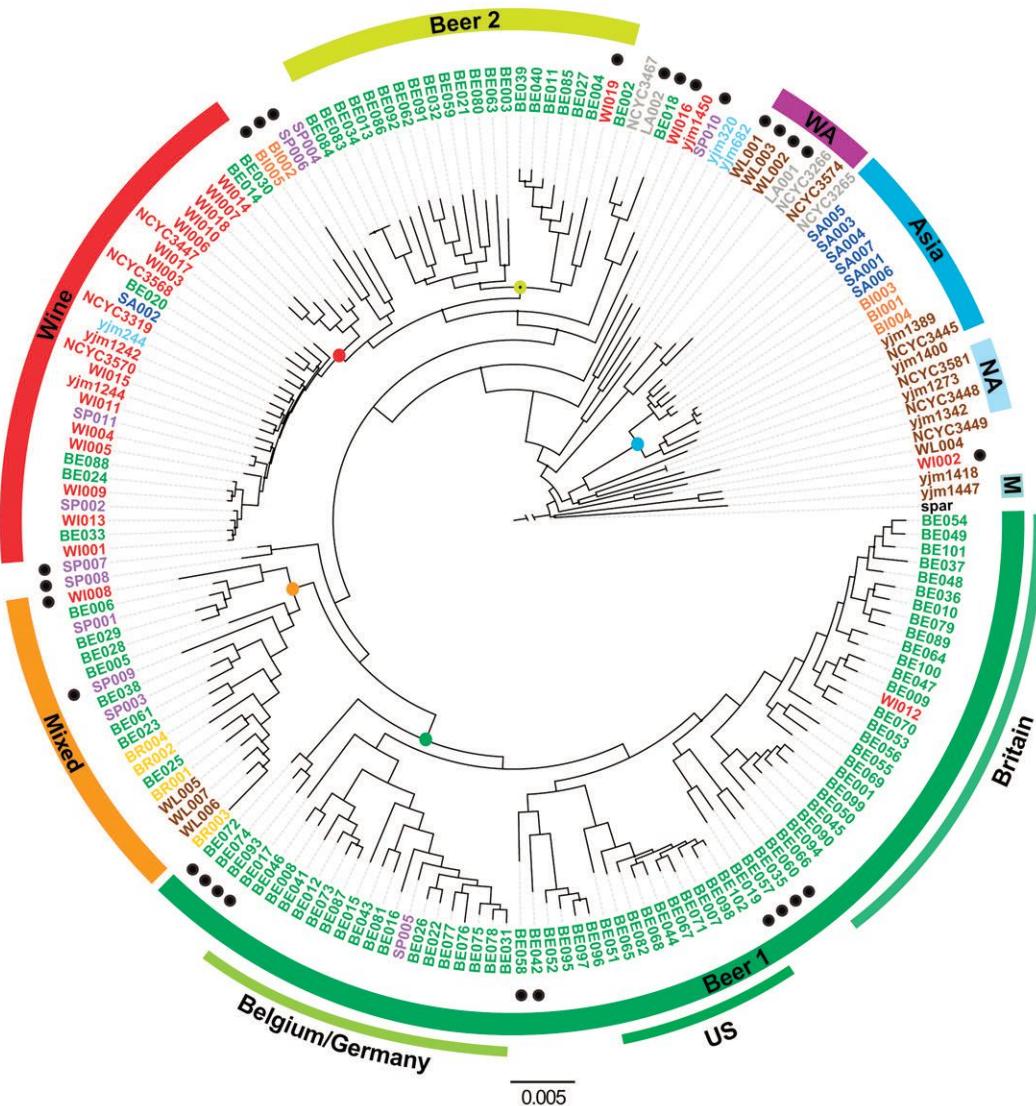
Yeast research at the brewery continues to this day and focuses on enhancing viability throughout storage and in other areas, always with the goal of further perfecting the Duvel family of beers.

## Origin

Beer  
Wine  
Spirits  
Saké  
Wild  
Bio-ethanol  
Bread  
Laboratory  
Clinical  
*S.paradoxus*

## Lineage

Beer 1  
Britain  
US  
Belgium/Germany  
Mixed  
Wine  
Beer 2  
West Africa (WA)  
Asia  
North America (NA)  
Malaysia (M)  
Mosaic



**Figure 1: Phylogenetic tree comparing DNA similarity of all sequenced *S. cerevisiae* strains.** *S. paradoxus* (spar at approximately 3 o'clock) is used as the reference strain as it is not in the *S. cerevisiae* species. Origin (source of yeast strain) and Lineage (dividing strains based on DNA similarity and common ancestor) are shown by colored text (origin) or colored circular bands (lineage). The predicted splitting off of each individual lineage is indicated with colored dots. Length of branches indicates number of DNA changes. Strains that share a branch are more similar to each other than strains that don't, and that similarity lessens as one moves up the tree from the outside and over to another branch. The center of the circle where branching initiates indicates predicted origin of all strains studied. It is interesting to note that both beer clades (a group of organisms with a single common ancestor) contain almost exclusively beer strains while the wine clade contains strains from four different origins.

at one time. I immediately suggested we contact White Labs because my strain bank maxed out at just over 50.

After setting up several meetings with the group, we were off and running. As the project moved forward, two other significant events took place. Dr. Toby Richardson, Vice President of Bioinformatics at Synthetic Genomics, a synthetic biology-driven company founded to commercialize genomic-driven tech-

nologies, joined the effort through his association with Troels Prahl, head of research at White Labs. Toby and his group were able to successfully assemble all the sequencing information in a proprietary database.

This may sound simple on paper, but imagine taking parts of every sentence in this issue of *Zymurgy*, offset by two or three words in the front and back, and stacking them all on top of each other.

Assembling a yeast genome is a similar process, except with computer algorithms to do the heavy lifting. The result combines all the DNA pieces, at least the ones that line up or match, to create sentences, then paragraphs, then a story, which is the genome of the organism.

In this case, not only can one put together the story, but then the stories can be compared between species or strains to identify similarities and dif-

ferences. These differences potentially translate into what makes these strains unique. The assemblies ultimately formed the foundation for the informatics side of the project, which probed the genomes (or genotype) of the different yeast strains. The area lacking then, was the phenotyping.

The second significant event that became a major contribution to the project occurred when Troels ran into Dr. Kevin Verstrepen of Katholieke Universiteit Leuven (VIB Laboratory for Systems Biology & Laboratory for Genetics and Genomics Centre for Microbial and Plant Genetics) at a brewer's conference. Troels found that the Verstrepen lab was involved with a similar effort. He returned to San Diego and asked the group if we should collaborate. The answer was a resounding yes. We felt joining forces with a top-notch yeast biologist with expertise in genetics, genomics, and systems biology was a no-brainer, especially considering that Dr. Verstrepen's lab had automation capabilities for high-throughput phenotyping studies and expertise in bioinformatics.

These experiments covered metabolic, stress and other characteristics of the yeast.

## Findings

So in the end, what did we learn?

The first big lesson from the project was that the yeast strains studied could be broken down into five lineages. By comparing 2,020 genes found in the nucleus and comparing them between species, and then adding 24 previously sequenced strains, a tree was generated which was separated into Wine, Beer 1, Beer 2, Asia, and a mixed-lineage group that contained species from various sources.

Interestingly, three of the lineages—Beer 1, Beer 2, and the mixed lineage group—were identified for the first time. One can imagine that there are factors that contribute to the distribution of the strains. For instance, if a strain is used just once in fermentation, as it is in spirits, there is less opportunity to change. Beer, on the other hand, especially in a brewhouse environment, can go through many rounds of division, and under the constant stress of sugars and

alcohol, will evolve much more rapidly. The sugar source, be it grain or must, can also influence whether the strain loses or gains specific genetic material necessary to thrive in such an environment.

Another component of the development of the tree is geography. Of the five *clades*, or limbs, of the tree, one of the beer subgroups showed signs of geographic separation, namely the United Kingdom, European (Belgium & Germany), and some of the American strains derived from Great Britain. As we know today, strains from Belgium are much different from strains from the United States, especially those that use bottle re-fermentation. This is again a product of environment, and the industrial use of these strains in their respective environments increases the likelihood of divergence over time.

Imagine your favorite house strain. Let's say you continually use this strain to brew your favorite beer, a Russian imperial stout. You pass this strain on to your children, and they continue using it as *their* house strain. Now multiply that over hundreds of years

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and many generations, and you get the picture. The yeast will continually adapt to its environment, often times amplifying genetic material that improves beer flavor and losing genetic information for traits the yeast doesn't need, such as sexual reproduction.

Another key observation from the study was that domestication through selection in industrial settings, or those settings where the strains were used repeatedly for the same purpose, occurred *before* yeast was identified as the microbial force behind those alcoholic beverages. The advent of yeast as an active component in fermentation came via the work of Louis Pasteur and others in the 1800s. However, humans' ability to induce fermentation was known to have taken place starting around 5,000 years ago, eventually becoming an essential process for multiple civilizations.

For beer yeasts originating from Belgium and Germany, the UK, and the US, one can estimate the beginnings of domestication by looking at the mutation rates based on the number of generations a strain in continuous use would go through in a year. In other words, calculating how frequently the genetic material changes over time can yield this estimate based on the sequencing data generated in the paper.

Our calculations for the Beer 1 group indicate a common ancestor somewhere between 1573 and 1604. Performing a similar calculation for the Beer 2 group yields an estimate of 1645 to 1671. These estimates predate the 1800s, suggesting that the process of domestication began even before Emil Hansen achieved the first pure isolate of yeast in 1883 at the Carlsberg brewery.

## Implications

One final observation from the project was that beer yeasts have characteristics consistent with domestication. One can imagine that, over time, yeast in a brewery adapts to its environment. Think of it like this: if you have a batch with some undesirable flavors, you're likely to get rid of it. At the same time, if you feed a yeast the same basic ingredients repeatedly, it will get progressively better at breaking them down. This continuous process essentially forces evolution to occur. A wild strain, on

the other hand, has a much harsher and more variable environment.

The hallmarks of this domestication can be found by looking at certain observable traits (phenotypes). One trait is the presence of 4-vinylguaiacol, or 4-VG. This is the compound responsible for the clove-like phenolic aroma found in German hefeweizen and some Belgian ales. It's generally considered undesirable for members of the Beer 1 group. Interestingly, many of the strains in this group not only don't create 4-VG, but actually have a mutation in the gene responsible for producing it.

Another observable trait is the ability to ferment maltotriose, which is extremely important in a brewery. Beer strains showed an increased ability to metabolize maltotriose, a sugar found specifically in wort. A look at the genetics shows that the Beer 1 strains have a variant of a sugar transporter that is better at moving sugar into the cell. Several other attributes of beer yeast that fit into this observation are the notable absence of off flavors and the inability for sexual reproduction. Both traits for beer yeast make sense.

Batches that produce off-flavors are usually discarded, which ensures that the yeasts responsible for them do not continue to propagate. And there is no need for beer yeast to retain the genetic information related to sexual reproduction because (1) repitching in a brewery renders sporulation unnecessary and (2) one does not want yeast to reproduce anywhere other than in wort. Such changes, which characterize better brewing strains, are solid evidence that these strains have, indeed, been domesticated.

When one considers these observations together—selection, domestication, improved brewing performance, and genotype-to-phenotype characterization of 157 strains—it makes real the possibility of creating hybrid strains with desired traits. The Verstrepen lab took this to task and, as an example, generated a new hybrid strain that produces 4-VG and has good fermentation properties as well. While "designer yeast" may be a ways off for the brewing industry, the outlook is potentially limitless in light of

similar approaches in such crops as hops. Imagine ordering a yeast strain by selecting a pull-down menu with traits you wish to have in your beer.

## Frankenbeer

This project spawned several interesting byproducts, one of which I will touch on here. When things first got off the ground, I initiated several calls to coordinate the San Diego group. On one call, I suggested that we brew a beer with all 96 strains that we had sequenced with Brian and Clotilde at Illumina. This could not only yield a fascinating beer, but could also offer a peek into the evolution of different yeast strains in a competitive environment.

Joe Kuroski brewed such a beer at White Labs. Frankenstout, as it came to be known, was a huge stout with complex layers from the grain bill and the many and varied yeast strains. White Labs continues to brew with this mega-blend today.

Looking back, I am awed at the evolution of knowledge in this project. From asking a simple question to running into a friend at a vendor show to publishing an article in *Cell*, it has been quite a journey. It reminds us that not only should we pursue unsolved questions, but also that we should engage others to help us answer them. Who knows? Maybe the next Frankenbeer will have 1,000 strains instead of 96!

## Resources

Gallone B, Steensels J, Prahl T, Soriaga L, Saels V, Herrera-Malaver B, Merlevede A, Roncoroni M, Voordeckers K, **Miraglia L**, Teiling C, Steffy B, Taylor M, Schwartz A, Richardson T, White C, Baele G, Maere S, Verstrepen KJ. "Domestication and Divergence of *Saccharomyces Cerevisiae* Beer Yeasts." *Cell* 166, no. 6 (n.d.): 1397–1410.e16. <https://doi.org/10.1016/j.cell.2016.08.020>.

**Loren Miraglia began brewing in 1992 and went on a Belgian beer kick several years later. With a college background in a *Saccharomyces cerevisiae* lab, it was a natural transition to apply those techniques to brewing. Endeavors in cider and winemaking eventually cooled to focus on beer and the contributions of yeast.**

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By Michael Piorunski

# BEER FESTIVAL® -AM TITION

**N**early 20 years of homebrewing have paid off for Robb Wick. For the second year in a row, one of his medal-winning homebrews has been entered into the Great American Beer Festival® (GABF) Pro-Am competition. In 2016, he and Sean Drew, both members of the Impaling Ales Homebrew Club in Kent, Wash., won gold in the club's annual Novembeerfest competition with their barrel-aged Scottish wee heavy.

The pair brewed their 2017 Pro-Am entry with Fish Brewing of Olympia, Wash., and even though it didn't earn a medal, their sense of accomplishment was palpable during the Friday session. Nearly every passerby within earshot tasted the beer and learned the finer points of its flavor production technique.

Brewers from 28 states submitted their commercially produced versions of homebrew recipes that had already earned medals at AHA/BJCP-sanctioned homebrew competitions. After three rounds of judging, a distinct theme arose: Colorado brewers and homebrewers alike are at the top of their game.

Colorado brewers produced all of the medal-winning beers at the 2017 Pro-Am and submitted a third of the 118 entries. Moreover, both the silver and bronze medal entries advanced to the Pro-Am via the Fort Collins, Colo.-based Liquid Poets Society's annual Liquid Poetry Slam.

It may be the water, the brewing culture, or maybe just the sheer quality of the beer from the Rocky Mountain state. No matter the case, the story of the 2017 Great American Beer Festival Pro-Am Competition was all about Colorado.



2017 GABF  
Pro-Am Competition

## GOLD MEDAL

# JUST ANOTHER PRETTY FACE

*Jason Buehler and Denver Beer Company Brewing Team  
with AHA member Doug Thiel*

Doug Thiel may have shown more humility than any other gold-medal-winning brewer at the 2017 Great American Beer Festival.

Don't let this humble brewer fool you though; Thiel has been taking steps to brew world-class beer for years. He started homebrewing in 2006 after convincing his wife that brewing beer was cheaper than buying it. Now his "modest" brewing rig includes a well-stocked, five-tap kegerator.

"My equipment only takes over half the garage," Thiel explains.

He uses no pumps to move water and wort through his brewhouse. No stainless steel fermenters either, just glass carboys, three of which were empty when we spoke in late October 2017.

The dark amber-hued, bourbon barrel-aged English barleywine Thiel brewed with Jason Buehler at Denver Beer Company (DBC) had its humble beginnings as a club brew with a few other members of the Rock Hoppers Brew Club. He and his club mates filled a bourbon barrel with their high-octane base, which went on to win the *Días Oscuros* homebrew competition at Copper Kettle Brewing Company in Denver.

