

FOR THE **HOMEBREWER & BEER LOVER**

zymurgy®

The Journal of the American Homebrewers Association®

Hop Bliss: Best Beers in America



14

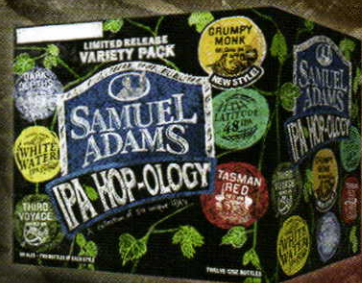
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by Jill Redding

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A Great Year for Craft Beer

For this annual Best Beers in America issue, our focus is on our brethren in the professional craft brewing community. As I write this, I've just returned from the Craft Brewers Conference (CBC) in San Diego, an inspirational four days of educational seminars, camaraderie, exciting news and events, the World Beer Cup® awards, and of course lots of great beer.

The buzz of the conference was craft beer's continued growth (along with the growth of the conference: more than 4,500 attendees, and 3,921 beers judged in the World Beer Cup). According to statistics compiled by the Brewers Association, craft beer sales grew 13 percent by volume in 2011. There are now more than 2,000 breweries operating in the U.S., with a mind-boggling 1,100-plus breweries in planning. We hope you're thirsty, because there's a plethora of new beer and new breweries coming your way.

Here are a few trends and newsworthy items that emerged from the CBC.

- A joke that made its way around the conference was that a last-minute seminar was being planned called "So You've Decided to Open a Second Brewery in North Carolina." Indeed, Oskar Blues' news that it had joined New Belgium and Sierra Nevada in choosing North Carolina for its second location was a talked-about item as the announcement was made during CBC week. Also, California's Lagunitas Brewing announced in April that it was opening a second location in Chicago.
- 2012 will surely be the "Year of the IPA" as more and more people are discovering this hoppy style. It was the number two category behind seasonals in SymphonyIRI sales scan data in 2011 and was closing in fast.
- Nanobreweries are carving their niche, according to Brewers Association

director Paul Gatz in his annual address at the CBC. "There have been two opened since the time I started this speech," he joked. In 2011, 270 breweries were brewing fewer than 100 barrels at their locations.

- Cans continue to explode in popularity, with craft beer being canned in many sizes and shapes. All conference goers received samples of CHAKA, a new collaboration beer from Oskar Blues and Sun King packaged in an Alumi-Tek® resealable aluminum pint bottle from Ball Corporation, the first craft beer to use the package.
- Collaborations with homebrewers continue to increase in popularity, including the Great American Beer Festival® Pro-Am competition as well as other programs. Coalition Brewing in Portland, Ore., offers its Coalator Program, an outreach program to the local homebrewing community. Homebrewers come into the brewery and brew their own recipes on the pilot system, and one tap at Coalition is dedicated to the quickly rotating creations.

Other fun trends include the increasing popularity of fresh beer on draught, including fresh beer to-go in growlers; more local farmer connections for restaurants including brewpubs; and brewpubs/tasting rooms expanding their horizons to include hotels, bed-and-breakfasts, and even campgrounds on site.

In all, it's a great time to be a craft beer lover, so cheers to those of you who voted in this year's Best Beers in America poll. You'll have even more beers to choose from as you start doing your homework for the 2013 poll!

Jill Redding is editor-in-chief of Zymurgy.

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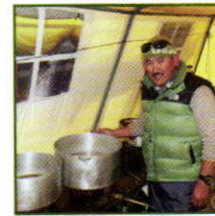
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By Mitch Steele

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By Tony Simmons and Brian Faivre

India pale ale is constantly evolving, offering a myriad of hoppy choices. Red, double black, and white IPA are the newest variations of the style.

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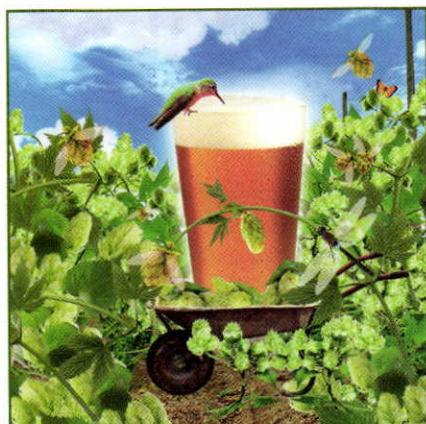
By Mike Hamill

A mountain guide on the world's highest peaks sets out to pursue a goal he wasn't sure was attainable: to brew a batch of beer at base camp of Mt. Everest.

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Cover illustration by Lou Beach

>> GET THERE!

SUMMERTIME BREWS FESTIVAL

The 8th annual Summertime Brews Festival will be held at the Greensboro Coliseum Complex in Greensboro, N.C. on July 14 from 2:30-8 p.m.

Serious beer connoisseurs can enjoy the first samples of the frosty brews during the VIP Brewmaster Tasting beginning at 2:30 p.m. The general session starts at 4 p.m.

Ticket prices (available on the website) include a souvenir sampling glass, unlimited beer samples, and entertainment. Food and non-alcoholic drinks are available for purchase.

For more information, go to www.summertimebrews.com.

June 29-July 1
8th Annual North American Organic Brewers Festival

Portland, OR.
www.naobf.org

July 6-8
Seattle International Beerfest
Seattle, WA.
Seattlebeerfest.com

July 7-8
Frogs and Dogs
Issaquah, WA.
www.Rogue.com

July 8
Stone Sour Fest
Escondido, CA.
www.stoneworldbistro.com/sourfest/

July 14
Breckenridge Summer Beer Festival
Breckenridge, CO.
www.breckenridgebeerfestival.com

July 26-29
Oregon Brewers Festival
Portland, OR.
Oregonbrewfest.com

For more craft brewing events, go to CraftBeer.com

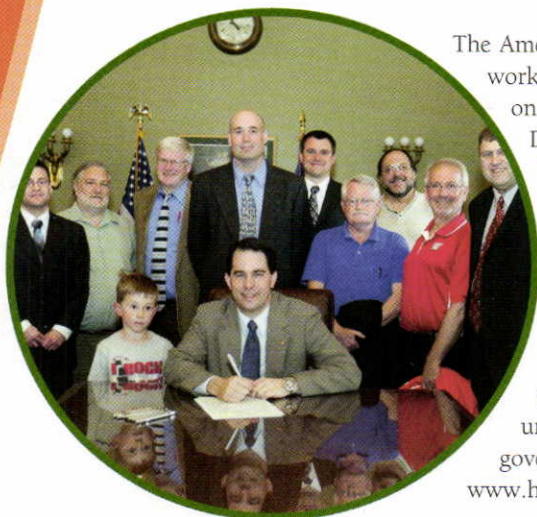
>> BREW NEWS

WISCONSIN HOMEBREW BILL SIGNED INTO LAW

On April 2, Wisconsin Gov. Scott Walker signed into law Senate Bill 395, which lifted restrictions that prohibited homebrew from being transported outside of the home where it was made. The new law will go into effect this summer.

The American Homebrewers Association had been working with the Wisconsin Homebrewers Alliance on this legislation since last spring when the Wisconsin Department of Revenue determined that under existing Wisconsin law, homebrew could not be consumed outside the home where it was produced.

The bill would not have passed without the dedication of the members of the Wisconsin Homebrewers Alliance and all of the contacts Wisconsin homebrewers had with state legislators. Our success in Wisconsin is a great example of the power the homebrewing community can wield when it unites behind a worthy cause. To learn more about the AHA's government affairs work and how you can get involved, visit www.homebrewersassociation.org/pages/government-affairs.



>> BREW NEWS

PILSNER URQUELL MASTER HOME BREWER COMPETITION



Pilsner Urquell, the world's first golden beer, announced the return of its Master Home Brewer Competition. The second annual competition will challenge homebrewers in New York, San Francisco, and Chicago to recreate the classic Czech-style Pilsner. The winning homebrewer from each event

will not only receive a trip for two to Prague and Plsen, but will also have the opportunity to brew a special one-time-only batch of Pilsner Urquell with brewmaster Vaclav Berka.

Revered for its importance in the history of beer, Pilsner Urquell will celebrate its 170th birthday later this year. It was October 5, 1842 that Josef Groll brewed the world's first golden beer and changed the way the world enjoyed beer. Berka, just the sixth brewmaster in Pilsner Urquell's history, continues the tradition created by Groll. He will be on hand to help judge the competition again this year.

"Last year, I experienced firsthand the passion and expertise shown by many of these very talented homebrewers," Berka said. "As the popularity of homebrewing continues to grow, we expect this year's competition to be even more spirited. I'm looking forward to judging the competition again this year and brewing with the winners when they visit the brewery later this fall."

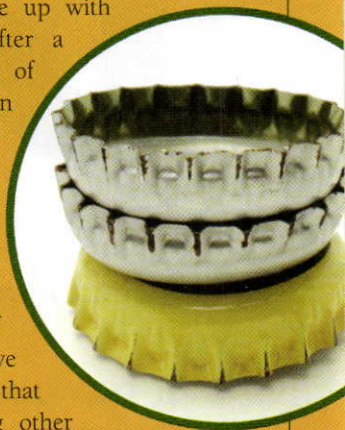
The dates for the 2012 Pilsner Urquell Master Home Brewer Competitions are: New York, July 23; Chicago, July 26; and San Francisco, July 28. Entries are judged on accuracy to the Czech-style Pilsner style (75 percent) and cleanliness/absence of off-flavors (25 percent). More information and official rules are available at Facebook.com/PilsnerUrquellUSA.

>> THE LIST

10 NEW BEER RULES

These rules are used by permission from *Brew Like a Monk* author Stan Hieronymus (who is also working on an upcoming *Brewing Elements* Series book from Brewers Publications called *Hops*.) To read more about each rule, go to his blog, www.appellationbeer.com.

Hieronymus came up with the first rule after a vertical sampling of vintage beers in 2007 (including a 1986 bottle of Samichlaus) that all had rust under the cap. The second rule was born out of the fact that, "I love hops, but to me that means something other than focusing on bitterness units. And it offends the fact checker in me to see people boast of [IBU] numbers that are physically impossible," said Hieronymus.



"The rest just sort of followed naturally, over the course of a year. Once in a while I think about adding more, but I don't want to force it."

Rule #1: When you open a beer for a vertical tasting and there is rust under the cap, it's time to seriously lower your expectations for what's inside the bottle.

Rule #2: A beer consumer should not be allowed to drink a beer with an IBU higher than her or his IQ.

Rule #3: You must drink at least two servings of a beer before you pass judgment on it.

Rule #4: The god of beer is not consistency.

Rule #5: It is only beer.

Rule #6: The best beer was in the empty glass.

Rule #7: Beer is not the new wine.

Rule #8: More beer, less analysis.

Rule #9: You cannot know all there is to know about beer.

Rule #10: Beer is food.

YOU'VE GOTTA DRINK THIS!

ALLAGASH FOUR

Allagash Four is by far the most enjoyable beer I've ever had. The malt flavor is like being on a rollercoaster ride of sweet, bready, biscuit goodness; light boiling hop additions of low alpha acids round off the flavors before delivering you right at the door of the blend of four different yeast strains. The residual sugars give this beer an extra flavor character in every dimension. This is no ordinary beer—this is an extraordinary beer!



Reviewed by Dan Martich,
Stamford, Conn.



