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WITH
CANNABIS

VOL 43 • N°2

MARCH/APRIL 2020

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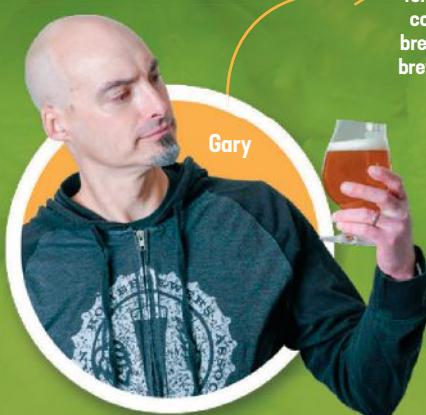


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PURSUE WHAT'S POSSIBLE

Spring is right around the corner.
What's your go-to shoulder season style?



Gary

I have really good fermentation temperature control, so I don't have to brew according to season. I brew what I like when I like.



Megan

All the saisons!



Duncan

Pale ales, pale ales,
pale ales, please.



John

The Schwarzbier is
strong with this one.



Dave

I'll change my go-to
beer style when
helles frozen over.



Matt

When Mother Nature
is capricious, I like
to sip on gueuze.

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THE MAGAZINE OF THE AMERICAN HOMEBREWERS ASSOCIATION®

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Sense of Scale

When a reader wrote in to ask for clarification on Petr Novotný's article "How Much Alcohol Is in Your Homebrew?" (*Zymurgy*, Jul/Aug 2019), I fell down a rabbit hole. We published Petr's response in the Nov/Dec 2019 issue, but my curiosity about alcohol and attenuation remained in that subterranean leporid lair for some time.

Most recipes in *Zymurgy* include Plato figures in parentheses next to the original and final gravity specs. But when beers, meads, and ciders ferment out really dry, to less than 1.000 specific gravity, the corresponding Plato number goes negative. That kind of bothered me. I thought it might bother others, too. So, here's what I learned.

Homebrewers usually express sugar concentrations in wort and beer as specific gravity. But specific gravity is a rather indirect way of getting at what we're really after, which is answers to the questions *When is fermentation complete?* and *How much alcohol is in my beer?* Answering these questions requires knowing how much actual sugar is in solution at the beginning and end of fermentation. In brewing parlance, we want to know the original extract and real extract.

Original extract is the percentage of wort, by weight, represented by dissolved solids at the *beginning* of fermentation. If you dissolve 10 mass units (pounds, kilos, bags of cement, whatever you like) of sucrose in 90 units of distilled water, you'll end up with 100 units of a solution that is 10% sugar by weight. Drop the percent sign and replace it with °P, and you've got your original extract in degrees Plato: 10°P.

Real extract is the percentage of beer, by weight, represented by dissolved solids at the *end* of fermentation. (Why we don't call it final extract is a mystery.) Because sucrose is 100% fermentable, our hypothetical 10°P solution would leave us with a mix of water, ethanol, and perhaps some residual carbon dioxide that didn't escape the airlock. There would be zero sugar, though, so the real extract would be 0% sucrose by weight, or 0°P.

But we don't measure sugar percentages directly. Instead we use a hydrometer (or,



more accurately, a saccharometer) to measure the density of the liquid, a proxy figure from which we infer a sugar concentration.

Brewing hydrometers are calibrated to measure specific gravity (the ratio of a substance's density to that of water) of a sugar solution at 60°F (15.6°C). By definition, pure water has a specific gravity of exactly 1. Wort usually has a specific gravity of 1.035 to 1.100, depending on beer style, which means it is 3.5% to 10% more dense than water, mostly thanks to sugar.

When you gently drop your fragile hydrometer into our hypothetical 0°P fermented solution, it gives a specific gravity of 0.992, which corresponds to -2.2°P. This would seem to imply that the solution has negative sugar, which we can all agree isn't a thing. Beer can't owe you sugar.

Recall that what we have here is no longer a mix of water and sugar but of water

and ethanol. Ethanol has a specific gravity of only 0.79—it is 21% less dense than water. This reduces the net specific gravity and mimics a sort of nonphysical—or apparent—negative sugar concentration.

The brewer's hydrometer is calibrated for sugar solutions, so its readings assume you're measuring a solution of pure sugar and water. Give it anything else, and it only tells you that your solution has the same density as a pure sucrose solution of a given concentration. The concentration of that pretend sucrose solution is what we call apparent extract.

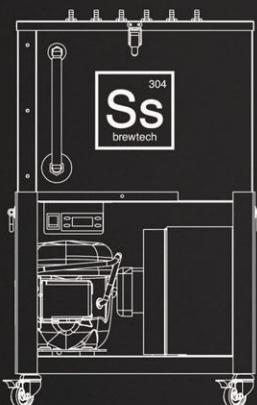
In this case, because there is no sugar and we know our solution is comprised exclusively of water and ethanol, you could use a distiller's proofing hydrometer, which is calibrated for, well, mixtures of ethanol and water. And you'd get an accurate reading of 5.1% ethanol by weight, or 6.4% ABV. But such a hydrometer only works in our little thought experiment because we have no residual sugar.

The beer we brew is a mix of mostly water, ethanol, and residual sugar. So, smart people who have far more time and patience than I do have figured out empirical formulae that relate sugar concentrations (°P) to density (SG). The hydrometer measures specific gravity. Converting that specific gravity to Plato or ABV requires knowledge of where you are and how you got there.

Researchers have also found relationships with which you (or, in my case, trusty software) can compute real extract if you know the original and apparent extracts. Using those equations, you can calculate that a sugar solution that has an original extract of 10°P (1.040 SG) and ferments down to an apparent extract of -2.2°P (0.992 SG) has a real extract of 0°P.

So, there you have it. If you've ever wondered why Plato figures can be negative—and wanted to be OK with it—I hope this little digression has helped. If it hasn't, please write. I will see to it that all complaints go straight into a rabbit hole.

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



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HOPS: THE LATEST RESEARCH

The volume of ongoing hops research can be overwhelming for hobbyists. Here are seven hops-related vocabulary terms and explanations of why they matter. Use these at your next homebrew club meeting and sound wicked smaht.

By Stan Hieronymus



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THE ORIGINAL BELGIAN ABBEY BEERS

Abbey beers are among the best the Belgian beer scene has to offer, but most are less than 100 years old. In medieval and early modern monasteries, beer played a different role than today's abbey beers seem to suggest.

By Roel Mulder



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BREWING WITH CANNABIS: A MEASURED APPROACH

Federal law and most state laws prohibit combining alcohol and marijuana for commercial sale. However, homebrewers who live in legal states and want to combine their beer with marijuana or hemp for personal enjoyment have options.

By Mark Rocheleau
and Andrew Orr



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HOMEBREWING IN SOUTH KOREA

South Korea's geographic isolation, the singularity of its language, and the illegality of homebrewing in neighboring Japan have left its vibrant and growing population of homebrewers underappreciated. But that is changing.

By Jared Hatch

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Columns



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EDITOR'S DESK

Sense of Scale

By Dave Carpenter

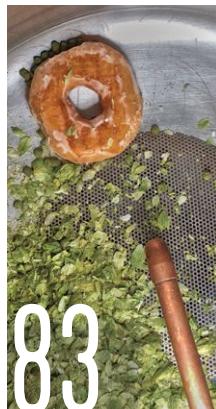
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	Double White IPA
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	Amy Olsen's Morat.....
	Stale Doughnut Belgian Pale Ale.....



ON THE WEB
Find these homebrewing recipes
and more on our website @
[HomebrewersAssociation.org/
homebrew-recipes](http://HomebrewersAssociation.org/homebrew-recipes)

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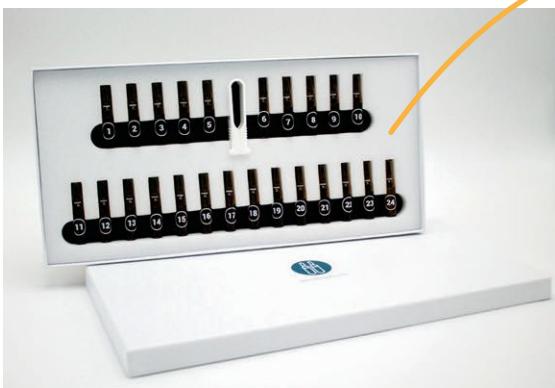
Blichmann Glycol Chiller

Brewers looking to take fermentation temperature control to the next level need look no further than the new Blichmann Glycol Chiller. This cold box features an 8-gallon glycol reservoir and a $\frac{3}{8}$ -horsepower compressor for reliable temperature control and fast cold crashing. With space for up to six controller-pump pairs (sold separately), this chiller can cool up to four 1-barrel fermenters or six smaller units in parallel. The Blichmann Glycol Chiller retails for \$899.99.



Blichmann Command Stand

Blichmann's new Command Stand is the flexible foundation for a choose-your-own-adventure brew rig. With pre-drilled mounting holes, Blichmann's modular tower can accommodate a BrewCommander Brewhouse Controller, Riptide Brewing Pumps, Therminator chillers, HopRockets, and more. A cable routing feature helps keep rats' nests at bay, while steel construction and a wide footprint ensure stability. The Blichmann Command Stand starts at \$159.99.

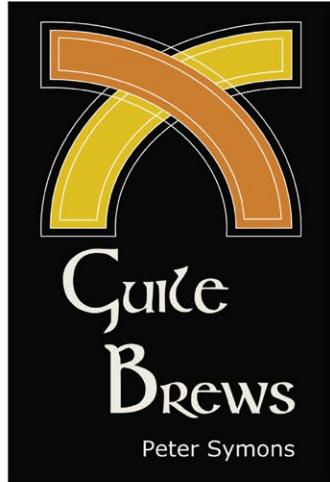


BREWESSENCE SENSORY TRAINING KITS

If you want to train your palate to detect off flavors, you're going to have to drink a lot of bad beer. These new off-flavor kits from BrewEssence, available now at MoreBeer.com, offer a cost-effective way to prepare spiked beers for honing your senses. Each ampoule contains enough pure liquid flavor extract to render 1 liter of acceptable beer unacceptable for training purposes. At press time, available off flavors included the list to the right.

BrewEssence customers can also make use of founder Keith Lemcke's Sensory Station Guidebook, a step-by-step approach for sensory training. The guidebook is perfect for homebrew clubs, small breweries, and others looking to efficiently introduce large groups to sensory evaluation. BrewEssence Sensory Training Kits are attractively priced from \$79.99 for basic six-element kits to \$189.99 for all 24 spikes. Visit MoreBeer.com for more details.

Diacetyl
Acetaldehyde
Metallic (ferrous sulfate)
Butyric acid
Indole
Isoamyl acetate
Dimethyl sulfide
Skunkly/lightstruck (3-methyl-2-butene-thiol)
Isovaleric acid
Caprylic acid
Spicy (eugenol)
Geraniol
Contamination (diacetyl + acetic acid)
Acetic acid
Hydrogen sulfide
Earthy (2-ethyl fenchol)
Ethyl acetate
Onion (dimethyl trisulfide)
Papery/oxidized (trans-2-nonenal)
Lactic acid
Mercaptan (methanethiol)
Grainy (isobutyraldehyde)
Ethyl hexanoate
Bitter (iso-alpha acids)



Guile Brews – Extra Double

Beer Book

GUILE BREWS BY PETER SYMONS

Peter Symons, Homebrew Con speaker and author of *Bronzed Brews: Home Brewing Old Australian Ales* and *6 O'Clock Brews: Home Brewing More Old Australian Ales*, is back with his third book on recreating traditional beers. This time, he revisits the Cornish beers of his younger years and uncovers old recipes from regional Irish and English breweries.

Building on extensive primary source research undertaken at innumerable

brewery archives and libraries, Symons assembles a picture of early 20th-century brewing in the British Isles. In addition to discovering homebrew recipes for historical porters, IPAs, and stouts, readers interested in the perplexing nomenclature of British brewing sugars will find much to digest.

To learn more, head over to prstempwixsite.com/tritun-books. And to view Peter's Homebrew Con presentations, including "The XXX Story of Australian Old Ale" and "Origins and Evolution of Australian Sparkling Ale," visit the How to Brew Beer section of HomebrewersAssociation.org.



JUNE 18-20
NASHVILLE, TN

Homebrew Con 2020

Registration for Homebrew Con 2020—June 18 to 20 in Nashville, Tenn.—starts March 10! Sign up by April 13 to receive Early Bird pricing of up to 23 percent off, depending on the package you choose. Three registration levels are available for Homebrew Con 2020.

- **Homebrewer:** Access to more than 70 educational sessions in 12 seminar tracks, plus all Enthusiast-level benefits. Does not include access to Homebrew Industry sessions.
- **Enthusiast:** Access to Homebrew Expo, Social Club, National Homebrew Competition awards ceremony, book signings, and nightly events. Does not include access to any educational sessions or Industry Professional events.
- **Industry Professional:** Limited to owners and employees of homebrew retail stores, wholesalers, suppliers, and brewery employees. Includes access to Homebrew Industry seminar track plus all Homebrewer and Enthusiast benefits.



In addition to selecting a basic package, attendees can add exclusive extras at registration to sweeten the experience, including commemorative T-shirts, pre-conference workshops, local brewery tours, and more.

Discounted room rates at the Homebrew Con host hotel—Gaylord Opryland Resort & Convention Center—are available through May 25, while supplies last. If you've never attended Homebrew Con before, trust us when we say that being able to walk to your hotel room after Club Night is one of life's small delights, so book now.

All Homebrew Con attendees must be members of the American Homebrewers Association and—it seems silly we have to say this—of legal drinking age (21+).

More details can be found at HomebrewCon.org.

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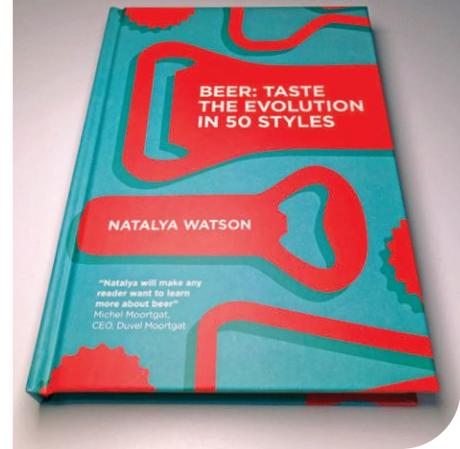
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Beer Book

**BEER: TASTE THE EVOLUTION IN 50 STYLES
BY NATALYA WATSON**

Beer sommelier and Advanced Cicerone Natalya Watson guides readers on a delightful journey through brewing history in *Beer: Taste the Evolution in 50 Styles*. Unlike most beer history books, which tend to stick to predictable chronologies that start on cuneiform tablets in Sumeria and end in a stainless San Diego brew-house, Watson views the story of beer through six lenses: malt, Pilsner, water, hops, yeast, and wheat.

An outstanding feature is the use of recommended commercial beers to illustrate themes. You can experience a progression of malting and kilning technologies that starts with Schlenkerla Märzen and ends with Harvey's Sussex Best Bitter, with nine other examples to accompany you from A to B. If only all history tasted this good.

Beer: Taste the Evolution in 50 Styles is published by Kyle Books and will be available March 19 in the United Kingdom (£15.99) and April 28 in the United States (\$19.99). For more information, visit beerwithnat.com.

Brew Over

In the Jopenbier article in the Jan/Feb 2020 issue, credit for the drawings should go to the Gdansk Library of Polish Academy of Sciences.

The recipe for WTG? Stout in the Jan/Feb 2020 issue calls for 1.2 lb. of golden light dried malt extract and incorrectly gives the metric conversion as 2.65 kg. The metric quantity should have read 544 g.

VENDOR of the MONTH

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STÉPHANE MEULEMANS

General Manager, Fermentis.
Brewer for 25 years.



The logo for Fermentis by Lesaffre. It features a stylized circular graphic composed of concentric arcs in shades of orange, grey, and white. To the right of the graphic, the word "Fermentis" is written in a large, bold, black serif font. Below it, the words "by Lesaffre" are written in a smaller, black sans-serif font.



Vote for Your AHA Governing Committee Representatives



As an AHA member, you should get out and vote, and that includes voting in this year's AHA Governing Committee election. Find the online ballot at HomebrewersAssociation.org and cast your vote by March 31, 2020.

The members of the Governing Committee help connect AHA staff with the greater homebrewing community. Governing Committee members also provide AHA staff with guidance and make decisions about the future course of your association.

Photo © Getty/BreakingTheWalls

In this election, 19 members are running to fill five open seats. Review the candidate statements on HomebrewersAssociation.org under the Community section, linked from the Governing Committee pages, and cast your vote.

Big-time thanks to outgoing Governing Committee members Martin Brungard, Dennis Mitchell, and Kathy Yan Li—I very much appreciate their service to the AHA and commitment to the homebrewing community. Current Governing Committee

members Phil Farrell and Jeff Rankert are running for re-election.

The Governing Committee members serve three-year terms, during which they participate in monthly conference calls, serve on topic-specific subcommittees, and take part in a half-day, in-person meeting each June at Homebrew Con. As a member, I ask you to spend 10 or 15 minutes to review the candidate statements and vote.

Thank you!

MEMBER DEMOGRAPHIC REPORT

The AHA Governing Committee's Diversity & Inclusion Subcommittee was established to provide the AHA with ideas and advice to support a diverse membership, promote an inclusive homebrewing community, and enhance member benefits for everyone. One of the first actions the subcommittee took was drafting the AHA Diversity, Equity & Inclusion Strategic Plan, which can be found at HomebrewersAssociation.org. The plan calls on the AHA to track demographic data on AHA membership over time. To that end, we have published a demographics report on December 2018 membership for members to view on HomebrewersAssociation.org.

Some highlights:

- **Gender:** 89% male, 11% female, 0.04% non-binary
- **Ethnicity:** 86% white (U.S. population is 69% white.)
- **Membership density per capita by state:**
 - **Highest:** Vermont at 392 members per 100,000 residents
 - **Lowest:** Illinois, Missouri, New York, and Virginia at 2 members per 100,000 residents
- **Membership by region relative to U.S. population**
 - **Highest:** Mountain West (7.5% of U.S. population) at 20.7% of membership
 - **Lowest:** Mid-Atlantic (12.6% of U.S. population) at 5.5% of membership
- **Membership by generation**
 - **Gen X** (born 1965–1976) represents 38.4% of AHA members and is the largest generation represented among members, but it represents just 15.1% of the U.S. population.
 - **Baby Boomers** (born 1946–1964) and **Gen Y** (born 1977–1995) represent 28% and 30.3% of members, respectively. Both are higher percentages than the U.S. population for those generations.
 - AHA membership percentage is lower than the US population for **Gen Z** (legal drinking age: 21–23 years old), the **Silent Generation** (born 1925–1945), and the **G.I. Generation** (born 1901–1924).

The Diversity & Inclusion subcommittee is using this data to help guide the AHA to grow homebrewing and AHA membership in demographics that are under-represented. We are currently compiling data for December 2019 membership for comparison and will publish a comparative report for members when complete.



HOMEBREW SHOP OF THE YEAR AWARD

Unless you grow all your own hops and malt your own barley, you almost certainly buy ingredients from a homebrew supply shop. While Walmart and Target stores carry just about everything imaginable these days, I can't get the primary ingredients I need for brewing a batch of beer there, and I'm totally cool with that. I'd much rather visit my local homebrew shop for whatever I need and inevitably get to talk beer and brewing with Mark, the owner. I absolutely value the convenience and camaraderie that a local homebrew supply shop affords me.

I know I'm not alone in that sentiment. To celebrate the critical role that homebrew supply shops play in the homebrewing community, the AHA created the Homebrew Shop of the Year Award.

All AHA members are eligible to nominate their favorite shop for this award. If your go-to homebrew supply shop deserves recognition, take a few minutes to submit a nomination for the Homebrew Shop of the Year Award by April 30 at HomebrewersAssociation.org/ShopAward. Members of the AHA Governing Committee evaluate all of the nominations and determine a winner.

The winner of the 2020 Homebrew Shop of the Year Award will be announced at Homebrew Con in Nashville on June 20.

RADEGAST CLUB OF THE YEAR AWARD

As with homebrew supply shops, homebrew clubs play a vital role in helping advance the hobby by providing local homebrewers a place to gather, learn, and have fun. Club events help get the word out about the hobby and bring new brewers into the fold.

The AHA Radegast Club of the Year Award (aka the Awesome Club of Awesomeness Award) is all about showcasing what makes homebrew clubs awesome. Club nominations for the 2020 Radegast Club of the Year Award must be submitted by March 31. If you are a member of an awesome homebrew club, take this opportunity to share with the rest of us what your club is all about. Submit entries via the nomination form in the Community section of HomebrewersAssociation.org. Entries will be judged by members of the AHA Governing Committee.

The winner of the 2020 Radegast Club of the Year Award will be announced June 20 at Homebrew Con in Nashville.

CLUB INSURANCE

Club members, if you are looking for an affordable insurance plan specifically catered toward homebrew clubs, we've got you covered. The AHA works with West's Insurance to provide a general and liquor liability policy to clubs for just \$3.75 per club member per year. March 1 is the deadline to sign up for the half-year policy term (\$1.88 per member) that runs from March to September. The annual policy term enrollment is open July 1 to September 1 and runs from September through August.

The AHA wants your club to be covered and, of course, we want club members to also be AHA members, so we will reimburse any club's insurance premiums if 75 percent or more of the club's members are also AHA members.

More info on this program is available at HomebrewersAssociation.org.



JUNE 18-20
NASHVILLE, TN

HOMEBREW CON 2020

Hopefully, by now you are well aware that Homebrew Con, the worlds largest gathering of homebrewers, is coming to the Gaylord Opryland Resort in Nashville, Tenn., June 18–20. Registration opens March 10.

I'm really excited about this year's keynote speaker: local homebrewer-turned-brewery-owner Bailey Spaulding, who founded Jackalope Brewing Company in Nashville in 2011. Jackalope is now one of Nashville's best-known breweries. Spaulding will be the first woman to deliver the Homebrew Con keynote.



Bailey Spaulding

Photo © Christine Lelmin Photography [Bailey Spaulding]

Homebrew Con includes 70 educational sessions covering a huge range of topics of interest to beer-, mead-, and cidersmakers. You can get a taste for what these sessions are like by checking out the seminars



Homebrew Con 2020 will be held at the Gaylord Opryland Resort in Nashville.



section on HomebrewersAssociation.org, where we post all the past years' session recordings as members-only content.

At Homebrew Con, you'll find a vast selection of homebrew and craft beers throughout the event. Plus, attendees get to check out the latest equipment and ingredients in the Homebrew Expo, where 80 different exhibitors have their wares on display.

During Homebrew Con, the nation's top Beer Judge Certification Program (BJCP) judges evaluate the award-winning entries that advanced from the 13 First Round AHA National Homebrew Competition (NHC) judge centers to the Final Round. We will announce Final Round winners during the NHC awards ceremony on Saturday of the conference, where you'll find out who is the best of the best in homebrewing.

Show up early to get in on the pre-conference workshops and brewery tours. Plus check out the numerous associated local events taking place in and around Nashville throughout the week of Homebrew Con.

Homebrew Con is the most fun event any homebrewer could possibly imagine. Don't miss out—space is limited, so be sure to register early! Go to HomebrewCon.org for details and I'll see you in Nashville.



“
Homebrew Con includes 70 educational sessions covering a huge range of topics of interest to beer-, mead-, and cidersmakers.

HILL STAFF HOMEBREW COMPETITION

In December, the AHA and our parent organization the Brewers Association hosted our annual Capitol Hill Staff Homebrew Competition in Washington, D.C., which is open to any employee on Capitol Hill. The best-of-show homebrew for the 2019 Capitol Hill Staff Homebrew Competition was awarded to Coast Guard Fellow Lieutenant Commander J.B. Zorn, who works in the office of Rep. Charlie Crist (D-FL, 13th District) and brewed the winning beer with his colleagues in Rep. Crist's office. Zorn and his colleagues beat out a field of 28 entries with an American pale ale called Majestic Sea Cow. The recipe can be found below and at HomebrewersAssociation.org.

Zorn made a previous appearance in *Zymurgy* when he penned the Last Drop



J.B. Zorn and his colleagues celebrate winning the 2019 Capitol Hill Staff Homebrew Competition.

department for the July/August 2011 issue. Check it out in the digital archive on HomebrewersAssociation.org.

Until next time, happy homebrewing!

Gary Glass is director of the American Homebrewers Association.



Majestic Sea Cow

Recipe courtesy J.B. Zorn.

Earlier this year, I joined a great new group of coworkers on Capitol Hill. Within weeks, we had made plans to enter into the Capitol Hill Homebrew Competition but weren't sure what to brew. In true democratic fashion, we set up to do an extensive tasting of styles to choose one that truly represents the people—or at least the handful of us in the office. While not unanimous, the group enjoyed citrusy new American hops and session strength. The natural choice was obvious—American pale ale.

But what to call this concoction? In a stroke of genius, we combined our Florida district connection (manatees) with our committee assignments (space) and, voilà, The Majestic Sea Cow Galaxy Hopped Pale Ale!