English-style beers are Thiel's forte. He says Denver-based Hogshead Brewery has inspired his foray into English IPAs, bitters, stouts, and barleywines.

Thiel didn't just attend GABF with the prospect of taking home hardware. He has served as a steward for the competition for five years and is a BJCP Certified beer judge.

Unsure if his experience behind the scenes at GABF helped him produce a winning beer, Thiel says being at the judges' table has improved his brewing.

## JUST ANOTHER PRETTY FACE

*English Barleywine*

Doug Thiel with Denver Beer Company

<b>Batch Size:</b>	5.5 US gallons (20.8 L)
<b>Brewhouse Efficiency:</b>	70%
<b>Original Gravity:</b>	1.093 (22.0° P)
<b>Final Gravity:</b>	1.018 (4.6° P)
<b>Bitterness:</b>	53 IBU
<b>Color:</b>	18 SRM
<b>Alcohol:</b>	10% by volume

### MALTS AND FERMENTABLES

16.38 lb.	(7.43 kg) 2-row pale malt
1 lb.	(454 g) Briess aromatic malt
1 lb.	(454 g) crystal 120° L
1 lb.	(454 g) turbinado sugar @ 15 min

### HOPS

2 oz.	(57 g) Challenger, 9.6% a.a. @ 60 min
1 oz.	(28 g) UK Fuggle, 4.0% a.a. @ 10 min

### YEAST

2 vials	White Labs WLP028 Edinburgh Ale Yeast
---------	---------------------------------------

### WATER

Ca 32 ppm, Mg 9 ppm, Na 26 ppm, Cl 27 ppm, SO<sub>4</sub> 48 ppm, CaCO<sub>3</sub> 89 ppm

### ADDITIONAL ITEMS

1 Whirlfloc tablet @ 15 min

### BREWING NOTES

Mash in at 154° F (68° C) for 60 minutes. Collect runoff and boil for 60 minutes. Add turbinado sugar 15 minutes before the end of boil along with 1 Whirlfloc tablet. Ferment at 68° F (20° C) until terminal gravity is reached. Rack into bourbon barrel for 2 months or add bourbon-soaked oak spiral until desired flavor is achieved. Bottle condition.

### EXTRACT VERSION

Substitute 12 lb. (5.4 kg) pale liquid malt extract syrup for the 2-row pale malt. Steep remaining malts in 155° F (68° C) water for 30 minutes, dissolve extract, and proceed with the boil as above.



Doug Thiel, center, celebrates with Denver Beer Company brewmaster Jason Buehler (rear) and the Denver Beer Company crew after the 2017 Great American Beer Festival awards ceremony.

"In general, [judging beer] makes you a better brewer," he says. "It helps you identify faults."

Thiel's collaboration with DBC was poured during the Friday session at GABF. There weren't many faults to be found.

"When I tried [the beer] Friday night, I thought this one might actually have a shot," he explained.

And even with that vote of confidence, the 39-year-old father of four says he almost didn't attend the awards ceremony on Saturday, where the top brewers in the country were revealed.

"My wife forced me to go," he explained.

Thiel does plan to display his coveted prize someday, but for now, it's quietly resting on a table in his bedroom.

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## SILVER MEDAL

### LICHTENHAINER

*Black Bottle Scuba Squad  
with AHA member Daniel Tomkins*



**M**aybe it's not surprising that a PhD student researched and executed a flavorful example of an obscure historical beer style that made an impression on both judges and festivalgoers at GABF 2017.

What is surprising though is that Dan Tomkins, 33, has only been homebrewing for two years. The silver-medal-winning economics student from Laramie, Wyo. said he had no expectations that his Lichtenhainer would ever make its way to GABF.

The Black Bottle Scuba Squad celebrates winning silver in the 2017 GABF Pro-Am.

### LICHTENHAINER

Dan Tomkins with Black Bottle Brewery

**Batch Size:** 5.5 US gallons (20.8 L)

**Brewhouse Efficiency:** 75%

**Original Gravity:** 1.041 (10.0° P)

Final Gravity: 1.010 (2.6° P)

**Bitterness:** 8 IBU

**Color:** 4 SRM

**Alcohol:** 4.1% by volume

#### MALTS

- |                 |  |
|-----------------|--|
| <b>4.5 lb.</b>  | (2.04 kg) Weyerman Oak Smoked Wheat malt |
| <b>2.25 lb.</b> | (1.02 kg) Weyerman Pilsner malt          |
| <b>0.75 lb.</b> | (340 g) Weyerman Munich malt             |

#### HOPS

- |              |                                      |
|--------------|--------------------------------------|
| <b>1 oz.</b> | (28 g) Czech Saaz, 2% a.a. @ 45 min  |
| <b>1 oz.</b> | (28 g) Hüll Melon, 7.3% a.a. @ 5 min |

#### YEAST

- |               |  |
|---------------|--|
| <b>1 vial</b> | White Labs WLP001 California Ale Yeast |
|---------------|--|

#### ADDITIONAL ITEMS

- |                   |   |
|-------------------|---|
| <b>1</b>          | Whirlfloc tablet @ 15 min   |
| <b>Rice hulls</b> | as optional lautering aid   |
| <b>Yeastex</b>    | added to whirlpool  |
| <b>2 tablets</b>  | Swanson Probiotics <i>Lactobacillus plantarum</i><br>or 4 oz. (113 g) Noosa Yoghurt |

#### BREWING NOTES

Mash in at 152° F (67° C) and hold for 60 minutes. Collect runoff and heat wort to 180° F (82° C). Cool wort to 115° F (46° C), wash wort with CO<sub>2</sub>, and purge kettle or another vessel to be used for souring (the key is to create an anaerobic environment until desired pH is achieved). Add yogurt or other *Lactobacillus* culture to wort. Insulate the vessel to maintain temperature. Conduct boil when pH has dropped to 3.5. Ferment at 68° F (20° C) until terminal, rack to secondary for 7 days, and then bottle or keg.

Due to the lack of an extract equivalent for smoked wheat malt, there is no extract formulation for this recipe.

"I'm pleasantly surprised with the level of success I have with any beer," Tomkins says. "It's pretty humbling to get this far."

Tomkins describes his Lichtenhainer as a low-gravity, smoky, sour wheat beer that's less puckering than the more familiar Berliner weisse, with a delicate smoke character from Weyermann oak-smoked wheat malt. According to Ron Pattinson's historical beer and brewing blog *Shut Up About Barclay Perkins*, Lichtenhainer originated in the Thüringen region of central Germany, which includes the former municipality of Lichtenhain.

***"I'm pleasantly surprised with the level of success I have with any beer. It's pretty humbling to get this far."***

On how he was able to achieve success with the style, Tomkins says that, aside from research, he approaches recipes from a culinary perspective, targeting flavors rather than focusing on other minutiae.

Tom Moseman, head brewer at Black Bottle Brewery, says the production version of Tomkins' recipe has blown up in the taproom since earning the silver medal.

Moseman says the Fort Collins, Colo. brewery selected the beer because of its historical chops and Tomkins' ability to execute the style. The brewery has entered four beers to the Pro-Am competition since opened in 2012. "From a homebrew standpoint, it would be tough to brew that beer," he says. "It's amazing that it came out super balanced," he added.

The opportunity, or excuse, to brew the historical style was also a bonus for Moseman. The seasoned brewer likes to use new ingredients for Pro-Am beers and collaborations and had no prior expe-

rience with Weyermann oak-smoked wheat, which Tomkins says is essential to the flavor profile of the beer.

Tomkins (and the bronze medal-winning brewer) used probiotic supplement tablets to provide the *Lactobacillus* bacteria for kettle souring, while the Black Bottle version relied on locally produced Noosa yogurt for the tangy cultures.

For Tomkins, brewing historical styles and re-creating beer history is part creativity and part curiosity. And, although brewing offers him an outlet from his doctoral research, Tomkins' academics guide his perspective.

"[Brewing] is a dope science experiment you get to drink when you're done."

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2017 GABF  
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## BRONZE MEDAL

Brewing balanced beers is hard, and brewing balanced sour beers is even harder. But that didn't stop Mark Boelman, 38, from venturing to the dark side of sour brewing.

Boelman is a self-described geek. As the director of accounting and administration at Left Hand Brewing Company in Longmont, Colo., he spends his days geeking out on numbers to keep the brewery financially stable.

"They typically don't let me touch anything other than numbers around here," he jokes.

## EXULANSIS

*Odell Brew Team with  
AHA member Mark Boelman*

He has brewed at home for seven years though, and he has served as the president of the Weiz Guys homebrew club for the past three years.

Boelman says he found inspiration for his Exulansis dark sour while listening to the Brewing Network's *Sour Hour* podcast. He explains that *Sour Hour* host Jay Goodwin, who cofounded The Rare Barrel in Berkeley, Calif., uses the platform to share insights into recipes, techniques, and processes for sour beer production.

"For me, I never try to brew the same beer twice," Boelman says. "I started geeking out on sours."



Mark Boelman (left), director of accounting & administration at Left Hand Brewing Company, with his former co-worker Jordan Kelly, quality technician at Odell Brewing Company. Boelman's Exulansis, a dark sour, won bronze in the Pro-Am.

## EXULANSIS

Raspberry sour

Mark Boelman with Odell Brewing Company

<b>Batch Size:</b>	10 US gallons (37.9 L)
<b>Brewhouse Efficiency:</b>	75%
<b>Original Gravity:</b>	1.067 (16.3° P)
<b>Final Gravity:</b>	1.002 (0.5° P)
<b>Bitterness:</b>	0 IBU
<b>Color:</b>	34 SRM
<b>Alcohol:</b>	8.6% by volume

### MALTS

<b>22 lb.</b>	(9.98 kg) pale US 2-row malt
<b>4 lb.</b>	(1.81 kg) Briess flaked wheat
<b>4 lb.</b>	(1.81 kg) Briess flaked oats
<b>2 lb.</b>	(907 g) Briess aromatic malt
<b>2 lb.</b>	(907 g) chocolate malt
<b>8 oz.</b>	(227 g) Weyermann Carafa III malt

### YEAST

<b>1 vial</b>	White Labs WLP648
	Brettanomyces bruxellensis Trois Vrai

### ADDITIONAL ITEMS

<b>10 tablets</b>	Swanson Probiotics <i>Lactobacillus plantarum</i>
<b>10 lb.</b>	(4.54 kg) frozen organic raspberries
<b>1 packet</b>	EC-1118 Champagne yeast
<b>Sugar</b>	for bottle conditioning

### BREWING NOTES

A few days prior to brewing, prepare a 1,200 mL starter of 1.030 wort for the *Brettanomyces*. Mash pale and aromatic malts with flaked wheat and oats at 152° F (67° C) for 60 minutes. Vorlauf and collect first runnings. Add chocolate and Carafa malts prior to sparge as a "mash cap."

Collect wort, heat to 185° F (85° C), and hold for 15 minutes. Cool wort to 100° F (38° C). Purge wort with CO<sub>2</sub>, and purge kettle or another vessel to be used for souring to create an anaerobic environment. Add *L. plantarum* tablets and let stand for 48 hours. Cool wort to 70° F (21° C), aerate, and pitch *Brettanomyces*. Ferment until terminal gravity is reached. Rack onto thawed raspberries. Condition for 4 to 6 months or until desired flavor is achieved and gravity has dropped to approximately 1.002. Bottle condition with a rehydrated packet of EC-1118 Champagne yeast and sufficient sugar for desired carbonation.

The bones of the bronze-medal-winning beer borrow from The Rare Barrel's Bruin base beer. Boelman added the roasted malts in the grist bill prior to sparging as a mash cap, he explains, to extract color and some flavor while leaving behind harsher tannin compounds.

The kettle-soured, *Brettanomyces*-fermented, dark raspberry sour was the kind of beer Jordan Kelly knew she could replicate at Odell Brewing in Fort Collins, Colo. Kelly, a lab technician at Odell, used to work with Boelman at Left Hand. She was pleasantly surprised to learn the beer she chose to brew at the Liquid Poets Society's annual Liquid Poetry Slam competition was made by her former co-worker. "It was pretty cool because the Pro-Am selection is blind," Kelly said.

*This was such a cool experience, especially pouring my own beer at GABF.*

The pair scaled the dark sour on Odell's 5-barrel pilot system in January 2017. Instead of kettle souring, the beer spent nine months in barrels that were part of Odell's Friek sour program.

"We do sour beers very well," Kelly explains. "I knew we could put the beer in into Friek barrels and do very well."

The beer almost didn't make it to the competition, though. Kelly explained that the brewery initially sold all the kegs before it set one aside for judging.

Since proving his brewing bona fides, Boelman says he's received a lot congratulations from the Left Hand crew. He and

Kelly earned the only medal at GABF between the two breweries.

"I feel really honored I got to work with Jordan and Odell," Boelman said. "This was such a cool experience, especially pouring my own beer at GABF."

**Michael Piorunski is a brewer at Evolution Craft Brewing in Salisbury, Md. He is a graduate of the American Brewers Guild and an avid coffee consumer.**

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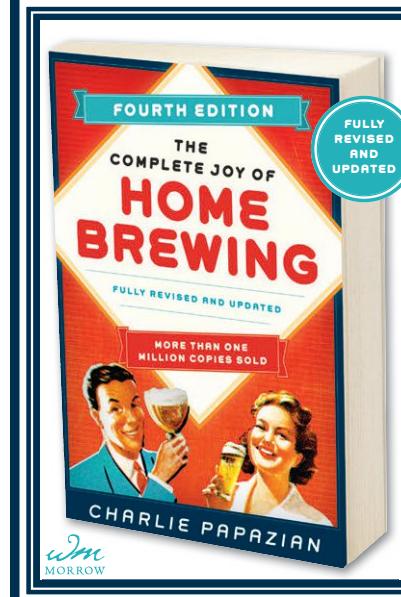


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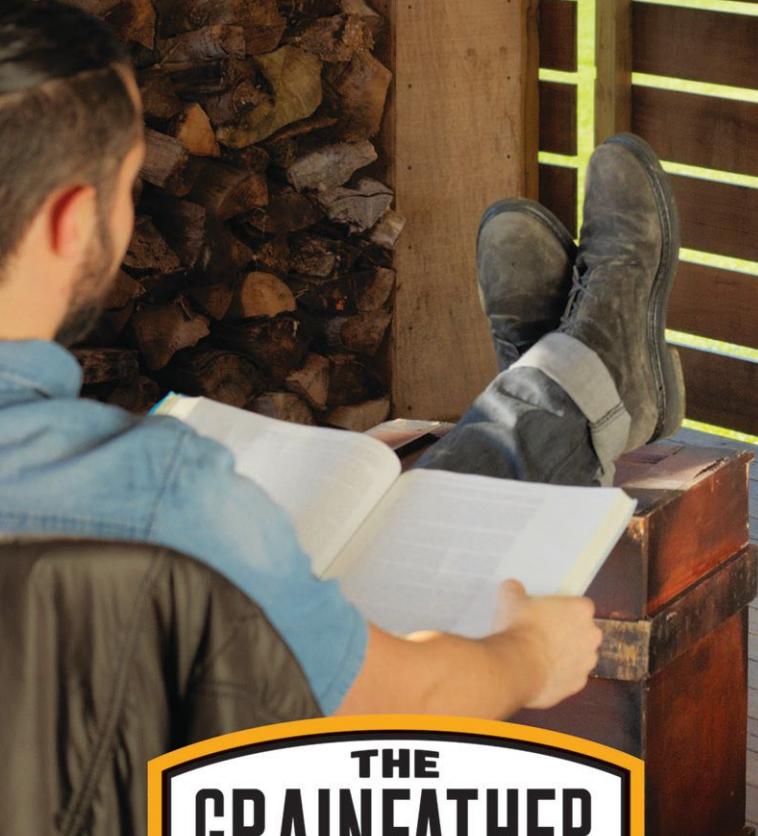


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By Amahl Turczyn

# Grand Rapids Pro-Am Competition

The Beer City Brewers Guild, with some 25 member breweries in the greater Grand Rapids, Mich. area, held its first beer festival in 2016, called Hopstock. Late that summer, homebrewer Nick Rodammer had an epiphany inspired by a special booth at the event called IPA Island, where participating breweries had a chance to show off their biggest and brightest IPAs for the thirsty crowds. Rodammer decided a Pro-Am booth to highlight collaborations between guild member breweries and homebrewers could also be a great addition to the fest.