If you've had a beer you just have to tell the world about, send your description, in 150 words or fewer, to zymurgy@brewersassociation.org.

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By Gary Glass



AHA National Homebrew Competition



The 2012 AHA National Homebrew Competition set another record for total entries judged, with 7,823 entries submitted by 1,735 entrants. Entries were judged at 10 regional judge centers around the U.S. and one qualifying Canadian competition. Congratulations to all of the first round winners! Taking any award at this competition is a major feat. Final round winners will be announced on June 23—about the time this issue starts hitting mailboxes. Check out HomebrewersAssociation.org for all of the winners, and look for all of the gold-medal winning recipes in the September/October issue of *Zymurgy*.

For this year's competition, we added an additional judge center, opening up another 750 entries to the first round judging capacity. In addition, the entry fee went up by \$1 to help cover costs associated with the growth in the competition. Despite the expanded entry capacity and the increased cost to enter, competition

registration reached capacity within days of launching the online registration system.

The growth of the competition is phenomenal, but also presents major challenges. While we want to accommodate as many people who want to enter as possible, we also want to ensure the quality of judging in the competition. Every year the AHA Governing Committee's competition subcommittee evaluates the competition and reviews potential rule changes. The subcommittee will once again be looking at potential changes for the 2013 competition following the completion of the 2012 competition. One of the challenges we face in dealing with the growth of the competition is that there are a limited number of locations and homebrew clubs that can realistically handle running a 750-entry competition (anyone interested in hosting a first round judging site should contact NHC director Janis Gross at janis@brewersassociation.org). Every additional first round location adds up to



LEGISLATIVE UPDATE

House Bill 354, to legalize homebrewing in **Alabama**, died May 16 when the 2012 legislative session ended before the bill was called for a vote before the Senate. While this is not the outcome we were hoping for, this year's homebrew bill passed the House and easily advanced through a Senate committee vote. This is the furthest a homebrewing bill in Alabama has ever progressed. With the gains made this year, 2013 looks promising for legalizing homebrewing in Alabama.

The headway made with homebrew legislation this year is the direct result of all the calls and emails made to **Alabama** legislators by supporters such as members of the AHA. We will need that same level of commitment next year in order to get the homebrew bill passed into law.

Three homebrew bills filed in **Mississippi** all died in committee without a hearing. Raise Your Pints, the Mississippi organization that is championing legislative change to improve the state's beer culture, continues to pursue homebrew legalization. Earlier this year, the state legislature passed and the governor signed a RYP-promoted bill to increase the allowable alcohol in beer sold in Mississippi. Hopefully that bodes well for future attempts to legalize homebrewing in the state.

84 additional entries to the final round judging (with 11 first round competitions, that's 924 entries to be judged in one day at the National Homebrewers Conference). Plus, additional first round judge centers mean recruiting more volunteers and a greater strain on staff resources.

Big Time Fun on Big Brew

This year's Big Brew celebration on May 5 drew 4,550 participants in 10 countries brewing 7,893 gallons of homebrew. Thanks to everyone who participated!

I especially want to thank the Craft Brewers Association of the UK for providing the English Brown Ale recipe for this year's Big Brew.

eZymurgy

By the time this issue arrives in your mailbox, it will likely already be available online via eZymurgy. We have now added back issues, starting with the 2008-2010 volumes, to eZymurgy, providing AHA members access to more than four years' worth of Zymurgy, with more back issues to be added in the coming months. This opens up a vast new resource of

homebrew information and recipes, all available at the click of a mouse. Plans to launch eZymurgy mobile applications for iPhone, iPad, and Android devices are in the works, though unforeseen changes in fee structure have delayed the anticipated arrival of those apps.

Homebrew in the Media

Perhaps you've noticed that our hobby has been getting a lot more media attention of late. I have been fielding calls from journalists writing stories about homebrewing on a weekly basis—more than at any time in the 12 years I have been

working at the AHA. This coverage goes a long way toward introducing more people to our hobby, which means more potential homebrew club members, AHA members, and customers at local homebrew shops. That coverage also elevates the status of the hobby in the eyes of the public, which helps when working on homebrewing rights legislation.

Stories about local homebrew events, award-winning local homebrewers, or a local homebrew shop's business success are likely to pique the interest of local reporters. The AHA provides sample press releases for events like Big Brew and Learn to Homebrew Day as well as National Homebrew Competition winners that can be edited and sent to local media outlets. (See the sample press release posted in the Big Brew section of HomebrewersAssociation.org.)

An example of how a local press release can generate substantial coverage for homebrewing occurred earlier this year in Wisconsin. The AHA put together a sample press release promoting the Wisconsin homebrewing rights bill when it was in the early stages of making its way through the state legislature. Many members of the Wisconsin Homebrewers Alliance took the sample release, modified it for their club or business, and sent it out. That resulted in several local stories about homebrewing and the homebrewing rights bill, a story in the *Chicago Tribune* and eventually an Associated Press story that ran in *Business Week* and the *Washington Post*. In the wake of that national coverage, multiple local media stories on homebrewing and homebrew laws popped up all across the country.

If you have an upcoming homebrew event, recently took an award at a competition, or are expanding your homebrew supply business, consider drafting a press release to send to local newspapers and radio and television stations. You never know, you might end up generating some buzz for homebrewing in your community.

Until next time, happy homebrewing!

Gary Glass is director of the American Homebrewers Association.



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Homebrewer Finds an Assistant



Dear *Zymurgy*,

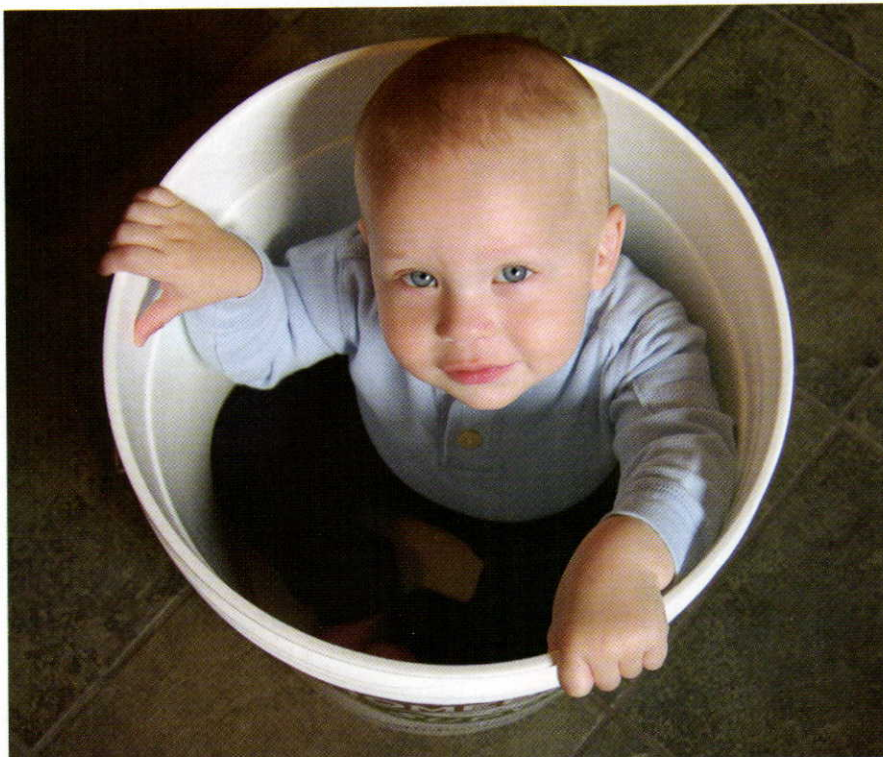
As I started the brewing process to make a Double IPA, my son Andrew, who turned one earlier this year, started showing more and more interest in what I was doing. He gets very curious any time I am cooking or fixing things around the house. Anyway, my fermentation bucket was of particular fascination to him, and he kept trying to either push it around or lift it and carry it. As the photos can attest, I think he wanted to, quite literally, get an "inside view" of the brewing process! Looks like this homebrewer now has an assistant for life.

As I have been a subscriber to *Zymurgy* for two years now, I thought you would enjoy these pictures and the story behind them.

Thanks for publishing a great magazine.

Jon Correll
Glen Gardner, N.J.

Send your *Dear Zymurgy* letters to zymurgy@brewersassociation.org. Letters may be edited for length and/or clarity. Hey homebrewers! If you have a homebrew label that you would like to see in our magazine, send it to art director Allison Seymour at allison@brewersassociation.org. 🍺



Photos courtesy of Jon Correll

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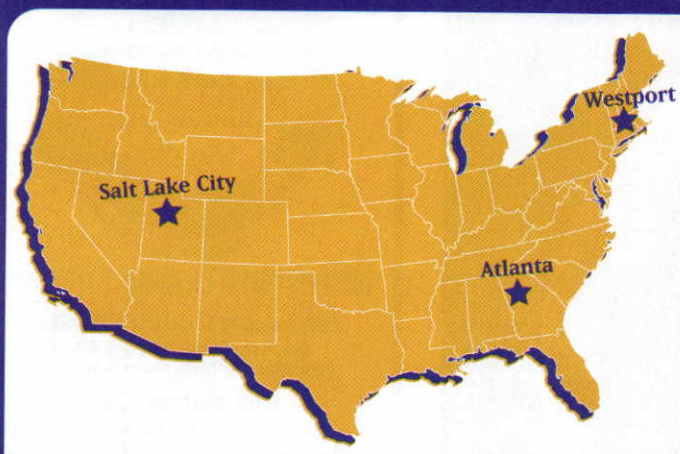
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Honey Do or Honey Don't?



My guess is that it would not do the honey good. UV light is an oxidizer. You might get some oxidized byproducts that would not be desirable.

I wouldn't be that concerned with baddies. Using good, healthy rehydrated dried wine yeasts will start fermentation quickly and vigorously. I've never tasted contaminated mead caused by "baddies." It's possible, I'm sure, but I wouldn't worry about it. If you really want to do something about it, you might consider sulfiting the unfermented mead like some winemakers do with their grape must before it ferments to wine. Add it to the must and then wait for 24 hours, but I'd never do that.

Hope this helps,
The Professor, Hb.D.

Volatile Aromas

Dear Professor,
I have noticed an off aroma in a few beers I have had (vegetal and medicine-like) that only lasted a few seconds before disappearing for good. Is there such a thing as a volatile aroma?

Wondering,
Hal Ward

Dear Hal,
Yes, there is such a thing as volatile aromas. The ones you are probably experiencing may

Dear Professor,
I read the Club Only article "Mead: Must We Heat?" by Amahl Turczyn Scheppach in the July/August 2011 Zymurgy. I recently made a batch of mead using the no heat method discussed in the article. I am a little concerned about baddies (bacteria and other unknowns) in the honey. I was wondering if pumping the must through a UV sterilizer would do more than kill off the baddies? For example, would reducing enzymes or protein-rich pollens affect the flavor or change the properties of the honey in any way?

Thanks,
Mike Morse the Must Man

Dear Mike the Must Man,
UV would certainly destroy the taste of beer as the UV light photochemically reacts with hops to produce that "skunky" flavor.

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be especially volatile. You say "vegetal." The culprit in those cases is usually sulfur-based compounds that are particularly volatile, such as DMS (dimethylsulfide) or miniscule amounts of rotten egg-like hydrogen sulfide. They gas off with the carbonation rather quickly and then, poof! You don't notice them anymore. Some "band-aid"-like phenolics seem to behave the same way but are a bit more persistent.