Batch volume: 12 US gal. (45.4 L)

Original gravity: 1.052 (12.9°P)

Final gravity: 1.012 (3.1°P)

Efficiency: 75%

Color: 3–4 SRM

Bitterness: 34 IBU

Alcohol: 5.3% by volume

MALTS

21 lb. (9.53 kg) Crisp Maris Otter

2 lb. (907 g) German Vienna malt

8 oz. (227 g) Weyermann Carahell malt

8 oz. (227 g) 40°L crystal malt

4 oz. (113 g) Dingemans biscuit malt

HOPS

1 oz. (28 g) Galena, 14.1% a.a., first wort hop

1.5 oz. (43 g) Galaxy, 14% a.a. @ 10 min

1.5 oz. (43 g) Amarillo, 12% a.a. @ 5 min

1.5 oz. (43 g) Galaxy, 14% a.a., whirlpool

1 oz. (28 g) Amarillo, 12% a.a., whirlpool

0.5 oz. (14 g) Mosaic, 12.5% a.a., whirlpool

1.5 oz. (43 g) Galaxy, 14% a.a., dry hop

1.5 oz. (43 g) Mosaic, 12.5% a.a., dry hop

ADDITIONAL ITEMS

Yeast nutrient @ 15 min

Irish moss @ 15 min

YEAST

White Labs WLPO07 Dry English Ale yeast (2 L starter)

BREWING NOTES

Conduct a single infusion mash at 156°F (69°C) for 60 minutes using a grain-to-water ratio of 1.25 qt./lb. (2.6 L/kg). Mash out at 165°F (74°C) for 15 minutes. Boil 90 minutes, adding hops according to the schedule above.

Chill wort and ferment until specific gravity stabilizes at or near 1.012 (3.1°P). Divide dry hops into two equal amounts and add to fermenter 5 and 8 days after fermentation starts. Bottle or keg.

EXTRACT VERSION

Replace Maris Otter and Vienna malts with 15 lb. (6.8 kg) Maris Otter liquid malt extract and 1 lb. (454 g) Briess CBW Goldpils Vienna liquid malt extract. Steep the remaining malts for 30 minutes at 150°F (66°C). Remove malts and dissolve extracts completely in the wort. Bring to a boil and proceed as above.



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Local Matters



Dear Zymurgy,

I enjoyed Dave Carpenter's recent editorial, "Go Local," in the Nov/Dec 2019 issue. Your article made me think of my favorite homebrew shop, Grapeland Supply, in Walla Walla, Wash.

Shopping at Grapeland is a joy. The selection is great, as are the prices. Where it really shines, however, is in customer service. If the shop doesn't have what you need, Brenda is happy to order it. She'll pull out her catalogs to scan through, and once you've made a selection, she'll quote an amount that is only a tad more than the wholesale price.

"I always try to give you guys a good price," she says. Brenda is not a brewer, but she has operated the store for years, so "talking shop" with her is always a unique experience. Shop talk is a dialogue at Grapeland.

There is, indeed, something special about local shops. Grapeland Supply stays away from fads, gimmicks, and jargon and is

built on good business sense and genuine, engaging customer service. I'll support that.

I also enjoyed reading Keith Seiz's article, "Brewing with Honey," in the same issue. I use honey at every opportunity—it adds something of an ethereal element to the brew. The article reminded me of the White House Honey Ale brewed by President Barack Obama's staff in 2011–12. I don't have access to honey from White House bees, so I guess my Costco honey will have to suffice. Happy brewing!

Scott Riseley
Ellensburg, Wash.

SHOW OFFS (IN A GOOD WAY)

Dear Zymurgy,

I am the brewmaster at One Barrel Brewing Co. (OBBC), the first nanobrewery in Madison, Wis. Several close veteran friends and I, a veteran myself, recently brewed →





DEAR ZYMGURGY

Send your Dear Zymurgy letters to zymurgy@brewersassociation.org. Letters may be edited for length and/or clarity.

a West Coast IPA with Veterans' Blend hops from Yakima Chief Hops. I took a picture of the beer that, in my opinion, was so solid I wanted to share it with you.

Regards,
Peter Schroder
Brewmaster, OBBC
Madison, Wis.

Dear Zymurgy,

I recently built my own walk-in fermentation (WIF) room. Going from used fridges to the walk-in has helped my homebrew game tremendously. I have been brewing since 2012, and in July 2017 I built this 7' x 7' x 4' unit. Since then, my beers have been improving every sip of the way.

Thanking you in advance,
Randy Gailit
Meadow Pointe, Fla.



IF IT SMELLS LIKE AN APPLE AND TASTES LIKE AN APPLE ...

Dear Zymurgy,

In the article on acetaldehyde in the Sept/Oct 2019 issue, the author says, "If you have tasted a certain well-known, mass-produced light American lager, you have also experienced acetaldehyde." This is a thinly veiled reference to Budweiser, but it is a misnomer that Budweiser has perceptible acetaldehyde.

Over the years I have become friends with a brewing scientist who works for Anheuser-Busch InBev. In correspondence, he provided to me values of acetaldehyde concentrations measured prior to packaging, and they are well below the perception threshold. The apple flavor that some perceive in Budweiser is an ester produced by the house lager yeast.

Cheers!
Jack Horzempska
King of Prussia, Pa.



Randy Gailit's custom walk-in fermentation room in Meadow Pointe, Fla.

FOUR-LEGGED ASSISTANT BREWERS



Princess Caroline loves to eat DME and tries to get into any brew equipment with malt on it!

Thanks!
Hunter Shunatona
Oakland, Calif.



Here are my brew dogs. Pugsly (tough guy) on the left is my chief of security. Pugsly's Porter was served at the Northern California Homebrew Festival last September. Indiana "Indy" (the smart one) is my operating manager.

Bill Kenney
Rescue, Calif.



This is my brewing assistant Zoe. She loves hanging out on the patio and getting a taste of any wort she can get. Today we made a stout for the winter. Zymurgy sure has helped us make better beer every year.

Steve & Anna Schaenzer
Midland, Mich.

Meet Braxton. He has the important job of protecting the brewing equipment on brew day. Good news is, he works for the right price: ear rubs, treats, and the occasional thrown tennis ball!

Cheers,
Brandon Lorton
Lawrenceburg, Ind.



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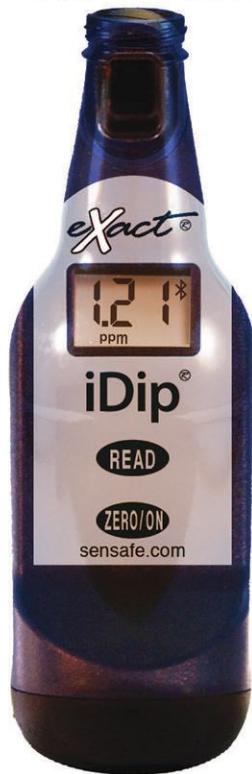


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R0719

HOMEBREW LABEL SUBMISSIONS

A couple of years ago I had the opportunity and pleasure to brew with a bunch of tech-savvy geeks who were well versed in Photoshop. The results were several great beers and some awesome, impressive labels. The labels are for Saint Stephen's Stout (Russian imperial stout) and Dr. Freeman's International Philanthropist Ale (IPA). I have homebrewed for six years and have been an AHA member for four.

John Appleagte
Henderson, Nev.



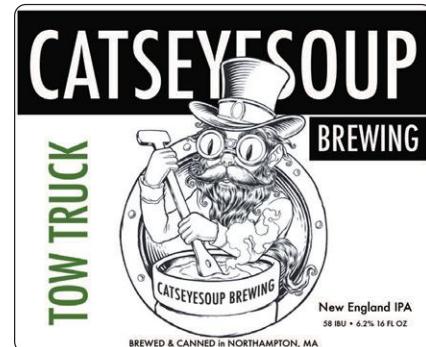
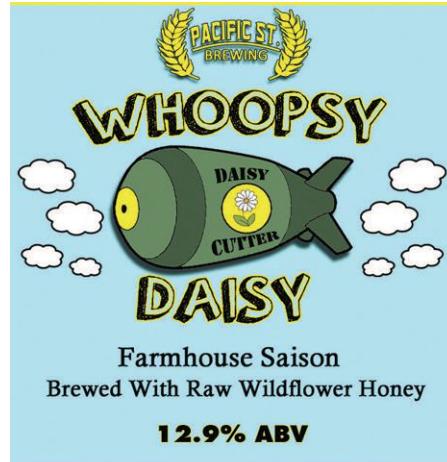
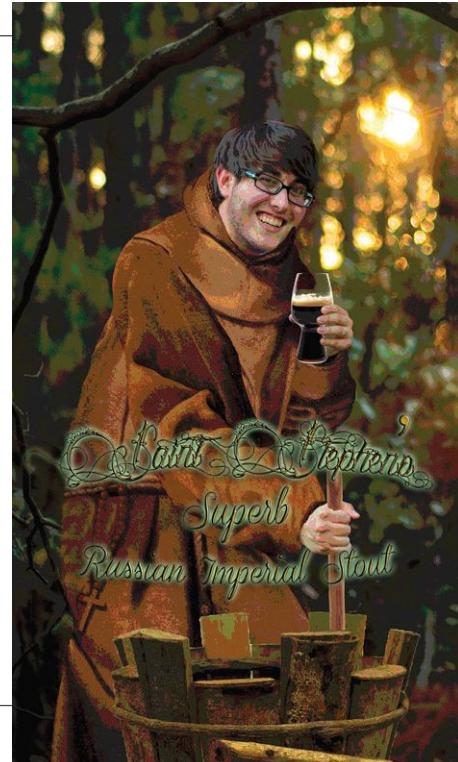
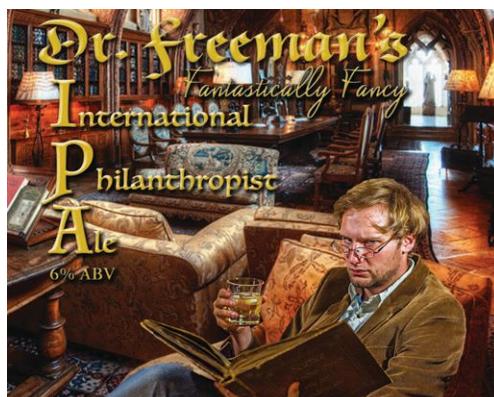
I started homebrewing eight years ago, while I was working on a graduate degree in bio-engineering. Inspired by visits to Belgium and the assertive yeast strains used in their beers, Belgian styles quickly became my favorite beers to brew. I got the "Belgianer" label idea as I was nearing the end of my PhD and in need of creative outlets.

Just as all Belgian breweries have their own unique glassware, I constructed my own glass using computer-aided design software, borrowing from elements of Trappist chalices (primarily Rochefort and Westmalle). The label features an engineering sketch of the glass brimming with chemical compounds produced by Belgian yeast strains: banana and plum esters, clove and pepper phenols, and, of course, ethanol and carbon dioxide. The steampunk RetroTech title font, featured on Instructables.com, was used with permission from the designer.

I've long since branched out into styles of beer from many other parts of the world, but I still often use variations of this label!

I have homebrewed for eight years and have been an AHA member for two.

Alex Cigan
New York City Homebrewers Guild
New York, N.Y.



My dad has been homebrewing for close to 10 years. I started taking a shine to craft beer when I turned 21, and he has been teaching me the ropes ever since. I dabbled with Photoshop and graphic design as a teenager, so I started making labels for our homebrews. This one is for a boozy farmhouse saison we brewed with wildflower honey. We ended up getting crazy-high efficiency, and it came out around 13% ABV! Naturally, the first word that came out of our mouths when we read the final gravity was "whoopsy." Since we brewed it with wildflower honey, this brew kind of named itself.

Taylor Seeley
Omaha, Neb.

I have homebrewed on and off for 27 years. Here's our CatMan logo stirring the mash. Tow Truck is a popular IPA that I brew. The "Catseyesoup" name is shortened from a radio show I used to do called *Cataclysmic Eyeball Soup on the Tales of the Stratosphere... The Paisley Show*.

Rikk Desgres
SPARGE
Northampton, Mass.



SUBMIT YOUR LABEL

Do you make custom labels for your homebrew? Want it featured here in the pages of *Zymurgy* for all to see your work?

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HomebrewersAssociation.org/magazines/submit-bottle-label and we will take it into consideration!

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Malt Vinegar



By Amahl Turczyn

Vinegar, like beer and wine, is one of the most ancient and revered food products known to civilized humanity, mainly because it resists spoilage. Nothing harmful can grow in full-strength vinegar; this is because of its high acid content rather than alcohol. Louis Pasteur was the first to discover, in 1857, that the conversion of wine to vinegar was caused by the presence of bacteria and oxygen, although it wasn't until 1878 that Danish botanist Emile Christian Hansen correctly explained the chemical process.

In very basic terms, the alcohol created by yeast during fermentation is broken down by the bacterium *Acetobacter aceti* into acetaldehyde, and then into carbon dioxide and acetic acid, aka vinegar. (Interestingly, your liver follows a similar path when it oxidizes ethanol into hang-over-inducing acetaldehyde and then into CO₂ and vinegar using an enzyme called dehydrogenase.) These processes must take place in the presence of oxygen and don't happen nearly as quickly as fermentation, so would-be vinegar makers should prepare to wait three to six months for their vinegar to taste and smell like it should.

MEDICINAL PROPERTIES OF VINEGAR

Just look around your local supermarket, and you're bound to find some little booklet touting malt vinegar as a panacea, a magical elixir capable of curing fever, dandruff, gout, arthritis, psychosis, halitosis, and warts. Now while all this may or may



Malt Vinegar

Batch volume: 1 gallon [3.8 L]
Target acidity: 5% by volume, after dilution

FERMENTABLES

1 gal. [3.8 L] unhopped or lightly hopped beer, degassed

OTHER INGREDIENTS

Vinegar mother and/or unpasteurized cider vinegar

Other herbs or flavorings, at bottling [optional]

WATER

Carbon filtered or reverse osmosis, to dilute to 5% acidity at bottling [optional]

BREWING NOTES

Degas the beer and pour into your vessel of choice, splashing as you go to aerate. Add vinegar mother and/or unpasteurized cider vinegar. Cover with cheesecloth and secure with string or a rubber band. Allow to acetify for 2–3 months undisturbed, then taste; if finished, you can decant some off for bottling and add more beer to keep the process going. Subsequent batches will progress more quickly.

not be proven, it is certain that, like unfiltered, unpasteurized homebrew, vinegar made at home in the traditional manner is much better for you than that clear distilled white stuff you use to wash your windows. Naturally made vinegar has historically been recognized for its medicinal value as far back as Hippocrates in 400 BCE, and while it may not cure blindness or paralysis, it certainly contains a good many of the same nutrients found in living, bottle-conditioned homebrew.

You definitely don't want live-culture vinegar anywhere near your brewing operation, but it is possible to use distilled vinegar as a sanitizer. As an emergency measure, people in the livestock industry used to blend 5 percent acetic acid with 3 percent hydrogen peroxide to use as an antiseptic spray. The resulting peracetic acid is said to be quite effective, and it is even used in the brewing industry for similar sanitizing purposes. So perhaps this humble and ancient remedy has some powerful juju after all. And it tastes great on fish and chips.

CHOOSING THE BEST BEER FOR MALT VINEGAR

Apple cider, wine, and beer can all be used to make vinegar, but each can contain preservatives that inhibit the growth of acetic bacteria. In wine and cider, sulfites are often added for that very purpose, so using such a wine to make vinegar can often result in a sluggish conversion, or it may kill off the bacteria altogether.

One of beer's prime preservatives is hops, and hop compounds tend to discourage the proliferation of *Acetobacter*, so as a rule, unhopped (or very lightly hopped) beers make the best malt vinegar. Flavor-wise, the bitterness of hops doesn't lend itself particularly well to a good malt vinegar either. Therefore, if you are somewhat unimpressed with a batch of dubbel, Scottish ale, hefeweizen, bière de garde, or even a sweet or foreign-style stout, you might consider "vinegarizing" it.

Any traditional beer strength will make a decent vinegar, but the higher the alcohol, the more acidic your vinegar will be. I once vinegarized an under-attenuated traditional bock that made a beautifully rich vinegar. (I've still got four and a half gallons of the stuff. Want some?)

Of course, if you are intent on producing malt vinegar right from the start, with no intermediary beer, you can do what commercial malt vinegar producers do, and forego the usual step of boiling your wort. Like a distiller's wash, malt vinegar begins life as unhopped, nitrogen-rich, highly diastatic, strong (15 to 18°P) wort that is lautered from

If you are not sure you can completely sterilize—not just sanitize—each and every piece of equipment that comes in contact with your active vinegar, make sure it is never used for beer making.

the mash with all its starch enzymes intact. Don't worry about recirculating for clarification—in this case, cloudy wort is better.

The wort is cooled to fermentation temperature, aerated, pitched with yeast, and allowed to ferment. Its fermentation in some ways resembles that of sake, in that starch enzymes continue to act on any remaining starches in the turbid wort, while the yeast simultaneously goes about the business of converting those sugars into alcohol. The resulting "beer" is then ready for the next stage: acetification.

WHERE TO PICK UP A FRESH MOTHER

During the conversion of alcohol to acetic acid, *Acetobacter* bacteria form a slimy mass known as a *mother*. The layer usually forms on the surface, spreads out into a uniform layer called a *pellicle*, and then drops to the bottom while a new layer

re-coats the surface. Dedicated vinegar makers keep mothers for years, much as kombucha makers jealously guard their SCOBYS (symbiotic cultures of bacteria and yeast), by feeding them periodically and breaking off a chunk every time they want to make a fresh batch.

Finding someone who has an active culture is really the best way to go if you want to try your hand at making vinegar, but barring that, your best alternative for obtaining a culture is to buy one. Many homebrew shops carry pure-culture vinegar mothers. Or, you can go to a health food store and pick up a bottle of natural, unpasteurized vinegar with the mother intact. Most of these active mothers (how active, of course, depends on how long it's been sitting on the shelf) can be used as starters for vinegar production. Just decant the clear vinegar off the top—that brownish, unsightly layer of sediment on the bottom is what you want. A roughly 3-ounce (85-gram) cider vinegar mother is more than enough for a gallon (3.8-liter) batch of malt vinegar and won't be enough to make it taste cidery.

MAKING VINEGAR

First and foremost, if you're a brewer wanting to make malt vinegar, please use extreme caution to keep these two crafts well separated. As you probably know, *Acetobacter* is one of the brewer's biggest enemies, and while a batch of malt vinegar is great to have on hand, you don't want each subsequent batch of beer to end up the same way. If you are not sure you can completely sterilize—not just sanitize—each and every piece of equipment that comes in contact with your active vinegar, make sure it is never used for beer making. That means hoses, spoons, sample jars, fermenters, everything.

You may want to consider taking a permanent marker and writing "VINEGAR" on everything that comes in contact with *Acetobacter* as a precaution. Also, if you can physically remove your vinegar operation to a part of the house away from the brewery, you'll be much better off. Brewers familiar with the kettle souring process know the routine, but at least they have the luxury of killing off all the bugs with a boil. You can boil your vinegar, of course, but a lot of the health benefits will be lost if you do.

You will need a wide container in which to store your vinegar while the mother is doing her thing, some good-sized pieces of cheesecloth, and your vinegar culture. A glass carboy can be used, but you will need to maximize exposure to air, and that's not always easy in such a vessel. Many vinegar producers and traditional

makers of vinegar insist that an oak barrel used for production and/or aging will soften and mellow the vinegar, but barrels are expensive and, once infected, they are vinegar barrels for life.

A cheaper alternative is your normal, 5-gallon (18.9-liter) food-grade bucket. Regardless of the type of vessel used, you will need to sanitize it, along with all other equipment. It may seem odd to sanitize for vinegar making, but you want only acetic bacteria to grow in this beer, so while you don't need to be as careful as you would for beer brewing, it's still a good precaution.

If you are working with beer that was originally intended for consumption as beer, chances are it is carbonated. Your first task will be to remove as much of that carbon dioxide as you can. If the beer is in bottles, uncap them and pour the beer into a bucket. Don't worry about yeast sediment—the bacteria won't mind. Remember to splash the beer around as much as possible. This is difficult for homebrewers, even sour beer brewers—we're used to purging with CO₂ to keep air out, but this is vinegar making, and we're out to "spoil" this beer in short order, so just grit your teeth and do it.

When the foam has settled, pour the contents into another sanitized 5-gallon bucket (only one of these buckets will actually be exposed to the acetic bacteria) to really incorporate as much oxygen as possible and reduce the CO₂, and then repeat the process a few times. Add the mother or vinegar dregs as above, and cover the bucket with a couple of layers of cheesecloth. Don't cover with a plastic bucket lid—this will not allow further exposure to air, which is important for the ensuing transformation into vinegar. Make sure you secure the cheesecloth with tape or a large rubber band. This is to keep a certain vinegar-loving insect, *Drosophila melanogaster* (also called the fruit fly or vinegar fly) from poking around in your brew.

Now you have two to six months to wait. A warm garage or closet (away from your beer fermentation area) is an ideal spot to leave the bucket. Colder temperatures will slow the process. Take a sniff occasionally. Your nose should tell you when it smells right. You will probably detect the in-between stages and byproducts of the process as the alcohol is broken down: the green-apple smell of acetaldehyde, the nail-polish smell of ethyl acetate. Be patient. If these off-odors persist, it may be beneficial to aerate again to guarantee full oxidation.

When the vinegar smells done, remove the cheese cloth and inspect it. Your mother may still be floating on top, or it may

have sunk, leaving the liquid exposed. Remove and save the mother in a jar, if you wish, for your next batch. Adding a few tablespoons of well-aerated, unfermented wort or apple juice every couple of months should keep her in good shape. Now, taste a little of the vinegar. Most commercial malt vinegars are diluted to about 5% acidity. Yours will most likely be stronger than this, depending on the strength of the beer you began with, so it will most likely be quite an eye-opener. If everything checks out, you can now dilute it to your desired acidity (most vinegars are bottled between pH 2.5 and 2.9, depending upon the original fermented liquid), and then siphon or decant it off the solids into bottles. You may need to siphon through some cheesecloth if it has floating chunks of the mother. They won't hurt anything, though, and many vinegar makers prefer to include remnants of the mother in the bottle.

At this stage, just as with beer making, you no longer want to incorporate oxygen. A little splashing during bottling is okay, but the acetic bacteria will continue to break down your vinegar and may form an unsightly pellicle on the surface. So if you aren't keen on pasteurizing your vinegar at this point, restricting its oxygen supply by bottling carefully, with little head space, is important. Bottled correctly, it

should last several years unrefrigerated and will continue to improve.

AGING

Vinegar should smooth out and mellow for several months once bottled, but you can transfer it to another vessel instead and bulk age it if you want. Again, oak barrels have traditionally been used for this and will do a great job mellowing the sharpness, but oak chips can also be used, so you don't have to "ruin" a barrel. Or, you may decide to get fancy and bottle the vinegar with flavorings. Malt vinegar isn't as delicately flavored as wine varieties, but will still take on flavors from various herbs and spices. Fresh tarragon, dill, red chile, cinnamon, caraway seeds—all will make interesting variations for the culinarily inclined. Bottles of homemade vinegar make great gifts, too.

RESOURCES

1. Alley L. *Lost Arts*. Ten Speed Press. 1995. 4: 75-88.
2. D.E. Briggs, J.S. Hough, R. Stevens, T.W. Young. *Malting and Brewing Science*, Vol. 1, Second Edition. Chapman and Hall. 1981. 330, 11, 140.

Amahl Turczyn is associate editor of Zymurgy.



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By Jack Horzempa

In 1842, a Bavarian brewer named Josef Groll traveled to the town of Pilsen, in what is now the Czech Republic, to help the locals brew better beer. The lore is that the citizens of Pilsen were unhappy with the quality of their existing beer and that bringing in an experienced brewer could change things. And Josef Groll did indeed change things.

Bavarian lagers were historically dark, but Groll created a new pale lager in Pilsen. He achieved the lighter color by kilning the malt at a lower temperature, a technique he and other Continental brewers borrowed from the British isles. Today we call this ultra-pale malt Pilsner malt. →

Another distinguishing feature of the new beer is that it was brewed using locally grown Saaz hops and very soft water, i.e. very low in dissolved minerals. The resulting beer became a hit, and we know that beer today as Pilsner Urquell (*Urquell* is German for “original source”). Pilsner Urquell is marketed as “The Original Pilsner.”

Application of the term *innovation* to beer is popularly debated, but the development of Pilsner Urquell was indeed an innovation, one which would have major repercussions for brewing in the 19th century and beyond.

PILSNER 2.0

The pale lagers brewed in Bohemia became popular among beer consumers of the mid-1800s. These Bohemian Pilsners were quite striking in appearance, and it became fashionable to drink them from increasingly affordable glass to showcase their pleasing golden appearance. It would take a few decades, but other breweries from other countries would make the necessary efforts to replicate Bohemian Pilsners.

German breweries recognized a demand for these golden beers and began producing their own imitations in the 1870s. On its website, the Radeberger brewery claims to have produced the first Pilsner in Germany:

Sometimes it's the small town heroes who catch the world off guard and surprise us when we least expect it. That's what happened in 1872 when five local men of distinction from the small town of Radeberg not far from Dresden decided to teach us all a thing or two about beer. Unhappy with the taste of the beers of their time, they set out to create something better. Their desire laid the foundation of Radeberger Pilsner, the inventor of our famous German Pilsner Culture.

It wasn't just European beer drinkers who wanted to drink golden-colored lagers. The challenge for producing a beer like Pilsner Urquell in America was a difference in barley. The barley grown in North America was typically six-row barley, while two-row barley dominated in Europe.