"I informally socialized the idea with a few local brewery owners that I know," Rodammer explained, "and received positive feedback from each. So, in January of 2017, I formally pitched the idea to Jackson Van Dyke, the owner of Harmony Brewing Co., and the president of the Beer City Brewers Guild. He was interested as well and took it to the Guild's board the following week. They agreed that if enough breweries were interested in participating, we would move forward with it."

Fortunately, most of the Guild's breweries liked the idea. "The next several weeks were spent contacting the various brewery owners in the Guild to gauge their interest, and once we were done, 20 breweries agreed to participate in our first year."

On the homebrewer side, there were some logistical challenges. Rodammer continued, "We had to decide how to choose which homebrewers would be invited to participate. After some discussion, we decided to use local homebrewing competitions as qualifiers. Entrants who were among the top finishers in these competitions were invited to participate in the Pro-Am."



The winning team of the inaugural Beer City Pro-Am: standing left to right, homebrewer Paul Arends; author John Palmer; and, from City Built Brewing, Dave Petroelje (chief beer officer) and Rob Qualls (head brewer).

They also instituted some logical and geographic restrictions. "To keep the numbers manageable, and to ensure that our collaboration with the Beer City Brewers Guild was truly pairing local homebrewers with local brewers, we also made it a requirement that the homebrewer must live in the same geographic area as the Guild, which includes breweries in Grand Rapids and surrounding communities, but not the nearby cities of Lansing, Kalamazoo, Holland, or Muskegon. We ended up with 21 qualifiers via this method, of which 20 accepted; this matched perfectly with the 20 participating breweries."

Homebrewer-to-craft brewer matchups were determined by lottery. "Once we had the breweries and homebrewers identified," Rodammer continued, "we held a draft on April 30th. This was held at Harmony Hall, a local brewery who participated (same owners as Harmony

Brewing Co.). The draft was as simple as pairing via a random draw—brewery name in one hat, homebrewer name in another—until everyone was paired up. We then left it up to the breweries to work with their homebrewer partner to create an original collaboration recipe."

Then fate stepped in and threw them a curveball. "In late spring, we learned that the Guild would not be holding Hopstock in 2017," said Rodammer. "However, the Pro-Am would go on as more of a city-wide event promoted by the Guild. Each collaborative beer would go on tap at its local taproom around July 31st and be judged on August 12th, with the winner announced at a picnic for Guild members in place of Hopstock."

Undaunted, they carried on with their plans for the Pro-Am. "By late July, every pairing had their beer on tap around



## BEST-OF-SHOW ROUND

### **City Built Brewing Co. & Paul Arends:**

Monroe Weiss, Berliner weisse with passion fruit, guava, and mango (first place)

### **Bier Distillery & Michael Meadow:**

Demos, rum barrel aged strong ale (second place)

### **Pike 51 Brewery & Jeff Carlson:**

Beer City Kolsch, Kolsch (third place)

### **Grand Rapids Brewing Co. & Nick Rodammer:**

Sur Les Nuages, mixed-culture, dry-hopped saison aged in white-wine barrels

### **Mitten Brewing Co. & Eric Nyhof:**

IPK, India pale Kolsch

### **White Flame Brewing Co. & Andrew Baculy:**

Weiss Flame, Berliner weisse

town. Each brewery was asked to turn in two containers (growlers, crowlers, cans, bottles, etc.) by the morning of August 12 for the judging session. We recruited a number of local judges, all of whom were either Certified Cicerones or BJCP judges, and included a diverse set of people all closely connected to the craft beer scene in Grand Rapids. Thankfully, *How to Brew* author John Palmer and Kristi Switzer of Brewers Publications were in town and able to round out the judging panel."

In the interest of creativity, judges were encouraged to give entrants wiggle room beyond the confines of the BJCP style guidelines. Rodammer explained, "We used BJCP-style judging, with the sole difference being that we asked the judges to score the beer based on a short description the brewers submitted, as opposed to specific BJCP styles. This was done to encourage creative recipes, many of which didn't necessarily fit well with established styles." Beers were judged in four flights of five, and the top beer from each flight plus the top two scoring beers that finished second in their flight advanced to the best of show round. From there, the top three, and eventually the winner were chosen. Winners were announced that evening at the Beer City Brewers Guild Summer Picnic.



John Palmer announces the winner of the inaugural Beer City Pro-Am at the Beer City Brewers Guild summer picnic.

With the success of the event, Rodammer is already looking ahead to the 2018 Pro-Am, with a mind to streamline the logistics based on his experience in 2017.

"We are already planning next year's event, and while we don't have firm commitments yet, we expect the vast majority of the participating breweries to return for year two," he said. "We also expect to pick up a few new breweries. Three of the competitions that served as qualifiers last year are no longer being held, however the two largest will again serve as qualifiers, and a third, club-only competition will serve as the last qualifier.

"We will know which homebrewers qualified by mid-November 2017, which gives us a four-month head start. Hopefully, the second year is even more successful. Considering how well it went, with no expectations after we started from scratch last January, we are hopeful this can become a signature beer event in West Michigan for many years to come."

Best-of-show winning homebrewer Paul Arends got into brewing courtesy of a friendly neighbor. "About 14 years ago, I was outside doing some yard work at a new home," he explained. "My next-door neighbor (whom I had not met yet) showed up to introduce himself with two tall glasses of Pilsner. I asked what kind of beer it was, and he said he made it. That weekend, I watched him brew a batch, and the following weekend I had equipment of my own. We've been friends and brewing buddies ever since!"

Soon, Arends followed his thirst for brewing knowledge to a local club, the Brewsquitos. "They were a good group: knew what they were doing, ran meetings fairly structured, and always had plenty of beer to share, as well as constructive feedback for my beers."

After qualifying for the Pro-Am and going through the lottery to be paired with a local craft brewery, Arends was pleasantly surprised by the amount of leeway City Built Brewing Co. gave him.

"When I met with Rob, Dave, and Ed at City Built, they gave me full latitude to make whatever I wanted," he recalls. "I'll never forget the first thing they said to me: 'What would you love to brew here?'

"It was obvious to me that they were in this thing for one reason: to have fun making beer with me. I looked at their tap list, and we talked about their upcoming brews. Since we were going to tap these in the heat of summer, I wanted to make something that was refreshing and easy to drink. They were a very new brewery at the time, so I also wanted to make something that would sell quickly. I decided to make something sour but not too crazy. So, I went home, brewed a kettle sour with wheat, and split it three ways to test different fruit additions. I brought in a few samples, and we played around with various fruit types and ratios. Ultimately we ended up using...passion fruit, mango, guava, and grapefruit to balance the sour provided by the lacto."

**Amahl Turczyn is associate editor of Zymurgy.**

## MONROE WEISS

**Batch Size:** 5.5 US gallons (20.8 L)

**Brewhouse**

**Efficiency:** 75%

**Original Gravity:** 1.037 (9.25° P)

**Final Gravity:** 1.008 (2° P)

**Bitterness:** 0 IBU

**Color:** 3 SRM

**Alcohol:** 3.9% by volume

### MALTS

**2.5 lb.** (1.13 kg) Pilsner malt

**4.2 lb.** (1.91 kg) white wheat malt

**7 oz.** (198 g) Weyermann acidulated malt

### YEAST

Fermentis Safale S-04 English ale yeast

Swanson *Lactobacillus plantarum*

### ADDITIONAL ITEMS

**11 oz.** (312 g) passion fruit (secondary)

**6 oz.** (170 g) mango (secondary)

**6 oz.** (170 g) guava (secondary)

**6 oz.** (170 g) yogurt (primary)

**3 oz.** (85 g) grapefruit (secondary)

**20 mL** phosphoric acid added to mash  
**3/4 cup** (175 mL) corn sugar (priming bottles)  
or 0.33 cups (80 mL) for kegging

### BREWING NOTES

Mash grains at 148° F (64° C) for 60 minutes in reverse osmosis water treated with phosphoric acid. Fly sparge at 168° F (76° C). Then raise temperature to 167° F (75° C), lauter, and sparge with 3.5 gal. (13.5 L) of 170° F (77° C) water. Collect about 5.5 gal. (21 L) of runoff. Bring to a full and vigorous boil.

The total boil time will be 90 minutes. Cool to 110° F (43° C) and add yogurt and lacto culture. Purge kettle with CO<sub>2</sub> and seal. Allow wort to sit for 5 days at 90° F (32° C) or until pH reaches 3.4. Bring to a boil, then chill to 67° F (19° C) and pitch English ale yeast. Once fermentation slows, rack onto fruit. Package after secondary fermentation is complete.

### EXTRACT VERSION

Substitute 5.5 lb. (2.49 kg) wheat malt extract syrup for malts. Dissolve extract in reverse osmosis water and bring to a boil. After boil, chill to 110° F (43° C) and add yogurt and lacto for kettle souring as above.

### WHAT'S NEW IN THE FOURTH EDITION?

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- Malting and Brewing
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## KUDOS—BEST OF SHOW

### AHA/BJCP Sanctioned Competition Program

#### September 2017

ACT Amateur Brewing Championship 2017, 235 entries—Stephen Lawford, *Canberra, Australia.*

#### October 2017

Ensenada Oktoberfest, 15 entries—Rodolfo Flores, *Ensenada, BC, Mexico.*

Urban Chestnut's Homebrew Competition, 60 entries—Tim Lerch and Brian Tomko.

The Royal Finger Homebrew Competition, 100 entries—Jamie Fowler, *Kitchener, ON.*

Homegrown: County Homebrewing Competition, 12 entries—Colin VanderMeulen, *Belleview, ON.*

HY62 HOP Off Homebrew Competition - Dubbel, 7 entries—Chris Schwebach, *Columbus, OH.*

Queen of Beer, 76 entries—Shan Tarkanian, *Costa Mesa, CA.*

M.A.S.H In Competition, 69 entries—Jason Chang, *Avon, CT.*

Dixie Cup XXXIV, 867 entries—Mike Peterson, *Queen Creek, AZ.*

Queens Challenge, 185 entries—Joshua Cotton, *Brooklyn, NY.*

Kabrew Homebrewing Challenge, 123 Entries—Kyuseon Kim, *Goyang City, Korea.*

Helderberg Homebrew Triggerfish Open, 12 entries—Paul Groenewald, *Stellenbosch, South Africa.*

#### November 2017

Concurso Estadual da ACervA Carioca 2017, 42 entries—Leonel Fontoura de Oliveira Neto, *Rio de Janeiro, Brazil.*

Concurso De Cervejas Artesanais Do V NoNeCo, 60 entries—Luiz Felipe Menezes Peixoto.

30th Annual Southern California Regional Homebrew Competition, 309 entries—Brian Gregory, *Santa Maria, CA.*

California State Homebrew Competition, 397 entries—Kevin Johnson, *Fairfax, CA.*

MALT Turkey Shoot “Lucky 13”, 115 entries—Brendan Bergquist, *Huntington, VT.*

Moravian Homebrewers Meeting, 124 entries—Milan Lazan, *Prague, Czech Republic.*

Africa Brew, 19 entries—Bruce Williamson, *Johannesburg, South Africa.*

3rd Annual 3rd Wave Brewing Company

Homebrew Competition, 13 entries—Ryan Psolka, *Salisbury, MD.*

Saveurs de Genie, 3 entries—Université de Laval de Québec, *Québec, QC.*

Texas Honey Show, 23 entries—Tanya Phillips, *Austin, TX.*

Stout Day Canarias, 9 entries—Samuel David Gonzalez Lemes, *Candelaria, Canary Islands, Spain.*

Land of the Muddy Watters, 234 entries—Germantown Hills, IL.

NXNW Wort War Two, 40 entries—Nathan Beels & Bonnie Evans, *Austin, TX.*

5th Annual LIBME Beer and Mead Competition, 210 entries—Steven Landgren.

SA NHC Final Jhb, 40 entries—Nick Reed.

BrewDat Homebrew Competition 2017, 35 entries—Chris Humble, *Mermentau, LA.*

3rd Annual Battle of the Brews, 103 entries—Chris Bokmuller and Jake Braga, *South Lyon, MI.*

Props and Hops Homebrew Competition, 12 entries—Jim Hammer, *Joshua Tree, CA.*

Op Bravo - Homebrew For Heroes, 21 entries—Ivan, Daniel Marshall, *Keller, TX.*

Brew Slam 2017 (GTA Brews), 804 entries—Alvaro Reyes, *Vancouver, BC.*

Primer Concurso Homebrewer de Beerlada, 30 entries—José Luis Veramendi Echeverría, *San Sebastián, Basque Country, Spain.*

Star City Homebrew Throwdown, 96 entries—Ian McElhone, *Roanoke, VA.*

Festival Curitibano de Cerveja Artesanal 2017, 70 entries—Leandro Goncalves Moreno, *Curitiba, Brazil.*

Grand View Brew Fest, 38 entries—Lori Ertl, *Plymouth, MN.*

Skirmish in the Triad, 275 entries—Thomas Carpenter, *Charlotte, NC.*

Music City Brew Off, 258 entries—Chris Allen, *Nashville, TN.*

Brew Con World Series, 254 entries—Simon Gladding, *Hertford, UK.*

Monster Homebrew Competition, 84 entries—Keith and Pam Bradley, *Austin, TX.*

VI Concurso Paranaense de Cerveja Feita em Casa, 239 entries—Luis Cláudio Damiati Theossi, *Curitiba, Brazil.*

Saskatoon Headhunters Brewing Competition, 243 entries—Dean Kelly, *Saskatoon, SK.*

Motown Mash, 406 entries—Jeff Mauriello, *Pompton Plains, NJ.*

FOAM Cup, 615 entries—Tom Roan, *Fargo, ND.*

Concurso Bahia Malte de Cerveja Artesanal, 54 entries—Ubirajara Pimental, *Salvador, Brazil.*

Black Friday 2017 (Black beers only), 82 entries—Robbie Gaston, *London, UK.*

Mazer Cup Brasil, 49 entries—Álvaro Munhoz, *Curitiba, Brazil.*

Brew na Bóinne, 52 entries—Oisin Boydell, *Wicklow, Ireland.*

7ª Copa Cerveceros Caseros de Chile, 107 entries—Felipe Saavedra, *Viña del Mar, Chile.*

I Festival de Cerveja Artesanal de Mato Grosso do Sul, 55 entries—Maercio Gracini, *Campo Grande, Brazil.*

WCB Meads, Ciders and Sours, 25 entries—Jarrad Taylor, *South Lake, Australia.*

Fifth Annual Big Spruce Home Brew Challenge, 39 entries—Justin Clarke, *Hubley, NS.*

QUAFF Club Only Wheat vs Rye, 13 entries—Doug Brown, *San Diego, CA.*

Copa Peruana de Cervezas, 205 entries—Rimson Lobo, *Lima, Peru.*

Copa Cerveza Invierno, 27 entries—Hermanos Morales, *Durango, Mexico.*

#### December 2017

Humpy's Big Fish Homebrew Competition, 33 entries—Anthony Strupulis, *Anchorage, AK.*