Gassing off,
The Professor, Hb.D.

Plastic Fermenters: Alcohol Safe?

Dear Professor,
Further to your doubts on plastic fermenters and carboys (Dear Professor, March/April 2012), we know that they are supposedly "food safe," but are they "alcohol safe"? It's one thing to say that a plastic carboy is safe for water, but quite another to say it's safe for a melomel that contains 12-percent ethanol and has a pH in the low 3s! Has it even been tested in such an environment? Unlikely.

You say you've had a few carboys break in 35 years, but you know why they broke, so it was a matter of a lapse in caution, not something unavoidable. One breakage every 10-plus years is a rare event. Personally, I've never broken a carboy in 33 years. (I've come close enough to scare myself a couple times though.) Not bragging, just saying that it's not inevitable to break carboys.

Dick Dunn
Hygiene, Colo.

Hey homebrewers! If you have a brewing-related question for Professor Surfeit, send it to "Dear Professor," PO Box 1679, Boulder CO 80306-1679; fax 303-447-2825; or e-mail professor@brewersassociation.org.

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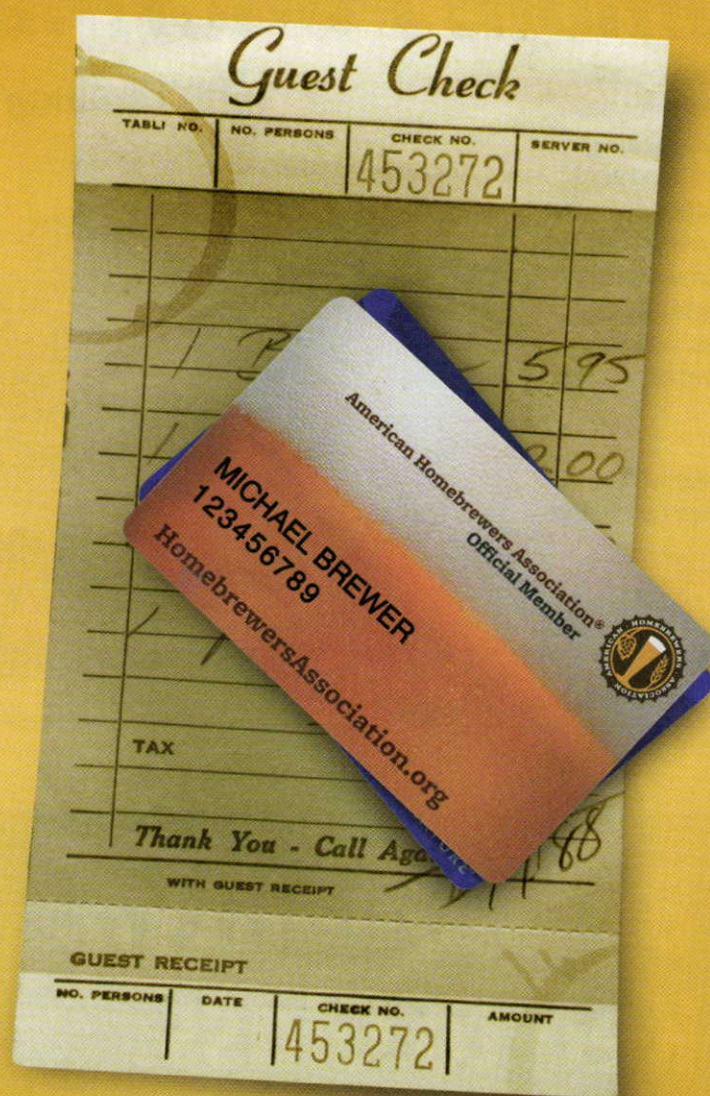


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A Look at Modern Day Porter

Despite the fact that porter had, from several accounts, an important and illustrious history; was an important precursor to stout; and was produced by London brewers in voluminous amounts in the late 1700s and early 1800s, exact recipes, malting techniques, and brewing techniques are at best vague. We do know it was made entirely of brown, highly kilned malts (somewhere between dark Munich and pale chocolate, but obviously with sufficient diastatic power for starch conversion), was powerfully hopped, and that, depending upon the publican, young porter was probably blended with aged, soured porter at the time of sale.


But this strong, bitter, sour, and smoky beer fell out of fashion, and all but disappeared until resurrected by the homebrewing and craft brewing movements of modern times. Even if the original could be duplicated, advances in modern brewing and malting techniques suggest modern porter is a different beast, shall we say, entirely. Composed of three popular and very different flavors, porter is now recognized as brown, robust, and Baltic.

Brown porter fits in easily with other English ales, with a bready, malty profile, modest alcohol strength, and reddish to dark brown color. Even with darker examples—color can range from 20 to 30 SRM—there are usually reddish tints. Like most porters, roast character can contribute, but should not be dominant—that's one thing that tends to differentiate them from stouts. Especially in brown and Baltic porter, the overall impression should be dark or bittersweet chocolate.

Brown porters are sweeter, breadier, and have more caramel than their robust

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Beer Made Better

3 Kings Baltic Porter

Based on Three Kings Baltic Porter, gold medal winner in the 2010 National Homebrew Competition and brewed by Karl King of Colleyville, Texas. Karl's all-grain recipe is found on the AHA Homebrewopedia wiki.

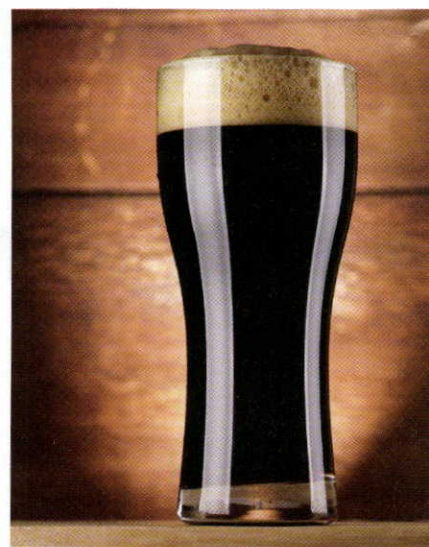
INGREDIENTS

for 5.3 U.S. gallons (20 L) using a 3.9-gallon (14.7 L) boil

- 3 cans** (9.9 lb or 4.5 kg) Coopers light malt extract
1.5 lb (680 g) Coopers light dry malt extract
0.75 lb (340 g) 60° L caramel Munich malt
0.5 lb (227 g) 475° L chocolate malt
0.25 lb (113 g) 350° L chocolate malt
0.25 lb (113 g) maltodextrin
1.6 oz (45 g) Czech Saaz pellets, 5.8% a.a. (60 min)
1.75 oz (50 g) Hallertauer pellet hops, 4.6% a.a. (60 min)
0.35 oz (10 g) Hallertauer pellet hops, 4.6% a.a. (10 min)
0.75 tsp (3 g) Irish moss (15 min)
Use 33 g properly rehydrated dry yeast, or a 1 L liquid yeast starter of Wyeast 2206 Bavarian lager yeast or White Labs WLP830 German lager yeast
Coopers Brewery Carbonation Drops for bottling to attain 2 to 2.5 volumes of CO₂

DIRECTIONS

Start with 1.5 gallons (5.7 L) of filtered water. Place the milled chocolate and caramel malts in a grain bag and steep the grains at 150 °F (66 °C) for 30 minutes. Remove the grains, strain the liquid from them and sparge with 2/3 gallons (2.5 L) hot water. Stir in dry extract, maltodextrin, and half of the malt extract syrup, and add hot water to bring the volume to 3.9 gallons (14.8 L). Bring to a boil, and boil for 30 minutes before adding the two bittering hops. Boil for 45 minutes, then add the rehydrated Irish moss and continue boiling for 5 minutes. Add the third hop addition and continue boiling for 10 minutes. Turn off the heat, remove the hops, and stir in the remaining extract. Cool the wort to 50-55° F (10-13° C), and then pour into fermenter with enough cold water to make 5.3 gallons (20 L). Aerate and pitch yeast when temperature drops to 50-55° F (10-13° C). Ferment at 52° F (11° C) for one to two weeks or until fermentation is complete. Age in secondary for 2 to 6 weeks at 53° F (12° C), or lager at 34° F (1° C) if possible. Prime with Coopers Brewery carbonation drops at bottling for a carbonation of 2 to 2.5 volumes of CO₂.



counterparts, and don't have near the strength of Baltic porters; browns range from 1.040 to 1.052 original gravity. Other flavors contributing to the chocolate maltiness may include nuts, licorice, biscuits, toffee, and toast. Obviously it takes a superb sense of balance to coax such complexity from a 1.040 beer. They tend to go one step beyond a dark mild, with greater strength in the 4 to 4.5 percent ABV range, and have more of a dark to bittersweet chocolate presence. Fruity, malt-enhancing British ale yeast strains are best, though brewers will sometimes use a lager strain.

Original Specific Gravity: 1.085

Final Specific Gravity: 1.020

IBU: 45

ABV: 8.8%

Robust porter bumps up the intensity level, but can favor hops, roastiness, or both. Or, with a nod to English traditional porter, this style can also encompass a beefed-up version of brown porter, with a pronounced malt, bread, and chocolate emphasis. Thus the parameters for this style are fairly broad; since Baltic porter is a fairly specific style, robust ends up being more of a catch-all subcategory. But while they may display roasty grain character, robust porters generally have a more rounded dark grain malt bill, with black patent and/or chocolate malt balancing roast barley, if roast is added at all. Roast character is still most strongly associated with stouts, so moderating that character will distinguish a robust porter from that style.

Hop-heavy versions are broadly categorized as American, and malt-heavy ones are similarly pigeonholed as English, but expect to see 25 to 50 IBUs of bitterness, with varying amounts of late hop char-

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acter. Starting gravities range from 1.048 to 1.065, attenuating down to 1.012 to 1.016, yielding a strength range of 4.8 to 6.5 percent ABV. Color can be dark brown to black opaque, somewhere in the 22 to 35 SRM range. Ale yeast is usually English or American, depending upon where the brewer wants to take the beer, and as with brown porter, moderate to high carbonate hardness water, like that of Dublin or London, is preferable.

Baltic porter is the oddball of the group. Rather than simply an amped-up version of robust porter, Baltic takes a decidedly smoother, cleaner, maltier approach. (Amped-up robust porters, with edgier, aggressive roast malt or hop emphasis and commensurate alcoholic strength, may do better entered in the 13F, Imperial Stout category.) Baltic porters are more like high-strength brown porters, with a toffee, chocolate, caramel, and even marshmallow emphasis, fermented with lager yeast. Moderate fruity esters of plums, raisins, dried cherries, and dates are fine, as long as they complement the smooth malt emphasis. Harshness, alcohol heat, grain or hop bitterness, and overt roastiness should be avoided. Weyermann's Carafa® malts are a great way to achieve the desired dark, smooth malt character, or some of the "de-bittered" black and chocolate malts from Belgium. In many ways,

this style resembles an imperial schwarzbier, if one can imagine such a brew.