Six-row barley was better suited for growing in the climate of North America, but it is higher in protein than two-row. An all-malt golden beer brewed from American six-row would suffer from chill haze when cold. American beer drinkers at that time (and many today) preferred to drink their beers cold, so chill haze was a real problem.

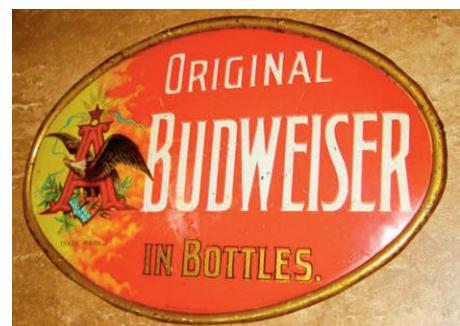
If you are seeking a crisp, dry American Pilsner, rice would be a good choice.
If you prefer a slightly sweeter, fuller lager, corn is the way to go.



The Father of Classic American Pilsner, Anton Schwarz.

With information in hand about the value of brewing with adjuncts, enterprising businessman Carl Conrad brewed the first Budweiser beer in 1876 at the Busch Brewery in St. Louis, naming it for the Bohemian town of Ceské Budějovice, known in German as Budweis. By 1880 Adolphus Busch was the sole owner and president of the brewery, which was renamed the Anheuser-Busch Brewing Association. Adolphus Busch purchased the Budweiser trademark and brand in 1891.

Budweiser became a successful beer brand. It met the demands of thirsty American beer drinkers who wanted lagers that were pale in color and light in body. Budweiser was a classic American adjunct lager (AAL) brewed with a combination of North American six-row barley malt and rice. The AALs of that time were highly hopped so that they would have a robust hop presence in terms of both bitterness and hop flavor/aroma compared to modern day AALs. The Budweiser of 1876 was no Bud Light!



Budweiser, one of the early examples of Classic American Pilsner.

HOMEBREWING A CLASSIC AMERICAN PILSNER CA. 1900

Homebrewers can recite the four basic beer ingredients in their sleep: barley malt, hops, yeast, and water. With Classic American Pilsner (CAP), there is one more ingredient: corn or rice.

Grist

To replicate a CAP like those brewed ca. 1900, North American six-row pale malt is the historically correct choice of malt.



Jack's Classic American Pilsner

Feel free to replace the six-row malt with your favorite North American two-row Pilsner malt for a more modern take on this classic.

Batch volume: 5.25 US gal. (19.9 L)

Original gravity: 1.050 (12.5°P)

Final gravity: 1.015 (3.8°P)

Bitterness: 40 IBU

Color: 3-4 SRM

Alcohol: 4.6% by volume

MALTS

10 lb. [4.54 kg] six-row pale malt

2 lb. [907 g] flaked maize

4 oz. [113 g] acid malt

HOPS

1.75 oz. [62 g] Cluster, 6.5% a.a. @ 60 min

1 oz. [28 g] Hallertauer Mittelfrüh, 3.75% a.a. @ 10 min

1 oz. [28 g] Hallertauer Mittelfrüh, 3.75% a.a., steep 20 minutes

WATER

Kai Troester's Pilsner water profile (see braukaiser.com for details)

Ca 59 ppm, Mg 0 ppm, Na 0 ppm, SO₄ 89 ppm, Cl 63 ppm, HCO₃ 0 ppm

OPTIONAL

1 oz. [28 g] Hallertauer Mittelfrüh, dry hop in secondary

YEAST

Wyeast 2124 Bohemian Lager

BREWING NOTES

Mill the malt and dough in, targeting a mash thickness of around 1.5 qt./lb., a temperature of 154°F (68°C), and a mash pH of 5.4. Hold the mash at 154°F (68°C) for one hour. Sparge slowly with 170°F (77°C) water and collect wort until the pre-boil volume is around 6.5 gal. (24.6 L). Adjust this volume as needed to account for your boil-off rate.

Boil for 60 minutes, adding the first addition at the beginning of boil and the rest at 10 and 0 minutes before the end. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill wort to 50°F (10°C), aerate thoroughly, and pitch yeast.

Ferment at around 50°F (10°C). With healthy yeast, fermentation should be complete in 2 weeks or less, but don't rush it (cold-fermented lagers take longer than ales). If desired, perform a diacetyl rest during the last few days of active fermentation by raising fermentation temperature to around 60°F (16°C).

Rack the beer to a secondary and lager for around 6 weeks. It was not common practice for brewers ca. 1900 to dry hop their lagers, but if desired, Hallertauer Mittelfrüh hops could be added to secondary during lagering for additional noble hop aroma: 1 oz. [28 g] should be sufficient.

Bottle or keg after lagering is complete.

EXTRACT VERSION

Replace the malts with 7 lb. William's Brewing American Lager liquid malt extract. Omit water salts.

Dissolve extract in enough hot reverse osmosis or distilled water to yield a pre-boil volume of around 6.5 gal. (24.6 L). Adjust this volume as needed to account for your boil-off rate. Stir thoroughly to dissolve the extract and bring to a boil.

Boil 60 minutes. Add the first hop addition with 60 minutes remaining in the boil. The other hop additions are 10 and 0 minutes left in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill, pitch, and ferment as above.



My preference is Rahr six-row malt, which is approximately 1.7°L in color. However, there is no reason a CAP can't be brewed using two-row pale or Pilsner malt. While these malts are not historically faithful to the style, they will produce a beer that is light in color and provide sufficient diastatic power to convert a grain bill that has a modest fraction of unmalted adjunct.

Speaking of adjuncts, the two choices are corn and rice. But how much adjunct should you use? The *American Handy-Book* provides advice:

Schwarz never advised using too much raw cereal, but rather opposed it. One-third of the materials figured for malt seemed quite sufficient ... For pale beers, malt, together with unmalted cereals usually to the amount of one-third of the grist, but varying from 10 to 50 per cent are used.

So, the answer according to this contemporary textbook is to have something like one-third of the grain bill as adjuncts. That said, my personal preference is to use 20 percent adjunct. I would suggest that no more than 33 percent be used, but feel free to go on the lower end (e.g., 10 percent) if so inclined.

Corn of several forms can be used, and your choice will affect the brewing process. Flaked corn has already been gelatinized via the steam rolling process and therefore can be added directly to the mash with the barley malt. Flaked corn was used by brewers in the 1800s and discussed in the *American Handy-Book*:

This led to the introduction of corn flakes. First among was "Cerealine." It cannot be denied that there are advantages in using these goods, which can be added directly in the mash-tun, especially in small breweries having only one mash-tun.

The other choices for corn are raw corn in the format of grits, polenta, or cornmeal. Since these forms are raw, they need to be gelatinized via a separate cereal mash.



Like corn, rice offers a choice of products. Flaked rice is an easy choice, as it has been gelatinized and can be directly added to the mash. Raw rice needs to be gelatinized via a cereal mash.

Corn imparts a noticeable but pleasant sweetness to your finished CAP, and it is my adjunct of choice. Rice is more flavor neutral. I have only used rice in one batch of CAP, and while I very much enjoyed that beer, I must confess that I missed the special quality corn brings to this beer style. If you are seeking a crisp, dry American Pilsner, rice would be a good choice. If you prefer a slightly sweeter, fuller lager, corn is the way to go.

Optional Cereal Mash

In "The Revival of the Classic American Pilsner" (*Zymurgy*, Sept/Oct 2000), Jeff Renner details a method for conducting a cereal mash:

Corn and rice starches don't gelatinize at mash temperatures, and so aren't available for conversion. Boiling the cereal gelatinizes the starch, but then they are hard to handle. The secret turned out to be malt. By adding a small amount of malt to the cereal and mashing a short time before cooking, the cereals become quite thin and stay that way.

I mash about five ounces of malt for every pound of adjunct. Use about a quart and a half of treated mash water per pound of corn, two quarts for rice. Rest at about 153°F for 20 minutes, then bring to a boil.

Rice and corn meal should be cooked covered about 30 minutes; grits or polenta 45 minutes to an hour. Stir as you bring them up to a boil and occasionally during the boil, adding more water if necessary. It's best not to overcook rice, but corn can be cooked longer for more flavor and color reactions to take place in the cooker if you want these.

Meanwhile, you have started the main, or malt mash, and timed it so that just as the cereal mash is done, it is time to boost the temperature of the main mash. It's best to plan this ahead on paper.

I must confess that I personally have never conducted a cereal mash. The steps above are more than I am willing to do, and I have always been extremely pleased with the results of using flaked adjuncts. If you prefer to go through this extra step,

please feel free to do so. Just pay attention and avoid scorching the pot (I absolutely hate cleaning scorched pots).

Hops

The BJCP's 2015 Style Guidelines offer a bitterness range of 25 to 40 IBUs for Historical Beer: Pre-Prohibition Lager. My preference is to shoot for the high end of that range. The *American Handy-Book* discusses the typical hopping schedule for American lagers of the early 1900s with a three-step schedule:

- 2/5 "fair quality" hops for the bittering addition (a total of 60 minutes of boiling time)
- 2/5 "better quality" hops for the flavor addition (a total of 20 minutes of boiling time)
- 1/5 "finest quality" hops for the aroma addition (end of boil)

The book *One Hundred Years of Brewing: A Complete History of the Progress Made in the Art, Science and Industry of Brewing During the Nineteenth Century* (1903) also provides clues as to the varieties of hops that were imported to the US during that time period. The best were Bohemian "Saazer," then Bavarian "Spalter," and then "Hollestan" (Hallertauer?). Other hops that were imported include English Fuggles and Styrian Goldings, which are Fuggles grown in what are now northern Slovenia and southern Austria.

The predominant hop variety grown in the US in the 1800s was Cluster hops. These would likely have been the “fair quality” hops above used for the bittering addition. Now any of the other imported hops listed above would have been used for the flavor and aroma additions. As a point of example, Budweiser historically used Saaz hops.

Any noble hop (or American hop equivalent) is suitable for flavor and aroma additions. My preferred hop for Classic American Pilsner is Hallertauer Mittelfrüh. If you prefer other noble hops (e.g., Saaz, Tettanger, and Spalt) use them, or even American hops that have noble-like qualities (e.g., Mt. Hood, Vanguard, and Liberty).

Now, I will bring up a controversial topic: dry hopping. I have yet to find references to these beers being dry hopped in contemporary books, but I did read “Explorations in Pre-Prohibition American Lagers” by George Fix. Fix provided a recipe that called for dry hopping with imported hops for the duration of lagering.

I don't know Fix's source for this technique, but I tried it in a batch of CAP over 15 years ago, and I became a believer. Every batch of CAP that have I brewed since then has been dry hopped for improved aroma and flavor.

Yeast

Lager yeasts do not vary to the same extent as ale yeasts, so the easiest approach is just to use your favorite lager yeast, especially if it's one you are already familiar with. Over the years, I have become more attuned to the differences between different lager yeasts, and I have brewed my CAPs using various yeast strains:

- Wyeast 2206 Bavarian Lager
- Wyeast 2272 North American Lager (reportedly the Christian Schmidt strain)
- WLP830 German Lager
- Wyeast 2124 Bohemian Lager (reportedly the Weihenstephan 34/70 strain)

I have also used Wyeast 2007 (Pilsner Lager) and Fermentis W-34/70. While any of these yeast strains would produce a quality CAP, I have a strong preference for Wyeast 2124. It provides a clean, crisp quality that complements this beer style well.

Other Considerations

Water for a Classic American Pilsner should be fairly soft and low in alkalinity. Although it may be tempting to use, say, a St. Louis water profile to brew this style, doing so may not be optimal. After all, the water a brewery uses may differ substantially from

that of the municipal system.

A better approach is to build up a water profile from distilled or reverse osmosis water. Kai Troester's excellent website braukaiser.com offers water profiles appropriate for a number of beer styles, including one for German Pilsner and Classic American Pilsner. This is the water profile given in the accompanying recipe.

Malt extract brewers are in luck when it comes to this style. Although adjunct malt extracts are not terribly common, Williams Brewing produces an American Lager Extract that is perfectly suited for Classic American Pilsner. According to William's website, it is made from 70 percent Pilsner malt and 30 percent flaked corn. One need only dissolve enough of this extract in hot water to achieve the desired original gravity, and the rest follows.

A MODERN CLASSIC

Classic American Pilsner is a true American classic that has one foot in the Old World and one in the New. If you've never brewed this historical style before, it's time to treat yourself to a sip of American history.

Jack Horzempa is an AHA member from King of Prussia, Pa.



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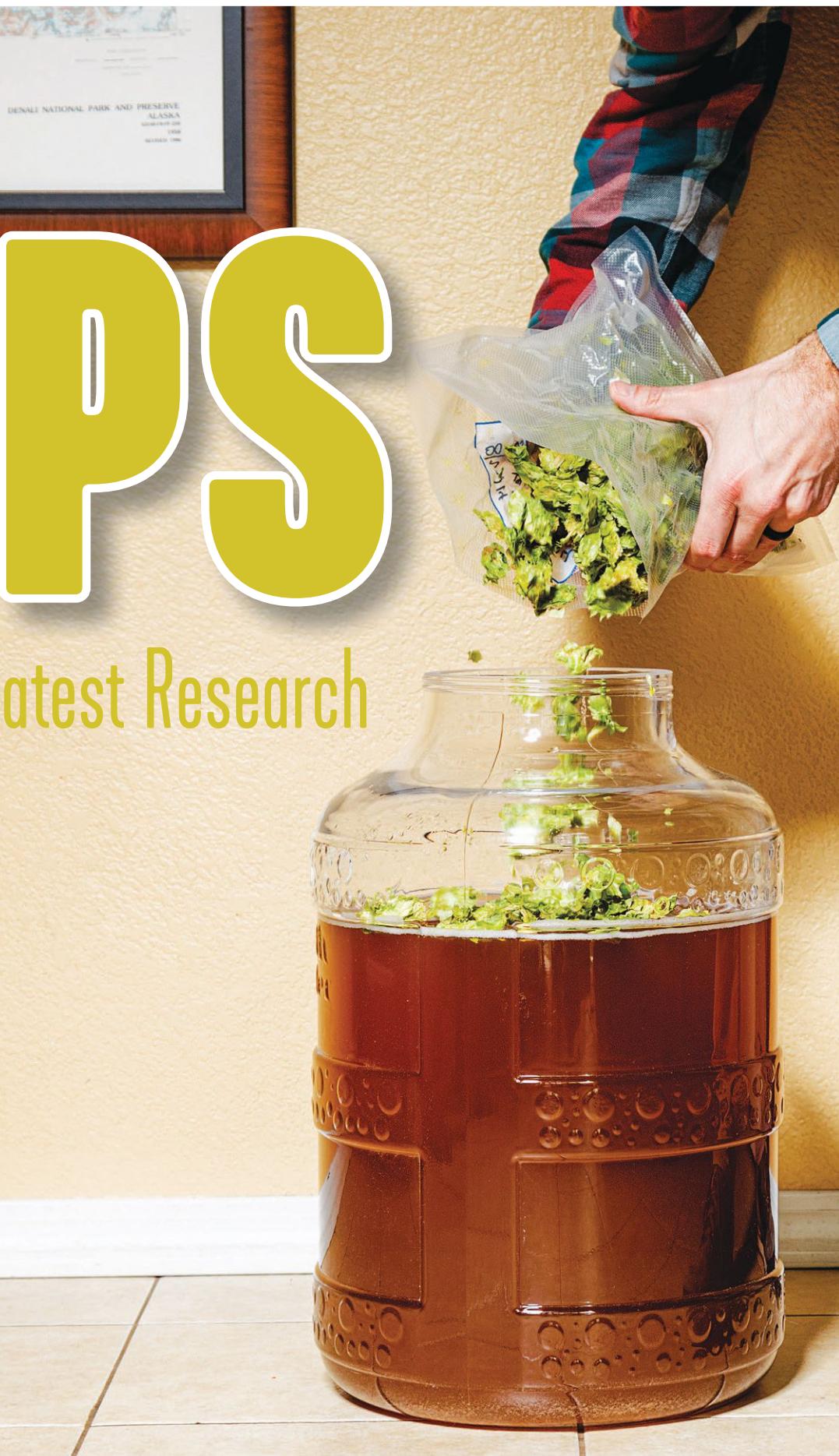
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HOPS

The Latest Research





By Stan Hieronymus

Speaking at a conference for homebrewers not long ago in Asheville, N.C., Mike Karnowski, founder of Zebulon Artisan Ales and author of *Homebrew Beyond the Basics*, began by saying, “Twenty years ago we had everything figured out.”

He proceeded to prove that there's plenty more for brewers, professional and amateur, to learn. However, he wasn't wrong about how different some things appeared in the mid-90s. Brewers were focused on tweaking processes to create beers with a much more limited range of flavors. The titles of a few articles from the *Master Brewers Association of the Americas Technical Quarterly* in 1995 tell a story: “High gravity blending,” “Chemical evaluation of beer flavor stability,” and “Anaerobic treatment of brewery waste water with the turbulent bed reactor.”



Now, consider some of the presentations and posters at the American Society of Brewing Chemists meeting last July: “House mixed cultures: Genetic and metabolic diversity across America,” “The impact on hop-derived volatile compounds in beer by dry-hopping at different points of fermentation using different strains of hops and yeast,” and “Does terroir exist in Cascade hops grown in the Midwest?”

Notice anything different? Beer has changed more since 1995 than anybody would have predicted, and brewing science has necessarily expanded. Much of the research has produced information relevant to homebrewers, and the amount can be overwhelming for a hobbyist. Here are seven vocabulary terms and a sometimes-oversimplified explanation of why they matter to use at your next homebrew club meeting.

Biotransformation

In the case of beer, biotransformation describes the modification of compounds facilitated by yeast. The monoterpenes linalool, geraniol, and citronellol are just three of many compounds involved, but they are prominent in what are called “special flavor hops.” These include Citra, Mosaic, Galaxy, Nelson Sauvin, and many others. The additive effect of aromas and flavors created by the biotransformation of these three compounds results in a citrus, lime-like character that would not otherwise be present.¹

(For those interested in more detail: Geraniol may be converted to citronellol and adjunctively to linalool. Nerol may be converted to linalool and terpineol. Part of linalool may be cyclized to α -terpineol. In addition, geranyl precursors may be converted into geraniol.²)

Monoterpenes are more easily retained in wort than hydrocarbons such as myrcene; nonetheless about half the quantity of each will be lost in 10 minutes of boiling. Late hopping, whirlpool hopping—or a hop stand—and dry hopping retain more of the compounds. (See DDH below for more on dry-hop additions.)

Scientists continue to examine how other compounds (hops contain more than 500) may also be transformed, and different yeast strains facilitate this transformation. For instance, consider what

German researchers found examining two hop varieties and two hop strains. They brewed six beers. Two were control beers, one fermented with White Labs WLP001 American Ale yeast, the other with WLP029 German Ale/Kölsch. Two were brewed with each yeast and hopped with Cascade, two with each yeast and hopped with Hallertau Mittelfrüh. Those final four were also dry hopped. The researchers measured esters and terpenes. The beers were analyzed by Nyseos, a laboratory in France, to quantify thiols and thiols precursors (What are thiols? See next entry). The beers were also put before a sensory panel. The takeaways:

- The thiol they call 3-mercaptopentan-1-ol (3MH) was more prominent in beers brewed with Cascade but still above threshold in those brewed with Mittelfrüh. Although the results were more dependent on hop variety, WLP001 released a significantly higher amount of 3MH.
- The thiol they call 4-mercaptopentan-1-ol (4MMP) was well above threshold in all beers made with Cascade, below in the Mittelfrüh beers.
- The beers fermented with WLP001 had higher levels of geraniol and citronellol than those fermented with WLP029.
- Beers made with Cascade had almost twice as many terpenes as beers made with Mittelfrüh. And beers hopped with Cascade and fermented with WLP001 had a higher level of terpenes than Cascade/WLP029 beers. In contrast, the sum of esters was more dependent on the yeast used—WLP029 beers showed higher values.
- Sensory panel members found the Cascade/WLP001 beers had more citrus character, while the Cascade/WLP029 beers were perceived higher in sweet fruits, green fruits, and red berries.³

Thiols

Thiols are sulfur-containing compounds that constitute less than one percent of essential oil, which in turn makes up between less than one-half to four percent of a cone. Until 20 years ago, research focused on 3-methyl-2-butene-1-thiol (3MBT), which may add undesirable light-struck “skunky” flavor to beer. Only since the early 2000s did scientists turn their

FLAVOR AND AROMA COMPOUNDS IN HOPS

Geraniol-Rich Varieties

Bravo, Cascade, Chinook, Citra, Mosaic, Motueka, Sorachi Ace

4MSP-Rich Varieties (and otherwise)

- **High levels:** Citra, Simcoe, Eureka, Summit, Apollo, Topaz, Mosaic, Ekuanot, Galaxy, Nelson Sauvin
- **Significant levels:** CTZ, Cluster, Chinook, Cascade, Centennial, Amarillo, German Northern Brewer, Hallertau Blanc, German Cascade, Mandarina Bavaria, Polaris
- **Measurable but low:** Bravo, Calypso, Denali, Galena, Lemondrop, Sorachi Ace, Super Galena, Willamette, Hallertau Tradition, Herkules, Perle, Taurus, Tettnanger, Styrian Golding, New Zealand Pacific Gem. Perhaps Saaz
- **None:** Hallertau Mittelfrüh, Hersbrucker, Hull Melon, Magnum, Saphir, Spalter Select, Bramling Cross, East Kent Golding, First Gold, Fuggle, Pilgrim, Progress, Wye Challenger, Wye Target

3SH-Rich Varieties

Nelson Sauvin, Amarillo, Mandarina Bavaria, Mosaic, Citra, Cascade, Calypso, CTZ

3S4MP-Rich Varieties

Hallertau Blanc, Nelson Sauvin, Mosaic

attention to other thiols, first to 4MSP and 3SH, more recently to 3-sulfanyl-4-methylpentan-1-ol (3S4MP). Although they may occur at very low levels in beer, their threshold of perception is also low, measured in parts per trillion.

(4MSP is short for 4-methyl-4-sulfanyl-pentan-2-one, and may also be known in some literature as 4-mercaptopentan-2-one/4MMP. 3SH is short for 3-sulfanylhexan-1-ol, and may also be known as 3-mercaptopentan-1-ol/3MH.)

Winemakers have studied these compounds—which may be prominent in Sauvignon Blanc, Riesling, and other wines, although they do not occur in grapes—for



decades. They are formed during fermentation from precursors in grape must. However, free thiols have been identified in many hop varieties. Analyzing them is difficult because of their low concentrations and high reactivity. The instrumentation to measure them is very expensive.

Several researchers have found a synergistic effect between monoterpenes and thiols that broadens and intensifies fruity aromas and flavors. For instance, at Sapporo Breweries in Japan, sensory panelists rated various aroma attributes of a solution dosed with 4MSP, scoring it two (out of four) for “tropical.” Similarly, a solution dosed with a mixture of linalool, geraniol, and citronellol scored less than two for tropical. However, when all four were blended, the tropical score jumped to a full four.⁴

CHEAPER HOPS

A couple of years ago, Mike Tonsmeire, author of *American Sour Beers* and cofounder of Sapwood Cellars Brewery in Maryland, coined the terms “cheaper hops” and “cheater hops.” The latter are varieties, such as Citra and Mosaic, responsible for bold, tropical aromas and flavors in vogue. “Cheaper hops” are the varieties that are more readily available and cost less but might be blended to create characteristics found in more expensive hops.

Campden BRI, a food and drink research laboratory in England, provided a framework for concocting such blends when it asked this question: can analytical and sensory assessment be used to accurately

predict the sensory characteristics of hops in finished beers? The original study assessed 14 new and established hop varieties. They were evaluated both in terms of sensory analysis, using an expert beer sensory panel, and chemical composition in hops and finished beer, using equipment homebrewers obviously do not have access to. The final goal was to brew with a blend of hops to match the sensory character of a target hop, in this case Amarillo.

They discovered that “hop teas are a poor predictor of hop sensory characteristics in finished beer” and wrote that blending can be assisted by sensory and analytical data, but it is best done in beer. Given what is understood about the role of yeast in bio-transformation, that should be no surprise.

Campden BRI determined the best match for a beer brewed with Amarillo was one made with Cascade and Lemondrop hops blended at a ratio of 4:1.⁵ Lemondrop is a proprietary Hopsteiner hop, so it is not surprising that Campden BRI was asked for blends to match the dry hop aroma of Citra and Simcoe, two proprietary hops for which other companies hold patents. Most, but not all, hops used to make the blends were proprietary hops from Hopsteiner.

They used hop extract in the boil to provide 20 IBU of bitterness. The beer was fermented with Nottingham Ale yeast and dry hopped with 5 grams per liter at 55°F (13°C). That’s comparable to a bit more than 1 pound of hops in a U.S. barrel, or 3 ounces in a 5-gallon homebrew batch. Ultimately, the best match for Citra was a blend of 70 percent Calypso and 30 percent Bravo. For Simcoe they suggest 50 percent Eureka, 40 percent Apollo and 10 percent Cascade.⁶

Homebrewers do not have access to the same testing equipment but can take

inspiration from the BRI’s conclusion that “Blending is more art than science.” Tonsmeire drew from lists of hop varieties rich in geraniol (which may result in citronellol as well because of biotransformation) and thiols for his “cheaper” blends. The disclaimer related to these lists is that (a) they are not complete and (b) there are variables beyond variety, related for the most part to seasonal variation, location, and when hops are harvested.