Pennsylvania Homebrew Open Competition, 104 entries—Christopher Higgins, *Wilmington, DE.*

Piracicaba Beer Cup 2017, 69 entries—Caio Almeida, *Limeira, Brazil.*

3rd Annual 50 West / Ocelot Invitational, 41 entries—Raoul Masangcay, *Dulles, VA.*

Hoppy Cup - Homebrew Competition, 55 entries—Tim Chiu, *Hong Kong.*

19th Annual Palmetto State Brewers Open, 336 entries—Edward Christian, *Kernersville, NC.*

CiderDays Amateur Cider Competition 2017, 92 entries—Gaston Picoulet, *Cheneville, QC.*

Northeast Brewers Alliance Homebrew Competition - Brew. Drink. Compete., 180 entries—Michael Land, *Fredericksburg, VA.*



## KUDOS—BEST OF SHOW

### AHA/BJCP Sanctioned Competition Program

Top of the Tower, 35 entries—*Raymond Schultz, Aurora, CO.*

8 Concurso Estadual de Cervejeiros ACervA Paulista, 56 entries—*Luiz Eduardo Miziara & Ricardo Simoni, Sao Paulo, Brazil.*

4to Concurso Nacional de Cerveceros Caseros del Uruguay, 116 entries—*Rafael Pacheco, Montevideo, Uruguay.*

Happy Holidays Homebrew Competition, 582 entries—*Scott Haarmann, Fenton, MO.*

Concurso Casa OLEC 4 años, 81 entries—*Pedro Rocha, Florianópolis, Brazil.*

Western Brewers Conference, 11 entries—*Dunc Blair, Auckland, NZ.*

ASH HBOY Oatmeal Beers, 18 entries—*Mauricio Peralta.*

2017 Masterbrewer - Cap & Hare Homebrew Club, 74 entries—*Jeremy Sanders, Haltom City, TX.*  
FDR Iron Brewer 2017, 36 entries—*Matthew Bixby.*  
Brasseurs Royale 2017, 39 entries—*Bruce Baker, Baton Rouge, LA.*

2018 Cheers Charlotte Radio “Capture The Crown” Homebrew Competition, 57 entries—*Brandon Carter, Salisbury, NC.*

CRAFT Homebrewer of the Year Competition 3, 9 entries—*Dan Fick, MI.*

### January 2018

Big Beers, Belgians & Barleywines Festival, 306 entries—*Anthony Burink, Frederick, CO.*

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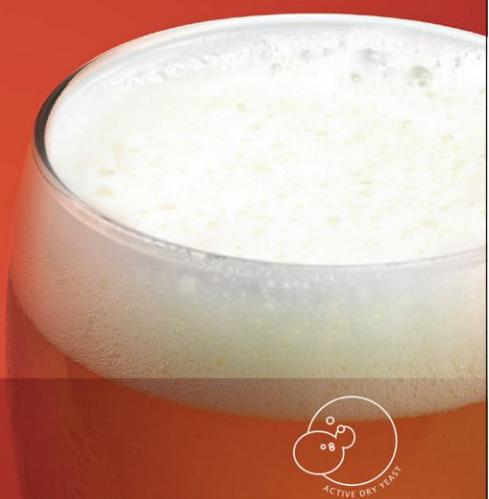
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**March 3, 2018**

**Boortmalt Beer Cup 2017**

Cholula, Puebla, Mexico

Entry Deadline: 2/17/2018

**March 3, 2018**

**Peach State Brewoff**

[coverthops.com](http://coverthops.com)

Avondale Estates, GA

Entry Deadline: 1/27/2018

**March 3, 2018**

**Bockfest**

[bockfest.brewcomp.com](http://bockfest.brewcomp.com)

Cincinnati, OH

Entry Deadline: 2/18/2018

**March 3, 2018**

**Winter's Warmers**

[phillyhbc.org](http://phillyhbc.org)

Philadelphia, PA

Entry Deadline: 3/2/2018

**March 3, 2018**

**Coconut Cup**

[miami-homebrew.org/2018-coconut-cup](http://miami-homebrew.org/2018-coconut-cup)

Miami, FL

Entry Deadline: 2/1/2018

**March 3, 2018**

**Hop Idol**

[reubensbrew.com](http://reubensbrew.com)

Seattle, WA

Entry Deadline: 2/12/2018

**March 3, 2018**

**Shamrock Open XXIII**

[carboyclub.com/shamrock-competition](http://carboyclub.com/shamrock-competition)

Raleigh, NC

Entry Deadline: 2/17/2018

**March 3, 2018**

**Champion of the Pint**

[garagebrewers.com/cop](http://garagebrewers.com/cop)

St. Peters, MO

Entry Deadline: 2/16/2018

**March 3, 2018**

**National Brewing Championships**

[nationalhomebrewclub.ie/competition](http://nationalhomebrewclub.ie/competition)

Dublin, Ireland

Entry Deadline: 1/27/2018

**March 8, 2018**

**Rocket Rod Kailua Kona Competition**

Kailua Kona, HI

Entry Deadline: 3/3/2018

**March 9, 2018**

**California State Fair Homebrew**

**Competition**

[castatefair.org/homebrew](http://castatefair.org/homebrew)

Sacramento, CA

Entry Deadline: 2/11/2018

**March 10, 2018**

**28th Annual Hudson Valley Homebrewers**

**Competition**

[hvhb.brewcomp.com](http://hvhb.brewcomp.com)

Poughkeepsie, NY

Entry Deadline: 2/23/2018

**March 10, 2018**

**2nd Annual West Plains BrewFest Home**

**Brew Competition**

[westplainsarts.org](http://westplainsarts.org)

West Plains, MO

Entry Deadline: 2/15/2018

**March 10, 2018**

**11th Annual Virginia Beer Blitz**

[colonialalesmiths.org/BeerBlitz](http://colonialalesmiths.org/BeerBlitz)

Hampton, VA

Entry Deadline: 2/24/2018

**March 10, 2018**

**San Diego Homebrew Festival**

[brewbrawl.com](http://brewbrawl.com)

San Diego, CA

Entry Deadline: 3/3/2018

**March 10, 2018**

**Snake Saturday Irish Only Competition**

[graintoglass.biz/competition](http://graintoglass.biz/competition)

North Kansas City, MO

Entry Deadline: 3/4/2018

**March 10, 2018**

**2018 Peak-to-Peak ProAm**

[indianpeaksalers.org/peak-to-peak-pro-am](http://indianpeaksalers.org/peak-to-peak-pro-am)

Longmont, CO

Entry Deadline: 3/2/2018

**March 10, 2018**

**March Mashness**

[cloudytownbrewers.org/competition](http://cloudytownbrewers.org/competition)

Saint Cloud, MN

Entry Deadline: 2/25/2018

**March 10, 2018**

**Drunk Monk Challenge**

[knaves.org/DMC](http://knaves.org/DMC)

Aurora, IL

Entry Deadline: 3/2/2018

**March 17, 2018**

**Bluebonnet Brew-Off XXXII**

[bbbewoff.com/bluebonnetbrewoff](http://bbbewoff.com/bluebonnetbrewoff)

Dallas–Fort Worth, TX

Entry Deadline: 1/31/2018

**March 17, 2018**

**Inner Sydney Brewers - Amylazy Days**

[innersydneybrewers.wixsite.com/amylazydays](http://innersydneybrewers.wixsite.com/amylazydays)

Sydney, Australia

Entry Deadline: 3/3/2018

**March 22, 2018**

**10th Annual Garrison Home Brew-Off**

[garrisonbrewing.com/community](http://garrisonbrewing.com/community)

Halifax, NS

Entry Deadline: 2/11/2018

**March 23, 2018**

**Batsisa 2018**

Tel Aviv, Israel

Entry Deadline: 3/16/2018

**March 24, 2018**

**8th Annual Ocean State Homebrew**

**Competition**

[oshc.brewcomp.com](http://oshc.brewcomp.com)

Pawtucket, RI

Entry Deadline: 3/3/2018



For an up-to-date calendar  
of AHA and BJCP events  
go to the Events section of  
[HomebrewersAssociation.org](http://HomebrewersAssociation.org)



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**March 24, 2018**

**Prague Homebrewing Competition**

[brewprague.cz](http://brewprague.cz)  
Prague, Czech Republic  
Entry Deadline: 3/24/2018

**March 25, 2018**

**Merri Mashers IPA Comp 2018**

[merrimashers.org/ipa-comp-2018](http://merrimashers.org/ipa-comp-2018)  
Melbourne, Australia  
Entry Deadline: 3/17/2018

**April 7, 2018**

**Thai Homebrew Competition**

[facebook.com/1201594903305897](http://facebook.com/1201594903305897)  
Bangkok, Thailand  
Entry Deadline: 3/31/2018

**March 24, 2018**

**Charlie Orr Memorial Chicago Cup Challenge**

[bossbeer.org/competition.html](http://bossbeer.org/competition.html)  
Crest Hill, IL  
Entry Deadline: 3/10/2018

**March 31, 2018**

**BeerMe BrewCup**

[facebook.com/groups/BeermeBrewClub](http://facebook.com/groups/BeermeBrewClub)  
Riverside, CA  
Entry Deadline: 3/30/2018

**April 9, 2018**

**Copa Cervezas del Caribe**

[ciclocervecero.com](http://ciclocervecero.com)  
Cartagena, Colombia  
Entry Deadline: 3/14/2018

**March 24, 2018**

**2º Concurso Interno Da Acerva Potiguar**

Natal, Rio Grande do Norte, Brazil  
Entry Deadline: 3/17/2018

**March 31, 2018**

**2nd Annual Port City Plunder Homebrew Competition**

[beerscores.com/comp\\_details.aspx?id=1143](http://beerscores.com/comp_details.aspx?id=1143)  
Wilmington, NC  
Entry Deadline: 3/21/2018

**April 14, 2018**

**Big South Beer Competition and Festival**

[bigsouthfestival.com](http://bigsouthfestival.com)  
Milton, GA  
Entry Deadline: 3/1/2018

**March 24, 2018**

**DC Homebrewers Club Cherry Blossom Competition**

[dchbcompetition.com](http://dchbcompetition.com)  
Washington, DC  
Entry Deadline: 3/16/2018

**April 7, 2018**

**Columbia Trails Homebrew Competition**

[facebook.com/events/185886115310610](http://facebook.com/events/185886115310610)  
Valmeyer, IL  
Entry Deadline: 3/24/2018

**April 14, 2018**

**Spirit of Free Beer Homebrew Competition**

[sofb.brewcomp.com](http://sofb.brewcomp.com)  
Beltsville, MD  
Entry Deadline: 4/5/2018

**March 24, 2018**

**Elevated Brewing Competition**

Columbus, OH  
Entry Deadline: 3/17/2018

**April 7, 2018**

**Between the Bluffs Homebrew Competition**

[explorelacrosse.com/bluffs-beer-wine-cheese-festival](http://explorelacrosse.com/bluffs-beer-wine-cheese-festival)  
La Crosse, WI  
Entry Deadline: 3/30/2018

**April 14, 2018**

**Grafton Brewing Competition**

[graftonbrewingcompetition.com](http://graftonbrewingcompetition.com)  
Grafton, NSW, Australia  
Entry Deadline: 4/6/2018

**March 24, 2018**

**IBU Open**

[ibuopen.com](http://ibuopen.com)  
Des Moines, IA  
Entry Deadline: 3/18/2018

**April 7, 2018**

**South Shore Brewoff**

[ssbc.brewcompetition.com](http://ssbc.brewcompetition.com)  
Mansfield, MA  
Entry Deadline: 3/24/2018

**April 14, 2018**

**HBC: No. I The English Sessions**

[hertfordbrew.club/english-sessions](http://hertfordbrew.club/english-sessions)  
Hertford, UK  
Entry Deadline: 3/31/2018

**March 24, 2018**

**SODZ British Beerfest**

[bbf.sodz.org](http://bbf.sodz.org)  
Columbus, OH  
Entry Deadline: 3/10/2018

**April 7, 2018**

**World Cup of Beer**

[worldcupofbeer.com](http://worldcupofbeer.com)  
Alameda, CA  
Entry Deadline: 3/13/2018

**April 19, 2018**

**Aurora - Dearborn County Brewoff**

[gcbeer.com/aurora---dearborn-country-brewoff.html](http://gcbeer.com/aurora---dearborn-country-brewoff.html)  
Aurora, IN

**March 25, 2018**

**Da Panela para o Mundo**

[hophunters.com.br/concurso](http://hophunters.com.br/concurso)  
Campinas, Sao Paulo, Brazil  
Entry Deadline: 1/20/2018

**April 7, 2018**

**Scorpion Homebrew Competition**

[scorpion.brewcompetition.com](http://scorpion.brewcompetition.com)  
Owings, MD  
Entry Deadline: 3/31/2018

**April 21, 2018**

**LA International Commercial Beer Competition**

[labeercomp.com](http://labeercomp.com)  
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For complete calendar, competition and judging information go to  
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**April 21, 2018**

**Iº Concurso Aberto Concervap**

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Entry Deadline: 4/1/2018

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**April 28, 2018**

**24th Annual Eight Seconds of Froth**

[highplainsdrafters.org/8-seconds-of-froth](http://highplainsdrafters.org/8-seconds-of-froth)

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**3rd Annual Ark-La-Tex Brewoff**

[reggiebeer.com/ReggieEntry.php?CompetitionID=UWIHWV1000319](http://reggiebeer.com/ReggieEntry.php?CompetitionID=UWIHWV1000319)

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**Hammerdown Brewcup 2018**

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**April 29, 2018**

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[dukesofale.com](http://dukesofale.com)

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**One way beer judges check their palates is by using commercial “calibration beers”—classic versions of the style they represent. Zymurgy has assembled a panel of four judges who have attained the rank of Grand Master in the Beer Judge Certification Program. Each issue, they score two commercial beers (or meads or ciders) using the BJCP scoresheet. We invite you to download your own scoresheets at [bjcp.org](http://bjcp.org), pick up a bottle of each of the beverages and judge along with them in our Commercial Calibration.**



Our über-dubbel is Abbey Ale, a classic offering from Brewery Ommegang in Cooperstown, N.Y. According to the brewery, “Abbey was Ommegang’s first beer and was styled after Dubbels produced by Belgian Trappist monks. A deep, rich and malty ale, Abbey uses several Belgian specialty malts and spices resulting in a very aromatic, flavorful beer. Deep burgundy in color, topped by a dense tan head, Abbey Ale is rich on the palate but with a dry finish. Suitable for cellaring, Abbey develops wonderful caramel, fig, and currant notes with age.”

The brewery notes that Abbey is brewed with Pils, amber, Munich, and aromatic malts; Styrian Golding and Spalt hops; and spiced with coriander, sweet orange peel, star anise, licorice root, and cumin. With 8.2% ABV, Ommegang’s take on the Belgian dubbel is a little more potent than many classic Trappist examples.

Now let us turn our attention 2,500 miles (4,000 km) to the west and the other side of the country. That’s where you’ll find Boonville, Calif., home to Anderson Valley Brewing Co., which brews a Belgian-style dark strong ale called Barkley’s. You might have once known it as Brother David’s Double, but rebranding seems to indicate that Brother David is now focused exclusively on his namesake tripel.

“Inspired by the classic Dubbels of Belgium, Barkley’s Belgian Ale has a dark brown body and aromas of warm cocoa, banana, and cloves,” says the brewery. “Specialty malts impart a toasted, nutty character and flavors of chocolate-covered

**W**hat’s in a name? Well, if you’re a beer judge, an awful lot. A beer’s style category is your first indication of what to expect when glass meets lips, and competitions are won and lost on how well entries fit within prescribed guidelines.

Ultimately, though, style categories are irrelevant to the process of enjoyment, which is nicely illustrated in this installment of Commercial Calibration. Here, our expert panel examines a dubbel that’s much more than a dubbel and a Belgian-style ale that once was a dubbel but is now a dark strong ale.