Hop bitterness should obviously be restrained, with 20 to 45 IBUs depending upon the original gravity (1.060 to 1.090), and with no to very low late hop character. Maltiness can be emphasized with a base of light Munich, or even better, Vienna malt. Strength can range from 5.5 to 9.5 percent ABV and still be within style, though the vast majority of Baltic porters are 7 to 8.5 percent ABV. Attenuation is fairly important, though: these should be malty, sweet beers balanced primarily

by black malts, so you don't want them to be too cloying or heavy on the palate. Finishing gravities can be 1.016 to 1.024, but try to hit the lower side of this range if possible. Chill to 55° F (13° C) or lower before pitching a large amount of lager slurry in order to maximize clean malt aromas, and lager long and cold after fermentation. Of all the porters, this one takes the most patience.

Amahl Turczyn Scheppach is the associate editor for Zymurgy. He is a former professional brewer who now brews at home in Lafayette, Colo.

AMERICAN HOMEBREWERS ASSOCIATION CLUB ONLY COMPETITION

Porter


Entry deadline is August 10. Judging will be held August 18. Entry fee is \$7. Make checks payable to American Homebrewers Association.


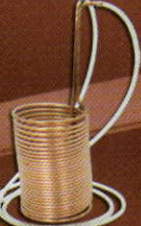


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Zymurgy's Best

**10th
Annual
Survey**

What else is there to say about Pliny the Elder?
How about: best beer in America, according to
Zymurgy readers, for the fourth year in a row!

The double IPA from Russian River Brewing Co.
in Santa Rosa, Calif. continues to be the gold
standard for Zymurgy readers.

"There is nothing finer than a freshly poured Pliny the Elder,"
proclaimed Zymurgy reader Jeff Holt of Fredericksburg, Texas.
"The birds sing louder, the sky is bluer, the clouds are whiter,
and all is right with the world. Wish I could get it in Texas."

The annual readers' poll drew a record-shattering number of
votes (16,445) for a dizzying array of beers commercially avail-
able in the United States. Zymurgy readers who are members
of the American Homebrewers Association are eligible to vote
in the annual poll for up to 20 of their favorite beers.



Beers in America

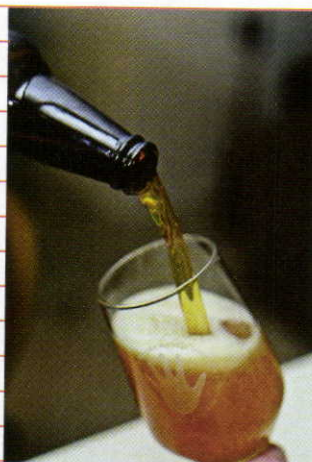


By Jill Redding

Top-Ranked Beers

T indicates tie

1	Russian River Pliny the Elder
2	Bell's Two Hearted Ale
3	Dogfish Head 90 Minute IPA
4	Sierra Nevada Pale Ale
5	Stone Arrogant Bastard
6	Bell's Hopslam
7	Sierra Nevada Celebration
8	Stone Ruination IPA
9	Sierra Nevada Torpedo
10	North Coast Old Rasputin
11	Firestone Walker Union Jack
12	Sierra Nevada Ruthless Rye
13	Bear Republic Racer 5
14	Oskar Blues Dale's Pale Ale
15	Dogfish Head 60 Minute IPA
16	Firestone Walker Double Jack
T17	Ballast Point Sculpin IPA
T17	Sierra Nevada Bigfoot
19	Stone IPA
20	New Belgium Fat Tire
21	Deschutes Black Butte Porter
22	Avery Maharaja
23	Founders Breakfast Stout
24	Left Hand Milk Stout
T25	Dogfish Head 120 Minute IPA
T25	New Belgium Ranger
T25	Stone Sublimely Self Righteous
28	Deschutes The Abyss
29	Goose Island Bourbon County Stout
30	Surly Furious
T31	Lagunitas Little Sumpin Sumpin
T31	Rogue Dead Guy
T31	Samuel Adams Boston Lager
34	Troegs Nugget Nectar
T35	Lagunitas IPA
T35	New Belgium La Folie
T37	Dogfish Head Palo Santo Marron
T37	Founders KBS
T37	Russian River Blind Pig IPA
40	Green Flash West Coast IPA
41	Deschutes Mirror Pond Pale Ale
42	Victory Prima Pils
43	Great Divide Yeti
T44	Alaskan Smoked Porter
T44	Anchor Steam
T44	Lagunitas Hop Stoopid
T44	Samuel Adams Noble Pils
T48	Great Lakes Edmund Fitzgerald Porter
T48	Oskar Blues Ten Fidy
T48	Russian River Pliny the Younger



"We are so flattered that Pliny the Elder has been chosen again by Zymurgy readers as the best beer," said Russian River owner and brewmaster Vinnie Cilurzo. "We humbly accept this award knowing that there are so many amazing beers being made these days, not only by U.S. craft brewers, but by small brewers around the world."

As per usual, pale ales, IPAs, and double IPAs dominated the top spots in the poll. Of the top 10, eight fall into that category, with Stone Arrogant Bastard (American strong ale) in fifth and North Coast Old Rasputin (Russian imperial stout) in 10th as the two exceptions.

"When we started brewing Pliny the Elder in 1999, there were almost no double IPAs on the market," said Cilurzo. "Present day, there are so many great hoppy beers, it's hard to put into words how honored we are."

For the third straight year, Bell's Two Hearted Ale finished second.

"Two Hearted is the single most genre-defying brew I've ever had," commented Zymurgy reader Alan Smith of Cairo, W.V. "It's ostensibly an IPA, but when I drink it, I don't think about that. I only think about how unique, delicate, and maddeningly delicious it is. It makes me want to brew something even just half as good, and it makes me look forward to what I'll learn along the way."

Dogfish Head 90 Minute IPA finished third for the second straight year, while Sierra Nevada Pale Ale was fourth.

Many of the usual suspects finished in the top 50 for 2012, but there were also some newcomers, including Firestone Walker Union Jack and Sierra Nevada Ruthless Rye (11th and 12th, respectively).

"I must say that Sierra surprised me with Ruthless Rye," said Zymurgy reader Garrett Milam of Olympia, Wash. "In a flock, no, an ocean of IPAs they managed to create a beer that stands out with a unique complexity without any of the 'in your face' hop character which seems to be in fashion with the imperial IPA set."

Photos © 2012 Colin Premshree Pillai, star5112 Sean Buchanan, Kelly Bailey, Mitch, and Brend Rostad through a Creative Commons license.

Of course, it's not all about the hops. Many voters steered toward maltier beers, session beers, or non-hoppy styles as their top choices.

"While it's true that there is nothing outrageous or over the top about Odell's humble 90 Shilling, it is in my mind the perfect beer," wrote Jeff Overturf of Arvada, Colo. "It's malty, satisfying, and has just enough hops to close the deal—this is simply the finest and most drinkable beer out there."

"You may notice the lack of big beers on my list," commented Sean McGinty of Lutz, Fla. "I'm a session beer guy. I love hanging out and putting down a couple of pints or a dozen or so sampler glasses."

"I am not a hophead," proclaimed Elspeth Payne of Silver Spring, Md. "I like complex, clean brews and I favor the spicy. At home I make a lot of braggots—malt, honey, minimum hoppage."

Easy-drinking seasonal beers made the top of some readers' lists.

"Sierra Nevada's Summerfest is the perennial go-to beer for any and all summertime activity," said Nicholas Ratkai of Severance, Colo. "For those who like flavor but don't want to slam an IPA after mowing the lawn on a 95-degree day, Summerfest is the way to go."

Some readers noticed that their tastes have changed over the years.

"The wheat/amber girl goes dark!" commented Lauren Greenfield of Longmont, Colo. of her top 20. "Yikes—this list of recommendations comes from a woman who had never tasted a stout ('I don't like dark beers') until about two years ago when I attended a tapping of a stout and was 'forced' into my new addiction. Life hasn't been the same ever since. I still enjoy a wheat or an amber every once in a while, but get me those creamy stouts and I'm all over it!"

With more than 2,000 breweries now in the U.S. and more than 1,100 breweries in planning (yes, you read that right), according to statistics compiled by the

Brewery Rankings

T indicates tie

- 1 Sierra Nevada Brewing Co, Chico, Calif
- 2 Dogfish Head Craft Brewery, Milton, Del
- 3 Stone Brewing Co, Escondido, Calif
- 4 Russian River Brewing Co, Santa Rosa, Calif
- 5 Bell's Brewery, Kalamazoo, Mich
- 6 New Belgium Brewing Co, Fort Collins, Colo
- 7 Firestone Walker Brewing Co, Paso Robles, Calif
- 8 Deschutes Brewery, Bend, Ore
- 9 Lagunitas Brewing Co, Petaluma, Calif
- 10 Founders Brewing Co, Grand Rapids, Mich
- 11 Boston Beer Co (Samuel Adams), Boston, Mass
- 12 Avery Brewing Co, Boulder, Colo
- 13 Oskar Blues Brewing Co, Longmont, Colo
- 14 Odell Brewing Co, Fort Collins, Colo
- 15 Three Floyds Brewing Co, Munster, Ind
- T16 Great Divide Brewing Co, Denver, Colo
- T16 Rogue Ales, Newport, Ore
- 18 New Glarus Brewing Co, New Glarus, Wis
- 19 Victory Brewing Co, Downingtown, Pa
- 20 Goose Island Beer Co, Chicago, Ill
- 21 Left Hand Brewing Co, Longmont, Colo
- 22 Surly Brewing Co, Minneapolis, Minn
- 23 North Coast Brewing Co, Fort Bragg, Calif
- 24 Bear Republic Brewing Co, Healdsburg, Calif
- 25 Green Flash Brewing Co, San Diego, Calif

Spirit of Homebrew

- 1 Alpine Beer Co, Alpine, Calif
- 2 Russian River Brewing Co, Santa Rosa, Calif
- 3 The Bruery, Placentia, Calif
- 4 AleSmith Brewing Co, San Diego, Calif
- 5 Jolly Pumpkin Artisan Ales, Dexter, Mich



**"The birds sing louder,
the sky is bluer, the clouds
are whiter, and all is right
with the world" —**

Zymurgy reader Jeff Holt of Fredericksburg, Texas, proclaiming his appreciation for Pliny the Elder.



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Best Portfolio

T indicates tie

1	Boston Beer Co (Samuel Adams)	41 beers
2	Dogfish Head Craft Brewery	34 beers
3	New Glarus Brewing Co	28 beers
T4	Rogue Ales	27 beers
T4	The Bruery	27 beers
T6	Bell's Brewery	26 beers
T6	New Belgium Brewing Co	26 beers
T8	Avery Brewing Co	25 beers
T8	Sierra Nevada Brewing Co	25 beers
T8	Three Floyds Brewing Co	25 beers
T11	Goose Island Beer Co	23 beers
T11	Great Divide Brewing Co	23 beers
T13	Brooklyn Brewery	22 beers
T13	Deschutes Brewery	22 beers
T13	Lagunitas Brewing Co	22 beers
T16	Cigar City Brewing Co	21 beers
T16	Victory Brewing Co	21 beers
T18	Southern Tier Brewing Co	20 beers
T18	Stone Brewing Co	20 beers
20	Flying Dog Brewing Co	19 beers
T21	Boulevard Brewing Co	18 beers
T21	Founders Brewing Co	18 beers
T21	Odell Brewing Co	18 beers
T24	Firestone Walker Brewing Co	16 beers
T24	Russian River Brewing Co	16 beers



Brewers Association, there are more beers than ever for craft lovers to explore.