DDH

Does “double dry hopped” mean dry hopped two times or with twice the hops? Sometimes the answer is both. And the follow-up questions are how many times, and how much hops is just plain wasteful?

To the last question, from recent research at Oregon State University (OSU): adding more hops does not simply lead to increased aroma intensity but also changes aroma quality. Dry-hopping rates greater than 8 grams per liter (a little less than 5.5 ounces per 5 gallons) led to hop aromas that were more herbal- and tea-like in quality than citrus.

To maintain a more balanced hop aroma quality, the study suggests using a dry-hopping rate between 4 and 8 grams per liter. Using dry-hopping rates greater than 8 grams per liter leads to diminishing returns in terms of increasing hop aroma and is an inefficient use of raw material. It should be noted, however, that many commercial breweries dry hop with up to four or five times that amount, producing beers that have been very popular.⁷

Dry hopping two separate times is not new. Firestone Walker Union Jack was “double dry hopped” when it won gold back-to-back years at the Great American Beer Festival® more than a decade ago. For that beer, brewmaster Matt Brynildson split the dry hop charge into two, adding the first for three days, removing hops and yeast from the bottom of the fermentation tank, and dry hopping it for another three days.

Recent research at Oregon State University examined the differences between dry hopping once and twice. Pilot-scale, two-stage, dry-hopped beers all showed changes in bitterness units, humulinones, and iso-alpha acids (see Humulinones below for more). As important, sensory panelists observed





significant increase in six aroma attributes: overall hop aroma intensity, citrus, herbal/tea, tropical/catty, tropical/fruity, and pine/resinous/dank.⁸

Brewers may also dry hop at different times because they suspect it might affect biotransformation. Although researchers at Sierra Nevada Brewing Co. and New Belgium Brewing Co. focused on single additions at different stages, the results may be relevant. Sierra Nevada assessed beers dry hopped at Day 0 of fermentation, Day 4, and Day 8, measuring them analytically as well as putting them before

a tasting panel. The panel found overall hop intensity to be the same for all three treatments. However, the Day 8 beer was perceived as skunkier and danker, with an onion-like, catty, sulfur aroma. The citrus character was perceived similarly in the Day 0 and Day 4 beers, but panelists found the Day 0 beer to have more rose/floral aroma, and much more fruity tropical character.⁹

New Belgium examined dry hopping at different stages of fermentation with different hop varieties and different yeast strains. The hops were Cascade and Centennial,

and the yeast strains were California Ale (WLP001) and London Ale III (WLP1318). The addition times were based on gravity.

They found that dry hopping at a higher gravity with geraniol-rich Centennial hops and WLP001 resulted in an increased concentration of citronellol, the compound responsible for citronella's distinctive aroma. Dry hopping at a lower gravity with the same hops and yeast increased concentrations of geraniol, the principal constituent of rose oil. Dry hopping at a lower gravity using geranyl acetate-rich Cascade hops and WLP1318, or hopping at a higher gravity using Centennial hops and the same yeast, increased concentrations of lavender-like geranyl acetate.

Timing was not a critical parameter when dry hopping during fermentation with California Ale, but it was a critical parameter when using London Ale III.¹⁰

HOP CREEP

More from Oregon State University, where researchers at the fermentation lab define hop creep as the refermentation of fully fermented beer following the addition of hops, which is observed as a slow reduction of residual extract and a steady increase of alcohol and carbon dioxide over time. That refermentation also creates diacetyl.

The information is not exactly new. Brewers first reported this in the 19th century, but it became much more relevant because of modern dry hopping practices, different varieties, and different ways hops may be processed.

Dry hopping liberates fermentable sugars in beer (mostly maltose, and some glucose), and hops contribute a small amount of sugar themselves; dry-hopped beer with high residual extract produces more fermentable sugars; enzyme activity varies across varieties and those are further influenced by farming practices (when the hops are picked and how they are kilned); and longer dry hopping time and higher temperatures result in more sugars.

Just how complicated this may be is illustrated by the results of a study led by Kalyn Kirkpatrick at OSU, which examined the enzymatic power of 30 hop cultivars. She found four groupings: Class-1 hops had high maltose production, Class 2 had low maltose, Class 3 had moderate maltose, and Class 4 had high fructose and glucose (so like Class 3, producing a moderate level of fermentable sugars). Notice that one year the batch of Amarillo has high enzymatic power, and the next low. There is much more to be understood.

- Class 1 (high): Amarillo 2015, Cluster, Fuggle, Nugget, Perle



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- Class 2 (low): Amarillo 2016, Centennial, Citra, Crystal, East Kent Golding, El Dorado, Galaxy, Hersbrucker, Saazer, Summit
- Class 3 (moderate): Azacca, Comet, Golding, Kohatu, Mosaic, Mt. Hood, Rakau, Simcoe, Wai-ti, Willamette
- Class 4 (moderate): Cascade, Dr. Rudi, Moutere, Pacific Gem, Pacific Jade.¹¹

It has been suggested that brewers may reduce the amount of enzymatic activity by using lower quantities of dry hops, reducing contact time and temperature, mashing to facilitate greater attenuation, and using Cryo Hops (which reduces the amount of hop material). Of course, conducting a proper rest after dry hopping will reduce diacetyl, although it may reappear during bottle conditioning.

HAZE

Scientists at international hop supplier Hopsteiner freeze-dried sediment from 12 commercial examples of New England IPA to determine the constituents of the haze as part of a study to reveal the “Hidden Secrets of the New England IPA.”

Analysis of the haze showed it to contain about 36 percent protein, 12 percent hop compounds, 10 percent carbohydrates, and

3 percent polyphenols. Yeast was generally not a contributor. High-protein adjuncts such as wheat and oats rich in prolamins (haze proteins) combine with polyphenols to form haze. Hop acids can also add to haze, but their contribution is small.

The “big secret” is that the haze in New England-style IPAs is important because it acts as a carrier and increases the concentration of non-polar compounds such as alpha acids, xanthohumol, beta acids, and most likely other non-polar flavor compounds that contribute to unique aroma and flavor.¹²

“Thiols are fairly polar compounds, so I wouldn’t expect an enrichment of those due to the haze,” explained John Paul Maye, technical director at Hopsteiner. “One of the things I found interesting is that we didn’t see a lot of soluble hop compounds like iso-alpha acids or humulinones in the haze precipitate. That makes me believe the haze is acting more like an emulsifier than a trap.”

HUMULINONES

Humulinones are formed by the oxidation of alpha acids within the hop. They are not a recent discovery, but there was little reason to pay attention to them before brewers began dry hopping at the rate some do

today. They are about two-thirds as bitter as iso-alpha acids, the primary bittering component in beer, but—here is the key—they are more soluble and will dissolve into beer during dry hopping to increase bitterness.

The Hopsteiner study concluded that the smooth bitterness of NEIPAs is due to high concentrations of humulinones and relatively low iso-alpha acids.

When large amounts of post-boil hops settle in a fermentation (or post-fermentation) vessel, they absorb some of the iso-alpha acids. Hopsteiner documented this in another study. Increasing the dry hopping dose from 0 to 0.5, 1.0, and 2.0 pounds per barrel resulted in progressively lower iso-alpha acid concentrations, from 48 to 39, 35, and 30 ppm, respectively. “This significant loss in bitterness was offset, however, by the large increase in humulinones that dissolved in the beer,” the study revealed.¹³

And the bitterness was different. “Sensory evaluation of a very low IBU beer spiked with 22 ppm of humulinones was compared with the same beer spiked with 14.5 ppm of iso-alpha acids. The bitterness intensity of the two beers appeared to be similar, confirming that humulinones are about 66% as bitter as iso-alpha acids,” Hopsteiner reported. “The bitterness profile of the humili-

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none beer, however, appeared smoother, and there was less lingering on the tongue than with the iso-alpha acid beer. This smooth bitterness makes sense given humulinones are more polar than iso-alpha acids and should therefore not stick or linger on the tongue as long as iso-alpha acids."

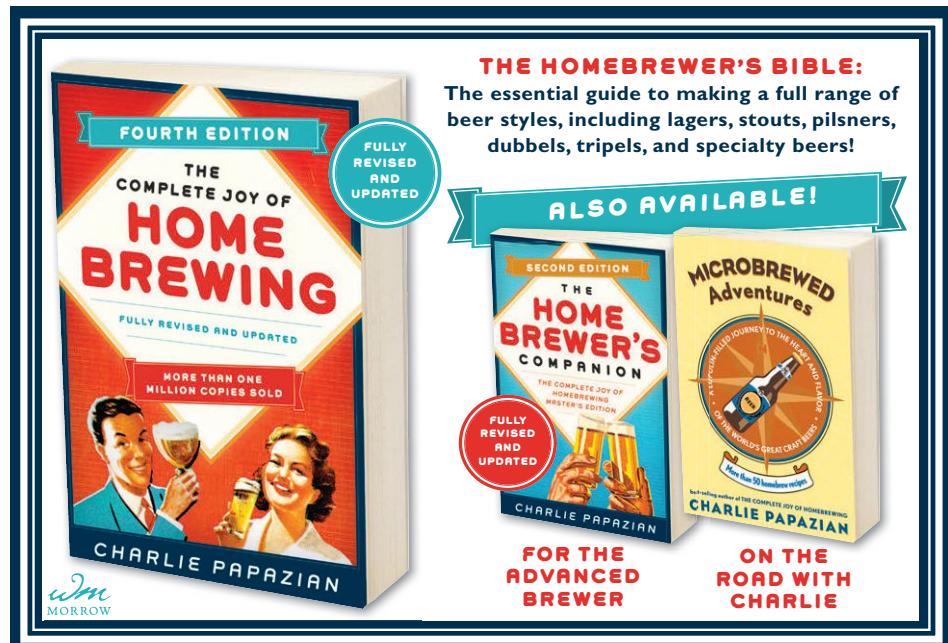
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Stan Hieronymus is the 2015 recipient of the American Homebrewers Association Governing Committee Recognition Award. He has written about beer for 25 years, including For the Love of Hops and three other titles for Brewers Publications®.



The illustration features a central blue glass beer bottle with a white label that reads "MoreBeer! THE BREWING NETWORK". The bottle is surrounded by several bunches of green hops and several stalks of golden wheat. In the top right corner, there are three logos: "MoreBeer!" with a red circular logo, "MELVIN BREWING" with a black bear logo, and "The BREWING NETWORK" with a stylized hop cone logo. Below the illustration, the text "THE BOIL Rumble" is written in large, bold, black letters, with "Rumble" in a smaller, lighter gray font. To the left of the main title, the text "Homebrew Clubs! Get into the ring & make the best beer in America:" is displayed. To the right, it says "3 clubs brew with Melvin", "3 clubs get cans released in their city", and "1 club gets cans released nationally". At the bottom, the hashtag "#THEBOILRUMBLE" is shown, followed by the instruction "Follow @Melvinbrewing for all updates and deadlines to enter".



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The Original Belgian Abbey Beers



By Roel Mulder

The Belgian beer scene wouldn't be complete without its abbey beers. In fact, one out of every eight glasses of beer consumed in Belgium itself is an abbey or a Trappist beer, making it the most popular beer style there after lager. But then again, what's not to like? It is an enchanting idea to drink a beer patiently crafted by hardworking, simple monks, in age-old monasteries where Gregorian chants resonate through Gothic cloisters.



That image is undoubtedly true, up to a point, for the world-famous Belgian Trappist beers. These are still made on the monasteries' premises and under the supervision of the monks. The various other Belgian abbey beers are another story: they are made by commercial brewers in modern breweries, often far away from the abbeys they are supposed to represent, and the involvement of the abbeys does not go further than receiving royalties for the use of their names. Or, sometimes, not even that.

Oddly, it's the commercial abbey beers that emphasize their age-old history. Affligem anno 1074. Grimbergen anno 1128. Leffe anno 1240. "Throughout the centuries, the monks and friars have preserved the recipes of the beers they made," writes Theo Vervloet, former brewmaster at Affligem, and he claims the monks "have

passed them on to the next generations." You get the implication: that dubbel or tripel you are drinking is a direct descendant of an ancient medieval ecclesiastical brewing tradition that continues to this day.

The truth is however rather sobering. Although these abbey beers are the pride and joy of their brewers and are among the best that the Belgian beer scene has to offer, the cold facts are that most of these beers are not more than 100 years old. In fact, 200 years ago, the number of abbeys that existed in Belgium was exactly zero. They had all been closed during the French revolution, and only a few of them slowly re-established themselves during the 19th and 20th centuries. This basically cuts off any monastic brewing tradition that exists today from the abbey breweries of the former feudal world.

In fact, in medieval and early modern monasteries, beer played a very different role than today's abbey beers seem to suggest. Their beers were quite different and, more importantly, so were the abbeys themselves.

Abbeys: Rich and Powerful

One thousand years ago, the region that is now Belgium was quite wild and empty. The official rulers, the German emperor and the king of France, were far away, and local lords basically did as they pleased. In this harsh environment, there was still a place for establishing new settlements out in the wild. That is how many Belgian abbeys began: as outposts of civilization, where fields were cleared and forests were cut down to make room for agriculture. Lords would often use these monasteries as markers of their domination, against

Brew
This!



Jesuit Beer, 1627

In 1627, someone at the headquarters of the Flemish province of the Jesuits in Brussels thought it was a good idea to investigate the brewing methods of their subsidiary monasteries. The result was a recipe for "good beer" that was recommended as the standard for the Jesuits. The Belgian historians Erik Aerts and Eddy Put who rediscovered this recipe, tried to compare it to today's abbey beers but had to admit that, to our modern palates, the 17th-century original must have been a "quite mushy drink."

In any case, the recipe states that the beer is at its healthiest if its color is not white, not brown, but, "of middle colour, that is orange." In other words, it's a three-grain amber beer. I added some roasted barley to get to that color. Unfortunately, there is no mention of the quantity of hops involved, so that is at your own discretion.

Batch volume: 5.25 US gal. [20 L]
Original gravity: 1.063 [15.4°P]
Final gravity: 1.016 [4.1°P]
Efficiency: 70%

Color: 12 SRM [24 EBC]
Bitterness: unknown
Alcohol: 6.2 % by volume

MALTS & ADJUNCTS

6.7 lb. [3.02 kg] Pilsner malt
3.6 lb. [1.64 kg] raw wheat

1.7 lb. [790 g] oat malt
4.2 oz. [120 g] roasted barley

HOPS

Who knows?

YEAST

Top-fermenting

BREWING NOTES

Brewing this should be straightforward, except for the precautions necessary for using wheat and oats—consider using rice hulls as a lautering aid. The original recipe does not offer many brewing details, but attenuation must have been relatively low. The text indicates that some monasteries left out wheat in favor of barley, as wheat made the beer heavier and was said to be less healthy. To brew this version, replace the 3.6 lb. [1.64 kg] of wheat with 5.4 lb. [2.45 kg] of additional Pilsner malt.



Portrait of a Carmelite, Bertholet Flemalle or Jean-Guillaume Carlier,
Musée des Beaux-Arts, Liège, Belgium.

was considered to be the drink of the rich. Beer was seen more as an everyday beverage.

That said, almost every monastery in what is now Belgium had a brewery of some sort. Usually, it was housed in a separate building some distance from the main complex, often combined with the bakery. This was done for practical reasons, such as the availability of water and the risk of fires. Initially, the breweries were often run by a monk or a lay brother, but by the 17th, and especially the 18th, century, with the number of monks diminishing, the brewer was often a lay person hired for the job. Usually the brewer was among the best-paid workers at the abbey.

It would be wrong to think of these breweries in terms of commercial operations famous outside the abbey gates. Most of the beer was meant for consumption by the monks and their staff, for giving to temporary workers (such as builders), and for distribution among the poor and to guests as alms. Some of the beer went to other monasteries as gifts, and to certain parish priests.

This means that no beer, or perhaps only a tiny amount of it, was sold to outsiders. Beer certainly would not have been a major source of income for these abbeys even if they had brewed for the market. After all, for their income the rich abbeys relied on their land, of which they had huge amounts.

other rulers. Linking the abbeys of Affligem and Villers to the duchy of Brabant, for instance, effectively meant securing their lands as part of the duke's territory.

These abbeys, huge landowners that received donations from wealthy noblemen and bore religious authority over a great number of parishes, were centers of great economic and political power. For instance, the abbey of Affligem owned more than 10,000 hectares of farmland and forest. Fifty tenants paid them rent. The abbey owned 16 water mills, various windmills, houses in six towns, vineyards, stone quarries, and various fishing and hunting rights.

Only a limited number of monks supervised all this—monasteries were also supported by converts, lay brothers who usually had entered the order later in life and who performed various menial tasks. But usually, and more and more over time, the abbeys simply employed laymen to do the work:

bakers, butchers, cooks, gardeners, farm workers, builders, and, of course, brewers.

These abbeys frequently grew very rich, and the monks lived lives of luxury. They ran their monasteries like businesses and entertained close relations with the rich and powerful. This triggered various countermovements, with new orders that wanted to go back to the basics of a simple, laborious, and poor monastic life. The Cistercians, Franciscans, and Carmelites are examples of these. The Trappists are, in fact, a breakaway sect of Cistercians who split off in the 17th century because they thought the Cistercians weren't going far enough.

Brewing at the Abbeys

If the monks in the classic Benedictine-style abbeys lived a life of luxury, does this mean they indulged in medieval versions of dubbel and tripel? Probably not. After all, wine

That would change after the French Revolution, which took place in 1789. After the French had abolished royalty and decimated nobility, beheaded the king, and done away with the ruling class, they turned their attention to the Church. The Catholic church owned enormous properties. Why not seize all this, close the churches and monasteries, and sell off the lands and buildings to finance the costly revolutionary wars? When the French invaded today's Belgian territory in 1794, they did the same there. The once glorious abbeys of Affligem, Grimbergen, Tongerlo, Villers, Park, and all the others were sealed off, divided, sold, and largely demolished.

Only after the restoration, and especially once Belgium had declared itself independent in 1830, did the monastic communities slowly come back. In a few instances, they managed to recover what was left of the old abbey buildings. They didn't, however, get back the huge plots of land they once owned.

This was a major difference from the abbeys of old. Now, abbeys had to rely on other ways to make money, some of which they had already performed in the old days: farming, making cheese, printing books, selling candles, operating schools.

Brewing beer for the market was a new form of income, and it took a while before it really got going. The Trappists, an order that had only come to Belgium in the early 19th century, pioneered this practice. Before that, the Trappists had only existed in France. But more on them later.

Brown, Amber, White

What were the beers of the old regime like? Even if the abbeys were closed by the French and then largely pillaged and destroyed, a few documents have been preserved that tell us more. Most abbeys brewed three types of beer: good beer, middle beer (also known as convent beer or servants' beer), and small beer, which was usually the type distributed to the poor. Sometimes, abbeys bought beer from elsewhere, mostly from brewing centers like Leuven, Antwerp, or Hoegaarden.

From what can be surmised from inventories and a few rare descriptions, abbey breweries were similar to the commercial breweries of those days. Mashing took place in a large wooden tun, to which the grains and hot water were added simultaneously. The mash was then stirred with wooden paddles. There usually was no false bottom in the tun—wort was extracted by pushing large baskets into the mash from above, from which wort was removed with spoons. Often a second mash was done to obtain the small beer.



Wit Bier ca. 1840

A wonderful find was a little black book full of handwritten brewing notes in the archives of the Franciscans in Holland. The booklet dates from ca. 1840 and may have been used by someone connected to Franciscan monks in the region of Rotterdam. Dialect words, however, suggest the anonymous author was probably from Flanders, the Dutch-speaking part of Belgium. In any case, it contains one of the weirdest recipes I've seen so far. It provides a glimpse into the hidden world of brewing of the past.

Batch volume: 5.25 gal. (20 L)
Original gravity: 1.056 (13.8°P)
Final gravity: 1.014 (3.6°P)
Efficiency: 70%

Color: 4 SRM (8 EBC)
Bitterness: 42 IBU
Alcohol: 5.2 % by volume

MALTS & ADJUNCTS

6.1 lb. [2.75 kg] Pilsner malt
 2.1 lb. [960 g] raw buckwheat

1.7 lb. [770 g] raw oats
 1.4 lb. [640 g] raw spelt

HOPS

2.2 oz. [63 g] Hallertau (or similar), see brewing notes for use

YEAST

Top-fermenting

ADDITIONAL ITEMS

0.2 oz. [5 g] coriander

BREWING NOTES

Reserve 10% of the unmalted grains apart and mash the remaining grain. You may run into problems with lautering, in which case use baskets to spoon out the wort if necessary (see main text). At the start of the boil, add the reserved unmalted grains and one-third of the hops. After boiling 20 minutes, reserve 5% of the wort and pour the remaining 95% over the spent grain. Do not stir. Lauter once more and combine with the reserved wort. Boil 60 minutes with the remaining two-thirds of hops and the coriander. Add water if necessary to get the desired final volume. After cooling, add the yeast.

As with the other recipes, efficiency and attenuation reflect today's brewing standards and may be slightly flattered compared to the original.

There is no specific information on yeast, but it must have been top-fermenting. All these beers were consumed fresh; aging beer was rare if it existed at all. Beer was brewed year round, even in summer.

Like the commercial beers of those days, abbey beers were made from several grains. Barley malt was of course the most common, but usually it was in combination with wheat, often oats, and sometimes spelt or rye. Some of these grains came from the abbeys' own lands, but the rest was bought on the market. A few beers were described as brown, though a 1627 recipe for the Jesuit province describes its beer as amber, and there are several mentions of white beer. In 1770, the monks at Affligem specifically asked for white beer to be brewed not just in summer but also in winter.

Some abbeys grew their own hops. In the 18th century, Grimbergen produced 4,000 pounds of hops a year, which covered slightly less than half of the quantity needed. At Averbode, common broom (*Cytisus scoparius*, also called Scotch broom) was added besides hops. (I would have loved to provide a recipe for this broom beer, but as it is now considered toxic, I've refrained from doing so. The quantity indicated in the recipe—two bundles of broom "as heavy as one man can carry with one hand" per 20 barrels—is pretty vague anyway.)

Modern Abbey Beers

As said, a few Belgian abbeys were reestablished during the 19th and 20th century, and many new ones were formed. Belgium was a predominantly Catholic country and monastic life started flourishing

Brew
This!



Goedt Bier ca. 1679-1689

When in the 1990s the Bosteels brewery was developing a three-grain beer, they came upon a 17th century brewing record from the Discalced ("shoeless") Carmelite monastery in the nearby town of Dendermonde. They used it as an inspiration for their now world-famous Tripel Karmeliet.

Here's my interpretation of the original recipe for the Carmelites' "Good Beer" from approximately 1679–1689. The original monastery was closed in 1796 and subsequently demolished. It is now the site of a courthouse.

Batch volume: 5.25 US gal. [20 L]

Original gravity: 1.090 [21.6°P]

Final gravity: 1.022 [5.6°P]

Efficiency: 75%

Color: 5 SRM (10 EBC)

Bitterness: 35 IBU

Alcohol: 8.8 % by volume

MALTS

11.2 lb. [5.1 kg] Pilsner malt

3.7 lb. [1.7 kg] raw wheat

1.9 lb. [850 g] spelt malt

HOPS

3.4 oz. [97 g] of Hallertau (or similar) @ 60 min

YEAST

Top-fermenting

BREWING NOTES

The original brewing record is rather concise. It is "an instruction to brew 16 barrels of good beer," for which were used 12 vats of wheat, 36 vats of barley, and 6 vats of spelt or "short oats," along with 40 pounds of hops. There's no indication of what was malted and wasn't, but from common practice at the time it can be concluded that the barley was malted and the wheat was not. At Villers abbey, some of the spelt was malted and some wasn't.

I tried to make the best sense of the quantities indicated, and the result is actually comparable in gravity to that of today's Tripel Karmeliet. My version is also a bit flattered in the sense of efficiency: probably at the time efficiency was lower and attenuation often wouldn't go much higher than 50%. Feel free to make adjustments to better approximate the 17th-century original.

the 1920s, their income from the sales of beer exceeded income from the farm and the sale of cheese. But it was at Westmalle that today's archetypes of abbey beer were created. In 1922, Westmalle restarted its brewery after having seen its equipment seized during the war. The new brewery was specifically intended for brewing a commercial product. Hendrik Verlinden, a brewer from the nearby village of Brasschaat and writer of several treatises on brewing, helped the monks create their new "strong beer": a deep brown brew to which candi sugar was added. Westmalle Dubbel was born. Westmalle Tripel would follow in 1934. Both beers were reminiscent of the strong foreign beers that were very popular in Belgium at that time. In fact, the dubbel was in many ways a clone of heavy brown Scotch ale.

During the 1920s and 1930s, Trappist beers met with considerable success, even more so in the 1950s. Success spawns imitation, and commercial Belgian brewers were eager to come up with something similar. They invented the abbey beer: brands with religious-themed labels that featured the names of saints or local churches and, if possible, the name of a very real abbey.

A typical example is Leffe: does this hail from the age-old monastery near Dinant? No. In the early 1950s the Lootvoet brothers, owners of a brewery near Brussels, were simply looking for an abbey that could lend its name to their beer. A chance meeting with the abbot led to a hastily signed contract, and Leffe beer was born. Today, it is brewed at the huge Anheuser-Busch InBev plant in Leuven. The sixteen monks at the original Leffe abbey receive an enormous yearly sum of royalties, but that's the only involvement they have.