**OUR EXPERT PANEL** includes David Houseman, a Grand Master VI level judge and competition director for the BJCP from Chester Springs, Pa.; Sandy Cockerham, a Grand Master IV level judge from Indianapolis, Ind. and an associate exam director and Midwest Representative for the BJCP; Scott Bickham, a Grand Master III judge from Corning, N.Y., who has been exam director or associate exam director for the BJCP since 1995; and Gordon Strong, a Grand Master IX judge, principal author of the BJCP Style Guidelines, and president of the BJCP board who lives in Beavercreek, Ohio.



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**Commercial Calibration Index**  
[HomebrewersAssociation.org/pages/zymurgy/commercial-calibration](http://HomebrewersAssociation.org/pages/zymurgy/commercial-calibration)

cherries and candied fruits, while the subdued hop profile and Abbey yeast create spicy, herbal notes to compliment [sic] the warm, slightly sweet finish.”

Barkley’s is brewed to a respectable 9% ABV from pale, Munich, aromatic, Special B, and chocolate malts, plus Columbus, Saaz, and Goldings hops.

Personally, I don’t care what you call it as long as it tastes good. You could take me at my word, but you’d do much better to go try these two Belgian-style dark ales for yourself.

# THE SCORES



Abbey Ale—Brewery Ommegang, Cooperstown, N.Y.  
BJCP Category: 26B, Belgian Dubbel



DAVE HOUSEMAN

## THE JUDGES' SCORES FOR ABBEY ALE



SANDY COCKERHAM



SCOTT BICKHAM



GORDON STRONG

**Aroma:** Chocolate malt and alcohol notes up front. Quite estery, but not of any particular fruit. No phenols. No hop aroma. Noticeable brown sugar-like aroma. Some raisin and fig notes do come through as the beer warms. No diacetyl. No DMS. (10/12)

**Appearance:** Dark mahogany color. Well carbonated, creating a mousse-like, dense, tan head with very good retention. A bit hazy but OK for style. (3/3)

**Flavor:** Chocolate and alcohol dominate. Moderate hop bitterness with no hop flavor. Malt and bitterness are balanced for style. Somewhat sweet but finishes dry. Bitterness lingers in the finish. Brown sugar, caramel flavor but not from crystal malt. Some light toasted notes. No phenols. Esters mostly nonspecific but a little dark fruit notes of figs and raisins—not as dominant as in many Belgian dubbels, but still complex, rich, and enticing. The alcohol is pleasant, not hot. Added spices are not noticeable but likely contribute to the overall complexity. (17/20)

**Mouthfeel:** Medium to medium-full body. Well attenuated. High carbonation resulting in a soft palate. Noticeable alcohol warming. Chewy. No astringency or excessive bitterness. (5/5)

**Overall Impression:** A well-made dubbel. Would benefit from more dark fruit, even some banana esters and spicy phenols in place of some of the brown sugar notes. Perhaps some Special-B malt and a different Trappist yeast would do the trick. Great beer to have by the fire, particularly paired with beef stroganoff with wild mushrooms in a rich cream sauce. (8/10)

**Total Score: (43/50)**

**Aroma:** The nose leads with medium-low clove-tinged peppery spice. The malt character is medium bread crust and toast and includes a slight cocoa note. Medium plum notes and a faint herbal hop aroma. Sweet alcohol aroma is moderately low. (10/12)

**Appearance:** Ruddy brown with reddish highlights. There is moderate haze, but that is OK for the style. Lovely, thick, dark ivory head has excellent retention. High carbonation is evident and gives the dense head great staying power. (3/3)

**Flavor:** The generous malt flavor is a bit bigger than moderate intensity and has a thread of milk chocolate that runs through the center. Spicy phenols are moderate and accentuate the sweet chocolate malt. Beyond chocolate, the malt has layers of toast and light caramel. Bitterness is medium, and balance is just to the malty side. There are low notes of raisin and dried cherries. Very low herbal hop flavor. (17/20)

**Mouthfeel:** The medium to medium-full body is coupled with high carbonation that's delightfully spritzy on the palate. Medium alcohol warmth is a bit warmer in the finish. (4/5)

**Overall Impression:** This beer exhibits moderate malt complexity that showcases a firm dose of cocoa. It's a bit more than moderately warming, and a little less warmth could enhance drinkability. The delicate sweetness is inviting, and the moderate bitterness and firm note of alcohol prevented it from coming across as too sweet. Well crafted and a pleasure to sip. (8/10)

**Total Score: (42/50)**

**Aroma:** The initial aroma has moderate bready, toasted malt notes balanced by fruit esters, particularly pineapple, but also bubblegum and banana. Low levels of chocolate and plums enhance malt complexity. Very light clove. The alcohol is moderate and clean but just a little too apparent. It fits the style fairly well otherwise. (9/12)

**Appearance:** Moderately hazy, despite my effort to leave the yeast sediment in the bottle. Copper color is appropriate, and the persistent, light beige head floats effortlessly on the surface. (2/3)

**Flavor:** Moderate bready and nutty malt notes introduce some honey sweetness and a little toffee. It finishes moderately dry, as desired for the style, with a little sharpness reminiscent of bitter chocolate. The alcohol is evident and provides some sweetness. Pineapple and red apple are dominant, with white pepper and cinnamon. Hop bitterness is appropriately low with a malty balance. (16/20)

**Mouthfeel:** Moderately high carbonation, with an appropriate, clean alcoholic warmth. Light roasted malt astringency. Body is moderately full, somewhat chewy, but not as rich as the best examples of this style. Great conditioning. (4/5)

**Overall Impression:** This is a nice beer with initial flavors and aromas driven by ripe fruit. Less ester emphasis would enhance the malt richness and bring out complexity. Spicy phenols are pleasant when they eventually emerge. This beer would benefit from some aging and, when uncorked, some time to breathe to allow the malt, esters, and phenols to balance. (8/10)

**Total Score: (39/50)**

**Aroma:** Dry, spicy, slightly corky nose. Rich malt with caramel and dark toffee notes mix with dark, dried fruits (cherries, orange peel, raisins). Hint of chocolate. Balanced with moderate intensity. Spicy notes of alcohol with light spicy phenols. Malt grows as it warms. Alcohol is a bit forward. (9/12)

**Appearance:** A satisfying pop when opening the corked bottle leads to a tall tan head with tiny bubbles: rocky with great persistence. Effervescent. Deep copper color. Nearly opaque, but showing a bit of haze. (3/3)

**Flavor:** Medium-high rich malt initially with deep caramel, toast, and notes of milk chocolate. Medium bitterness. Full on the palate but has a dry finish with a light alcohol flavor adding to the bitterness and dry impression. Moderately strong fruit enhances the malt with caramelized bananas, orange peel, dried cherries, and a peppery spice. Great balance of flavors: malt-forward but not sweet. (16/20)

**Mouthfeel:** Very high carbonation. Creamy texture. Medium-full body, a bit heavy for the style. Warming alcohol shows its strength. Not astringent. (4/5)

**Overall Impression:** On the strong side for a dubbel, straddling the line between a dubbel and a Belgian dark strong ale (BDSA). More like a small BDSA, like Westvleteren 8. Dropping the ABV by about 1.5% would fit the style better. Great blend of flavors and overall balance. Malty with fruit and spice, balanced bitterness, and a properly dry finish. Bottle conditioning in the Trappist tradition gives a classic, creamy, prickly texture. Superb cold-weather beer. (8/10)

**Total Score: (40/50)**



## THE JUDGES' SCORES FOR BARKLEY'S BELGIAN STYLE ALE



**Aroma:** Complex amalgam of alcohol, chocolatey malts, and esters. Esters are fairly nondescript with a hint of raisin. Notes of brown sugar. No hop aroma. No phenols. Alcohol is fairly subtle. No diacetyl. No DMS. (10/12)

**Appearance:** Brilliant clarity in a rich mahogany body. Dense, tan, long-lasting head. A beautiful beer. (3/3)

**Flavor:** Sweet and malty up front, with chocolate notes and alcohol that has a bit of a bite, but is not hot. No hop flavor. Moderate hop bitterness doesn't quite balance the sweetness. Finishes with a little lactic tang. No DMS. No diacetyl. Lots of figgy, raisiny esters. Noticeable brown sugar notes. No phenols. Finishes a bit too sweet with a somewhat salty note. (16/20)

**Mouthfeel:** Soft palate up front in mouthfeel that finishes with sharpness from the alcohol. Quite warming. Medium to medium-full body but well attenuated. High initial carbonation dissipates quickly. (5/5)

**Overall Impression:** This is a nice Belgian dark strong ale. It's a little one dimensional with a sweet, brown sugar finish. Could cut back a little on the brown sugar aspect of the beer. A different yeast might add complexity with some peppery phenols. Still, well-made and very drinkable, especially on a cold winter night with a bowl of wild-game stew. (7/10)

**Total Score:** (41/50)



**Aroma:** The aroma begins with moderate peppery phenolic spice notes. Medium malt character is a mix of bread crust and dark caramel. Slightly less than medium plum, fig, and raisin notes along with a touch of red apple esters. No hop aroma. Besides the esters and phenols, the fermentation character is clean with a moderate spicy and floral alcohol aroma. (9/12)

**Appearance:** The beer is deep coppery brown with ruddy highlights. Clarity is very good. A moderate, dark ivory head is a mix of fine bead and frothy bubbles and has medium-low retention. (2/3)

**Flavor:** The flavor begins with medium-high malt that includes rich bread crust with a little pop of dark chocolate. Moderate bittering tempers the malt without hop flavor. The dark fruit aromatics are all but missing. There is a bit of rounded, dark, sugary sweetness too, but bitterness and moderate alcohol keep it in check and make the beer finish on the dry side. Balance is even between malt and hop bitterness. Moderately complex with high drinkability. (16/20)

**Mouthfeel:** The beer is medium to medium-full bodied and has medium-high carbonation. Moderate alcohol leaves a warming sensation on the palate but is fairly smooth. There is a slight creaminess in the mouthfeel. (4/5)

**Overall Impression:** A dark ale of obvious strength, yet very approachable. Malt complexity could have had more depth to fit the style better. The dark fruit notes are muted, especially in the flavor. Still, I enjoyed this and would welcome a snifter on a cold winter's night. (8/10)

**Total Score:** (39/50)



**Aroma:** Opens with a moderately intense burst of toffee, cacao nibs, toasted malt, tutti-frutti esters and clove phenols. It has some earthy, slightly musty notes and a little more roast and dark malt character than most examples. Alcohol aroma is moderate, with a hint of solvent, but not inappropriate. Malt character could be a little richer and less roasty. (9/12)

**Appearance:** Deep brown in color with ruby highlights and excellent clarity. The head is beige in color and forms well with uniform bubbles, but fades a little quickly. (2.5/3)

**Flavor:** Moderate malt sweetness, caramel and toffee give way to an overabundance of burnt, smoky phenols that disrupt the smoothness and malt richness. High alcohol amplifies these and adds some spice, pepper, and light solvent notes. Fermentation character has moderate bubblegum and pineapple. Finishes quite alcoholic, with some roasted malt acidity accentuating the dryness. Hops contribute just enough bitterness to support. (15/20)

**Mouthfeel:** The creaminess and body are both medium, and the carbonation level is less effervescent than most examples of this style. It packs some heat, with the too-assertive higher alcohols negatively impacting the desired smoothness in the finish. (3.5/5)

**Overall Impression:** This is a good example of the Belgian dark strong style, but perhaps on the young side. It would benefit from some aging to soften the alcohol notes and rough edges. A little more malt complexity and richness would be welcome. (7/10)

**Total Score:** (37/50)



**Aroma:** Moderate malt richness mixed with fruity esters and alcohol. The malt has a deep toast-y-bready character, and the esters are like dried cherries. Lightly spicy. Hints of chocolate and caramel. The well-integrated components are complex, intriguing, and inviting. (11/12)

**Appearance:** Deep coppery-brown. Opaque in a goblet but clear to a light. Moderate beige head settles a bit fast. (2/3)

**Flavor:** Similar to aroma: rich malt with a toasted, caramel flavor. Light alcohol adds to the medium to medium-high bitterness. Balance is malty, but the finish is dry with an aftertaste of malt and alcohol with esters. The ester profile has a dark fruit quality of figs and cherries. Medium-low spicy hops lie behind the malt, fruit, and alcohol. Clean fermentation supports the malt with a fruity, spicy yeast character. (17/20)

**Mouthfeel:** Medium-full body. Warming but not burning. Silky mouthfeel on the palate with heat in the finish and aftertaste. Medium-high carbonation. Not astringent. (4/5)

**Overall Impression:** Rich, well-developed, and balanced malt profile with complex, complementary esters. Light spicy phenols are welcome. Dry and well-attenuated but has a rich body: nice! No fermentation flaws or off-flavors. Seems a little young as the alcohol is a touch too forward. I'll cellar a bottle for next year as I think this will keep improving. (8/10)

**Total Score:** (42/50)



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# AHA MEMBER SHOPS



**Beverage People, The**  
1845 Piner Rd Ste D  
Santa Rosa, CA 95403  
(707) 544-2520  
bevpeo@sonic.net  
thebeveragepeople.com  
*Teaching homebrewing in California's wine country for over 30 years, we pride ourselves on the depth and breadth of our stock and unsurpassed support.*

**Beer Designs**  
5574 Everglades St Suite D  
Ventura, CA 93003  
(805) 308-2337  
sales@beeravenue.com  
beeravenue.com  
*Bringing your ideas to life by creating custom beer tap handles for home, office, or restaurant use! A selection of homebrewing supplies is also available.*

**Beer Belly Fermentation Supply**  
399 Business Park Ct. Suite 205  
Windsor, CA 95492  
(707) 837-5750  
info@beerbellybrewingsupplies.com  
beerbellybrewingfermentation.com  
*Beer Belly Fermentation Supply store located in Sonoma County, where great beer is always brewing. The BIGGER the belly the BETTER the brew.*

## Colorado

**The Brew Hut**  
15120 E Hampden Ave  
Aurora, CO 80014  
(303) 680-8898  
brewmaster@thebrewhut.com  
thebrewhut.com  
*Colorado's largest homebrew shop! Extensive inventory of beer-, wine-, cider-, and cheesemaking supplies. Cutting-edge classroom. Enjoy beer from Dry Dock Brewing while you shop.*

**Boulder Fermentation Supply**  
2510 47th St. Unit A2  
Boulder, CO 80301  
(303) 578-0041  
fermentationsupply@gmail.com  
boulderfermentationsupply.com  
*Open 7 days! Unique selection of ingredients and equipment including local Colorado products. Also offering classes for all skill levels, custom fabrication, kegerators, and more!*

**Castle Rock Homebrew Supply**  
1043 Park St  
Castle Rock, CO 80109  
(303) 660-2275  
eric@castlerockhomebrew.com  
castlerockhomebrew.com  
*Open 7 days a week! Outstanding selection of brewing, winemaking, draft and cheese supplies. Friendly and knowledgeable staff.*

## Altitude Brewing & Supply

2801 Walnut St Unit C  
Denver, CO 80205  
(303) 292-2739  
info@altitudebrew.com  
altitudebrew.com  
*Come in for all your brewing needs or to brew-on-site with our equipment and learn from our knowledgeable staff. Centrally located in Denver's RiNo district.*

## CO-Brew

1133 Broadway  
Denver, CO 80203  
(720) 485-4959  
jamie@cobrewdenver.com  
cobrewdenver.com  
*Beer and wine supplies, equipment, learn to brew, events, and brewery. Centrally located near Downtown at 11th & Broadway. Experience a new way to brew!*