"Love beer. Top 20 is like picking your favorite kid," commented Bill Jankowski of Mystic, Ct.

"You have no idea how hard this is," agreed Leigh Audin of Boulder, Colo.

Ahead of the Pack

As in years past, we also kept track of which breweries received the most votes. This year's top brewery is Sierra Nevada Brewing Co. in Chico, Calif., which made headlines this year after announcing that it will build a second brewery near Asheville, N.C.

"Fantastic news!" proclaimed Sierra Nevada founder Ken Grossman, who got his start as a homebrewer. "We are very honored and humbled to be chosen by Zymurgy readers. I know there are a lot of great beers and breweries today to support, so thanks!"

Sierra Nevada has a "boatload" of new beers on deck for the rest of 2012, according to brewery spokesperson Bill Manley. In June, Ovila Belgian Golden, the next beer in the Ovila Abbey Ale series, will debut. In July, the brewery will release BRUX Domesticated Wild Ale, a Brett beer collaboration with Russian River. August will bring the second release of the brewery's Best of Beer Camp Variety Pack including a floral IPA, a dry-hopped imperial Pilsner, an oatmeal stout, and an imperial red ale. A new, yet-to-be-named imperial stout will debut in September, and in October, Ovila Abbey Quad will be released.

Finishing second in the voting was perennial favorite Dogfish Head Craft Brewery in Milton, Del.

"Really, just about anything Dogfish Head is doing is interesting, full of flavor, and is not just another lame attempt at making America's 2,000th overly hopped IPA," summed up Adam Keele of Missoula, Mont.

Dogfish Head also had the second highest number of votes for different brands

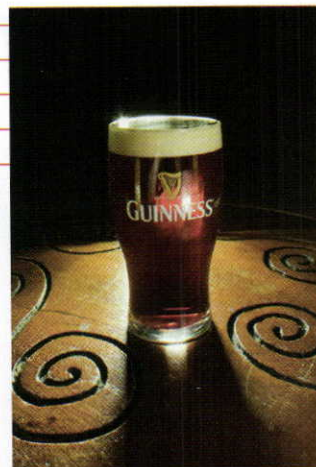
Top Imports

T indicates tie

1	Guinness Draught (Ireland)
2	Unibroue La Fin du Monde (Canada)
T3	Ayinger Celebrator Doppelbock (Germany)
T3	Saison Dupont (Belgium)
T5	Orval (Belgium)
T5	Rodenbach Grand Cru (Belgium)
T7	Newcastle Brown (England)
T7	St Bernardus Abt 12 (Belgium)
T9	Duvel (Belgium)
T9	Pilsner Urquell (Czech Republic)
T9	Samuel Smith's Oatmeal Stout (England)

"Love beer. Top 20 is like picking your favorite kid"

comment from Bill Jankowski of Mystic, Ct.



Deschutes Black Butte Porter Clone

Recipe by Amahl Turczyn Scheppach

Ingredients

for 5 U.S. gallons (18.93 L)

9.0 lb	(4.08 kg) NW two-row pale malt
12.8 oz	(363 g) chocolate wheat malt
8.0 oz	(227 g) 80° L crystal malt
5.0 oz	(142 g) dextrin malt
0.5 oz	(14 g) Galena pellets, 13% alpha acid (90 min) 34 IBU
0.25 oz	(7 g) Cascade pellet hops, 5.75% alpha acid (15 min) 2 IBU
0.25 oz	(7 g) Hallertauer pellet hops, 4.5% alpha acid (5 min) 1 IBU
English ale yeast (White Labs WLP 002 or Wyeast 1968 London ESB)	

Boil Time: 90 min

Original gravity: 1.057

Final gravity: 1.016

IBU: 37

SRM: 32

Brewhouse Efficiency: 75%

Directions

Mash grains at 153° F (67° C) for one hour. Mash out at 168° F (76° C). Ferment at 65° F (18° C).

Extract Version: Substitute pale malt with 7 lb (3.18 kg) light malt extract syrup. Steep and rinse grains, dissolve extract completely, and proceed with boil.

in its portfolio. Samuel Adams won that category with a whopping 41 different brands receiving votes.

"The universe of beer styles is infinite, and this year we're going to keep innovating," promised Boston Beer Co. founder Jim Koch. "You'll see some classic styles reinvented and surprising new small-batch beers, and it's the 10th anniversary of our most extreme beer—Utopias—so you know we have to celebrate."



Foreign Affairs

As in years past, there was a decidedly all-American bent to this year's voting. Of the top 50 beers in the poll, none were produced by a foreign brewery.

"One thing is constant: America has the best beer and brewers," proclaimed Zymurgy reader Michael Osborne of Chicago.

Guinness Draught stout reclaimed the number one spot in this year's imports voting, followed by Unibroue's La Fin du Monde, a tripel. Ayinger Celebrator Doppelbock and Saison Dupont tied for third, and Orval and Rodenbach Grand Cru rounded out the top five.

"If I were contemplating the 'end of the world' (or any other time I was thirsty), I'd want a La Fin du Monde in my glass," wrote reader Bob Kauffman of Lafayette, Colo.

Sierra Nevada Ruthless Rye Clone

Recipe by Amahl Turczyn Scheppach

This is a stab at Sierra Nevada's popular seasonal, which makes use of proprietary experimental hops in the aroma and dry hop charges. Reliable sources have said the brewery's mystery hops are similar to a blend of Columbus and Amarillo, so those have been used as stand-ins.

Ingredients

for 5 U.S. gallons (18.93 L)

- 9.5 lb (4.31 kg) pale malt
- 1.5 lb (0.68 kg) rye malt
- 12.0 oz (340 g) 80° L crystal malt
- 1.0 oz (28 g) chocolate malt
- 8-16 oz rice hulls (in mash – optional)
- 1.0 oz (28 g) whole Bravo hops, 15% alpha acid (First Wort Hops)
- 1.0 oz (28 g) whole Chinook hops (0 min)
- 0.5 oz (14 g) whole Amarillo hops (0 min)
- 0.5 oz (14 g) whole Columbus hops (0 min)
- 1.5 oz (42 g) whole Citra hops (dry)
- 0.5 oz (14 g) whole Columbus hops (dry)
- 1.0 oz (28 g) whole Chinook hops (dry)
- 0.5 oz (14 g) whole Amarillo hops (dry)

Chico or California ale yeast

Boil Time: 90 minutes

Original Specific Gravity: 1.062 (15.2° P)

IBU: 57

SRM: 12

ABV: 6.6%

Directions

Mash grains at 154° F (68° C) for one hour. Mash out at 162° F (72° C) for 10 minutes, then raise to 172° F (78° C) and commence sparge. Use rice hulls if a rye-induced stuck sparge is a concern. Steep aroma hops for five minutes at knockout and proceed with wort chilling. Ferment at 68° F (20° C) until finished, rack on to bagged, weighted dry hops and hold for three days. Remove dry hops. Crash cool and condition the beer for at least a week before packaging.

Mini-Mash Version: Substitute 7 lb (3.18 kg) pale malt extract syrup for the pale malt. Mash rye malt at 154° F (68° C) with crystal and chocolate malts for one hour. Rinse grains, dissolve extract completely, and commence boil.

"The universe of beer styles is infinite, and this year we're going to keep innovating"

Boston Beer Co. founder Jim Koch

Great Beers, Small Breweries

Once again, we raise a glass to those breweries that, though small in production, score high with beer lovers. We determine the Spirit of Homebrew Award by taking a brewery's total number of votes and dividing it by the brewery's production in number of barrels.

Among the top 50 breweries, Alpine Beer Co. in Alpine, Calif., is the 2012 Spirit

of Homebrew winner. The brewpub produced 1,550 barrels in 2011, according to statistics compiled by the Brewers Association.

"My first experience with Alpine Beer Company was at the 2011 [National Homebrewers Conference] in San Diego," said reader Jon Koerber of San Ramon, Calif. "I went with four other club members to their tasting room. We all ordered

samplers, drank our samplers, and sat silently staring at each other, each waiting for someone else to start the discussion. Finally we all said at about the same time, 'Am I insane, or are every one of their beers unique and delicious?' It was a great day!"

Finishing second was Russian River, which brewed 3,127 barrels at its brewpub location and 9,353 barrels at its production facility in 2011.

The Bruery of Placentia, Calif., AleSmith Brewing Co. of San Diego, and Jolly Pumpkin Artisan Ales of Dexter, Mich., rounded out the top five.

Recipes

As usual, we're providing clone recipes for some of the top beers in the poll. *Zymurgy* associate editor Amahl Turczyn Scheppach assembled clone recipes for Deschutes Black Butte Porter and Sierra Nevada Ruthless Rye. Give them a try and see what you think!

The recipe for Pliny the Elder can be found in the July/August 2010 issue of *Zymurgy*; Bell's Two Hearted Ale appeared in 2011; and 90 Minute IPA appeared in the July/August 2005 issue.

In addition, check out the excerpt from the book *IPA* on page 26, which includes more recipes for top 50 beers Russian River Blind Pig, Firestone Walker Union Jack, and Stone Ruination, as well as Odell IPA, another top vote getter.

We've also run clone recipes in the past for many others in the top 50. Search the *Zymurgy* index at HomebrewersAssociation.org to find the specific issues for recipes for some of those beers.

Thanks for voting, and thanks to the many of you who provided comments and reviews of your favorite beers. We'll provide information about participating in the 2013 poll in future issues and on HomebrewersAssociation.org.

Jill Redding is editor-in-chief of *Zymurgy*.

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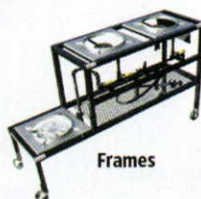
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HOP RECIPE



Editor's Note: The following is an excerpt from the book IPA: Brewing Techniques, Recipes and Evolution of India Pale Ale, which will be published this fall by Brewers Publications.

Certainly, no discussion of IPA brewing techniques would be complete without a look at the hop varieties, hop products, and hopping techniques that can be used to obtain the prominent hop bitterness, flavors, and aromas that characterize the IPA style.

Dry hopping has become requisite for brewing IPA, but over the years, brewers have become more creative in how they have supplemented dry hopping with other techniques and alternative hop products. As such, innovative brewers are constantly pushing the boundaries regarding how much bitterness and hop intensity can be obtained in their beer.

Table 9.2 lists the typical composition of a hop cone. Of these components, the alpha acid content, essential oils, and, to a lesser extent, beta acids and polyphenols are most important to the brewer. Most of these components are found in the lupulin glands.

ALPHA ACIDS

Alpha acids, the hop component that most IPA brewers look at first when formulating their recipes, contribute directly to the bitterness in the beer. Therefore, hops with higher alpha acid content can contribute much more bitterness to the beer (at the same addition rates) as hops with lower alpha acid content. Noble hop varieties such as Hallertau, Saaz, and Goldings typically have lower alpha acids, ranging from 1.5 to 5 percent, and the newer American varieties are typically higher, with "super alpha" varieties such as Warrior, Summit, and Apollo reaching levels of 17 to 18 percent alpha acids. These high-alpha hops were originally bred to provide a less expensive bitter-

ing source for large brewers, but as an added benefit, many varieties also have interesting and intense flavor attributes. Because of the increased bittering power of the newer varieties, they have become highly desirable for use in very bitter beers like IPA and double IPA, and the argument can be made that the development of these hop varieties contributed significantly to the rise of American IPA and double IPA as styles.