So there you have it. Today's abbey beers have little to do with monastic brewing of the past, and they are mainly imitations of beers created by the Trappists about one hundred years ago. One interesting exception is Tripel Karmeliet. Conceived in 1996 by the Bosteels brewery, this three-grain beer is based, to a degree, on an original 17th-century recipe from the Carmelite monastery in Dendermonde. Of course, it is a modern interpretation brewed with modern equipment, but it does offer some idea of what the 'good beer' of these monks must have been like.

Roel Mulder is a Dutch historian writing about beer history. He has written a book about Dutch beer including historical recipes and is currently researching the origins of the many Belgian beer styles.

again. Less so for monastic beer: in many places, like Grimbergen, brewing was not resumed. Where it was, the beer was still mainly for the abbey's own consumption. In any case, the beers had changed. When in 1885 Affligem started brewing again, they used only barley, hops, and crystal sugar, all bought from elsewhere.

When the Trappists started producing beer for the market, the first abbey to do so on a meaningful scale was Abbaye Notre-Dame de Scourmont, located at Chimay in the south of Belgium. In the second half of the 19th century, Chimay's monks developed a *Bière Forte* ("Strong Beer"), which they sold mainly in their region. In 1904, 200,000 bottles ready for shipment were

destroyed in a fire at the abbey, which tells us something about the quantities involved.

Chimay was eclipsed however by the activities of the Trappists at Koningshoeven in the Netherlands. There, the monks established a German-style bottom-fermenting brewery in 1884, where they would make industrial-style lagers like Munich dunkel and eventually Pilsner. They also had considerable exports to Belgium, ironically making the Dutch monks the first to advertise Trappist beer in Belgian newspapers.

Around the First World War, the Saint-Sixtus Abbey of Westvleteren developed its first strong beers, of which the current Westvleteren 8 is a direct descendant. By



BREWING WITH CANNABIS

A MEASURED APPROACH

BY MARK ROCHELEAU
AND ANDREW ORR

Editor's Note:

Despite legalization and/or decriminalization of cannabis and cannabis-derived products by many states and the District of Columbia, marijuana remains classified as a Schedule I substance under the Controlled Substances Act of 1970 and, thus, federally illegal. The American Homebrewers Association neither endorses nor discourages brewing with cannabis-related products, however homebrewers who do so should remember that such beers are not permitted in the National Homebrew Competition.

Most local and regional competitions also do not allow cannabis beers at this time.

In recent years, the legalization of marijuana by individual states and the federal legalization of hemp have led to explosive growth in both industries and in the variety of ways to ingest and enjoy these products. Federal law and most state laws currently forbid the combination of alcohol and drugs for commercial sale, and federal law still considers marijuana a Schedule 1 controlled substance. However, there are options for homebrewers who live in states where marijuana and/or industrial hemp is legal, and want to combine their craft beer with marijuana or hemp for personal enjoyment.



Here, we break down the differences between marijuana and hemp and identify the compounds present in the cannabis flower, including THC, CBD, and terpenoids. We'll also discuss how to brew with THC, CBD, and terpenoids. Furthermore, we will discuss the results and conclusions from a tasting panel that involved a few BJCP-credentialed judges.

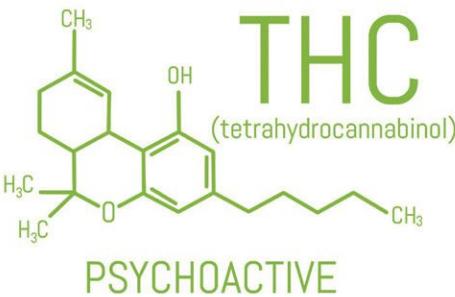
MARIJUANA VS. HEMP

The difference between marijuana and hemp is a matter of the quantities of the compounds the cannabis plants produce, rather than a variation in species. The line between hemp and marijuana is based on its concentration of tetrahydrocannabinol (THC): anything less than 0.3% THC is considered hemp, and anything above that number is considered marijuana.

Cannabis sativa is one of the oldest cultivated plants in the world and has been used by humans for its fibers and psychoactive properties for millennia. In that time, humans have created different cultivars for different purposes. Fibrous hemp is primarily grown for its industrial applications, which are numerous, including things like rope, textiles, and even biodegradable plastics.

The part of the cannabis plant grown for its psychotropic properties is actually the flower of a female cannabis plant. This is done by restricting the female plant's access to pollen from the male plant, thus encouraging the growth of large flowers brimming with resinous compounds. The dozen plus compounds the flowering plants produce are called cannabinoids and they include the two best known: tetrahydrocannabinol (THC) and cannabidiol (CBD).

THC is the cannabinoid that produces the psychoactive "high" users are familiar with, while CBD is non-psychoactive and instead used to relieve pain, reduce inflammation, and treat seizure disorders, sleep disturbance, anxiety, and more. Time will tell which benefits are real and which



“
THE DIFFERENCE
BETWEEN HEMP
AND MARIJUANA
IS THC CONTENT.
HEMP CAN BE
GROWN WITH HIGH
CONCENTRATIONS
OF CBD WITHOUT
VIOLATING
FEDERAL LAW.

are simply hype. Since the only difference between hemp and marijuana is the THC content, hemp can be grown from the cannabis plant with high concentrations of CBD without violating federal law. This has led to an explosion in hemp grown for its CBD content and concurrent growth in sales of CBD-containing products.

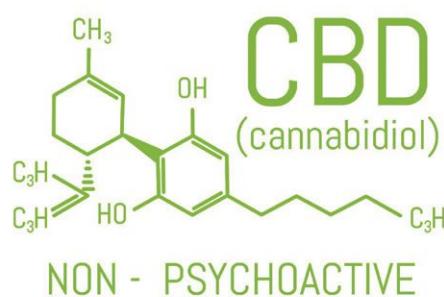
BREWING WITH TERPENES

In addition to cannabinoids, cannabis produces another group of organic compounds called terpenes, also known as terpenoids. Terpenes are present in many plants, including hops, and are responsible for giving them their distinctive aromas. The terpene pinene gives pine trees their piney smell, myrcene is responsible for the fruity clove-like notes in hops, and limonene gives oranges and other citrus fruits their characteristic scent.

Pinene, myrcene, and limonene, along with dozens of other terpenoids, are present in cannabis plants to varying degrees and are responsible for the distinctive aroma associated with the cannabis flower. There is also some scientific evidence that terpenes can have so-called "entourage effects" by which they interact with cannabinoids like THC to modulate the effects of those cannabinoids. Further research could show ways in which terpenes and cannabinoids could be combined to manifest specific and desirable effects.

We all know that hops control a beer's bitterness and impart important flavors to beer, but the addition of terpenoids is relatively unknown to the vast brewing community. Terpenes are naturally occurring in the marijuana flower, and they are extremely fragile and temperature sensitive. These volatile organic compounds quickly break down when exposed to heat. This is why different marijuana strains can smell distinctive in the container but taste identical when flame is applied.

What if one were to add extracted terpene oils to beer as a separate adjunct?



Unlike bitter orange peel, vanilla, coffee, and other adjuncts, extracted terpenes, available commercially, are oil based and generally water insoluble. Overcoming terpenes' sensitivity to heat and insolubility in water will be the challenge of brewers who want to introduce these aromatic compounds in beer.

Floraplex Terpenes, a terpene producer out of Michigan, publishes a PDF document on introducing terpenes to beer (link available at HomebrewersAssociation.org/ma20). Floraplex recommends adding terpenes after the cold side trub dump and using 95% food-grade ethanol as a solvent. Terpenes are potent and are recommended to be used at a 0.01% or 0.02% concentration, which equates to approximately 1.88 grams of terpenes per 5-gallon batch. The terpenes should be mixed with a solvent at a ratio of 1:5 or 1:9. At a concentration of 0.01% terpenes per barrel, and a solvent ratio of 1:9, this equates to 16.89 grams of solvent per batch. Other options for terpene infusion that do not require the addition of ethanol include tinctures made from water-soluble carrier oils like vegetable glycerin.

DECARBOXYLATION

As mentioned previously, cannabis produces THC and CBD, which humans use for their psychoactive and medicinal properties, but this is not the whole story. The primary compounds in the cannabis flower aren't THC or CBD, but rather THCa and CBDa. These are organic molecules which contain carboxyl groups. THCa and CBDa are not bioavailable to humans—they won't have any effect if ingested. This means that you could eat an ounce of cannabis flower and not experience very strong psychoactive effects. For the body to process THCa and CBDa, one must remove a carboxyl group of atoms using a process called decarboxylation, or “decarbing” for short.

In decarboxylation, a carboxyl group is broken off the molecule and replaced with a hydrogen molecule. When cannabis flower is smoked, heat rapidly decarbs the flower as one inhales, allowing it to be absorbed by the body. However, this is an incredibly inefficient method of decarboxylation that results in a significant loss of available THC. Applying too much heat for too long causes THC to break down into CBN (cannabinol), which is not psychoactive and can give you a sense of tiredness.

Applying controlled heat within a desired temperature range over a longer time period is far more efficient for converting THCa to THC via decarboxylation, similar to mashing grain to produce wort. There are charts available online that show conversion rates based on temperature and time: searching “THC decarboxylation chart” in your preferred search engine will typically yield successful results within the first few links.

When adding THC to beer, it's important to know how efficient your decarbing process is so you know how much THC you will consume per beer, just as you want to know the ABV. For example, in the state of Colorado, all legally sold marijuana products must label the potential percentage of THC and CBD (THCa and CBDa). If you know how effective your decarbing process is, you

can get a fairly accurate estimate of the total THC/CBD yield.

For example, if 3.5 grams (aka, an eighth) of purchased marijuana has a potential of 22% THCa, and your decarb process is 75% efficient, then you can expect approximately 575 milligrams of usable THC. For the new and modest marijuana user, a single dose of 10 mg will have you feeling the effects of THC. This would equate to approximately 58 individual dosages, meaning an eighth of marijuana would be more than enough to dose an entire 5-gallon batch of beer.

INFUSION TECHNIQUES

Marijuana compounds are fat soluble, which means they will not mix evenly with a water-soluble liquid such as beer. There are numerous ways to incorporate



Brew
This!

THC-Infused Caramel Amber Ale

Recipe courtesy Mark Rocheleau and Andrew Orr.

Batch volume: 5 US gal [18.93 L]
Original gravity: 1.055 (13.5°P)
Final gravity: 1.014 (3.5°P)

Color: 16 SRM
Bitterness: 46 IBU
Alcohol: 5.4% by volume

MALTS

5 lb. [2.27 kg] Briess CBW Golden Light DME
1.75 lb. [794 g] Crystal 60

5 oz. [142 g] Special B malt
1 oz. [28 g] chocolate malt

HOPS

1 oz. [28 g] Cascade @ 60 min
0.75 oz. [21 g] Cascade @ 45 min

0.5 oz. [14 g] Centennial @ 15 min

ADDITIONAL ITEMS

4 oz. [113 g] corn sugar to bottle condition
25 packets Stillwater Brands THC Ripple

YEAST

Imperial Yeast A07 Flagship or White Labs WLP001 California Ale

BREWING NOTES

Steep specialty grains in a large muslin bag in 1.25 gal. (4.7 L) at 154°F (68°C) for 30 minutes. Strain water from muslin bag. Add 3 gal. (11.4 L) of water to boil kettle. Mix in extracts and boil 60 minutes, adding hops as indicated. Chill wort to room temperature and ferment for 2–3 weeks.

On bottling day, boil corn sugar in a small amount of water for 15 minutes and cool before adding to bottling bucket. For 5 mg of THC per bottle, add 25 packets of THC Ripple to bottling bucket and stir until powder is dissolved. Revise ratio of dissolvable THC to alter THC concentration. Another option is to add a packet, or portion of packet, to poured beer to keep some bottles untreated.



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THC-Infused Tripel Royal Stag

Recipe courtesy Mark Rocheleau and Andrew Orr.

Batch volume:	5.5 US gal. (20.8 L)
Original gravity:	1.074 (18°P)
Final gravity:	1.010 (2.6°P)
Efficiency:	63%
Color:	6.5 SRM
Bitterness:	33 IBU
Alcohol:	8.6% by volume

MALTS

13 lb.	(5.9 kg) Belgian Pilsner malt
2 lb.	(907 g) rye malt
1.5 lb.	(680 g) Carapils malt
11 oz.	(312 g) aromatic malt

HOPS

3 oz.	(85 g) Styrian Goldings @ 45 min
1 oz.	(28 g) Saaz @ 5 min

ADDITIONAL ITEMS

1 lb.	(454 g) Candi Syrup Simplicity @ 15 min
-------	---

THC tincture [see main text for details on preparation]

YEAST

Imperial Yeast B48 Triple Double

BREWING NOTES

Mash at 147°F (64°C) for 60 minutes. Lauter, sparge, and collect wort. Boil for 60 minutes, following hop and boil addition schedule above. Chill to 67°F (19°C), oxygenate, and underpitch yeast with approximately 250 billion cells. Ferment at 67°F (19°C) for three days, then raise temperature to 75°F (24°C) over 11 days. Rack to secondary and hold at room temperature for 7 days.

Carbonating in a keg and then bottling from the keg lets you dose bottles individually. Infuse bottles with THC tincture and dropper. Placing the tincture in a warm bath improves viscosity and solubility. A slight swirl to a capped bottle helps disperse infused THC tincture before serving.

marijuana into your liquid, but they are not equal in their results. The first and easiest method to add marijuana to beer would be to add the raw marijuana flower directly to the boil during the brewing process. This process uses the heat of the boil to decarb the flower, and although it may convert THCa to THC, boiling also breaks down the flower to impart appreciable and unwanted vegetal off-flavors.

If the extreme heat of the boil and direct contact with water rapidly breaks down the flower, the next better option is to decarb your flower in a temperature-controlled oven. An ideal oven temperature of 165°F (74°C) for one hour is believed to convert the potential THC, preserve some of the fragile terpenes, and kill pesky microbes, allowing one to add this flower as a cold-side addition (e.g. dry hopping) for a week. This process sounds easy and ideal, but such a passive addition limits extraction of fat-soluble THC and terpenes from the flower. It also means this process is terribly inefficient, and it is nearly impossible to determine how many milligrams of THC one may be adding to their beer.

For the sake of argument, let's pretend for a moment that these oils were water soluble, and you wanted to proceed with marijuana flower dry hopping. Beer is normally dry-hopped with an ounce or more of hops in secondary. Most marijuana purchases range from 1 gram to 7 grams and can cost anywhere from \$7 to \$100, respectively. Extrapolating that purchase to 1 ounce (28 grams), it could cost anywhere from \$100 to \$400, making dry hopping a very expensive method for extracting an unknown amount of THC, especially when a comparable amount of hops costs \$2 to \$4 per ounce.

Some may suggest using marijuana concentrates, but this method still produces a non-water soluble product and is extremely dangerous to produce if you don't have proper ventilation. One extraction techniques that is lesser known, but is somewhat similar to adding concentrates, is the use of a tincture. Tinctures use solvents such as ethanol, carrier oils such as animal fats (butter), or vegetable-based oils such as vegetable glycerine for extraction.

A common and easy technique to make a tincture is to break up your flower, add it to a mason jar with a high-proof alcohol (such as 95% ethanol), and set it in the freezer for five days before straining the mixture through cheesecloth to remove the spent flower. The downside to alcohol-based tinctures is that they can impart

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a grass-like flavor to the liquid, which would then be carried over into your beer.

As noted, tinctures can also be made with a carrier oil such as vegetable glycerin. High-proof alcohol generally extracts THC and CBD better than glycerin, but tinctures have the benefit of being soluble in liquid. Vegetable glycerin can also be dosed sublingually for fast-acting effects and won't contain the harsh alcohol taste. For the homebrewer, testing sublingually can be a useful and practical way to understand the dosages added to your beer. Test sublingually with a small amount of THC/CBD, gauge its effects, and very gradually increase the dose on future occasions to understand how it will affect you.

Furthermore, vegetable glycerin tinctures are a good way of infusing beer with THC/CBD, as vegetable glycerin is water soluble and has a mild, slightly sweet flavor that won't adversely affect the taste of your beer and can be counteracted with hops. The downside to using vegetable glycerin over other methods is that vegetable glycerin isn't an efficient carrier oil, so you will need to use more cannabis than if you were using an ethanol-based tincture.

To make a vegetable glycerin tincture, the first step is to decarboxylate the flower following the steps previously provided. Second you need to extract the THC/CBD from the flower into the vegetable glycerin. The extraction technique is somewhat complicated but shouldn't pose a problem for an individual used to the complexities of the homebrewing process. The extraction process uses a double boiler to control the temperature. Temperature control is important because if it is too hot, the decarboxylated THC will further break down into cannabidiol (CBN), which is not psychoactive and, when combined with the remaining THC, can act as a sedative. If the temperature is too cool, then the THC will not become molten and will not extract from the flower, leaving you with a weak tincture.

For the double-boiler method you will need a saucepan, a smaller heat-safe container that will nest inside the pan (a small Pyrex dish works well), two candy or meat thermometers, and a stove or hot plate, preferably with precise temperature control. You will also need cooking oil, vegetable glycerin, and your cannabis flower. Finely grind the flower into the Pyrex dish and cover it completely with vegetable glycerin.

Pour cooking oil into the saucepan and place the pyrex dish with the vegetable glycerin into the saucepan. Add cooking oil to the saucepan until it equals the level of the vegetable glycerin in the Pyrex dish.

Place a thermometer in the saucepan to measure the temperature of the cooking oil, and another in the Pyrex dish to measure the temperature of the vegetable glycerin. Heat the oil in the saucepan up to approximately 220°F (104°C)—this should raise the temperature of the vegetable glycerin to 180°F (82°C).

You want the vegetable glycerin to remain at 180°F (82°C) for about 45 minutes. This is hot enough to melt the THC crystals in the flower without breaking it down further. After 45 minutes at that temperature, remove the Pyrex dish from the saucepan and strain your tincture through several layers of cheesecloth into your tincture container. Squeeze the flower in the cheesecloth to get as much vegetable glycerin out as possible.

Return the flower to the Pyrex dish and repeat the process with fresh vegetable glycerin up to twice more to maximize THC extraction. You will be left with a tincture that is water soluble and easy to add to any liquid, including beer! Test out different dosages of your tincture sublingually to determine effects so you don't accidentally add too much or too little to your beer.

SENSORY TESTING OF DIFFERENT INFUSION METHODS

We wanted to see how various methods of infusing THC, CBD, and terpenes into homebrew would change the flavor profile, so we assembled a tasting panel of local BJCP-certified judges to evaluate a few options. We brewed a Belgian-style tripel as a base beer, which we dosed with THC and CBD in bottles for adjunct sensory comparisons. We gave judges one clean beer (no infusions) as a control, plus two separate THC/CBD-infused bottles for evaluation.

Having tried various infusion methods over time, we had determined which methods added favorable flavors to beer, which methods had the best psychotropic effects, and which methods may turn people away. For this tasting, we discarded such methods as boiling the flower, dry hopping, and adding ethanol tinctures in favor of using (1) a vegetable glycerin tincture and (2) a water-soluble dissolvable THC/CBD powder.

All bottles were filled from the same keg using the Blichmann BeerGun. The clean beer contained no extra additions. The first beer infused with THC/CBD used a water-soluble dissolvable powdered product called Ripple, produced by Stillwater Brands. Ripple is generally flavorless and comes in packets with three variations: THC 10 mg, THC 0.5 mg + CBD 10 mg,

and THC 5 mg + CBD 5 mg. For reference, a box containing 10 packets costs just over \$20 per box. This first infused sample, which we called "Ripple beer," was dosed to contain 5 mg THC and 5 mg CBD per 12-ounce bottle.

The second beer infused with THC/CBD used the vegetable glycerin tincture method. We extracted THC from the cannabis strain LA Confidential into the vegetable glycerin and then added in CBD distillate (pure CBD crystals) and a few drops of terpenes. This tincture dosed each 12-ounce bottle with approximately 10 mg THC and 10 mg CBD. LA Confidential is a strain with caryophyllene (peppery), limonene (citrus), and myrcene (herbal). The terpenes added were a blend called "Lemon Diesel" from Floraplex Terpenes mentioned earlier. Lemon Diesel is a cannabis strain whose primary terpene profile includes caryophyllene (peppery), pinene (pine), and myrcene (herbal).

The panel judged each of these variations against BJCP guidelines for beer style accuracy and also determined what flavors, or any off-flavors, may be detected. The tasting panel tasted these three beers in flight and followed the BJCP judging guidelines using four judges. For this tasting experiment, evaluations focused on the differences, specifically appearance, mouthfeel, aroma, taste, and overall perception. Judges tasted blind, with no knowledge of which beer was the control and which two had been dosed with cannabinoids and terpenes. Since each sample had been bottled using the same beer, and two beers had separate additions, the goal was to try and determine how each infusion method affected the beer.

Using the clean beer as a base beer to generate differences, the tasting panel found the beer to be within style, having a higher alcoholic flavor and a low plastic flavor as flaws. The Ripple beer scored a couple of points better than the clean beer, with judges still perceiving the low plastic flavor and a couple of judges picking up a subtle smoke flavor.

Judges' scores and perceptions differed most with the glycerin beer, however it still scored similarly to the clean beer. Testers stated that the glycerin beer had noticeable Band-Aid, plastic, and medicinal flavors and noted that it differed from the other two in mouthfeel, flavor, and appearance. Since the glycerin method uses a viscous glycerin and extracts THC/CBD compounds from flavor, it is no surprise that this infusion method would slightly darken the beer a brownish-green, reduce head retention, and add a creamy mouthfeel.

The flavor results were unexpected, as tasters who sampled the beer shortly after bottling received it positively. Tasters noted that the beer had a slight sweetness, but a well-balanced flavor that ultimately left them craving the next taste.

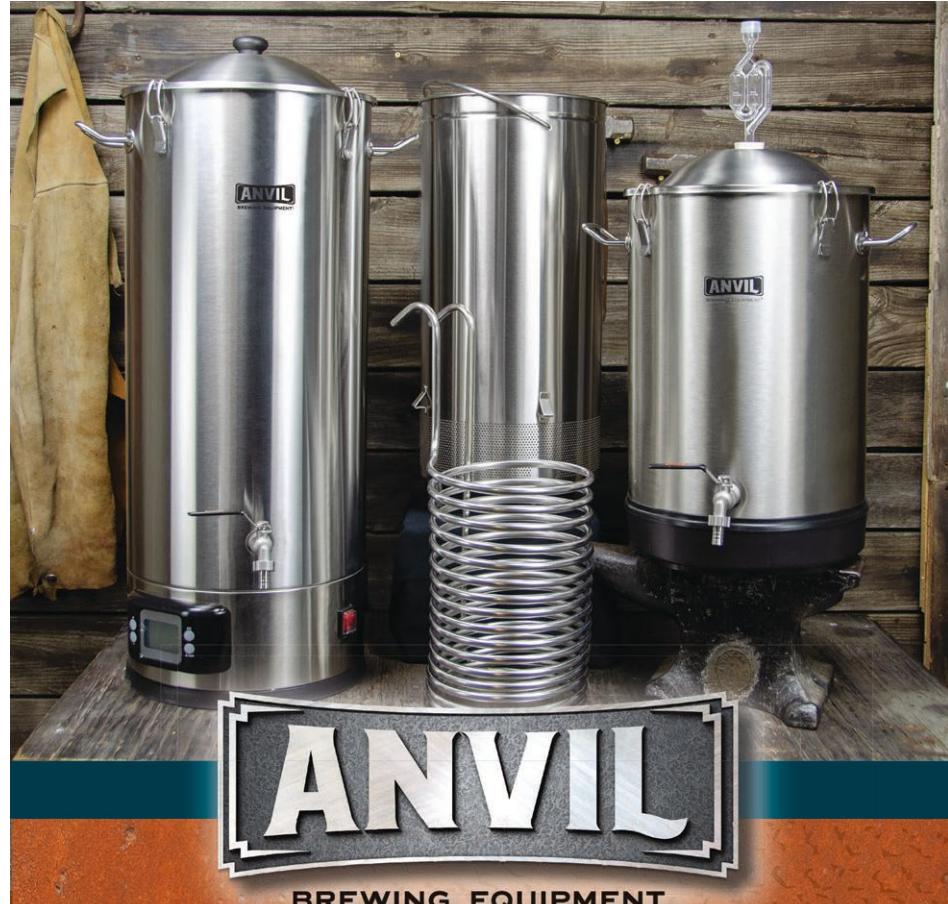
In addition to the BJCP tasting panel, other tasters who consumed an entire 12-ounce bottle on their own said it left them with a strong body high and a noticeable but not overpowering head high for anywhere from 4 to 6 hours after consumption.

With the differing results from the official tasting panel, it should be noted that this tasting experiment happened approximately 6 months after the beers were bottled. This leads us to believe that, over time, the glycerin infusion method either interacts with or breaks down in the beer, creating off flavors such as Band-Aid, plastic, and medicinal flavors. Seeing these results, one clear conclusion is that your infused beer should be consumed in a timely fashion. Readers might consider adding these infusions to their next IPA, American pale ale, or other hop-forward beer, which should be consumed fresh anyway.

The Ripple beer had no clear differences from the control besides the subtle smokiness, but these results were expected, since the Ripple product used is clear and flavorless. As Ripple is easy to use and add to any beverage of your choosing, the only disadvantage is that Ripple is expensive compared to the cost of infusing with glycerin at home.