## Broadway Brew Supply

4391 S. Broadway  
Englewood, CO 80113  
(303) 781-4680  
jose@broadwaybrewsupply.com  
broadwaybrewsupply.com  
*Proudly serving South Metro Denver and surrounding areas. Beer, wine, cider, and distilling equipment and supplies. Monthly classes for all experience levels. Come brew!*

## Hops & Berries

1833 E Harmony Rd Unit 16  
(directly Behind The Cinemark Theatre)  
Fort Collins, CO 80528  
(970) 493-2484, x802  
manager@hopsandberries.com  
hopsandberries.com  
*Northern Colorado's homebrewing and winemaking supply shop! Also check out our cheesemaking kits, hot sauces, and coffee roasting supplies.*

## Lil' Ole Winemaker

516 Main St  
Grand Junction, CO 81501  
(970) 242-3754  
lilolewinemaker@gmail.com  
*Serving Colorado and Utah brewers since 1978.*

## Tom's Brew Shop

883 Parfet St Ste J  
Lakewood, CO 80215  
(303) 232-5347  
kegs@tomsbrewshop.com  
tomsbrewshop.com  
*Lakewood and Denver's #1 choice for kegs, beer, wine, ingredients, & glasses. AHA & club discounts. Monday-Friday, 9am-6pm and Saturday, 9am-2pm.*

## Kettle and Barrel Brew Supply

311 E County Line Rd. A-4  
Littleton, CO 80122  
(720) 484-6265  
info@kettleandbarrel.com  
kettleandbarrel.com  
*Whether you're curious about the craft or creating your masterpiece, we have everything you need for*

*successful fermentation. We're veteran owned and ready to serve!*

## Quirky Homebrew Supply

425 W 115th Ave Ste 6  
Northglenn, CO 80234  
(303) 457-3555  
quirky@quirkyhomebrew.com  
quirkyhomebrew.com  
*Beer-Wine-Soda-Cider-Everything Homebrew. Featuring 275+ grains, 200+ wine kits, bulk pricing. Walk in cooler! 160+ hops, and internet competitive pricing! Huge selection.*

## Connecticut

### Beer & Wine Makers

**Warehouse**  
290 Murphy Rd  
Hartford, CT 6114  
(860) 247-2969  
info@bwmwct.com  
bwmwct.com

*Full line of beer-, wine-, and cheesemaking supplies and equipment. Specializing in kegging setups and custom beer recipes. Beginner and advanced beer class offered.*

### Maltose Express

246 Main St  
Monroe, CT 6468  
(203) 452-7332  
info@maltoseexpress.net  
maltoseexpress.net  
*Connecticut's largest homebrew & winemaking supply store owned by the authors of *Clonebrews & Beer Captured*. Buy pre-made kits for all 500-plus recipes in Szamatulski's books.*

## Delaware

### Xtreme Brewing Supplies

11307 Trussum Pond Rd  
Laurel, DE 19956  
(302) 280-6181  
contact@xtremebrewing.com  
xtremebrewing.com  
*Make beer, wine, cider, spirits. Dogfish Ancient Ales homebrew kits, 60, 90, and more. Clone kits for local beers. Free classes. Teas, coffees, cheesemaking & cultures.*

### Xtreme Brewing Supplies

24608 Wiley Branch Rd  
Millsboro, DE 19966  
(302) 934-8588  
contact@xtremebrewing.com  
xtremebrewing.com  
*The original Xtreme little store stuffed with everything we can fit from the big store. Official hours on Saturday; other days by appointment.*

## Florida

### VetterBrew HomeBrew Supply

2705 Cypress Drive  
Clearwater, FL 33763  
(727) 330-3825  
info@vetterbrew.com  
vetterbrew.com  
*Pinellas County's newest complete homebrew supply store. Located in the Clearwater/Countryside/Dunedin area. We carry all your beer- and winemaking supplies and equipment.*

### Hangar 41 Winery & Brew Shop (Time To Make Wine, Inc.)

10970 S Cleveland Ave Ste 304  
Fort Myers, FL 33907  
(239) 542-WINE (9463)  
sandy@timetomakewine.com  
timetomakewine.com  
*On-premises winery with a great selection of equipment and ingredients for home beer- and winemakers! Friendly and knowledgeable staff!*

### Brock's Homebrew Supply

7025 Industrial Road Unit A  
Melbourne, FL 32904  
(321) 473-3846  
customerservice@  
brockshomebrew.com  
BrocksHomebrew.com  
*Free shipping to FL, GA, SC, NC, and AL. Retail store open 7 days a week. Code BREWFL for 10% off your first web order.*

### Urban Brewers

4600 SW 75th Ave. Suite E  
Miami, FL 33155  
(866) 414-2739  
admin@urbanbrewers.com  
urbanbrewers.com  
*Free shipping for all Florida customers!! Fresh ingredients!! We also offer beermaking classes for beginners and experienced homebrewers.*

### Orlando Homebrew Supplies

2230 Curry Ford Rd  
Orlando, FL 32806  
(407) 730-1850  
orlandohomebrewsupplies@  
gmail.com  
orlandohomebrewsupplies.com  
*Orlando Homebrew Supplies is your one stop shop for all your homebrewing and winemaking needs. We carry a wide variety of equipment and ingredients. Cheers!"*

### Gary's Homebrew Supply

3403 Gulf Beach Hwy  
Pensacola, FL 32507  
(850) 723-2739  
garyshomebrew@gmail.com  
garysbrew.com  
*Open Monday through Friday: 11AM to 5PM and Saturday: 10AM to 3PM. 5% off purchases for AHA members.*



# AHA MEMBER SHOPS

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## Sanford Homebrew Shop

115 S Magnolia Ave  
Sanford, FL 32771  
(407) 732-6931  
[sanfordhbs@gmail.com](mailto:sanfordhbs@gmail.com)  
[sanfordhomebrewshop.com](http://sanfordhomebrewshop.com)  
Fresh ingredients & great advice!  
Supplying everything for making beer, wine, cider, mead, cheese, and fermented foods at home. Check our website for class and workshop calendar.

## Scortino & Son Brewery Supply

661 Sebastian Blvd Suite G  
Sebastian, FL 32958  
(772) 999-6242  
[info@scortinoandson.com](mailto:info@scortinoandson.com)  
[scortinoandson.com](http://scortinoandson.com)  
Sebastian, Fla.-based family-run brew store.

## Georgia

### Brew Depot Home of Beer Necessities

10595 Old Alabama Rd.  
Connector Ste 10  
Alpharetta, GA 30022  
(770) 645-1777  
[beernec@aol.com](mailto:beernec@aol.com)  
[BeerNecessities.com](http://BeerNecessities.com)  
Georgia's largest brewing supply store! Providing supplies for all your wine & beer needs. Custom bar design & draft dispensing systems. Award-winning brewer & vintner on staff! Check out the class schedule online!

### HopCity Craft Beer and Wine

1000 Marietta St NW Ste 302  
Atlanta, GA 30318  
(404) 350-9998  
[info@hopcitybeer.com](mailto:info@hopcitybeer.com)  
Carrying a full lineup of homebrew equipment, ingredients, wine, and the largest selection of beer in the southeast.

### Gravity Craft & Homebrew Supply

1136 Dogwood Dr SE Ste A  
Conyers, GA 30012  
(770) 679-5118  
[info@gravityhomebrew.com](mailto:info@gravityhomebrew.com)  
[gravityhomebrew.com](http://gravityhomebrew.com)  
Your one-stop shop for wine & beer brewing supplies and genuine craft beer from around the world. You never had a hobby until now!

## Hawaii

**Homebrew In Paradise**  
740A Moowaa St  
Honolulu, HI 96817  
(808) 834-2739  
[bill@homebrewinparadise.com](mailto:bill@homebrewinparadise.com)  
[homebrewinparadise.com](http://homebrewinparadise.com)  
Nothing tastes better than homemade! Check out our shop on Oahu or shop online. Supplying the Aloha state since 1996.

## Illinois

**Brew & Grow (Bolingbrook)**  
181 W Crossroads Pkwy Ste A  
Bolingbrook, IL 60440  
(630) 771-1410  
[website@brewandgrow.com](http://website@brewandgrow.com)  
[brewandgrow.com/brew](http://brewandgrow.com/brew)  
Show any current homebrew club membership card and get 10% off your brewing supplies.

### Brew & Grow (Chicago - North)

3625 N Kedzie Ave  
Chicago, IL 60618  
(773) 463-7430  
[website@brewandgrow.com](http://website@brewandgrow.com)  
[brewandgrow.com/brew/](http://brewandgrow.com/brew/)  
Show any current homebrew club membership card and get 10% off your brewing supplies.

### The Pursuit Supply Company

4316 W. Irving Park Road  
Chicago, IL 60641  
(312) 985-6652  
[contact@pursuitsupply.com](mailto:contact@pursuitsupply.com)  
[pursuitsupply.com](http://pursuitsupply.com)  
We have everything you need to make great beer: hops, yeast, grain, adjuncts, equipment & more! Plus supplies for cider, wine, coffee, cheese, and photography.

### Chicagoland Winemakers

689 W North Ave  
Elmhurst, IL 60126  
(630) 834-0507  
[info@chicagolandwinemakers.com](http://info@chicagolandwinemakers.com)  
[chicagolandwinemakers.com](http://chicagolandwinemakers.com)  
Offering a complete selection of wine- and beermaking supplies and equipment.

### Perfect Brewing Supply

619 E Park Ave  
Libertyville, IL 60048  
(847) 816-7055  
[info@perfectbrewsupply.com](http://info@perfectbrewsupply.com)  
[perfectbrewsupply.com](http://perfectbrewsupply.com)  
We have an excellent selection of equipment and ingredients for beer, wine, cider, and more. Remember, great friends bring homebrew.

### What's Brewing? Supply

335 W Northwest Hwy  
Palatine, IL 60067  
(847) 359-2739  
[Info@WhatsBrewingSupply.com](mailto:Info@WhatsBrewingSupply.com)  
[WhatsBrewingSupply.com](http://WhatsBrewingSupply.com)  
We have the freshest home beer- and winemaking ingredients as well as all your equipment needs. CO<sub>2</sub> refills! 10% AHA member ingredient discount.

### Chicago Brew Werks

14903 S Center St Unit 107  
Plainfield, IL 60544  
(815) 531-5557  
[brews@chicagobrewwerks.com](mailto:brews@chicagobrewwerks.com)  
[chicagobrewwerks.com](http://chicagobrewwerks.com)  
Midwest's largest selection of grain, hops, and yeast. Over 300 different whole grain malts, 110 hop varieties and 220 yeast strains! Brew on!

## Brew & Grow (Rockford)

3224 S Alpine Rd  
Rockford, IL 61109  
(815) 874-5700  
[website@brewandgrow.com](http://website@brewandgrow.com)  
[brewandgrow.com/brew](http://brewandgrow.com/brew)  
Show any current homebrew club membership card and get 10% off your brewing supplies.

### Brew & Grow (Roselle)

359 W Irving Park Rd Ste E  
Roselle, IL 60172  
(630) 894-4885  
[website@brewandgrow.com](http://website@brewandgrow.com)  
[brewandgrow.com/brew](http://brewandgrow.com/brew)  
Show any current homebrew club membership card and get 10% off your brewing supplies.

## Indiana

**Great Fermentations West**  
7900 E US Highway 36 Ste D  
NW Corner of Us36 & Dan Jones Avon, IN 46123  
(317) 268-6776  
[info@greatfermentations.com](mailto:info@greatfermentations.com)  
[greatfermentations.com](http://greatfermentations.com)  
A friendly neighborhood shop with a full line of fresh ingredients and equipment on the west side of Indianapolis. Brewers serving brewers.

### Great Fermentations

5127 E 65th St  
Indianapolis, IN 46220  
(317) 257-9463  
[info@greatfermentations.com](mailto:info@greatfermentations.com)  
[greatfermentations.com](http://greatfermentations.com)  
Indiana's largest selection of FRESH ingredients! Extensive line of brewing and draft equipment. Beginning and advanced classes in our education center. Largest inventory of Blichmann replacement parts. Brewers serving brewers.

## Iowa

**Bluff Street Brew Haus**  
372 Bluff St  
Dubuque, IA 52001  
(563) 582-5420  
[jerry@bluffbrewhaus.com](mailto:jerry@bluffbrewhaus.com)  
[bluffbrewhaus.com](http://bluffbrewhaus.com)  
Proudly serving the Tri-state area since 2006 with a complete line of beer- & winemaking supplies.

### Buck Creek Hops

206 E Main Street  
Solon, IA 52333  
(319) 331-3198  
[buckcreekhopsllc@gmail.com](mailto:buckcreekhopsllc@gmail.com)  
[buckcreekhops.com](http://buckcreekhops.com)  
Our family owned hops farm is located just south of Solon, Iowa. Our farm features rolling hop fields & onsite harvesting facility. Fresh hops & T90 pellets are available each harvest!

## Beer Crazy

3908 NW Urbandale Dr. / 100th St.  
Urbandale, IA 50322  
(515) 331-0587  
[info@beercrazy.com](mailto:info@beercrazy.com)  
[beercrazy.com](http://beercrazy.com)  
Specialty beers by the bottle and a full line of beer- and winemaking supplies.

## Kansas

### Brew Bros Hops and Sprockets

1110 Laramie St.  
Manhattan, KS 66502  
(785) 537-3737  
[brewbroshs@gmail.com](mailto:brewbroshs@gmail.com)  
[facebook.com/brewbroshopsandsprockets](http://facebook.com/brewbroshopsandsprockets)  
We're your local homebrewing supply and bicycle repair emporium! Homebrewing supplies and bike repair? We DID know we couldn't do that.

### Homebrew Pro Shoppe

2061 E Santa Fe St  
Olathe, KS 66062  
(913) 768-1090  
[charlie@HomebrewProShoppe.com](mailto:charlie@HomebrewProShoppe.com)  
[HomebrewProShoppe.com](http://HomebrewProShoppe.com)  
For all your brewing equipment and supply needs!

### Bacchus and Barleycorn Ltd

6633 Nieman Rd  
Shawnee, KS 66203  
(913) 962-2501  
[alberta@bacchus-barleycorn.com](mailto:alberta@bacchus-barleycorn.com)  
[bacchus-barleycorn.com](http://bacchus-barleycorn.com)  
Fast, friendly, personalized service since 1968. Full line of fresh ingredients for home beer-, wine-, mead-, cider-, and cheesemakers. Your home fermentation specialists.

### All Grain Brewing Specialists LLC

1235 NW 39th St  
Topeka, KS 66618  
(785) 230-2145  
[info@allgrainbrewing.biz](mailto:info@allgrainbrewing.biz)  
[allgrainbrewing.biz](http://allgrainbrewing.biz)  
As a new homebrew store, we have to try harder to get you what you want when you want it. Give us a try!

## Kentucky

### Blue Holler Brew Supplies

1563 31-W ByPass  
Bowling Green, KY 42101  
(270) 792-3003  
[bluehollerbrewsupplies@yahoo.com](mailto:bluehollerbrewsupplies@yahoo.com)  
[facebook.com/Bluehollerbrew/](http://facebook.com/Bluehollerbrew/)  
Servicing South Central KY with homebrew ingredients and equipment and 20 crafts on tap while you shop



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# AHA MEMBER SHOPS



## Winemakers & Beermakers Supply

9475 Westport Rd Ste 301  
Louisville, KY 40241  
(502) 425-1692  
[winemakers@earthlink.net](mailto:winemakers@earthlink.net)  
[winebeersupply.com](http://winebeersupply.com)  
Complete beermaking and winemaking supplies. Premium malt from Briess, Muntons, and Avangard. Superior grade of wine juices. Family owned store since 1972.

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### LA Homebrew

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(225) 773-9128  
[info@lahomebrew.com](mailto:info@lahomebrew.com)  
[lahomebrew.com](http://lahomebrew.com)  
Over 120 types of brewing grains sold by the ounce or pound. Liquid and dry yeasts. Order online for in-store pickup or same day shipping.