The three major alpha acids in hops are humulone, cohumulone, and adhumulone. The ratio of these three alpha acids varies with each hop variety, and some brewers look closely at the cohumulone level in hop varieties, as levels higher than 30 percent are thought to contribute a harsher bitterness. Noble hop varieties, originating from Central Europe (Saaz, Hallertau, etc.), typically have lower cohumulone values.

In order to contribute bitterness to beer, alpha acids need to be boiled. The wort kettle boil, the step during which

BY MITCH STEELE



hops are typically added in the brewhouse, transforms the alpha acids into an isomerized form, called the iso-alpha acid. The iso-alpha acid is the compound that contributes bitterness to beer. The isomerization reaction occurs at temperatures higher than 185° F (85° C); the rate and completeness of the isomerization reaction is dependent on temperature and boiling time. Therefore, the longer one boils hops, the more bitterness is extracted.

The solubility of iso-alpha acids (the ability to dissolve in wort) is much higher than the un-isomerized alpha acids. Also worth noting is that iso-alpha acids are much more bitter than alpha acids. In addition to imparting bitterness, iso-alpha acids also contribute significantly to foam retention and foam stability in beer, which explains why highly hopped beers typically have much thicker, denser foam than lower hopped beers. It is interesting to note that iso-humulone is the iso-alpha acid in beer that reacts with sunlight to produce skunkiness in beers packaged in green or clear bottles.

TABLE 9.2

CHEMICAL COMPOSITION OF HOPS	
CONSTITUENT	PERCENT BY WEIGHT
Water	6-12
Soft Resins	
Alpha Acids	1.5-18
Beta Acids	1-10
Essential Oils	0.5-2.5
Hard Resins	
Polyphenols (tannins)	
Amino acids	0.1
Simple sugars	2
Pectin	2
Oils and fatty acids (higher in hops with seeds)	0-2.5
Protein and carbohydrates	15
Ash (minerals)	8-10
Cellulose	40-50

ESSENTIAL OILS

Essential oils contribute the aroma and flavor of hops to beer. Hop oils contain thousands of different compounds, but the primary three are myrcene, humulene, and caryophyllene. Myrcene is the most abundant hop oil, at 30 to 60 percent of the total, and is lost quickly to evaporation as hops are boiled. Myrcene is the oil that many brewers believe is of prime importance for late hop addition flavor and aroma contributions. Many hop oils undergo chemical or oxidative transformation during the kettle boil and during fermentation, resulting in different hop aromas and flavors obtained depending on when in the process the hops are added and how long they are exposed to boiling wort or yeast fermentation.

Each hop variety has its own unique composition of alpha acids and hop oils. Therefore, hop selection and blending is particularly important to achieve the perfect combination of hop bitterness, flavor, and aroma. Table 9.4 lists some hops widely used by IPA brewers. It is by no means complete, as there are new hop varieties being developed every year, and adventurous brewers use “nontraditional” IPA hops to brew amazing IPAs.

HOP PRODUCTS

Another important consideration is which form of hops to use. Over the past 40 years, several different types of hop products have been made available to



TABLE 9.3

HOP ALPHA ACIDS		
ALPHA ACID	R=	% OF ALPHA ACIDS
Humulone	iso-butyl	40-80
Cohumulone	iso-propyl	14-50
Adhumulone	sec-butyl	5-15

commercial and home brewers, and each offers its own advantages and challenges.

Hop Cones

Hop cones, or whole hops, are the traditional hop product. Hop cones are dried, compressed, and baled hop flowers. The advantage of using hop cones is primarily one of perceived flavor. Several craft brewers use only whole hop cones in their beers, because they think that the compressed whole hop cone gives the best flavor. In addition, whole hops can be used in a vessel called a hopback, after the boil, to add additional flavor and assist in filtering out trub. Many brewers think that whole hops give a superior flavor in the dry-hop process, and while they may use other hop products for bittering and flavoring in the brewhouse, they will limit themselves to only whole hops for dry hopping. Whole hops are much easier to inspect for quality than other types of hop products.

The disadvantages of using whole hop cones are primarily related to storage, stability, and efficiency. Whole hops tend to oxidize and age more rapidly than other hop products. Once opened, whole hops are susceptible to oxidation and flavor degradation, so be careful buying small amounts of whole hops that have been taken from larger packages or bales. Lupulin glands can become dislodged from the cone, resulting in inconsistent bittering and flavor contributions. Using whole hops for dry hopping requires the use of a bag or some other perforated container, so the hop leaves can be easily removed from the beer when the dry-hopping process is complete.

Hop Pellets

By far the most common form of hops available and used by craft brewers and homebrewers is the hop pellet. Developed in 1972, hop pellets are made by taking the compressed bale of whole hops,


TABLE 9.4

COMMONLY USED IPA HOP VARIETIES

The "4 C's"

English IPA varieties

VARIETY	TYPICAL ALPHA ACID CONTENT (%)	COHUMULONE (% of alpha acids)	OILS (ml/100 g)	FLAVOR AND AROMA DESCRIPTION	TYPICAL USES AND OTHER COMMENTS
Cascade	5-8	37	0.8-1.5	Spicy, floral, citrus, grapefruit	Classic American aroma and dry hop
Centennial	9-11.5	30	1.5-2.5	Floral, citrus (lemon rind), piney	Originally developed as Super Cascade, used for flavor, aroma, dry hopping
Chinook	12-14	39-34	1.5-2.5	Intense spice, pine, and apricot flavors, grapefruit	Dual-purpose hop
Columbus (aka Tomahawk, Zeus, or CTZ)	13-16	32	1.5-2.5	Intense pungent, herbal, floral	Good bittering hop, used frequently in dry hopping. Can get sulfury
Citra	11-13	22-24	2.2-2.8	Strong citrus and tropical, grapefruit, lime, melon, passionfruit	Newer variety
Warrior	15-17	25	1.0-2.0	Mild, clean	Primarily a bittering hop
Bullion	7-10	35-40	2-3	Intense American hop aroma. Black currant and catty	Hard to find, used in Ballantine IPA
Apollo	15-19	24-28	1.5-2.5	Grapefruit, spicy	Newer variety, very intense. Can get sulfury
Bravo	14-17	29-34	1.6-2.4	Floral and fruity	Newer variety
Delta	5.5-7	22-24	0.5-1.1	Citrusy and spicy, with hints of tea, berry, melon	Newer aromatic variety
Calypso	12-14	40-42	1.6-2.5	Pear, berry, apple	Newer aromatic variety
Galaxy	13.5-15	35	2.4-2.7	Citrus, passionfruit, stone fruit	Australian variety
Magnum	12-14	22-26	1.9-2.3	Clean, bitter	German origin, excellent bittering hop
Amarillo	8-11	22	1.5-2	Floral, citrus, mango/tropical fruit	Popular bittering and aroma hop. May be too intense if not used with other varieties
Simcoe	12-14	15-20	2-2.5	Strong resinous/piney	Bittering and aroma. Nice dry hop
Nugget	12-14	26-30	1.7-2.3	Strong bitter. Light herbal	Bittering, primarily
Summit	16-18	26-33	1.5-2.5	Citrusy and herbal	Bittering and flavor. Can get oniony/sulfury at high levels
Sorachi Ace	10-16	23	2-2.8	Herbal, dill, tangerine	Developed in Japan. Unique flavor
Nelson Sauvin	12-13	24	1-1.5	White wine, berries	Unique New Zealand variety
East Kent Golding	4.5-7	28-32	0.5-1	Spicy, earthy, herbal, marmalade	Classic British variety
Challenger	5-9	20-25	1-1.7	Spicy, clean bitter	Primarily a British bittering hop, good flavor characteristics, can be used effectively for flavor/aroma
Northdown	7-8	24-29	1.5-2.5	Clean bitter, mild flavor	Good dual-purpose hop
Target	10-12	29-37	1.6-2.6	Intense. Herbal, floral, some citrus/tangerine	Good bittering hop, good for flavor
Fuggle	3.5-5	26	0.7-1.5	Mild, grassy, floral, herbal	Flavor, aroma, and dry hopping British ales
Willamette	4-7	32	1-1.5	Herbal, grassy, mild	American version of Fuggle



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shredding them, and running the hop material through a hammer mill to mill them into a fine powder. The hop powder is then pressed through a die to form a 4- to 6-millimeter diameter pellet. The die press is flushed with liquid nitrogen by some hop suppliers, which allows the pellets to be packed more tightly without too much heat generation. This in turn promotes flavor stability, because the pellet is more compact. The important thing to note is that hop pellets, unlike other hop products, still retain the hop leaf material, which many brewers think is an important component of hop flavor. A standard hop pellet is often called a Type 90 pellet, because 90 percent of the original whole hop weight is retained in the pellet. A Type 45 pellet is one that has the same bittering potential in only 45 percent of the weight.

Until opening, vacuum-packed or nitrogen-blanketed hop pellets will remain fresh for several years. In addition, the pelletizing process captures all the lupulin in the compressed pellets, making the hops more consistent with respect to bittering potential and flavor contributions. Hop utilization (the amount of bitterness captured from the hops during the brewing process) is typically 5 to 10 percent higher when using pellets vs. using whole hops.

One disadvantage of using hop pellets is that the hops will oxidize rapidly once exposed to oxygen. The lupulin glands have been somewhat ruptured in the pelletizing process and will form oxidation products (resulting in harsher bittering compounds) and lose aromatic characteristics after the vacuum pack is opened. Additionally, hop pellets disintegrate rapidly into wort and beer and form a large amount of solid sludge material during the kettle boil and the whirlpool that must be separated from the wort. This can result in lower overall brewhouse efficiency, because much of the wort is left behind in the hop/trub sludge. Some brewers also feel that because the milling process generates a substantial amount of heat, hop pellets provide a grassier, more vegetative flavor when used for a dry hop, as opposed to the citrusy fruitiness provided by whole hops of the same variety. My experience has been that suppliers now have a very good grasp of optimal



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temperatures and control them during the pelletizing process, making this argument somewhat moot.

Carbon Dioxide Hop Extracts

Hop extracts are highly concentrated forms of hop resins, extracted with liquid carbon dioxide from pellet hops into a usable syrup form. Although traditionally the realm of larger brewers, hop extracts are finding their way into the world of the craft brewer. Several brewers have found when brewing extremely bitter double IPAs that hop extracts are a good alternative for maximizing bitterness without overloading the brewhouse with leafy hop material or sludgy hop pellet residue. As such, some brewers are using combinations of hop extracts in the bittering portion of their hop recipes.

Distilled Hop Oils

Hop oils can be steam distilled from hops and used to augment dry-hop character in beer. Most taste trials have shown that the flavor is not quite the same as using whole hops or pelletized hops, but oils can be used effectively in combination with other hop products to augment and intensify hop flavor and aroma.

DEVELOPING THE HOP RECIPE

Brewers must consider the following aspects when creating a hop recipe for their IPA:

- Hop varieties to be used and their alpha acid content;
- Desired hop flavor and aroma characteristics;
- Desired bitterness level;
- Kettle hop utilization and impact of late hop additions on flavor and bitterness level.