If you intend to try these methods on your own, plan to do so in a safe manner, and in a state that has legalized marijuana use. In the end, the sample size for the tasting panel was small, and the beer dosed using glycerin contained THC, CBD, glycerin, and terpenes in combination, which prevented isolating how terpenes alone affected the beer. Future testing might include infusing the same beer style with various terpene compound strains, or infusing various beer styles using a single terpene compound strain.

Mark Rocheleau is an award-winning homebrewer and recent participant in the 2019 GABF Pro-Am competition, in which he partnered with Adamant Brewing and Blending out of Boulder, Colo. Andrew Orr works for Native Roots Cannabis Co. in their original Boulder grow facility, where he strives to create the highest-quality medical and recreational marijuana on the market.



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Homebrewing in South Korea

By Jared Hatch

One of the best-kept secrets in homebrewing is the booming scene that is occurring in South Korea. The country's geographic isolation, the singularity of its language, and the illegality of homebrewing in neighboring Japan have left South Korea's vibrant and growing population of homebrewers underappreciated. But that is changing.

The secret sauce that led to this boom was the result of a market saturated with low-flavor, mass-produced lagers; a society that values the importance of culture and cultural trends; and an economically growing population that has experienced craft beer on work trips around the world and through foreign expatriates who have brought their homebrewing culture to Korea.

The two major producers of beer, known as *maekju*, in South Korea are Hite-Jinro and the Oriental Brewery (OB, which was acquired by Anheuser-Busch InBev in 1998), whose products dominate the local market. These domestic lagers are often mixed with *soju*, a vodka-like drink, in an attempt to improve the flavor of both drinks, and the process of mixing these together often entails a level of pageantry and showmanship that is itself part of the entertainment of an evening's meal.

Historical and Cultural Background of Alcohol in Korea

Koreans love to drink. It plays an important role in business situations and promotes social bonding necessary for a country in which people are expected to work very long hours. Consequently, beer is a staple in almost every restaurant and plays a central role in Korean culture. The Korean government actively promotes this culture

around the

globe to open doors of economic growth for their other exports; thus, Koreans are hyper-aware of what is in vogue globally and work hard to keep up with these changes.

Craft beer is an important global phenomenon, and although the early adopters of homebrewing in South Korea were part of a very small subculture, it is now a healthy, growing community. Homebrewers and craft brewers in Korea are constantly seeking to keep up with American craft beer trends—it only took a few months from the point when brut IPA started gaining attention before homebrewed and craft versions of that style started appearing in South Korea.

Korea's alcohol laws have historically been quite restrictive—imported beer was illegal until 1984—but easing of these laws has awakened curious consumers to a wider range of flavors in beer. Homebrewing was legalized in 1995 but failed to gain any traction until 2002 when the alcohol production laws were loosened to allow microbreweries; this resulted in the opening of many German-inspired craft brewpubs. The increased awareness of craft beer during this time led to the formation of the Korean Homebrewers Society, known in Korea as the *Maekmandong*. They established the country's longest-running competition, which held its 17th annual national competition in March 2019.

Finding quality ingredients and reliable brewing information posed a significant hurdle to Korean homebrewers. The lack of institutional knowledge and the need to translate information into Korean made the homebrewing scene a true labor of love for the hobbyists who were willing to spend the time, money, and effort to brew beers that they were passionate about and proud of. Just as in America, the homebrewing community was grown by evangelists who shared their love of homebrewing with others.

Joey Baek, considered the Charlie Papazian of South Korea, first learned about homebrewing in 2004 when a brewpub opened near his home. This led him to learn about homebrewing, which grew into a love affair with making beer. Baek was responsible for translating the BJCP guidelines into Korean, as well as for mentoring many of the young home brewers in Korea who have now become professionals across the country.

A Culture of Community

Korea is home to a large population of foreigners who come from English-speaking countries. The US military maintains several bases in South Korea, and Korean elementary schools and English academies hire many native English speakers to help improve their children's English-language skills.

For many of these expats, finding a fresh pint of IPA was nigh on impossible, which led them to take up homebrewing. The foreigner homebrewing community grew up in parallel with the Korean homebrewing community, but the two groups had only limited crossover.

Over the past five years though, expat and Korean homebrewers have started coming together more and more.

Foreigners' familiarity with homebrewing, paired with an ability to quickly read and comprehend English texts, has allowed them to help improve the quality of homebrew of new Korean



Members of the Foreign Homebrewers club and the Korean Homebrewers Society celebrate together at their annual River Festival.

Korean homebrewers judge beers fermented with a yeast selected from native peaches.

brewers, while locals offer invaluable advice on finding brewing equipment, working with native ingredients, and understanding the local laws.

Much of the cultural mixing that does occur happens at local homebrew shops, which often double as brew-on-premises locations. Korea is a mountainous country whose population is heavily concentrated in large cities. The Seoul Capital Area, home to 25 million, is the fifth-largest metropolitan area in the world and has a population density twice that of New York City. Real estate is at a premium, so having a large area dedicated to brewing equipment in apartments is a true luxury.

The solution is communal brewing spaces where groups of friends pay for the ability to brew on shared equipment at a cost of around 45 dollars per batch, ingredients not included. These brew-on-premises locations also often house the equipment and ingredients needed to brew various wines, including traditional Korean rice wines such as *makgeolli* (see Beer School in the May/June 2019 issue of *Zymurgy*). These locations are hubs where foreigners and Koreans cross paths and share their knowledge of a common passion with one another.

Korea is a collectivist culture where working in groups is preferred to working individually. It is common for a group of several friends to rent a brewing space for a day to brew a batch of beer together and then split their beer up at bottling time. Beer is commonly bottled in 1-liter PET bottles: an unwieldy amount to drink that becomes more manageable when shared among friends. Living in Korea has expanded my perspective on the importance of community to homebrewing.

I arrived in Korea in 2011 and, after verifying that homebrewing was legal, I soon found a few other foreigners who made beer in their apartments. These new friends helped me find the equipment



Brew This!



Toto Stout

Milk Stout

Recipe courtesy Seung Yob Nah.

This recipe was provided by the winner of the Daegu Stout Smackdown in 2019. Seung Yob was the first two time best-of-show champion of this competition, and his recipe was brewed at the Daedo Brewing Company and released in November 2019. It's a classic take on the sweet stout style.

Batch volume:	5.5 U.S. gallons [21 L]
Original gravity:	1.056 [13.8° P]
Final gravity:	1.024 [6.1° P]
Bitterness:	31 IBU
Color:	50 SRM
Alcohol:	4.2% by volume
Efficiency:	66%

MALTS

7 lb.	[3.18 kg] pale malt
1.37 lb.	[620 g] rolled oats
1 lb.	[454 g] Munich 10° L malt
1 lb.	[454 g] roasted barley 600° L
12 oz.	[340 g] crystal malt 60° L
12 oz.	[340 g] chocolate malt

HOPS

0.5 oz.	[14 g] Bravo @ 60 min
1 oz.	[28 g] East Kent Goldings @ 10 min

ADDITIONAL ITEMS

1 lb.	[454 g] lactose @ 10 min
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YEAST

1 sachet	Fermentis SafAle US-05
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BREWING NOTES

Mash at 156°F [69°C] for 60 minutes. Aim for a mash pH of 5.5 (use CaCl₂ if needed to adjust pH.) Sparge to collect 7.4 gal. [28 L] of wort.

PARTIAL MASH

Reduce pale malt to 1 lb. [454 g] and mash with other grains at 156°F [69°C] for 45 minutes. Rinse grains and sparge with 175°F [79°C] RO water. Dissolve in 4 lb. [1.81 kg] pale malt extract syrup and proceed as above.

Brew
This!



Kumquat Citra Sour

Recipe courtesy Jared Hatch.

Variations of this recipe have won the Korean National Homebrewing Championship two times. The citrus flavors produced from the frozen kumquats pair beautifully with the Citra hops. I like to use Cryo Hops when dry hopping to reduce absorption losses since every ounce counts in this beer. I do a clean primary fermentation before racking to secondary, where I add the Roeselare culture. Once the gravity is stable and the beer has the desired Brett aromatics and sourness, I rack this beer onto the kumquats and allow the yeast to ferment the fruit sugars before dry hopping and bottling.

Batch volume: 5.5 U.S. gallons [20.8 L]

Original gravity: 1.059 [14.5° P]

Final gravity: 1.010 [2.5° P]

Bitterness: 20 IBU

Color: 5 SRM

Alcohol: 6.5% by volume

Efficiency: 64%

MALTS

10 lb. (4.54 kg) Weyermann pale malt

2.6 lb. (1.20 kg) flaked oats

1 lb. (454 g) flaked wheat

HOPS

0.5 oz. (15 g) Magnum, 12% a.a. @ 60 min

3.2 oz. (90 g) Citra Cryo Hops, 25% a.a.,
dry hop 5 days

2.1 oz. (60 g) Citra, 12% a.a., dry hop 5 days

1.1 oz. (30 g) Loral Cryo Hops, 19.5% a.a.,
dry hop 5 days

YEAST

1 sachet Fermentis SafAle S-04

1 pack Wyeast 3767 Roeselare Belgian Blend

ADDITIONAL ITEMS

11 lb. (5 kg) kumquats, washed, sliced in half,
frozen, and thawed

BREWING NOTES

Mash at 154°F (68°C) for 60 minutes and batch or fly sparge to collect 7.4 gal. (28 L) of wort. Boil 60 minutes, adding hops as indicated. Chill wort to 68°F (20°C) and pitch S-04. Ferment at 68°F (20°C) until the specific gravity is stable, then transfer to a clean, sanitized carboy, preferably glass to reduce oxidation. Pitch Roeselare culture and allow beer to age 6–12 months until specific gravity stabilizes (measure the gravity once a month to monitor progress). Add kumquats to a sanitized tertiary fermentation vessel, rack beer on top of the fruit, and allow to ferment until the specific gravity falls to what it was before adding the fruit. Add the dry hops 5 days before kegging or bottling.

PARTIAL MASH

Reduce pale malt to 3 lb. (1.36 kg) and mash with wheat and oats at 154°F (68°C) for 45 minutes. Rinse grains and sparge with 175°F (79°C) reverse osmosis water. Dissolve 4.5 lb. (2.04 kg) pale malt extract syrup in the resulting wort and proceed as above.

Washington, D.C., with the exception of the summer monsoon season. One effect of this is that fruits found in South Korea are similar to those in America, with a few notable exceptions.

The diversity of citrus fruits found in South Korea is the best part of the winter season. The unique flavors of yuja (also known as yuzu), kyul (similar to mandarin orange), hallabong (featuring a distinctive dome-shaped protrusion), and kumquats have all found their way into many different beer styles. My favorite is to use kumquats in aged wild ales, a combination with which I have twice won the Korean National Homebrewing Championship.

Herbs and spices play an important role in Korean traditional medicine, known as *hanuihak*. Many of the items used as herbal remedies are commonly found in the kitchen, including ginger, cinnamon, and honey. Adventurous homebrewers walk the tightrope by adding more exotic medicinal ingredients such as ginseng, jujubees, and omi berries (tart, slightly astringent berries used in tea). Added judiciously, some of these ingredients can contribute a pleasant depth of flavor; overdone, they can bring up strong memories of being forced by a parent to take traditional medicine.

Korean cuisine revolves around rice. Until recently, Korean homebrewers avoided brewing with rice due to its associations with the macro lagers that dominate the market. However, the brut IPA trend paired with Korea's abundance of rice has made homebrewers and professionals rethink how rice can be integrated into delicious craft beers.

Not every Korean enjoys spicy food, but it is difficult to find a restaurant in Korea that does not serve a dish featuring some form of the Korean pepper known as *gochu*. These peppers vary in heat level but work well both in dark and light beer styles to add a little spiciness.





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“
The final frontier for many homebrewers in Korea is using the native microflora to produce ales similar to those found in Belgium.

The final frontier for many homebrewers in Korea is using the native microflora to produce ales similar to those found in Belgium. Sour-beer makers represent a small but rapidly growing portion of the homebrewing community in South Korea. The most iconic South Korean craft beer is actually a dry-hopped sour ale called Surleim, which was the brainchild of a Korean homebrewer who helped to popularize sour beer across the country. Brewers have also started experimenting with *nuruk*, the dried flakes of wild yeast and bacteria used in *makgeolli* production, to kettle-sour wort for gose and Berliner weisse.

Homebrewers in America left their day jobs to jumpstart the craft beer boom, and the same is happening in Korea. Like many homebrewers I have known over the past eight years who have joined or started their own breweries, I will be helping to open a brewpub in my city of Daegu in the coming year. I am confident that as more



Local homebrewer Seung-Yob Nah celebrates his second best-of-show victory at the Daegu Stout Smackdown.



Frozen and thawed kumquats being prepped for adding to a mixed-fermentation golden ale.



Local homebrewer Bum-Ho Kim celebrates his best-of-show victory at the 2016 Daegu Stout Smackdown.

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—RANDY MOSHER, AUTHOR OF
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Hallabong, a citrus fruit featuring a distinctive dome-shaped protrusion, has found its way into homebrewers' ingredient toolkit.

homebrewers join the growing number of breweries in South Korea, plenty of new enthusiasts will take their place and keep the homebrewing spirit alive.

Jared Hatch is a brewer, a writer for the Beer Post magazine in South Korea, and a National-ranked BJCP judge. He lives in Daegu, South Korea, with his family and is always looking for the next exotic ingredient to put into his beer.

Members of the Korean Homebrewers Society Tigger and Lee Hyoung educate the public at a local beer festival.



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Double White IPA

Recipe courtesy Jared Hatch.

I designed this IPA to make use of some of the citrus fruits native to Korea. I am an avid cook, so I like applying things I learn from the culinary world to brewing. To extract the citrus flavors from the fruit without adding unwanted astringency and vegetal matter, I peeled 20 green tangerines from Jeju (an island off the south coast of Korea), put them in a zip-top bag with dextrose, and removed the air to keep the peels in close contact with the sugar to produce an "oleo-saccharum." The peels dissolve the sugar and lend their essential oils in the process to yield a syrup that can be added to the boil kettle at knockout.

You may be able to find yuja or yuzu oranges at your local Asian market. Feel free to use more than is specified in the recipe.

Batch volume: 5.5 U.S. gallons [20.8 L]

Original gravity: 1.072 [17.5° P]

Final gravity: 1.012 [3° P]

Bitterness: 53 IBU

Color: 4 SRM

Alcohol: 8% by volume

Efficiency: 67%

MALTS

6.6 lb. (3 kg) Weyermann Pilsner malt

3.3 lb. (1.5 kg) flaked soft red wheat

3.3 lb. (1.5 kg) wheat malt

HOPS

0.4 oz. (10 g) Warrior, 15% a.a. @ 60 min

1.4 oz. (40 g) Centennial, 10% a.a. @ 10 min

1 oz. (28 g) Amarillo, 9.2% a.a. @ 10 min

0.5 oz. (14 g) Citra Cryo Hops, 25% a.a.
@ 10 min

1.4 oz. (40 g) Centennial, 10% a.a.,

dry hop on day 2 of fermentation

1 oz. (28 g) Amarillo, 9.2% a.a., dry hop 4 days

0.5 oz. (14 g) Citra Cryo Hops, 25% a.a.,
dry hop 4 days

ADDITIONAL ITEMS

0.4 oz. (10 g) coriander, lightly toasted
and cracked @ 0 min

1.15 lb. (520 g) dextrose, @ 0 min

10.5 oz. (300 g) washed orange zest
for oleo-saccharum

5.3 oz. (150 g) dextrose for oleo-saccharum

YEAST

2 sachets Fermentis SafBrew S-33

BREWING NOTES

Twelve to 24 hours before brew day, prepare the oleo-saccharum by mixing 150 g (5.3 oz) dextrose with the orange zest in a zip-top bag. Push as much air out of the bag as possible before sealing.

Mash at 121°F (49°C) for 15 minutes and then add enough hot water to raise the mash temperature to 146°F (63°C). Hold mash at that temperature for 60 minutes and sparge to collect 7.4 gal. (28 L) of wort. Boil 60 minutes, adding hops as indicated. Add the oleo-saccharum at knockout, chill wort to 66°F (19°C), and pitch yeast.

Ferment at 66°F (19°C), adding 1.4 oz. (40 g) Centennial two days into fermentation. When specific gravity has stabilized and fermentation is complete, dry hop for 4 days before kegging or bottling with 3 vol. (6 g/L) of CO₂.

PARTIAL MASH

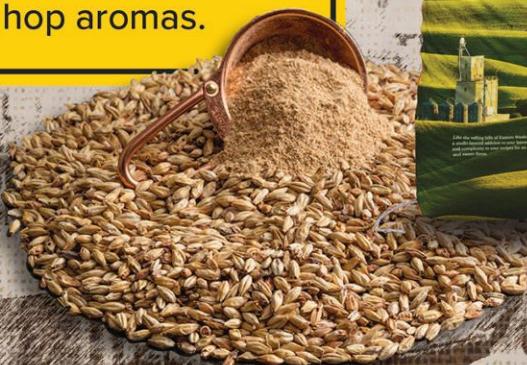
Substitute 4.5 lb. (2.04 g) liquid Pilsner malt extract for Pilsner malt. Mash wheat malt with flaked wheat at 152°F (67°C) for 45 minutes. Rinse grains and sparge with 175°F (79°C) reverse osmosis water. Dissolve extract syrup in the resulting wort and proceed as above.

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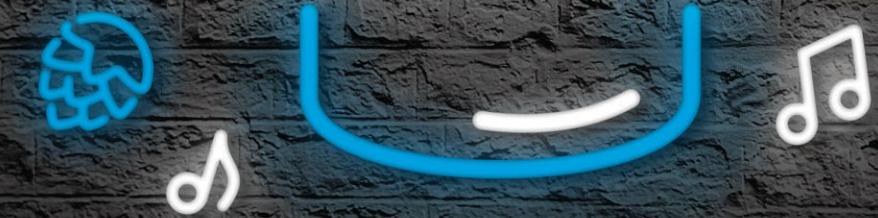
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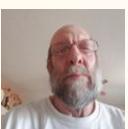
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Michigan Mead Cup

2019



By Amahl Turczyn

In spring of 2018, a small group of Detroit-area homebrewers from the Motor City Mashers lamented the general lack of beer, cider, and mead competitions in Michigan. The original professional and amateur Michigan Mead Cup, sponsored by the Michigan Honey Festival from 2012 to 2016, had been discontinued. The Michigan Beer Cup, which included cider and mead categories, and the Great Lakes International Cider and Perry Competition (GLINTCAP) remained, but the state no longer had a mead-only competition.

"Our state has about 25 meaderies (or wineries/breweries that make mead),

almost half of them within 60 miles of downtown Detroit," says Gail Milburn, a founding member of the Motor City Mashers. "It's also home to a number of award-winning amateur meadmakers, yet we had no mead-only competition."

Seeing an opportunity, the club rolled up their collective sleeves. With the help of members of other area clubs and the Motor City Mashers' own highly ranked BJCP beer and mead judges, the Michigan Mead Cup was reborn in 2018.

Milburn, who organizes the revived competition, is a retired behavior specialist and school social worker who has brewed



Amy Olsen, Michigan-only Best of Show.

professionally in southeast Michigan. She is a lifetime AHA member, a BJCP Grand Master judge, Mead judge, BJCP assistant North region representative, and an assistant exam director.

The club set the bar high for what they wanted out of the relaunched event. "For 2018 and 2019, our goals were to run a BJCP- and AHA-sanctioned competition in which every judge pair in every flight contained at least one Mead judge, along with



Left to Right: Susan Rankert, Gail Milburn, Annie Zipser, and Sandy Cockerham. Recyclables from the competition: office paper, rinsed plastic cups, cardboard.

either a BJCP Certified or higher judge, or a professional meadmaker,” Milburn explained. “We aimed to provide high-quality, complete judging feedback to entrants. We would also run the event in a way that was as environmentally friendly as possible.

“The result was only one half-full garbage bag headed for a landfill in 2018. Although our 2019 judge venue did not have community recycling available, we still recycled all of our cardboard and rinsed plastic cups by bringing all of those items home to place in our own residential recycling bins. All of the paper used would be reused on the unprinted side before also recycling at home. Scoresheets would be scanned and immediately available electronically to entrants by the end of the judging day.”

The organizers also made sure participants went home happy. “In addition to wonderful homebrew-centric gifts procured in 2018, for 2019 we reached out to meaderies, honey farms and manufacturers, yeast manufacturers, and other mead-centric businesses to sponsor our judge, steward, and category prizes,” she continued. “Each judge and steward was given a bag of swag and also won a raffle prize; no small feat considering we had 24 judges and the same number of stewards and volunteers. We are very thankful to the generosity of our many sponsors.”

Organizers also wanted to pay homage to their great home state with a special competition category. “We showcased Michigan in the Michigan Mead Cup by having a Michigan-only mead category that could include only Michigan meadmakers who

“
We
showcased
Michigan
by having a
Michigan-
only mead
category.

used all Michigan ingredients in their meads’ entries,” she notes. (Exceptions were made for yeast, nutrient, and oak products.)

The most recent Michigan Mead Cup, held on October 19, 2019, was again presented by the Motor City Mashers and was held at Kuhnhenn Brewery in Clinton



Best-of-show panel: Brian Joas, Sandy Cockerham, and Mike Winnie.

Township, a northeast suburb of Detroit. The event saw 157 entries and 115 registered participants, judges, and stewards. With meads entered from across the United States, it represented the last leg of the highly competitive Meadmaker of the Year circuit of the American Mead Makers Association, as it had been in 2018.

“Also expanding on the success of the previous year, the formal organizing committee became a unique and mostly female endeavor of members primarily from the Motor City Mashers (MCM), but also from the Ann Arbor Brewers Guild (AABG). All are long-time AHA members,” she went on.

Alongside Milburn, the organizing committee included a number of talented individuals.

- **Annie Zipser**—a highly regarded meadmaker, BJCP Certified and Mead judge, advisory committee member of the American Mead Makers Association, and member of MCM and AABG—spearheaded the effort to procure mead-centric swag and gifts.
- **Sandy Cockerham**—a BJCP Grand Master VI, Mead judge, Zymurgy Commercial Calibration contributor, and AHA Governing Committee member—led the judge pairing effort.
- **Susan Rankert**—a highly experienced head steward and AABG member—headed up the recycling effort;
- **Ray Bilyk**—an MCM member and highly regarded homebrewer who is experienced in the software and hardware necessary to run a competition—worked hard to scan every

scoresheet before the awards ceremony held at the conclusion of judging.

On the day of the competition, the organizing committee provided small flights of five to eight meads each. They held three sessions, which offered judges the maximum 1.5 BJCP judge points and were pleased to host judges and stewards from Arizona, Illinois, Indiana, Michigan, Ohio, and Wisconsin.

Milburn commented, "In addition to being a sponsor, the American Homebrewers Association was well represented: Governing Committee members Jeff Rankert, Carvin Wilson, and Sandy Cockerham all served as judges. Our best-of-show judges included Sandy, Grand Master BJCP mead judge Mike Winnie, and Grand Master VI mead judge Brian Joas, as well as a BJCP North regional representative."

Competition prizes captured the spirit of Michigan meadmaking. Milburn explains, "The grand prize for competition best of show was a 5-gallon bucket of Dutch Gold honey and a framed photo of a bee on a flower taken by a talented member of the Ann Arbor Brewers Guild, Laura Higle. The gold-medal winner of the special Michigan-only category took home 6 pounds of Windmill Hill Farm honey from Croswell, Mich., and a \$50 gift certificate from B. Nektar Meadery in Ferndale, Mich."

The 2020 Michigan Mead Cup will be held on October 17 in southwest Michigan. Entry and shipping dates will be posted on the club's webpage, as well as on their Facebook page. Milburn will remain at the helm.

"We are already looking forward to, and planning for, an even better competition moving forward. In addition to many compliments from judges, stewards, and entrants, one of the most rewarding bits of feedback came from one of the most highly respected meadmakers in the country, who entered the Michigan Mead Cup 2019 and took home at least one medal. That luminary noted, 'I got a little lucky. I underestimated the quality of mead that would be there. I'm very lucky to have medaled with what I sent, as the caliber of mead was way above par.' That comment was all we needed to fully jumpstart our preparations for 2020!"

The brewing duo of Jeremy Goehring and Dustin Deisher of the Lincoln Lagers homebrew club took top honors for their best-of-show mead, Mr. Anderson's El Hefe's El Pogo, a guava, mandarin orange, and prickly pear session-strength melomel, or fruit mead.



Mr. Anderson's El Hefe's El Pogo

BJCP Category M2E: Melomel

Recipe courtesy Jeremy Goehring and Dustin Deisher, Lincoln Lagers, 2019 Michigan Mead Cup best of show.

This is an ode to our former club president Jeff Anderson, who bore the name El Hefe on his club shirt.

Batch volume: 5 US gal. (18.9 L)
Original gravity: 1.060 (14.8°P)

Final gravity: 1.025 (6.3°P)
after back-sweetening

FERMENTABLES

5 lb. (2.27 kg) wildflower honey
90 fl. oz. (2.66 L) mandarin oranges

132 fl. oz. (3.9 L) guava juice

YEAST

1 packet Lalvin 71-B

OTHER INGREDIENTS

Go Ferm
stabilizers & clarifiers as needed

4 lb. (1.81 kg) wildflower honey
[to back-sweeten]
48 fl. oz. (1.42 L) prickly pear juice
[to back-sweeten]

BREWING NOTES

Rehydrate yeast with Go Ferm. Follow your standard staggered nutrient addition (SNA) procedure for low-gravity musts. Pitch yeast and ferment 14 days at 65°F (18°C). Once primary fermentation is complete, rack, stabilize, and rack once again. Gravity should be 1.000 (0°P). Back-sweeten with wildflower honey and prickly pear juice to achieve a gravity of 1.025 (6.3°P). Use dual-stage fining with Super-Kleer. After mead clears, rack to a keg and carbonate with 2.3 vol. (4.6 g/L) of CO₂.