### Brewstock Homebrewing Supplies

3800 Dryades St  
New Orleans, LA 70115  
(504) 208-2788  
[kyle@brewstock.com](mailto:kyle@brewstock.com)  
[brewstock.com](http://brewstock.com)  
Louisiana's largest homebrew selection in the heart of the Crescent City. Beer, wine, cheese, coffee, and more. Online ordering available.

## Maine

### Central Street Farmhouse

30 Central St  
Bangor, ME 4401  
(207) 992-4454  
[zeth@centralstreetfarmhouse.com](mailto:zeth@centralstreetfarmhouse.com)  
[centralstreetfarmhouse.com](http://centralstreetfarmhouse.com)  
Maine's premiere homebrewing destination, featuring extensive line of signature beer kits, winemaking classes and supplies, and everyday technical and emotional support! Check out our webstore!

## Maryland

### AleCraft Brewing Supply

319 N. Main St.  
Bel Air, MD 21014  
(410) 420-5102  
[estreatt@alecraftbrewing.com](mailto:estreatt@alecraftbrewing.com)  
[alecraftbrewing.com](http://alecraftbrewing.com)  
Free and private brewing classes available. Stop in for your beer, wine, cheese ingredients, and more!

### Maryland Homebrew

6770 Oak Hall Ln Ste 108  
Columbia, MD 21045  
(888) BREW-NOW  
[chrisanderson@mdhb.com](mailto:chrisanderson@mdhb.com)  
[mdhb.com](http://mdhb.com)  
For all your beer, winemaking, fermenting, and cheesemaking needs. Free shipping! AHA discounts!

## Flying Barrel

1781 N Market St  
Frederick, MD 21701  
(301) 663-4491  
[info@flyingbarrel.com](mailto:info@flyingbarrel.com)  
[flyingbarrel.com](http://flyingbarrel.com)  
Supply shop and brew-on-premises. Large selection of ingredients, equipment, and supplies for homebrew, winemaking, and more.

## Massachusetts

### Boston Homebrew Supply

1378 Beacon St.  
Brookline, MA 2446  
(617) 879-9550  
[info@bostonhomebrewsupply.com](mailto:info@bostonhomebrewsupply.com)  
[bostonhomebrewsupply.com](http://bostonhomebrewsupply.com)  
High-quality ingredients, supplies, and customer service.

### Modern Homebrew Emporium

2304 Massachusetts Ave  
Cambridge, MA 2140  
(617) 498-0400  
[mhe@beerbrew.com](mailto:mhe@beerbrew.com)  
[beerbrew.com](http://beerbrew.com)  
Plenty of hops, 60+ grains, herbs and spices, kegging equipment, wine, cheesemaking, more. Open 7 days a week, staffed by brewers and winemakers. Visit us: M-W 10-7; Th & F 10-8; Sa 9-7; Su 10-6.

### West Boylston Homebrew Emporium

45 Sterling St Ste 9  
West Boylston, MA 1583  
(508) 835-3374  
[wbhe@beerbrew.com](mailto:wbhe@beerbrew.com)  
[beerbrew.com](http://beerbrew.com)  
Plenty of hops, 50+ grains, herbs and spices, a wide selection of kegging equipment, more. Open 7 days a week, staffed by brewers and winemakers.

### South Shore Homebrew Emporium

86 Finnell Dr. Unit 20  
Weymouth, MA 2188  
(781) 340-2739  
[SSHE@beerbrew.com](http://SSHE@beerbrew.com)  
[beerbrew.com](http://beerbrew.com)  
Huge store of hops, 60+ grains, herbs, spices, kegging, winemaking, cheesemaking equipment, more. Staffed by brewers and winemakers. M-W 11-6; Th, F 11-7; Sa 10-6; Su 12-5.

## Michigan

### Gravel Bottom Craft Brewery & Supply

418 Ada Dr SE  
Ada, MI 49301  
(206) 403-8563  
[michiels.brewing@gmail.com](mailto:michiels.brewing@gmail.com)  
[gravelbottom.com](http://gravelbottom.com)  
Six frequently changing taps showcase different styles, including recipes by homebrewers. Classes with a fully stocked homebrew shop provide everything to brew your own.

## Adventures In Homebrewing

6071 Jackson Rd  
Ann Arbor, MI 48103  
(313) 277-2739  
[hops@homebrewing.org](mailto:hops@homebrewing.org)  
[homebrewing.org](http://homebrewing.org)  
Michigan's largest selection of homebrew supplies. Serving homebrewers since 1999.

## O'Connor's Home Brew Supply

619 Lyon St NE  
Grand Rapids, MI 49503  
(616) 635-2088  
[info@oconnorshomebrew.com](mailto:info@oconnorshomebrew.com)  
[oconnorshomebrew.com](http://oconnorshomebrew.com)  
O'Connor's is a dedicated homebrew supply store that caters to the needs of all levels of homebrewers. Our knowledgeable staff is always eager to help!

## Siciliano's Market

2840 Lake Michigan Dr NW  
Grand Rapids, MI 49504  
(616) 453-9674  
[info@sicilianosmkt.com](mailto:info@sicilianosmkt.com)  
[sicilianosmkt.com](http://sicilianosmkt.com)  
The largest inventory of homebrew supplies in western Michigan!

## Bell's General Store

355 E Kalamazoo Ave  
Kalamazoo, MI 49007  
(269)382-5712  
[generalstore@bellsbeer.com](mailto:generalstore@bellsbeer.com)  
[bellsbeer.com](http://bellsbeer.com)  
Staying true to our roots, Bell's General Store has been supplying homebrewers since 1983. Visit us next door to Bell's Eccentric Cafe or online at [bellsbeer.com](http://bellsbeer.com).

## Cap N Cork Homebrew Supply

16776 21 Mile Rd  
Macomb, MI 48044  
(586) 286-5202  
[info@capncorkhomebrew.com](mailto:info@capncorkhomebrew.com)  
[capncorkhomebrew.com](http://capncorkhomebrew.com)  
We carry a full selection of beer- and winemaking equipment!

## Scrooge & Barley Inc.

226 S. Lafayette St.  
South Lyon, MI 48178  
(248) 278-6282  
[info@scroogeadbarley.com](mailto:info@scroogeadbarley.com)  
[scroogeadbarley.com](http://scroogeadbarley.com)  
A veteran-owned homebrewing supply store. We have a variety of beer and wine kits, as well as grains, extracts, yeast, hops, and equipment.

## Adventures In Homebrewing

23869 Van Born Rd  
Taylor, MI 48180  
(313) 277-2739  
[homebrew@homebrewing.org](mailto:homebrew@homebrewing.org)  
[homebrewing.org](http://homebrewing.org)  
Michigan's largest selection of homebrew supplies. Serving homebrewers since 1999.

## UBREW - Traverse City

3054 Cass Rd.  
Suite D  
Traverse City, MI 49684  
(231) 943-2016  
[info@ubrewtc.com](mailto:info@ubrewtc.com)  
[ubrewtc.com](http://ubrewtc.com)

## Minnesota

### Brew-n-Wine

219 S Victory Dr Ste 100  
Mankato, MN 56001  
(507) 345-5733  
[dg@brew-n-wine.com](mailto:dg@brew-n-wine.com)  
[brew-n-wine.com](http://brew-n-wine.com)

### Northern Brewer, LLC

6021 Lyndale Ave S  
Minneapolis, MN 55419  
(651) 291-8849  
[info@northernbrewer.com](mailto:info@northernbrewer.com)  
[northernbrewer.com](http://northernbrewer.com)

Serving the Twin Cities and the nation since 1993. Stop in and chat with our staff of award-winning brewers, meadmakers, and BJCP-certified judges.

### Midwest Supplies

5825 Excelsior Blvd  
Minneapolis, MN 55416  
(952) 925-9854  
[service@midwestsupplies.com](mailto:service@midwestsupplies.com)  
[midwestsupplies.com](http://midwestsupplies.com)  
Everything you need to make beer, wine, cheese, and coffee with an extensive selection of hydroponics paired with unmatched service at an affordable price.

### The Hop Shop

3415 W. Division St. Suite 142A  
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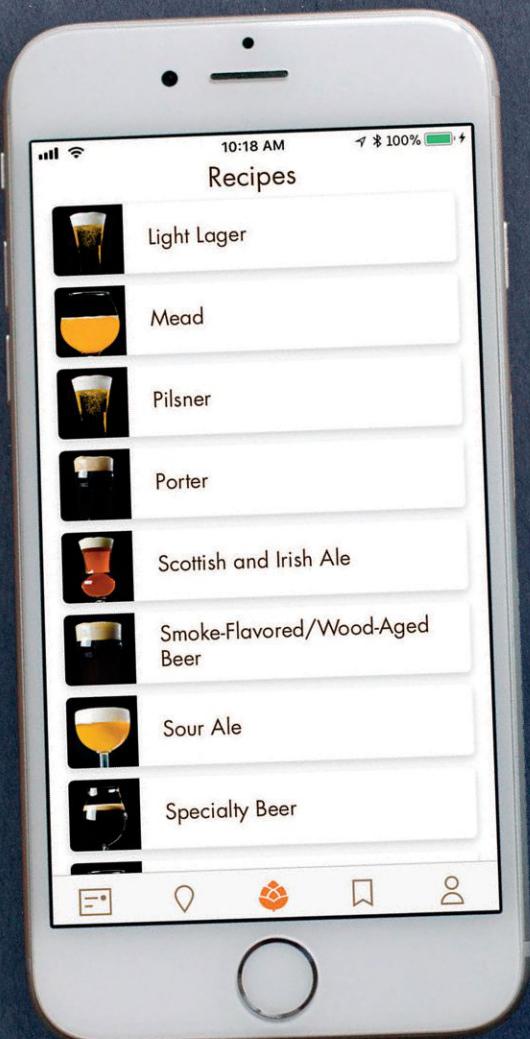
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By Charlie Papazian



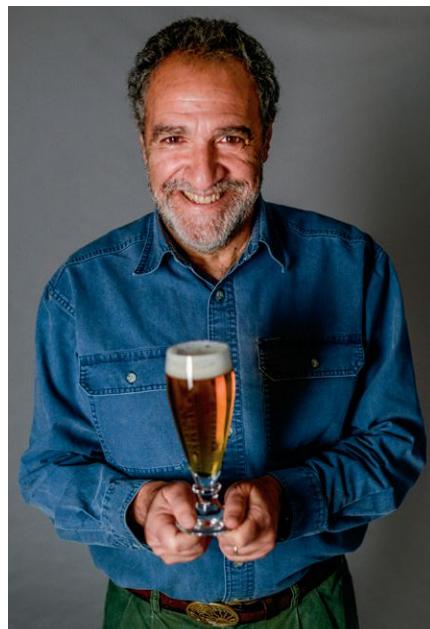
# Capturing the Past: Resourcing the Pieces That Made Dreams

**T**ime flies, and then we look back, pause, and reflect, incredulously asking ourselves, “What was that all about? How did that ever happen? What was I thinking?”

I'll never forget the time a friend of mine told me, “Charlie, I can't believe all the stuff that has happened to me.” Then he paused for a few seconds before loudly exclaiming, “AND I WAS THERE!” It sums up what I've been realizing about the extraordinary journey we call craft brewing and craft beer.

For the last two full years, I've had the opportunity and pleasure to unearth and organize 40 years of the Brewers Association's professional and amateur (homebrewing) craft beer history in the form of more than 100,000 publications, photographs, audio tapes, films, videos, and documents. I've also had the extraordinary privilege to manage more than 140 video interviews of the pioneers of American craft brewing, all of which will be preserved for future reference and inspiration. Many of these pro pioneers recalled the inspirations that were their homebrew beginnings. Their stories are as much tributes to American homebrewing as they are to professional craft brewing and their craft beer.

This is my final year of “work.” In January 2019, I will exit the Brewers Association and American Homebrewers Association after an extraordinary 40-year journey. The stories of craft brewing's pioneers will be a lasting tribute. I conducted many 50-minute interviews, which offered inti-



mate and emotional stories of success, failure, risk, humility, pursuit, escape, passion, energy, naivety, and so much more. I would go home in the evening after a full day of interviews, exhausted and unable to sleep. The stories, images, and emotions swirled in my mind. They would not let go of me. What the pioneers left for us continues to make me believe that we have lived through some unique and extraordinary times.

Here are a few thoughts that highlight some of the important things that matter about the legacy of craft brewers.

I often get asked, “Charlie, did you ever imagine that beer would become this?” The answer is simply yes, I had a playful and inebriated vision that there would be

a homebrewer in every neighborhood and a brewery in every town. However, what I did not imagine, couldn't imagine, never considered, was the impact that craft brewing would have on our culture, our economy, and our American lives.

Context matters in helping to define the relevance of craft brewing history. What else was happening in those formative times of craft brewing? What was the attitude toward food? What was the interest rate? How bad was unemployment? What circumstances shaped the dreams of young adults? What wars had we just fought, and why? How did we travel? What were the twelve beer brands that were imported into the USA? How could an entire generation love Wonder Bread, celebrate instant coffee, and go gaga over Velveeta cheese? What changed?

Context comes through in every interview I conducted.

Why did we start homebrewing? It was not just because we wanted better beer choice. One interviewee said quite succinctly, “The old version of beer and food was the world of *The Matrix*. You were told that things were real, but nothing was real at all.”

Did a career in craft brewing change you? “Over time, I have had to learn to shave some of the edges of my religion...as long as you don't bite into the central tenets of what you believe in....”

Humility has always been a key factor for most homebrewers' and professional craft brewers' success. Knowing that you

will make mistakes. Learning how to recover from those mistakes. Never feeling that you know enough about brewing quality beer. Forever thirsting to know more and do better. Listening to others' wisdom and experience.

Were pioneer professional craft brewers naive about getting into the business of craft brewing? Certainly they were. They were lucky, very lucky not to realize their naivety, because if they knew what they were getting into, their enthusiasm and resiliency may have been tempered. Only when you look back do you perceive naivety. That's what naivety is all about.

The earliest microbrewers and craft brewers pursued exploration into uncharted territory. They certainly didn't have in mind that they were preparing for those who followed. Only now in retrospect do we add that calculated reasoning to explain what they achieved. In reality, the original microbrewers were explorers. There was little that was charted. Those who followed were pioneers.

The challenges faced by entrepreneurs are shared across many types of businesses. The need for both passion and energy is paramount. Did all the early craft brewer entrepreneurs have a well-thought-out vision? No. It was a day-to-day exercise in survival and taking one step at a time. Succinct, defining business plans and vision more often than not, developed later and over time.

Craft brewers need both passion and energy to be in this business. They need the passion to get through the times when energy is low and the entire world around them seems to be falling apart. Passion is what sustains craft brewers as they confront one challenge after another, and sometimes, seemingly, all the challenges at once. There is a constant need to nurture if one is to have enough energy to get past every challenge.

Even with passion and energy, there were frequent times in which early brewers faced imminent failure. Many reflect on having to consider "throwing in the towel," but for the most part, if destiny was in their control, failure was simply not an option. One has to listen to the context of their sto-

ries. In the early '80s, interest rates were at or higher than 17 percent per year. Banks did not give loans to brewery startups. Regulatory agencies didn't have a clue how to apply the regulations. Craft brewing as we know it today was mostly against the law. Laws were in need of change.

Financing came from family reserves and personal property. Risk and faith became one. Relatives, close friends, and family invested more in a brewer's passion and energy than in their idea. Most everyone thought that starting a brewery was an insane idea and an unthinkably wrong thing to do. Given the context, it is no wonder that most early entrepreneurs were driven by a "failure is not an option" mentality.