A brewer cannot develop a recipe with a target IBU level without knowing the hop utilization rate. Hop utilization is defined as the amount of alpha acids added to the kettle vs. the amount of iso-alpha acids in the resulting wort. It can be expressed with the following formula:

$$\text{Hop utilization percentage} = \frac{\text{Iso-alpha acids in wort} \times 100}{\text{Alpha acids added to the brew}}$$

Alpha acids added to the brew



TABLE 9.5

FACTORS AFFECTING HOP UTILIZATION IN KETTLE BOIL	
Measured against standard of using hop cones in 12° P wort, 90-minute boil	
Change	Typical hop utilization, impact on bitterness obtained
Hop cones, 12° P wort, 90 minute boil	20-30% utilization
Hop pellets	Increase, 25-35% utilization
Hop extract	Increase, 30-40% utilization
Increase boil time	Increase
Increase wort pH	Increase
Decrease gravity	Increase
Increase hopping rate	Decrease. Bitterness will increase, but not linearly

Hop utilization is best calculated once the brewer has the bitterness content in the wort analyzed, but the IBU analysis process involves adding a strong acid and iso-octane to the wort, creating and separating an extract, and measuring the absorbance of the extraction with a spectrophotometer at 275 nanometers. This is an expensive and time-consuming process, beyond the abilities of most homebrewers and craft brewers, so instead an estimate is usually used.

Hop utilization generally falls into the range of 20 to 40 percent. Table 9.5 shows how different processes can affect hop utilization.

It's also important to note that utilization

numbers are for wort, and a significant drop in IBUs (as much as 33 percent) occurs during fermentation, because the pH drop as the wort is fermented to beer causes a reduction in the solubility of isomerized alpha acids.

Some critical points regarding hop utilization:

1. Different levels of bitterness will be obtained depending on when you add hops to the boiling wort and how long they are boiled. Published tables approximate the bitterness or utilization obtained by adding hops at different times during the wort boil, but at best, those tables are an approximation, because every brewer has slightly different hop supplies, heat exchange,

boil properties, evaporation rates, and kettle design, all of which will impact utilization and recovered bitterness.

- Utilization is highly dependent on wort gravity. An increase in wort gravity will result in a decrease of hop utilization and recovered bitterness.
- Adding more hops will increase bitterness, but utilization will decrease. The bitterness increase is not linear, and eventually the brewer will hit a point where diminishing returns are obtained. In other words, adding 50 percent more hops will not always result in a 50-percent increase in bitterness.

- For most brewers, a critical balance is necessary to obtain the proper amount of hop flavor and aroma from the kettle hops, vs. extracting hop bitterness. The essential oils responsible for hop flavor and aroma are highly volatile compounds that will be evaporated almost completely with early hop additions. Later hop additions will retain more hop flavor and aroma at the expense of hop utilization and extracting bitterness. Part of the brewer's art is balancing these additions to get a wort with proper bitterness levels and the proper amount of hop flavor and aroma.

CALCULATING BITTERNESS

A typical calculation for determining the bitterness in wort is:

- Calculate the Alpha Acid Units (AAU) from your hop addition in a 10-gallon batch: For example, 8 ounces of Chinook at 13 percent alpha acids = $8 \times 13 = 104$ AAU

$$\text{IBU} = \text{AAU} \times U \times 75/V \text{ where } U = \text{utilization and } V = \text{wort volume} \\ = 104 \times 0.2 \times 75/10 = 156.$$

The problems with this type of calculation are multifold:

- The utilization number is, at best, an estimate. There is research available that provides utilization values for different-gravity worts and different boil times, but these numbers cannot account for different kettle designs, mixing parameters, and other variables that can affect extracting hop bitterness.
- An IBU value of 156 is probably not possible. There is a limit as to how much iso-alpha acid can be extracted in wort. As wort gravity increases, the maximum amount of iso-alpha acids that can be extracted will also increase, but at a much lower utilization rate.
- It is a common misconception that an IBU and the iso-alpha acid content (in ppm) are the same thing. This is not true. A 1-ppm addition of pure iso-alpha acids might increase IBU by only 0.6-1.0, depending on other conditions and variables. Excessive age of, and warm storage conditions for, the hops can cause additions with no measurable iso-alpha acid increase but significant IBU increase, due to oxidation of beta acids during storage.
- Brewers who use their wort calculation to publish the IBUs of their beer are often not accounting for the fact that 25 to 35 percent of their IBUs will drop out of their beer during fermentation. Yeast will absorb some iso-alpha acids. (Yeast recovered from a fermentation often has three to four times the bitterness level of the beer it came from). In addition, the pH reduction (typically from 5.3 to 4.5) reduces the solubility of the iso-alpha acids, and some will precipitate or solidify during the fermentation. This solid hop bittering material is often seen deposited at

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Stone Ruination IPA was the first regularly bottled imperial or double IPA in the world, released in June 2002.

INGREDIENTS

for 5 U.S. gallons (18.93 L)

12.5 lb (5.67 kg) pale two-row malt
12.0 oz (340 g) 15° L crystal malt
1.75 oz (49 g) Columbus pellets, 15% a.a. (90 min)
1.0 oz (28 g) Centennial pellets, 10.5% a.a. (0 min)
2.5 oz (71 g) Centennial pellets (dry)
White Labs WLP007 Dry English ale yeast or WLP002 English ale yeast
Brewing Liquor:
Municipal water (~300 ppm hardness) carbon filtered and reverse osmosis treated to reduce hardness to 100 ppm.

Original Gravity: 17.8 °P (1.071 SG)

Final Gravity: 2.9 °P (1.012 SG)

IBU: 105

ABV: 7.8%

Color: 10 °L (19.7 EBC)

DIRECTIONS

Use an infusion mash with a 30 minute rest at 152° F (67° C), then raise to 165° F (74° C) to mash out for 10 minutes. Use a water-to-grain ratio of 2.93/1 (1.41 qt/lb). Boil 90 minutes. Ferment at 72° F (22° C) until 3.1° P (1.012 SG). Chill to 62° F (17° C) for 24 hours, rack off yeast. Add dry hops, hold for 36 hours, then chill to 34° F (1° C). Hold for 7 days.

EXTRACT VERSION

Substitute pale malt with 9.6 lb (4.35 kg) pale malt extract syrup. Steep crystal malt in 2.5 gallons (11.4 L) of water at 160-170° F (71-77° C) for 30 minutes. Rinse grains, add extract, dissolve completely and proceed with boil.

RUSSIAN RIVER BLIND PIG IPA

Vinnie Cilurzo says about the groundbreaking Blind Pig IPA: "Blind Pig IPA was first brewed in Temecula, Calif., at my first brewery, Blind Pig Brewing Company, in 1994. This version was 92 bittering units and had very little malt with a very forward hop character. In December 1996, I left the brewery and my former business partner continued the brewery for a few years. After the original brewery closed and I was at Russian River Brewing Company, we were able to trademark the name and start making Blind Pig IPA again. The recipe has changed, in that we have added a couple of new hop varieties that were not in existence when the brewery in Temecula was open."

INGREDIENTS

for 5 U.S. gallons (18.93 L)

9.8 lb (4.44 kg) pale two-row malt
6.5 oz (184 g) 40° L crystal malt
5.0 oz (142 g) dextrin malt
0.25 oz (7 g) Columbus pellets, 16% a.a. (90 min)
0.5 oz (14 g) Chinook pellets, 13% a.a. (90 min)
0.5 oz (14 g) Amarillo pellets, 7.5% a.a. (30 min)
0.5 oz (14 g) Cascade pellets, 5.75% a.a. (0 min)
0.5 oz (14 g) Amarillo pellets, 7.5% a.a. (0 min)
0.5 oz (14 g) Centennial pellets, 10.5% a.a. (0 min)
0.5 oz (14 g) Simcoe pellets, 13% a.a. (0 min)
0.5 oz (14 g) Cascade pellets, 5.75% a.a. (dry)
0.5 oz (14 g) Amarillo pellets, 7.5% a.a. (dry)
0.5 oz (14 g) Columbus pellets, 16% a.a. (dry)
California ale yeast (WLP001 or Wyeast No. 1056)
Brewing Liquor:
Santa Rosa, Calif. water with gypsum added.

Original Gravity: 14.25 °P (1.057 SG)

Final Gravity: 3.25 °P (1.013 SG)

IBU: 62

ABV: 6.10%

DIRECTIONS

Mash grains at 153-154° F (67-68° C) for one hour. Ferment at 68° F (20° C). After primary fermentation, dry hop with a blend of Columbus, Amarillo, and Cascade pellets and hold for 10 days.

EXTRACT VERSION

Substitute pale malt with 7.25 lb (3.29 kg) pale malt extract syrup. Steep crystal and dextrin malts in 2.5 gallons (11.4 L) of water at 160-170° F (71-77° C) for 30 minutes. Rinse grains, add extract, dissolve completely, and proceed with boil.

Editor's note: These recipes were converted from percentages into standard style for 5 gallons.

the sides or top of the fermenter after fermentation. The maximum level of IBUs in a 12-14 °P OG beer at pH 4.5 is probably about 80 IBUs.

The best way to know what wort IBUs and beer IBUs are in a given IPA is to measure them analytically, then make adjustments using simple algebra to get to your desired level. Unfortunately, this analysis is beyond the means of most small brewers, so an estimate remains the best way to determine IBUs for most brewers. There are many brewing calculation programs available that do a nice job of estimating IBU values.

HOPPING TECHNIQUES IN THE BREWHOUSE

Although almost all brewers continue to utilize the wort kettle for adding their hops and extracting bitterness, flavor, and aroma, hops can be used in other brew-house vessels as well.

Mash Hopping

In this technique, whole hops or hop pel-

lets are added directly to the mash. This apparently was a common practice in the early twentieth century, and the theory is that the higher pH in the mash and the presence of oxygen allow the volatile compounds in the hops to form oxidation products with components in the malt. The resulting compounds are not volatile and remain in the wort throughout the lautering and kettle boil process, and lend a "more rounded" depth of hop flavor to the beer.

Unfortunately, most brews that are mash-hopped involve recipes with high amounts of hopping elsewhere in the process, so any flavor gain would be hard to detect through sensory analysis. Whole hops would be the hops of choice here, because the leaves may help in lautering, but pellet hops would work also.

First-Wort Hopping

First-wort hopping is similar in theory to mash hopping. Hops are added to the first wort in the kettle, and during the time it takes to fill the kettle, the volatile flavor

components are bound to the malt components in the wort. In addition, the hops' longer contact time with the wort at the higher pH increases utilization, resulting in higher bitterness levels. This technique also has the advantage of helping to reduce foaming during the start of boil. As with mash hopping, the desired hop product to use here would most likely be whole hops or pellets. A good-quality, high alpha hop with desired flavor and aromatic properties would be best for this stage.

Kettle Hopping

Almost every brewer adds hops during the kettle boil. Hopping regimens during the kettle boil differ among all brewers but typically involve one to three additions at different stages of the kettle process.