If their names sound familiar, it's because these two meadmakers also won best of show at the Sowers Cup for another of their meads, Jiggly Puff and Stuff. Check out Winners Circle in the Jan/Feb 2020 issue of *Zymurgy* for more on Jeremy and Dustin.

The Michigan-only category winner, Amy Olsen, of Sterling Heights, got her start as a meadmaker in September 2014 and has since enjoyed a meteoric rise in success at competitions. She doesn't bother with beer—though she hasn't entirely ruled out the possibility—and prefers to focus on the creativity that goes into meadmaking.

"I was extremely fortunate to have the patient mentorship of Kuhnhenn Brewing Company's Frank Retell," she explained. "He is a highly decorated and very talented mazer [meadmaker]. I met him at Kuhnhenn's bar. I had no idea that he worked there, and we got into a conversation about flavor.

"I am a classically trained chef—I teach culinary arts, baking, pastry arts, and restaurant management. Food and flavor are, of course, big passions of mine. The

conversation led to him asking me if I had ever tried mead. Until that point, I had only ever tried one mead. I told him what it was, and he decided that I should try one of his.

"That mead blew my mind! I was telling him how much I was enjoying the different layers of flavor that he'd created and the depth of character that came out as the mead opened up, and Frank gave me this strange look and asked me if I had ever considered making mead. He thought that I would be good at it. So, he took me on as his protégé. He has never had another student. To this day, I still feel blessed that he offered to teach me.

"Frank had some base mead already created and ready for flavoring. Over the next several months, we worked on quite a few batches together. All of them were released at the brewery, some to much wider acclaim than others. But it got me completely hooked. In less than a year I was making solo batches at home and entered my first competition, 2015's Michigan Mead Cup. I won best of show in my first competition. So, to say that I

was inspired by Frank Retell would be a huge understatement.

"Since then, I have tried to learn everything that I can from many different people. I am very lucky to live in an area that is so rich in awesome mead, and that the meadmakers are so willing to share their time and talents. Some of my influences and inspirations are Ken Schramm, Ash Fischbein, Michael Fairbrother, Peter Bakulic, Marek Leczycki, Krzysztof Piwowar, Jon Talkington, and Bob Slanzi. They are all outstanding meadmakers, and all of them have helped me to improve my craft."

Olsen has a sweet tooth and makes no apologies for it—these are the meads she prefers to drink and make.

"I am from the sugar belt," she admitted. "I totally own that—I tend to lean toward making and drinking sweeter meads. Although I have never made one, I have a penchant for drinking Polish meads especially." But she is attempting to explore other sweetness levels.

"I am trying to branch out and make some that are semisweet to off dry. I have not really learned to appreciate a lot of dry mead. There have only been a few that I have had that are extremely well done. If you remove the bulk of the sweetness, you can taste every imperfection in the fermentation process. It really does take tremendous skill to make a fantastic dry mead, and I'm not sure that I'm there yet."

In the meantime, she's working on perfecting traditional mead. "I have been making trads [traditional meads] with varietal honeys for a couple of years. Now, I am working with yeast and trying to find strains that complement and bring out the best qualities of different honeys."

Olsen obviously puts a lot of effort into her craft, and that means sourcing the best quality honey she can.

"Variety and source absolutely make a difference when it comes to quality. While learning about the different varietals of honey, I was blown away at how vastly different they are. Most of us grew up thinking that all honey tasted like what you get in the little bear at the supermarket. Wow, were we wrong!"

She's had quite a bit of practice locating exactly what she wants. "Whenever possible, I go directly to the beekeeper to buy my honey. Most of my Michigan honey comes from Windmill Hill Farm. They are local enough that I can arrange for pickup, and the Ragans are great people. I am also a member of the American Mead Makers Association (AMMA). I take full advantage of their member deals. I have saved my

Brew This!



Amy Olsen's Morat

Recipe courtesy Amy Olsen, 2019 Michigan Mead Cup Michigan-Only Category Winner

Batch volume: 2 US gal. (7.6 L)

Original gravity: 1.102 [24.3°P]

Alcohol: 9.6% by vol.

FERMENTABLES

8.75 lb. (3.97 kg) fresh Michigan mulberries

6.9 lb. (3.13 kg) Michigan wildflower honey

OTHER INGREDIENTS

1 tsp. (5 mL) sorbate

1/4 tsp. (1 mL) sulfite

1 tsp. (5 mL) pectic enzyme

1 tsp. (5 mL) acid blend

YEAST

Fermentis SafAle US-05

BREWING NOTES

Start with a base of standard, traditional mead made from Michigan wildflower honey using US-05 yeast and tailored organic staggered nutrient additions (TOSNA), then add cleaned fruit in secondary. Top with base mead to the 2-gallon (7.6-liter) mark. Allow the fruit to remain in secondary until you reach the desired flavor, about 1 month. Rack off of the fruit, back-sweeten and adjust for acid and tannin to taste. Clarify and bottle.

membership dues several times over with the honey deals that I get from them."

When it comes to improving her knowledge about honey varietals, she's ready to fully commit.

"I am a bit of a honey geek—not as big as some folks, I mean I do not have my own honey pole barn like some people that I know. But I did drive from Michigan to Minnesota once, over 500 miles in a snowstorm, last minute, to steward a competition because I heard that Carvin Wilson was speaking about varietal honey and bringing over 100 unique samples for tasting. I skipped lunch and took notes two days in a row. It was worth it! I'd do it again in a hot second."

Becoming a great meadmaker takes research, commitment, and a willingness to get involved with mead competitions, Olsen stated. "Learn all you can. Read, join good-quality online mead forums (Modern

Meadmakers is great), go to MeadCon, take UC Davis courses, attend the AHA conference [Homebrew Con], and listen to the people who are willing to share their knowledge. Most of them are more than happy to talk about their triumphs and their failures. Absorb that knowledge and learn from those failures so that you do not have to make them yourself. Get involved with competitions. As a steward, you get to taste a lot of mead and network with people more experienced than yourself. Then become a judge. Drink mead—lots of mead. Remember what you love about each one and try to emulate its greatness. Most importantly, use the best ingredients that you can afford and make a lot of mead. You have to brew to get better."

Her future goals are twofold. "The first has nothing to do with my brewing, really. I'd truly like to see more female names on the leaderboards. I have been in the competition circuit for a few years now, and many times, mine has been the only female name on the board. Yet, I know some wonderful female meadmakers. Come on ladies, please step up and represent!"

"Second, I mentioned my goals with varietals and various yeast strains. That is an ongoing challenge. I also have a little notebook that I keep with different flavor ideas. Some have been in there waiting patiently for me to make them for four or five years. Sometimes, life has a way of derailing you. The challenge for me this year is a better balance. I plan to make a lot more mead and get some of that creativity off the page and into some glasses. Who knows, I might even try my hand at a beer!"

Olsen was kind enough to share her winning morat recipe with *Zymurgy* readers. Of her inspiration for the recipe, she confided, "I made this mead well over a year ago. I have learned a lot since then and, to be honest, if I were to make it again, I would do it differently. But I got the idea when researching for the Digby category at the Mazer cup. I was reading [1669 English cookery book] *The Closet of Sir Kenelm Digby Knight Opened* and ran into the word *morat*. I had no clue what a *morat* was, and I was very curious why, of all of the fruits, that a mulberry mead deserved its own classification. So, I made a very basic recipe to see how it would turn out. The hardest part was gathering all of the blasted berries. It took two summers to pick enough to make this mead!"

A full list of event winners can be found at MichiganMeadCup.com.

Amahl Turczyn is associate editor of *Zymurgy*.

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Relax, Don't Worry, Have a Homebrew!

That mantra rings as true today as it did in 1978 when Charlie Papazian cofounded the American Homebrewers Association with Charlie Matzen. Homebrewing can be as simple or as complex as you want to make it, but the first step is always to relax and not worry.

To aid your relaxation and help you get the most out of *Zymurgy*, here are some standard assumptions and methods for our recipes. Of course, when a recipe says to do something different, follow the recipe. But you can always fall back on these general tips to brew great beer.



ON THE WEB

For more detailed info, head over to HomebrewersAssociation.org and dive into our How to Brew resources.

BREWING WITH ZYMGURGY

MAKING WORT

Most recipes in *Zymurgy* offer an all-grain version and a malt extract or partial-mash alternative. Pick the procedure you prefer and prepare some wort! Some recipes

might include a water profile. If you can't (or don't want to) deal with water chemistry, don't worry about it: just go ahead and brew! Extract brewers needn't add minerals to water.

Malt Extract Recipes

Making wort from malt extract is easy.

- Crush specialty grains, if any.
- Place milled grains in a mesh bag and tie it off.
- Steep bag of grains in 150–160°F (66–71°C) water for 30 min. in your brew pot.
- Remove bag of grains from the pot.
- Fully dissolve extract in the hot, grain-infused water (if there are no specialty grains in the recipe, you can skip directly to this step).
- Top up with water to your desired boil volume. (Leave some room for foam!)



All-Grain and Partial-Mash Recipes

Unless otherwise specified, all-grain brewers can conduct a single-temperature infusion mash with these parameters:

- Water/grain ratio: 1.25 qt./lb. (2.6 L/kg)
- Mash efficiency: 70%
- Mash temperature: 150–153°F (66.7–67.2°C)
- Mash duration: 60 minutes

Partial-mash recipes make the same assumptions but use a smaller amount of grain and augment the wort with malt extract.

BOILING

No matter how you get here, everyone loves adding hops.



- Boil time is 60 minutes unless otherwise stated.
- Boils are assumed to be the full batch volume, but you can also boil a concentrated wort and top up with water in the fermenter.
- Hop additions are given in minutes before the end of the boil.

Brew Lingo

Every field has specialized language, and homebrewing is no different. Here are some of the key terms, abbreviations, and acronyms you'll find throughout Zymurgy.

AA – alpha acid

ABV – alcohol by volume

AHA – American Homebrewers Association

BBL – US beer barrel (31 US gal or 117.3 L)

BIAB – brew in a bag

BJCP – Beer Judge Certification Program

Chico – American ale yeast, AKA Wyeast 1056, WLP001, SafAle US-05, and others

CTZ – Columbus, Tomahawk, and Zeus: interchangeable high-alpha-acid hops

DME – dry malt extract

DMS – dimethyl sulfide, an off flavor similar to canned corn or cooked vegetables

DO – dissolved oxygen

EBC – European Brewing Convention (beer color)

FG – final gravity

FWH – first wort hops, added to the boil kettle as it fills with sweet wort after mashing

HERMS – heat exchange recirculating mash system

HLT – hot liquor tank

IBU – international bitterness unit

LHBS – local homebrew shop

°L – degrees Lovibond (malt color)

LME – liquid malt extract

LTHD – Learn to Homebrew Day

MLT – mash-lauter tun

NHC – National Homebrew Competition

OG – original gravity

°P – degrees Plato (density of wort or beer)

RIMS – recirculating infusion mash system

RO – reverse osmosis, a water purification process that removes most dissolved ions

SG – specific gravity (wort/beer density)

SMaSH – single malt and single hop

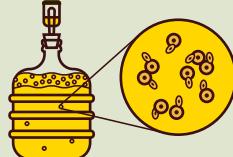
SMM – S-methyl methionine, precursor to dimethyl sulfide (DMS)

SRM – Standard Reference Method (beer color)

FERMENTING & CONDITIONING

Pitch yeast into chilled, aerated or oxygenated wort.

- Use twice as much yeast for lagers as you do for ales.
- Ales ferment at 60–70°F (15–20°C). Lagers ferment at 45–55°F (7–13°C).
- Condition ales at room temperature or colder for a week or two.
- Condition lagers at close to freezing for several weeks if you can (traditional but not required).



BOTTLING & KEGGING

If you bottle,

- Use 1 oz. of dextrose (corn sugar) per gallon of beer (7.5 g/L) for a good, all-purpose level of CO₂.
- Use less sugar for less fizz.
- Take care with higher carbonation levels—many single-use beer bottles aren't designed for high pressure.



If you force carbonate in a keg,

- Use the chart to dial in the gauge pressure on the regulator.



- Add 0.5 psi (35 mbar) for every 1,000 feet (300 meters) you live above sea level.
- To convert psi pressures to mbar, multiply by 69.
- To convert volumes of CO₂ to g/L, multiply by 2.

REGULATOR PRESSURES (PSI) FOR VARIOUS CARBONATION LEVELS AND SERVING TEMPERATURES

TEMP (°F)	VOL. CO ₂										
	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1
33	5.0	6.0	6.9	7.9	8.8	9.8	10.7	11.7	12.6	13.6	14.5
34	5.2	6.2	7.2	8.1	9.1	10.1	11.1	12.0	13.0	14.0	15.0
35	5.6	6.6	7.6	8.6	9.7	10.7	11.7	12.7	13.7	14.8	15.8
36	6.1	7.1	8.2	9.2	10.2	11.3	12.3	13.4	14.4	15.5	16.5
37	6.6	7.6	8.7	9.8	10.8	11.9	12.9	14.0	15.1	16.1	17.2
38	7.0	8.1	9.2	10.3	11.3	12.4	13.5	14.5	15.6	16.7	17.8
39	7.6	8.7	9.8	10.8	11.9	13.0	14.1	15.2	16.3	17.4	18.5
40	8.0	9.1	10.2	11.3	12.4	13.5	14.6	15.7	16.8	17.9	19.0
41	8.3	9.4	10.6	11.7	12.8	13.9	15.1	16.2	17.3	18.4	19.5
42	8.8	9.9	11.0	12.2	13.3	14.4	15.6	16.7	17.8	19.0	20.1

■ = PSI

Source: Brewers Association Draught Beer Quality for Retailers



Sanctioned Competition Program

SEPTEMBER 2019

Luxembourg 2019 Home Brew Contest,
24 entries
Ludovic Capitte, Givet, Belgium

OCTOBER 2019

Bayside Brewers Oktoberfest, 75 entries
Brett Tyrrell

Brew Con Norway Masters, 46 entries
Hein Frode Hansen, Stavanger, Rogaland, Norway

NCLAC ARToberfest Judge's Choice Homebrew Award, 12 entries
Jean Gourd, Ruston, LA

1º Concurso Mestre Panelero Hop'n Roll & Bil Bil Beer, 68 entries
André Bezerra de Oliveira, Itaperuçu, Brazil

Lights Out!, 190 entries
Tristan McCoy and Kyle Jung, Federal Way, WA

Johogs Octoberfest, 23 entries
Angelique Kieser, Johannesburg, South Africa

Oaktoberfest in the Dimond 2019, 45 entries
Eric Ruff, San Leandro, CA

VII Concurso de Cerveja Artesanal da Acerva Pernambuco, 21 entries
Vitor Lima, Recife, Brazil

Ozarks (Almost) Open, 76 entries
John Stevens, Springfield, MO

TBFBH - Club Only Competition, 20 entries
Roxanne Westendorf, Cincinnati, OH

SNAFU's 30th Anniversary Competition, 114 entries
Shaun Laughlin, Las Vegas, NV

Celebrewtion, 120 entries
Patrik Svensk, Strängnäs, Sweden

Brisbane Brewers Club Spring Mini Comp, 39 entries
Greg Osborne, Brisbane, Australia

Annual Music City Brew-Off, 319 entries
David O'Neal, Atlanta, GA

NOVEMBER 2019

Skirmish in the Triad, 312 entries
William Spiesberger, Mechanicsville, VA

2019 Brew Oahu Homebrew Competition, 95 entries
Justin Rivera, Waimanalo, HI

19th Annual Fall Classic, 347 entries
Jason Barker, Beaverton, OR

Africa Brew 2019, 11 entries
Gareth Todd, Centurion, South Africa

Monster Homebrew Competition, 53 entries
Kevin Rael, Cypress, TX

WCB Ogdens Competition, 19 entries
Neville Scott, Perth, Australia

Copa San Arnulfo Otoño, 34 entries
Gustavo Canales

Copa Alianza Cerveceros de Venezuela 2019, 89 entries
Cristobal Perret, Caracas, Venezuela

UNISO BEER TECH, 6 entries
Alekison Mori, Sorocaba, Brazil

Brew Slam 2019 (GTA Brews), 819 entries
Alex Cochran, Langley, BC

Vale do Lupulo BrewShop - Cervejeiro Destaque Novembro/2019, 5 entries
Patrício Amaral Neto, Blumenau, Brazil

Top Hop, 16 entries
Lacy Phillippe, Lincoln, NE

Stoney Creek ABC 12, 240 entries
Edward Walkowski, North Abington Township, PA

Indy Brew Battle, 34 entries
Jeremy Railey, Fishers, IN

FOAM Cup, 388 entries
Gary Black, Arnold, MO

Son of Brewzilla, 450 entries
Paul Shick, Cleveland Heights, OH

Steampunk Brew Works Homebrew Competition, 51 entries
Brian Wrenn, St. Louis, MO

FVG Brew Challenge, 63 entries
Luca Dalla Torre, Sutrio, Italy

Best of Hogtown 2019, 25 entries
Daniel Short, Gainesville, FL

2019 AIChE Beer Brewing Competition, 21 entries
Catherine Brewer, Jacob Ursey, Juanita Miller & Nancy Garnett, Las Cruces, NM

RIBS November Club Competition, 38 entries
Alex MacIntosh, Pawtucket, RI

B.A.S.H. Club-Only Competition, 30 entries
Wild Bill Lehfeld, Corpus Christi, TX

VII NoNeCo - Encontro Regional das Acervas do Norte, Nordeste e Centro-Oeste, 76 entries
Paulo Rosas, Brasília, Brazil

VIII Concurso Paranaense de Cerveja Feita em Casa, 180 entries
Felipe Lessio, Curitiba, Brazil

Saveurs de Genie 2019, 4 entries
SherBroue, Sherbrooke, Australia

TurkeyShoot 2019, 153 entries
Brooks Edman, Stewartstown, PA

Moravian Homebrewers Meeting 2019, 143 entries
Frantisek Rezek, Prague, Czech Republic

Ventania Beer Cup, 40 entries
Walter Cariman with Tres Hileras, Bahia Blanca, Argentina

Blue Ox Brew Off, 51 entries
Joshua Rumpza

Mead, cider, 'wine, 15 entries
Jerome Kennedy, Perth, Australia

Saskatoon Headhunters Brewing Competition, 315 entries
Alex Blais, British Columbia, Canada

Knickerbocker Battle Of The Brews, 132 entries
Dave Williams, Swampscott, MA

Motown Mash, 389 entries
Drew Rodgers, Maplewood, NJ

Session IPAs, 1st annual CRAM Homebrew Competition, 53 entries
Pierre James, Rennes, France

Props and Hops Homebrew Competition, 133 entries
Jason Dunn, Corona, CA

Rumble in the Jungle Series No.3, 62 entries
Pascal Jahn, Aachen, Germany

Copa Latinoamericana de Cervezas 2019, 430 entries
Nitsuga Mabelita, Asunción, Paraguay

HHCBC Nov 2019 Club Only Competition, 30 entries
Ryan Braswell, Long Island, NY

Concurso Estadual Cervejeiro Caseiro ACERVA-ES 2019, 84 entries
Diego Barbosa de Souza, Vila Velha, Brazil

1º Concurso Cervejeiro Caseiro CERVACON, 28 entries
Jeferson Pilla, Concordia, Brazil

SOBA National Homebrew Competition, 688 entries
Simon Woods, Dunedin, New Zealand

1. Turkey Homebrew Competition, 58 entries
Gulendam Turkcan, Izmir, Turkey

HHCBC Club Competition, 34 entries
Michael Gallagher, Patchogue, NY

Brew Con World Series III, 533 entries
Steve Smith, London, UK

0 Dark 30, 14 entries
Jeremy Buddemeir, Savannah, GA

Seventh Annual Big Spruce Home Brew Challenge, 32 entries
Brian Harvey, Halifax, NS, Canada

Desafio Cervejeiro - Etapa Final, 12 entries
Erick Ferreira

MHB Black Winter, 50 entries
Jose Luis Salazar

3 Festival dos Cervejeiros Artesanais do Mato Grosso do Sul, 70 entries
Kristopher Murata, Campo Grande, Brazil

QUAFF COC - Autumn v. Winter Seasonal Beer, 10 entries
Eli Palma, San Diego, CA

I Competencia Interna ACCE, 8 entries
Los Telmos, Quito, Ecuador

Piracicaba Beer Cup 2019 - 5 anos, 80 entries
Saulo Vieira, Americana, Brazil

IV Concurso Estadual da ACerva Baiana, 16 Entries
Luis Alexandre Freitas, Mutuipe, Brazil

5. Mainzer Hobbybrauerwettbewerb, 31 entries
Daniel Reese

3º Concurso Engenheiro Cervejeiro, 23 entries
Joao Luiz Mendes Moretto & Alexia Carvalho Sant'Anna, Brazil

6º Concurso Abierto del Club de Cerveceros Caseros del Uruguay, 145 entries
Guillermo Fernández, Montevideo, Uruguay

DECEMBER 2019

Bire de Nadal, 53 entries
Selvi Matteo, Meldola, Italy

Copa Chilebruers 2019 2da Etapa, 47 entries
Erik Simoes, Santiago, Chile

Beer7fest - Winterfest, 57 entries
Sabresa, Kibbutz Ein HaShlosha, Israel

Monk Melee IX, 60 entries
Paul Futer, Conshohocken, PA

Utah Brew Fest, 68 entries
Josh Anderson, Saratoga Springs, UT

CiderDays Amateur Cider Competition 2019, 104 entries
Tom Bell, Cohasset, MA

Northeast Brewer Alliance Homebrew Competition, 226 entries
Mike Neville, Dearborn, MI

Stout Challenge Homebrew Tijuana, 12 entries
Guillermo Velasco, Tijuana, Mexico

VIII Concurso Estadual Acerva Gaúcha, 124 entries
Nicolas Mega, Porto Alegre, Brazil

2019 Capitol Hill Staff Homebrew Competition, 28 entries
J.B. Zorn

ASH HBOY Stout Mini Competition, 12 entries
Todd Beutel, Chandler, AZ

4º Concurso de Final de Ano ACZ, 71 entries
Marcos José Ferreira, Juiz de Fora, Brazil

Copa Homebrewer Zona Norte, 23 entries
Sebastián Lazarcuk, Argentina, Buenos Aires, Argentina

5th PA Homebrew Open Competition, 112 entries
Michael Humes, Kennett Square, PA

Queen of Beer, 138 entries
Katherine Gooding, White Center, WA

Happy Holidays Homebrew Competition, 558 entries
Kelly Junge, St. Louis, MO

Lupuleros Winter Challenge 2019, 8 entries
Ten Pino en Tu Casa Esta Navidad, Zapopan, Mexico

FDR Iron Brewer 2019, 32 entries
John Warner, San Francisco, CA

Homebrewers Guild of Beer Sheva - Dark Beer Challenge, 52 entries
Talor Turjeman, Beer Sheva, Israel

MCM Homebrewer of the Year Q4, 4 entries
Ryan Moore, Garden City, MI

Concurso Cervecerio de Panama, 30 entries
Erika de Otero, Panama City, Panama



ON THE WEB

For an up-to-date calendar of AHA and BJCP events, visit the Events section of HomebrewersAssociation.org

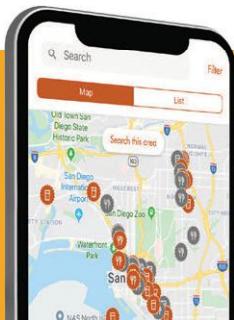
BIG BREW



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REPEAT

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In this round of Commercial Calibration, our judges review two American Wild Specialty Beers. Wild means they are fermented with yeast and/or bacteria beyond traditional *Saccharomyces cerevisiae*. Category 28C does not have to be sour, necessarily; the BJCP only mandates that it be a “sour and/or funky version of a fruit, herb or spice beer, or a wild beer aged in wood.”

Crooked Stave Artisan Beer Project, hailing from Denver and Fort Collins, Colo., ferments its delicate Sour Rosé with a house mixed culture of wild yeast, with →

Judges' Score SOUR ROSE

Crooked Stave Artisan Beer Project, Denver, Colo.

BICP Category 28C, Wild Specialty Beer



DAVE HOUSEMAN



SANDY COCKERHAM

→ raspberries and blueberries added for color and flavor. The beer spends time in oak foeders and is then canned unfiltered with a bit more yeast to maintain freshness. It is 4.5% ABV, and the brewery recommends a serving temperature of 46 to 54°F (8–12°C). Despite its tartness, this is touted as a perfect beer for all seasons, and it goes remarkably well with a variety of cuisines. It is complex, crisp, and bubbly.