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## CHARLIE, DID YOU EVER IMAGINE THAT BEER WOULD BECOME THIS? THE ANSWER IS SIMPLY YES.

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Regarding risks they had taken, I frequently asked pioneers during the interviews, "How scared were you?" One successful veteran of the craft brewing movement summed it up, "I wake up scared shitless every day." Another rejoined, "I slept like a baby—I wake up at 3 a.m. every night and cry like a baby."

"This is all quite fragile. There is this historical trend of revolutionaries who win for a while, but ultimately, power and money and efficiency eventually grind them up. "There is a difference between things that are risky, things that are scary, and things that are dangerous. The greatest risk of all is wasting your life out of fear of change. Things that are dangerous but are not scary: those are the things you have to watch out for."

For several early pioneers, there was a sense of loneliness that crept into their psyches. Few beer drinkers were interested in trying beer other than ordinary light lager. Distributors were not interested. Entire populations seemed to dismiss craft beer as bizarre. Families were supportive but questioned the wisdom of this mysterious and unknown pursuit.

There were no craft beer drinkers. "It was lonely out there," one said, and many agreed. Some early craft brewers had partners they could count on for support—encouragement and answers to the dilemmas they confronted—and in those circumstances, it was not so lonely. However, for the sole proprietors and partners who were not on the same page, loneliness was a familiar sentiment.

There were always challenges that were extraordinary, even by our standards today. It's 2018. Loneliness? Have you experienced it at times? If not, it is worth reflection that times were very different for the earliest pioneers and entrepreneurs who helped build the foundation that is now craft brewing. It still takes immense courage and resiliency to be an entrepreneur.

The world of partnerships takes on many faces: husband and wife; sister and brother; father, mother, son, and daughter; friends, investors, and bankers. Some partnerships start perfectly and change with time. Some partnerships dissolve and others persist. Visions change. Priorities shift. Growth changes things. Growth changes people. Some marriages stay intact; some don't.

One partnership of sister and brother had to come to terms: What was more important: to be brother and sister or to be partners in business? Coming to terms with changing priorities and needs confronts growing brewers. Dealing with them is always a unique experience. There are many lessons that provide for self-reflection.

Century-old, family-owned craft brewers have a unique perspective on approaching risk. Their culture is embedded in time and family. The weight of their brewery's legacy drives their approach to business decisions, stewardship, and succession.

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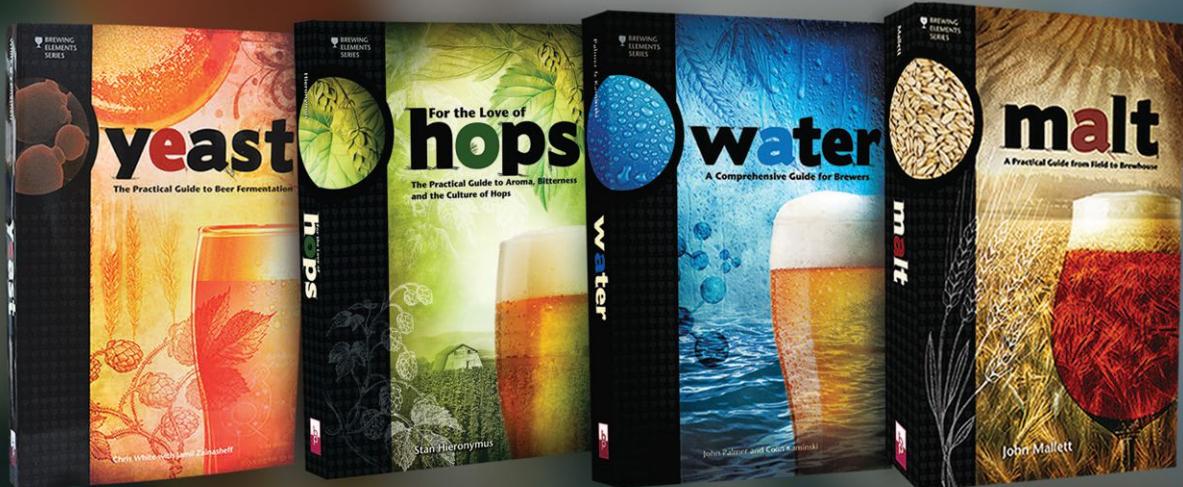
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# Smokey the Beer II (All-Grain)

**Batch Size:** 5 US gallons (19 L)

**Extract Efficiency:** 75%

**Original Gravity:** 1.053 (13.1 B)

**Final Gravity:** 1.014 (3.5 B)

**Bitterness:** About 31 IBU

**Color:** About 13 SRM (26 EBC)

**Alcohol:** 5.1% by volume

## MALTS

<b>2 lb.</b>	(908 g) Munich malt (10–15° L)
<b>6 lb.</b>	(2.7 kg) German beechwood-smoked malt or American cherrywood-smoked malt
<b>2 lb.</b>	(908 g) Bohemian floor-malted pale malt
<b>8 oz.</b>	(227 g) aromatic malt
<b>4 oz.</b>	(113 g) German Caramunich malt (70–80° L)
<b>4 oz.</b>	(113 g) German acidulated malt ( <i>Sauermalz</i> )
<b>4 oz.</b>	(113 g) Gambrinus Honey Malt

## HOPS

<b>0.8 oz.</b>	(24 g) Alsace Aramis, 6.5% a.a. @ 60 min (5.2 HBU/147 MBU)
<b>1 oz.</b>	(28 g) Alsace Aramis @ 0 min
<b>1 oz.</b>	(28 g) Alsace Aramis, 1st dry hop at racking
<b>1 oz.</b>	(28 g) Alsace Aramis, 2nd dry hop, 7–10 days before kegging/bottling

## YEAST

German or Bavarian lager yeast.

I use White Labs Cry Havoc yeast.

## ADDITIONAL ITEMS

<b>1/4 tsp.</b>	(1 g) powdered Irish moss
<b>3/4 cup</b>	(175 mL) corn sugar (priming bottles) or 0.33 cups (80 mL) corn sugar for kegging

## BREWING NOTES

A step infusion mash is employed to mash the grains. Add 11 quarts (10.5 L) of 140° F (60° C) water to the crushed grain, stir, stabilize, and hold the temperature at 132° F (56° C) for 30 minutes. Add 5.5 quarts (5.2 L) of boiling water and add heat to bring temperature up to 155° F (68° C) and hold for about 30 minutes. Then raise temperature to 167° F (75° C), lauter, and sparge with 3.5 gallons (13.5 L) of 170° F (77° C) water. Collect about 5.5 gallons (21 L) of runoff. Add 60-minute hops and bring to a full and vigorous boil.

The total boil time will be 60 minutes. When 10 minutes remain, add the Irish moss. When boiling is complete, turn off the heat and add the 0-minute hops. Place the pot (with cover on) in a running cold-water bath for 30 minutes. Continue to chill in the immersion or use other methods to chill your wort. Then strain and sparge the wort into a sanitized fermenter. Bring the total volume to 5.5 gallons (21 L) with additional cold water if necessary. Aerate the wort very well.

Pitch the yeast when temperature of wort is about 70° F (21° C). Once visible signs of fermentation are evident, ferment at temperatures of about 55° F (13° C) for one to two weeks or until fermentation shows signs of calm and stopping. Rack from your primary to a secondary and add the first dry hop addition. If you have the capability, “lager” the beer at temperatures of 35–45° F (1–7° C) for 3–6 weeks. Seven to ten days before bottling or kegging, add the second dry hop addition.

Prime with sugar and bottle or keg when complete.

It is personally far more emotional than what most newly emerged craft brewing pioneers experience. It is a sobering realization when you understand this. For many, that realization suddenly becomes part of your own future.

“What is it about you personally, that you wanted to pursue brewing as a business endeavor?” Of course the first answer that comes to mind for many is, “I loved beer” or something similar. But, when I followed up the question with, “As a young twentysomething, what were you escaping?” my inquiry came into perspective.

The early brewing pioneers and explorers are perhaps not so very different from today’s newest brewers. The origins of craft brewing business endeavors are mostly about individual pursuit of lifestyle, ideals, freedom, independence, and quality of life. Small-and-independent has been a driving force for more than 40 years. Pursuit of craft brewing is not necessarily a business decision. It is not necessarily all about the love and passion for beer. It is a decision based on the core values of the founder.

A simple example may put this into relevant perspective. A large corporation may choose to locate its facility based on data,

efficiency, and business factors. A small and independent brewer almost always chooses a location because “I live here.” Is this a relevant example? How many times have you been asked, “Why did you choose to locate your brewery here in Craft City?” In the back of your mind you are thinking, “That’s a silly question. Because I live here.” Values matter.

Were there sacrifices along the way? For many there were. Veteran craft brewers and entrepreneurs later reflect on family, friends, relationships, and the physical wear and tear on the body that manifests itself with age. A degree of regret becomes intermingled with

## Smokey the Beer II (Partial-Mash)

**Batch Size:** 5 US gallons (19 L)

**Extract Efficiency:** 75%

**Original Gravity:** 1.053 (13.1 B)

**Final Gravity:** 1.014 (3.5 B)

**Bitterness:** About 31 IBU

**Color:** About 13 SRM (26 EBC)

**Alcohol:** 5.1% by volume

### MALTS

- |                |   |
|----------------|---|
| <b>3.5 lb.</b> | (1.6 kg) very light malt extract syrup<br>or 3 lb. (1.4 kg) very light dry malt extract |
| <b>6 lb.</b>   | (2.7 kg) German beechwood-smoked malt<br>or American cherrywood-smoked malt             |

### HOPS

- |                |   |
|----------------|---|
| <b>1.1 oz.</b> | (32 g) Alsace Aramis, 6.5% a.a.<br>@ 60 min (5.2 HBU/147 MBU)           |
| <b>1 oz.</b>   | (28 g) Alsace Aramis, 0 min   |
| <b>1 oz.</b>   | (28 g) Alsace Aramis, 1st dry hop at racking                            |
| <b>1 oz.</b>   | (28 g) Alsace Aramis, 2nd dry hop,<br>7–10 days before kegging/bottling |

### YEAST

German or Bavarian lager yeast.

I use White Labs Cry Havoc yeast.

### ADDITIONAL ITEMS

- |                 |  |
|-----------------|--|
| <b>1/4 tsp.</b> | (1 g) powdered Irish moss  |
| <b>3/4 cup</b>  | (175 mL) corn sugar (priming bottles)<br>or 0.33 cups (80 mL) corn sugar for kegging |

### BREWING NOTES

Heat 1.5 gallons (5.7 L) water to 172° F (77.5° C) and then add crushed grains to the water. Stir well to distribute heat. Temperature should stabilize at about 155° F (68° C). Wrap a towel around the pot and set aside for about 45 minutes. Have a homebrew.

After 45 minutes, add heat to the mini-mash and raise the temperature to 167° F (75° C). Then, pass the liquid and grains into a strainer and rinse with 170° F (77° C) water. Discard the grains.

Add more water to the sweet extract you have just produced, bringing the volume up to about 2.5 gallons (9.5 L). Add malt extract and 60-minute hops and bring to a boil.

The total boil time will be 60 minutes. When 10 minutes remain, add Irish moss. After a total wort boil of 60 minutes turn off the heat and add the 0-minute hops. Immerse the covered pot of wort in a cold water bath and let sit for 15–30 minutes or the time it takes to have a couple of homebrews.

Then strain out and sparge hops and direct the hot wort into a sanitized fermenter to which 2 gallons (8 L) of cold water has been added. If necessary, add additional cold water to achieve a 5.5-gallon (21 L) batch size. Aerate the wort very well.

Pitch the yeast when temperature of wort is about 70° F (21° C). Once visible signs of fermentation are evident, ferment at temperatures of about 55° F (13° C) for one to two weeks, or until fermentation shows signs of calm and stopping. Rack from your primary to a secondary and add the first dry hop addition. If you have the capability, “lager” the beer at temperatures of 35–45° F (1–7° C) for 3–6 weeks. Seven to ten days before bottling or kegging, add the second dry hop addition.

Prime with sugar and bottle or keg when complete.

a sense of achievement. It becomes confusing and emotional for many to recall their craft brewing journey. Knowing they took risks because they pursued what defined them, they look back and ask, “Would I have done it differently if...?”

For me, the collection of more than 140 interviews is an important and defining legacy of craft brewing. In several ways, it is also a reflection of my 50-year beer journey. I’m encouraged that continued success is sustainable. Craft brewers are genetically inclined to resource the pieces that will make their dreams and provide for the dreams of others.

Our legacy as homebrewers has been to inspire and help sustain craft brewers and the craft beer culture to which we all have contributed in one way or another.

So, let’s cut the shuck and jive and get on with the recipe. I recently visited Port City Brewing Company in Arlington, Va. At the tap, I tasted their rauchbier, or smoked beer. It reminded me of the extraordinary experience of enjoying German-brewed rauchbier in the city of Bamberg. Back then, it was a beer heaven one could only experience in Germany. Now, craft brewers like Port City and homebrewers like you

can brew authentic rauchbier every bit as terrific as those in Bamberg. Context has its merits: if you can get to Bamberg, it’s worth the journey. If you can’t, the journey is your home, and, with a stash of your own brand of authenticity, that’s the best! This is my contemporary recipe using hops that really bring out the complexity of flavors that emerge with rauchbier.

**Charlie Papazian is founder of the American Homebrewers Association and the author of *The Complete Joy of Homebrewing*.**

# Brewing with Irma

**A**s a Florida homebrewer facing Hurricane Irma's march toward Tampa Bay in September 2017, I faced special challenges, as well as some benefits, when nature's fury set its sights on my home during a busy brew time.

As the hurricane approached and residents began prepping for the storm, bottled water became hard to find. Fortunately, with half a dozen clean kegs to fill, and a full cylinder of CO<sub>2</sub>, my equipment was ideally suited for dispensing drinking water and giving new meaning to the term "tap water!"

But there were other challenges to consider. Outside my home, I store a large, refrigerated, 10-tap beer trailer owned by a local homebrew organization. The sides of the trailer would certainly become sails in the winds of a hurricane. Lacking other options, I parked it alongside two large oak trees, lashed it with heavy tie-down straps, and hoped for the best.

Early fall is also when I brew several large batches of Oktoberfest and use the resulting yeast for my holiday doppelbock. I had originally planned to brew said doppelbock the day before Irma was due, but faced with the storm's arrival, I had to hatch a new plan for dealing with beer, yeast, and refrigeration in anticipation of a likely power outage.

I decided the large chest freezer I use for lagering would be my best choice for maintaining cool temperatures during an outage. I placed an ice-filled cooler on the compressor shelf and assumed it and two lagering carboys of Oktoberfest would keep cool for several days, even in the Florida heat.

The morning of the storm, I transferred my Oktoberfest from primary to second-



ary. These carboys went into an improvised Irma—a.k.a. diacetyl—rest, during which they slowly warmed to room temperature as the storm approached. Then I transferred the yeast slurry into a large Erlenmeyer flask and placed it in the cool freezer. At last, there was nothing left to do but hunker down with some homebrew and wait.

That night, as the storm raged and wind howled, the power went out and things went dark. After the weather subsided the next morning, I ventured outside to find the trailer still safely lashed to the trees with no major damage to my home or property. I then put into place the final step of my beer contingency plan when I moved the resting Oktoberfest into the

freezer and covered it with blankets to try and maintain the cool as long as possible.

Later that evening, electric service was restored. The outage had lasted only 18 hours, the freezer had remained completely cool, and beer and yeast were both safe. I brewed the doppelbock the next weekend using the slurry, so the only lingering effect of Hurricane Irma was a one-week delay in my brew schedule.

In this challenge of brewer vs. Irma, the brewer won! However, I think I'll invest in a generator for next year.

**Mark Stober is a homebrewer living in the Tampa Bay area of Florida.**



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