Bretta Weisse is one American craft brewery's answer to the much-loved Berliner weisse of times past, when it was still slow-fermented with all the fruity complexity that wild *Brettanomyces* yeast can offer. (See more about traditional Berliner weisse in the Jan/Feb 2020 issue of *Zymurgy*.) Firestone Walker revives this time-honored version of Berlin's "Champagne of the North" with Bretta Weisse, a very special and extremely limited 4.9% ABV sour wheat that's been aged in 1,700-gallon French oak foeders for 8 months. Soft aromatics of citrus, cereal, and oak transition to a firm tartness and dry, yet creamy finish. Given the nature of the mixed culture and Brett yeast, it keeps extremely well in its 375 mL corked bottles, and even with several years of age, as our judges find out, it tastes fresh and vibrant.

Both beers score above 40 this time, so enjoy the tasting notes as the judges sing the praises of these special wild brews. 

AROMA

Complex aroma of funky yeast-derived character and fruity esters. Lactic sourness and barnyard notes dominate. Individual fruits are not discernible. Very little alcohol aroma. No hop aroma—OK. No DMS or diacetyl. No oak notes, but some woodiness I attribute to raspberries. **10/12**

APPEARANCE

The color of pink Champagne. A bit hazy, but OK for style. Thin, rocky, pinkish head dissipates quickly. Canned carbonation a bit low for a bubbly beer. **3/3**

FLAVOR

Very tart up front from primarily lactic acid, with just a hint of acetic acid notes. Little to no malt sweetness; this has developed a very dry finish. No hop bitterness to speak of, nor any hop flavor. Light barnyard Brett character. Fruity, but blueberries and raspberries are not specifically discernible. No overt oak character, but more of the aforementioned woody notes. No alcohol flavor. No DMS. No diacetyl. **17/20**

MOUTHFEEL

Thin body. Acidity gives the impression of even thinner mouthfeel. A bit of dry astringency from acid, oak, and fruit. No alcohol warming. Crisp, fully attenuated. **4/5**

OVERALL IMPRESSION

Very complex amalgam of yeast-derived byproducts, fruit, and oak. Quite sour, and dry to brut standards. Could benefit from a little higher carbonation and a little more residual malt sweetness and character that would have balanced this beer even further. The added malt sweetness would also accentuate the fruit character as well. However, it is still quite refreshing, like a radler or shandy. I'd suggest pairing this beer with coconut shrimp, poke, or spicy tuna roll. Save some cans for toasting on New Year's Eve, too—it would be more interesting than Champagne. **7/10**

TOTAL SCORE **41/50**

AROMA

A moderate mix of lactic sourness, raspberry, and a touch of funk. Light notes of wood married with Brett-like aromas. The lightest note of grainy, crackery malt forms a base. Blueberry is there but less noticeable than the raspberry. No diacetyl. **9/12**

APPEARANCE

This is a pretty beer, pouring with a rosy, salmon-pink color that has a hint of haze. A medium-low, pink-tinged, white head has above-average retention. The texture is a mix of fine bubbles and some medium-sized frothy ones. **3/3**

FLAVOR

Moderate sourness up front is mostly lactic. Fruit flavor is a dryish fermented berry flavor—more raspberry than blueberry. The beer is balanced toward tart fruit character. Bitterness just barely noted at a very low level. There are very low wood flavors and a slight note of tetrahydropyridine (aka THP—breakfast cereal, cracker, and biscuit at low levels) in the aftertaste. Malt is very low, crackery, and grainy. **18/20**

MOUTHFEEL

Body is just a little less than medium and the carbonation is medium high. This doesn't quite have an effervescent finish, but it does have a Champagne-like presence on the palate, in part due to the dry finish. The beer leaves a lingering, drying note on the tongue. **4/5**

OVERALL IMPRESSION

This delightful, fruity sour ale balances fruit with sour and wood notes but still lets a small malt presence be known. It isn't bracingly sour or funky, and I appreciate the gentle complexity it offers. Refreshing and aperitif-like, I'd enjoy this in a proper glass or just served from the can. It would be a pleasure on a warm day! **9/10**

TOTAL SCORE **43/50**



Judges' Score BRETTA WEISSE

Firestone Walker Brewing Co., Paso Robles, Calif.

BJCP Category 28C, Wild Specialty Beer



GORDON STRONG



SCOTT BICKHAM

AROMA

Moderately fruity, tart, and lightly funky. Toasty wood note follows. Primary fruitiness is a lemony character, but there are apple and pear notes too. The acidity seems mostly lactic and clean. The funk is quite clean. Light malt, like fresh bread dough, in the background. **10/12**

APPEARANCE

Slightly hazy. Pale gold color. Big, frothy white head settled moderately quickly. Lightly effervescent. Dark for a Berliner. **2/3**

FLAVOR

Moderately tart but not bitingly sour. Dry but soft finish, not crisp. Lemon and apple flavors are moderately high. Low bitterness. Light toasted/woody flavor in background. White grape. Slight rhubarb. Clean sourness. Low funk, lightly leathery, quite fruity. Acidity isn't overpowering due to full finish. Bready, doughy malt backbone. **18/20**

MOUTHFEEL

Rather full on the palate. Seems medium-high. Tannins give a fullness rather than an overt astringency. Acidity is fairly high. Not warming, but has an unusual strength for a Berliner. Moderately high carbonation, not spumante. **4/5**

OVERALL IMPRESSION

Unusual as a Berliner due to wood, size, body, and Brett. As a Wild Specialty, quite nice. Almost like a nice, lightly funky gueuze. Fruity flavors are very interesting. Good balance. Has a fairly full mouthfeel that helps attenuate the sourness. Refreshing but not crisp. Acidity level seems near perfect for drinkability. **9/10**

TOTAL SCORE 43/50

AROMA

Moderate yeast and bread dough with a sour twang reminiscent of sourdough starter. Sourness becomes more assertive as it warms, underpinned by medium toasted oak. Medium-low leathery Brett notes recall gueuze with less funk. No perceptible acetic acid, just lactic. Very nice balance and complexity. **11/12**

APPEARANCE

Light gold in color with a dense flotilla of persistent white bubbles that covers the surface. The initial pour is slightly hazy, despite taking care to not disturb the sediment. **3/3**

FLAVOR

Lactic sourness with moderate lemony notes. Bread dough and light toasted oak add complexity but are less apparent than in the aroma. The sourness is fairly intense, but the finish is nonetheless soft. No perceptible hop bitterness. Light tannic dryness from Brett and wood phenols. **17/20**

MOUTHFEEL

Medium-high carbonation not quite at Champagne level. Medium-low body owing to low final gravity. Some perceptible alcohol is not strictly to style but is OK for a specialty variant. Very low astringency. **4/5**

OVERALL IMPRESSION

This enjoyable sour beer combines a well-executed Berliner weisse riff with enhanced flavors from oak aging. The exceptional fermentation profile has a great balance of yeast and lactic bacteria. Alcohol is high for the base style but more than acceptable—it probably helps extract wood character from the barrel. It tastes very fresh, despite having been bottled more than three years ago. **10/10**

TOTAL SCORE 45/50



0 10 20 30 40 50

JUDGING

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, pick up a bottle of each of the beverages and judge along with them in our Commercial Calibration.

OUR EXPERT PANEL

Includes Dave Houseman, a Grand Master VII level judge and competition director for the BJCP from Chester Springs, Pa.; Sandy Cockerham, a Grand Master VI level judge from Indianapolis, Ind. and an associate exam director and Midwest Representative for the BJCP; Scott Bickham, a Grand Master IV 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 XIII judge, principal author of the BJCP Style Guidelines, and president of the BJCP board who lives in Beavercreek, Ohio.



#SEEKTHESEAL

The Independent Craft Brewery Seal is your assurance that the beer you're holding was crafted by a small, independent, traditional brewery.

ON THE WEB



Crooked Stave
Artisan Beer Project
crookedstave.com

Firestone Walker Brewing Co.
firestonebeer.com

BJCP Style Guidelines
bjcp.org

Illustrations by Terry McNerney

MADE FROM AMERICA'S HOPS AND DREAMS

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#SEEKTHESEAL

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Stale Doughnut Ale

By Dan Heil

Stale doughnut ale was an experiment first conceived in the milliseconds of a sideways thought during a lunch conversation with my fellow Grain Trust brewing club members.

As it does in many brewing competitions, the morning started out with some coffee and orange juice, a couple dozen bagels, and a few varieties of cream cheese. This August morning at Clandestine Brewing in San Jose, Calif., was no different. I was there to judge beer for the Worts of Wisdom 4th Annual Firefighter Chili Cook-Off & Homebrew Competition. I grabbed a half cup of black coffee and half a bagel with a schmear to get my brain started that morning while I helped distribute Saltines, cups, pencils, judging sheets, and other items to the judging tables. →

Photos courtesy of Dan Heil



Stale Doughnut Belgian Pale Ale

Recipe courtesy Dan Heil

Batch volume: 5.5 US gal. [20.8 L]

Original gravity: 1.045 [11.2°P]

Final gravity: 1.008 [2.1°P]

Color: 3 SRM

Bitterness: 23 IBU

Alcohol: 5% by volume

MALTS

6 lb. [2.72 kg] Weyermann Pilsner malt

2 lb. [907 g] Gambrinus Pale Ale malt

9 oz. [255 g] wheat dry malt extract

HOPS

0.5 oz. [14 g] Cascade whole hops 7.3% a.a., first wort hop

0.25 oz. [7 g] German Spalt Select pellet hops, 6.5% a.a., first wort hop

0.3 oz. [9 g] Cascade whole hops 7.3% a.a. @ 20 min

0.25 oz. [7 g] German Spalt Select pellet hops 6.5% a.a. @ 20 min

OPTIONAL ITEMS

½ Campden tablet for chlorine/chloramine elimination

1 tsp. powdered citric acid to adjust mash pH

ADDITIONAL ITEMS

8 glazed doughnuts, chopped, added to the mash

2 glazed doughnuts, whole, first wort doughnut

YEAST

White Labs WLP510 Bastogne Belgian Ale Yeast, 1 gal. [3.8 L] starter

BREWING NOTES

Mash malts with 8 chopped doughnuts at 152°F [67°C] for one hour, adjusting mash pH to 5.4 with citric acid if needed. Lauter, sparge, and run off wort onto the first wort hops and the 2 whole doughnuts in the boil kettle. Boil 60 minutes, adding hops as indicated. Chill wort to 68°F [20°C] and pitch yeast.

Ferment at 68°F [20°C] until specific gravity stabilizes at or near 1.008 [2.1°P]. Condition for several weeks before bottling or kegging.

I was going to judge a round of porters and stouts that morning with a much more experienced judge, and that was good news to me. I brew a fair number of porters and other dark beers, but I'm just a rookie judge. I had volunteered for many competitions as a table steward for the chance to help out, learn about competitions, taste beer from many different brewers, and see how it was scored. The seemingly desperate call for judging help every time a local competition came around, along with some kind words from a fellow club member, encouraged me to start working on my judging skills and to start volunteering to fill an empty judging seat.

The tables are set, the beer is being pulled, and it's time to get judging. And then I see it. The last judge is rolling through the door with two dozen Krispy Kreme doughnuts in hand.

I think to myself, *Those would have been good with my coffee, but maybe I'll grab one for dessert at lunch.* That's for later, time to focus on beer.

The judging goes well. We have one really great beer, the rest are good, and I do OK writing in the language of beer judging.

Sitting around with some of the other volunteers at lunch, we talk about the beers we judged and the beers at Clandestine. Somehow the conversation gets around to pastry beers, which I haven't really indulged in. I'm not that familiar with them or how to make one.

Do you just put in pastry? Or pastry dough? I have questions, and the others are tossing back some answers.

I say aloud, "What about dumping in some of those leftover doughnuts? What would that do?"

Oh! Now my brain is thinking about the sugar glaze. *How much would you get from a dozen Krispy Kreme doughnuts? Would the dough add extra starch or flavor? Bad flavor?*

"Hm," I say to the group, "I think I need to try this out."

After asking if anybody wants the last 10 doughnuts, I grab the box. That box gets tossed on the side counter at home and sits there for about a week while I research and decide what style of beer to brew. They are stale by the time I brew, but it won't matter.

I decide to make 5 gallons of Belgian pale ale, which shouldn't need much added sugar. My calculations, based on Krispy Kreme's website, for the sugar content of an average doughnut tell me there's not much there. Nine glazed plus one with sprinkles yields a little less than 4 ounces of sugar. Sure, let's see what that does. I decide not to add any more sugar than that.

When brew day comes, I add eight of my now stale doughnuts, chopped into pieces, to the mash. And I put two in the boil for what flavor they might add there. It is a crazy experiment—why not use plain glazed doughnuts in boiling wort?

The sugar all melts, and the dough dissolves somewhat in the mash. I recirculate the mash liquid, which I'm sure helps

break them down a bit. Hot, gooey dough pieces are left over in the spent grain. The same happens in the boil, and I carefully scoop out the five smallish, frail chunks with my long-handled spoon.

Overall, my brew day goes flawlessly, which is not always the case, and I end up with not quite 6 gallons of wort. I make a big starter of about a gallon with White Labs WLP510 Bastogne Belgian Ale Yeast. The beer ferments at the back of my garage, which is about three-quarters sunken in the ground, so it stays a cool and relatively constant temperature, even in August in California. I don't transfer to a secondary.

I let the beer ferment for a good four or five weeks and bottle it in mid-September. Just before the October meeting of the Grain Trust, I chill a beer down and give it a try. It is good. The color is a gray yellow with a bit of chill haze—possibly the byproducts of mashing and brewing with oil-cooked dough? Time to get some other opinions at the club meeting.

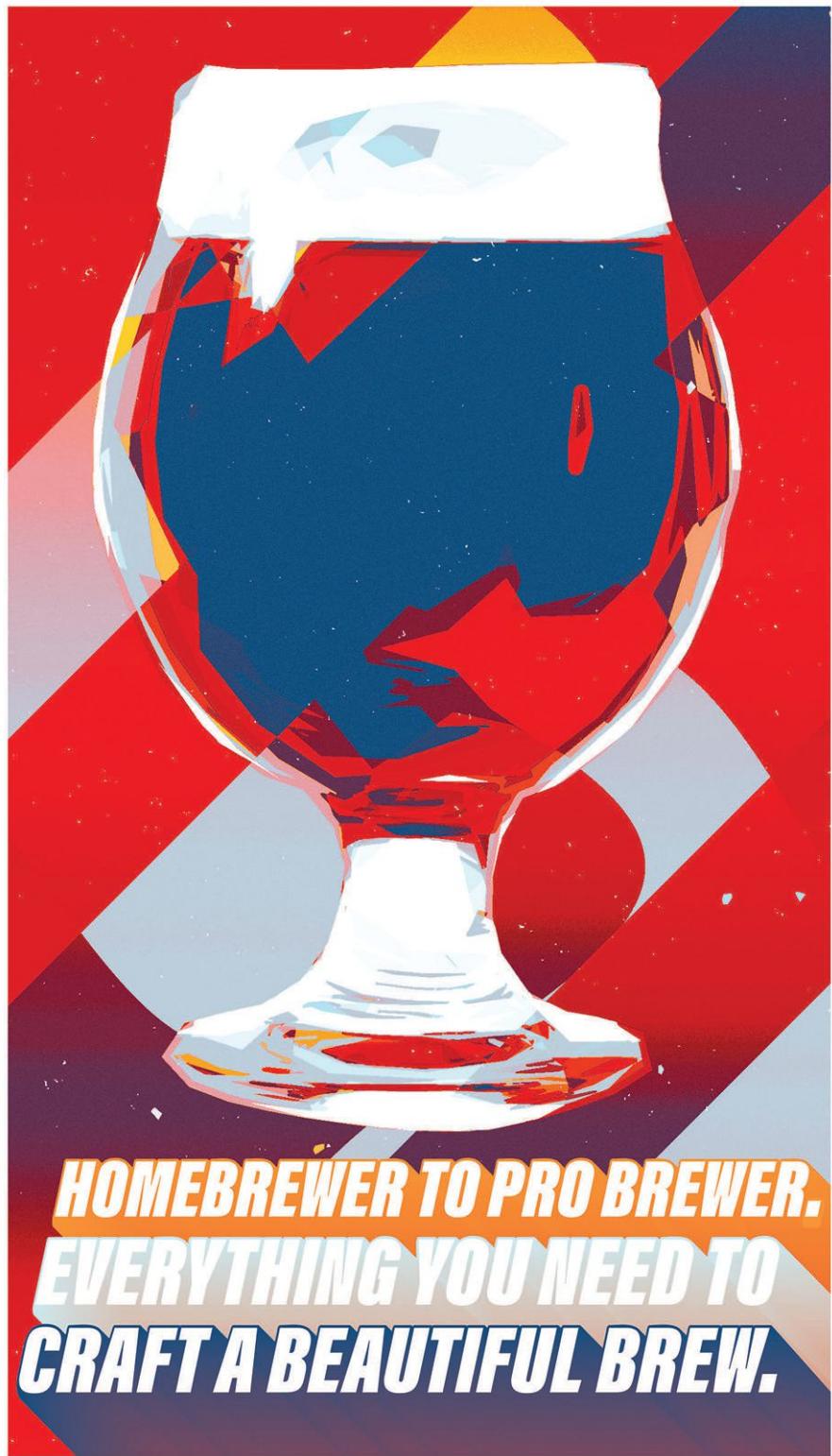
The Grain Trust, like many other clubs, places members' beers in a logical order for tasting at the club meeting. When I announce the beer I had brought, the comments are a bit skeptical. I think the guy ordering the beers for tasting looks like he wants to move this "experiment" to the end of the flight, but he has some faith, and my Belgian pale ale ends up in the right placement of light to dark, weak to strong.

When the time comes, I pop open the flip top and pass the beer around for everyone to get a sample. Despite the initial skepticism, everyone likes it. It really is a good-tasting Belgian pale ale with some nice, subtle phenol and ester flavors. A few people mention a hint of doughnut in the background, but maybe that is wishful thinking?

So, doughnuts in beer—yeah, that worked. Will I brew this again? Maybe. Or maybe it was just a fun one-time experiment that turned out right. I think it really depends on whether I score a lot of stale doughnuts in about six months to a year and I'm in the mood for another Belgian pale ale.

Ah, the joys of homebrewing—choices.

Dan Heil started brewing in 2009 after buying a copy of Radical Brewing to try and figure out how to brew gluten-free beer for a friend with celiac disease. He took several years' hiatus due to a contamination issue but restarted after solving the problem in 2019. Dan likes to make dark beers and strong beers, but he continues to try all sorts of different styles.



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Adriane and Patrick Hughes, owners of Bold Republic Brewing Company.



Adriane and Patrick Hughes' son, Jack.

Brewing Capt. Jack

The city of Belton, Texas, is known nationally for its July 4th parade and weeklong celebration. On July 6, Belton's celebration also included the first annual Penelope Street Patriot Festival, the aim of which was to raise funds to help build the National Desert Storm and Desert Shield War Memorial (NDSWM) in Washington, D.C. The festival was the idea of Adriane and Patrick Hughes, owners of Bold Republic Brewing Company (located on Penelope Street), the Belton Chamber of Commerce, and the NDSWM Association.

Adriane's father was Marine Captain Jonathan "Jack" Ross Edwards. He was one of the first casualties of Operation Desert Storm in February 1991. Adriane came up with the idea of brewing a beer called Capt. Jack, a Maibock/helles bock, to honor her father. When she found out about the NDSWM Association and contacted them, she knew this was a way to help. The NDSWM Association is a nonprofit organization and is using no government funds to build the memorial.

Festival attendees received a Miller's Smokehouse hot dog and first pour of Capt. Jack. Many different vendors—from food trucks and barbecue to neighboring breweries—were on hand to support the

fundraising. Volunteers from the NDSWM Association had merchandise for sale, volunteers helped with ice and water distribution, and the VFW Motorcycle Group of Texas held an Honor Ride.

But the day belonged to Capt. Jack. Ticket and merchandise sales raised about \$12,000, with individual vendors donating proceeds directly to the memorial; attendees offered a matching donation of \$1,000. Even Adriane and Patrick's son, Jack, got in on the action with his own lemonade sales of over \$100. As of the end of October 2019, Bold Republic had also donated about \$5,000 from taproom sales.

Many homebrewers across the nation are veterans, and like me, many are veterans of Operation Desert Shield/Desert Storm. We can brew our own version of Capt. Jack at home. Black Hawk Brewing Supply, a homebrew shop near Belton, sells a kit called To Helles and Bock. All proceeds from the sale of this kit go towards building the memorial. Kits can be ordered online at blackhawkbrewing.com.

Many Zymurgy readers know a professional brewer. Some readers are professional brewers. Any brewery can apply to brew Capt. Jack, with a portion of proceeds going to build the memorial. In return, the



Memorial Association supports those breweries with a comprehensive social media presence. As of the end of October, there were 11 breweries across the country who had brewed, or were contracted to brew, Capt. Jack. The brewery application can be found at ndswm.org/captain-jack.

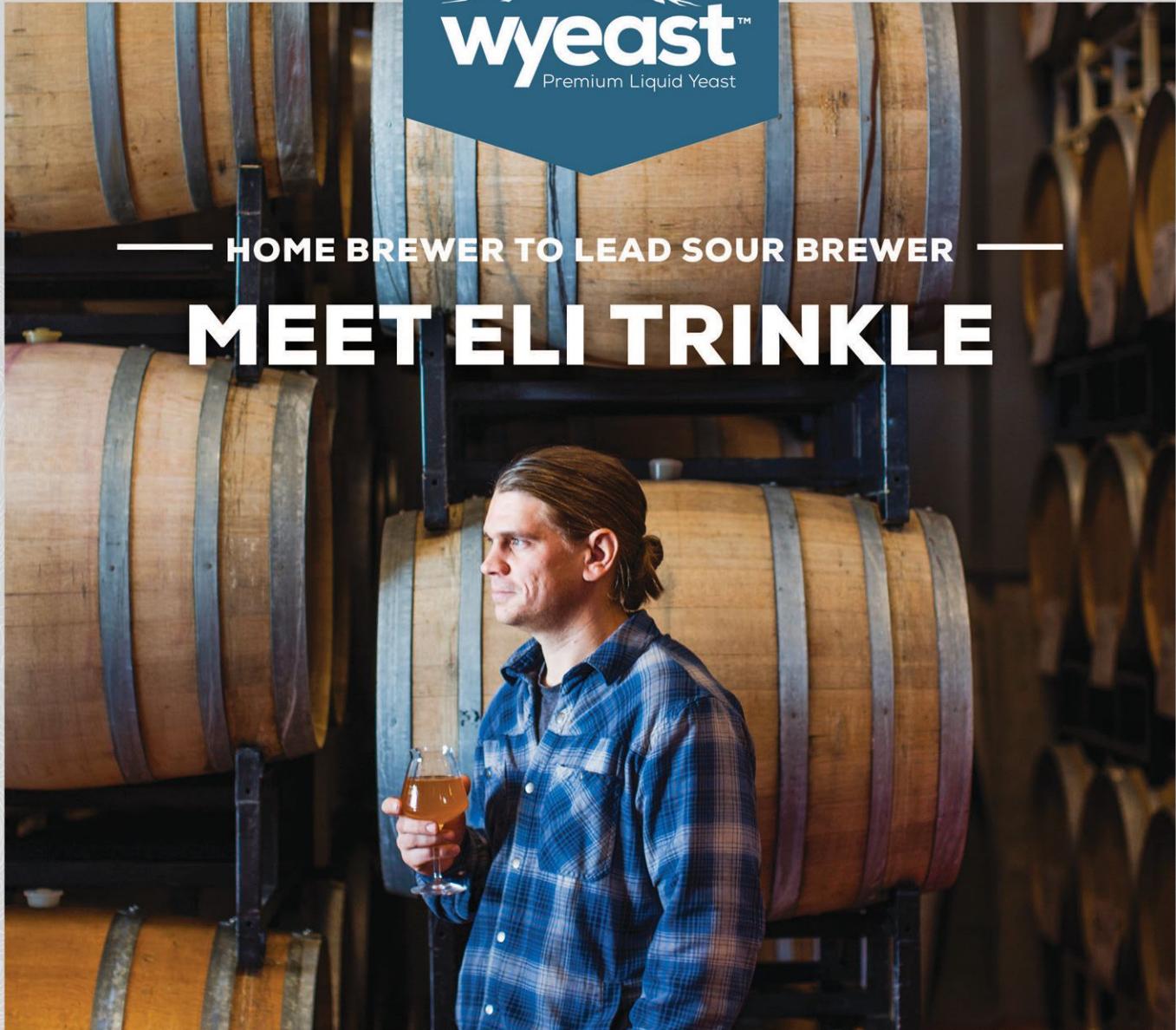
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Rick Chaplin, US Army retired, has homebrewed for more than 24 years and is a lifetime member of the American Homebrewers Association.



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MEET ELI TRINKLE



Eli Trinkle of Upland Brewing Co. was immediately drawn to home brewing after being introduced to it by his neighbor. After just one month of owning his own home brew setup, Eli was brewing all-grain with Wyeast smack-packs and kegging his own beer. He admits he was so intrigued by the process, it consumed his life. He spent countless hours researching and experimenting—he even worked as an assistant brewer while finishing his degree in engineering technology. Post-graduation, Eli decided that instead of pursuing more education, he'd turn his passion for brewing into a career.

Today, Eli has crafted a diverse portfolio of award-winning sours for Upland. He attributes his present-day brewing devotion to his colleagues at Upland, to the people of Bloomington, IN and the pride associated with pioneering a quality fermentation product. At Wyeast we share these same values, which is why we're pleased to toast the work of Eli and the rest of the Upland Brewing team.



See wyeastlab.com for homebrewing recipes from Eli and other commercial craft brewers.

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