Invariably, brewers will add a significant portion of their hops at the start of the wort boil. This so-called "bittering hop addition" is considered by most brewers to contribute very little in the way of flavor and aroma, as most of the volatile oils and other flavor compounds are boiled

TABLE 9.6

IPA RECIPES					
SUGGESTED RECIPE GUIDELINES					
		English IPA	American IPA	Double IPA	Black IPA
MALTS	Pale Malt %	85-100	85-97	95-100	88-95
	Crystal Malts used	15-40°L	10-60°L	10-20°L	10-20°L
	Typical Crystal %	0-10	3-15	0-5	5-10
	Adjuncts	Maize, Sugar	none	Dextrose, Candi Sugar	none
	Adjunct %	0-15	none	0-10	none
	Roasted Malts	Munich (0-10%)	Munich (0-10%)	none	Dehusked Black Malt, Black Malt Extract (3-7%)
MASHING	Mash conversion Temperature	150-155°F (66-68.3°C)	148-153°F (64-67°C)	148-150°F (64-66°C)	148-153°F (64-67°C)
	Mash Conversion Time	15-30 minutes	15-60 minutes	60-120 minutes	15-120 minutes
	OG	1.050-1.075	1.050-1.075	1.075-1.090	1.056-1.072
	Fermentability	70-80%	75-82%	80-86%	75-82%
	TG	1.012-1.018	1.010-1.016	1.008-1.015	1.012-1.018
	ABV Target	5.7%	6.3-7.5%	7.5-10.5%	6-7.5%
HOPPING	Typical Hopping Rates:				
	Pounds per barrel	0.75-2.5	0.75-2	3.5-8	1.5-4
	Ounces per Gallon	0.4-1.3	0.4-1.1	1.8-4.2	0.8-2.1
	Recommended Hop Varieties	EKG, Fuggle, Target, Sovereign, Styrian Golding	4 C's, Citra, Simcoe, Amarillo, Sterling	4 C's, Citra, Simcoe, Amarillo, Sterling, Nelson Sauvin	4 C's, Citra, Simcoe, Amarillo

FIRESTONE WALKER UNION JACK IPA

Firestone Walker brews some of the best West Coast IPAs. Brewmaster Matt Brynildson worked for a time with noted hop processor Kalsec, and Matt also is a Siebel grad who brewed for Goose Island in Chicago before moving to California. He has brought a lot of technical expertise to the beers at Firestone Walker and uses his experience to craft some of the best hoppy ales and blended, wood-aged ales as well. He also is the only brewer in the United States who replicates the Burton Union fermentation system by doing a modified version of the primary fermentation in oak barrels.

INGREDIENTS for 5 U.S. gallons (18.93 L)

10.75 lb	(4.88 kg) pale two-row malt
12.0 oz	(340 g) Munich malt
6.0 oz	(170 g) dextrin malt
6.0 oz	(170 g) Simpson 30°/40° L crystal malt
0.5 oz	(14 g) Magnum pellets, 14% a.a. (60 min)
0.25 oz	(7 g) Warrior pellets, 16% a.a. (60 min)
1.0 oz	(28 g) Cascade pellets, 6% a.a. (30 min)
1.0 oz	(28 g) Centennial pellets, 10.5% a.a. (15 min)
1.0 oz	(28 g) Cascade pellets, 6% a.a. (0 min)
1.0 oz	(28 g) Centennial pellets, 10.5% a.a. (0 min)
1.0 oz	(28 g) Cascade pellets (1st dry)
1.0 oz	(28 g) Centennial pellets (1st dry)
0.25 oz	(7 g) Amarillo pellets (1st dry)
0.25 oz	(7 g) Simcoe pellets (1st dry)
1.0 oz	(28 g) Cascade pellets (2nd dry)
1.0 oz	(28 g) Centennial pellets (2nd dry)
0.25 oz	(7 g) Amarillo pellets (2nd dry)
0.25 oz	(7 g) Simcoe pellets (2nd dry)
London ale yeast	
Brewing Liquor:	
Reverse osmosis-filtered water treated with calcium (in the form of calcium chloride and/or gypsum) to take total calcium above 100 ppb. Acidify by adding phosphoric or lactic acid to achieve mash pH of 5.4.	

Original Gravity: 16.5° P (1.066 SG)

Final Gravity: 3.0° P (1.012 SG)

IBU: 75 in finished beer

ABV: 7.5%

Color: 8° L (15.2 EBC)

DIRECTIONS

Matt likes to use some Munich malt in his grain bills to get an English malt character. At times he will lighten the color and body with a small (up to 5%) dextrose addition, which will allow the hop flavor to be accentuated. Mash grains using a two-step infusion mash with rests at 145° F (63° C) for 45-60 minutes, and at 155° F (68° C) for 20-30 minutes. After the boil, cool wort to 63° F (17° C). Pitch with a London ale strain or another soft and fruity ale yeast. Ferment at 66° F (19° C). At 6° P, allow temperature to rise to 70° F (21° C) for VDK reduction and dry hopping. Rack off primary hops and yeast, add dry hops, and hold for three days of contact time. Rack, dry hop again with equal amounts of the same blend, and hold for three days maximum before crash cooling. Matt is a big believer in short contact time with dry hops. (Matt adds that the beer should be racked to a well-purged [CO₂] vessel, and that the racking between dry hops can be omitted if oxygen pickup is an issue.)

EXTRACT VERSION

Substitute pale and Munich malt with 9 lb (4.08 kg) pale malt extract syrup. Steep dextrin and crystal malts in 2.5 gallons (11.4 L) of water at 160-170° F (71-77° C) for 30 minutes. Rinse grains, add extract, dissolve completely, and proceed with boil.



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off. Many IPA brewers use a high-alpha bittering hop, such as Warrior, Magnum, Summit, or Apollo, for this addition. This would also be the place to use a hop extract, if so desired.

Subsequent hop charges later in the boil are often termed "flavor" and/or "aroma" hop additions, with the later additions thought to retain those volatile essential oil compounds contributing mostly to aroma. It should be noted that bitterness is also obtained by these additions, though not at such a high utilization rate as that first addition. Brewers select single hop varieties or combinations of hop varieties to get the desired flavor, aroma, and bittering contributions from these additions. Typically, when brewing an IPA, more aromatic high alpha hop varieties such as Centennial, Cascade, Simcoe, and Amarillo can be used for these additions. Using low-flavor hops such as Nugget, Magnum, or Perle is not recommended.

Hopback Hopping

For brewers who use whole hops, a hopback is an important vessel for facilitating the removal of leaf hop material from the wort after the kettle boil. Brewers

can fill the hopback with hops, and as they run the wort through the hopback, these additional hops not only help filter the wort of spent hops and trub, but also contribute a significant amount of hop flavor and aroma.

Typically, a brewer would use only the highest quality aromatic hops for this step, as bitterness extraction is of secondary importance here. With wort temperatures falling below boiling levels, recovery of aromatic and flavorful essential oils will be maximized.

Whirlpool

Many brewers, regardless of whether they whirlpool in a separate vessel or in their kettle, use this trub separation step for adding more flavor and aroma hops. It may surprise some that a significant amount of bitterness (as much as 20 to 30 percent of the total) will also be obtained with this hop addition. Remember that isomerization of hop alpha acids to iso-alpha acids will occur at temperatures above 185° F (85° C).

Hop pellets are the hop product of choice in the whirlpool, because whole hops would require the use of a porous bag or

other container, and extracts would not have the desired aromatic qualities.

Dry Hopping

Dry hopping is what sets apart the IPA from most other beer styles. Dry hopping is the practice of adding hops to the aging tank, serving vessel, or cask and allowing the hops to steep in the beer to get significant fresh hop flavors without imparting additional bitterness.

Most craft brewers and homebrewers will dry hop their beer after primary fermentation is complete. This is an effective technique, allowing brewers to maximize the flavors obtained from hops and also allowing for removal of the hops prior to packaging the beer.

Most brewers avoid adding hops during fermentation, as much of the hop character can be absorbed by the actively fermenting yeast, and the efficiency of the dry hop is reduced. In addition, waiting to dry hop allows for repitching of the primary fermentation yeast, if so desired. When using conical fermenters, yeast can be collected in the cone and removed prior to adding the dry hops. When fermenting in carboys, racking the beer off the settled yeast is rec-

ODELL IPA

INGREDIENTS FOR 5 U.S. GALLONS (18.93 L)

10.25 lb (4.65 kg) pale two-row malt
15.5 oz (436 g) caramel malt
14.0 oz (397 g) Vienna malt
2.0 oz (56 g) honey malt
0.5 oz (14 g) Chinook pellets, 13% a.a. (60 min)
0.75 oz (21 g) Amarillo pellets, 7.5% a.a. (60 min)
0.75 oz (21 g) whole "mystery hop" (hop back)
0.75 oz (21 g) whole Centennial, 10.5% a.a. (hop back)
0.25 oz (7 g) whole Columbus, 15% a.a. (hop back)
0.5 oz (14 g) Chinook pellets, 13% a.a. (dry)
0.5 oz (14 g) Centennial pellets, 10.5% a.a. (dry)
0.25 oz (7 g) Columbus pellets, 15% a.a. (dry)
Odell's house yeast, strong top cropper with medium attenuation and low-medium flocculation characteristics
Brewing Liquor:
Ft. Collins, Colo. municipal water. Odell adds gypsum to its untreated municipal brewing water to mimic Burton water. MgSO₄ and NaCl are also added in much lesser amounts.

Original Gravity: 16.4 °P (1.066 SG)

Target Gravity: 3.2 °P (1.013 SG)

IBU: 60

ABV: 7%

Color: 9.5 °L (18.1 EBC)

DIRECTIONS

Mash grains at 153-154° F (67-68° C) for one hour. Use a hop back if possible, or steep whole hops at knockout. Ferment at 68° F (20° C). After primary fermentation, dry hop with a blend of Chinook, Centennial, and Columbus pellets.

EXTRACT VERSION

Substitute pale and Vienna malt with 8.65 lb (3.92 kg) pale malt extract syrup. Steep caramel and honey malts in 2.5 gallons (11.4 L) of water at 160-170° F (71-77° C) for 30 minutes. Rinse grains, add extract, dissolve completely, and proceed with boil.

ommended prior to dry hopping.

There is a considerable amount of debate over whether pellet hops or whole hops should be used for dry hopping. Many brewers feel that whole hops will give a better "fresh hop" character to their beers. My experience has been that with the technical improvements in controlling temperature during pelletizing, the dry-hop character obtained from pellet hops is comparable, and in some cases superior, to that achieved from using whole hops.

Dry-hop residence time needs to be monitored closely. Allowing hops to steep in beer for excessive time can result in "stemmy" and vegetative flavors in the beer, which can mask the more pleasant essential oil flavors. Most brewers limit dry-hop contact time to five to 15 days, and recent research indicates that maximum flavor extraction from the hops happens in just a few days.

Some brewers further maximize hop flavor by using multistage dry-hopping techniques, removing the first charge of dry hops and adding a second or even third charge prior to packaging. Another technique is to dry hop both in the secondary and in the finished/bright beer tank.

FINAL THOUGHTS ON FORMULATING A HOP RECIPE

Single-Stage Additions vs. Multiple Additions

At one extreme is Stone Brewing Company, which uses one bittering hop addition and one flavor hop addition in the whirlpool for Stone IPA and Stone Ruination IPA. At the other extreme are beers like Dogfish Head IPAs and Port Hop 15, for which the hops are added continually or in many stages. Both techniques produce exceptional IPAs. Practicality plays a role in the decisions on whether to use multiple additions, as does flavor.

Blending Hops

Several breweries make excellent IPAs using single hop varieties, and these are great beers for gauging the flavors a particular hop variety will add to a beer. Weyerbacher's Simcoe Double IPA is a good example.

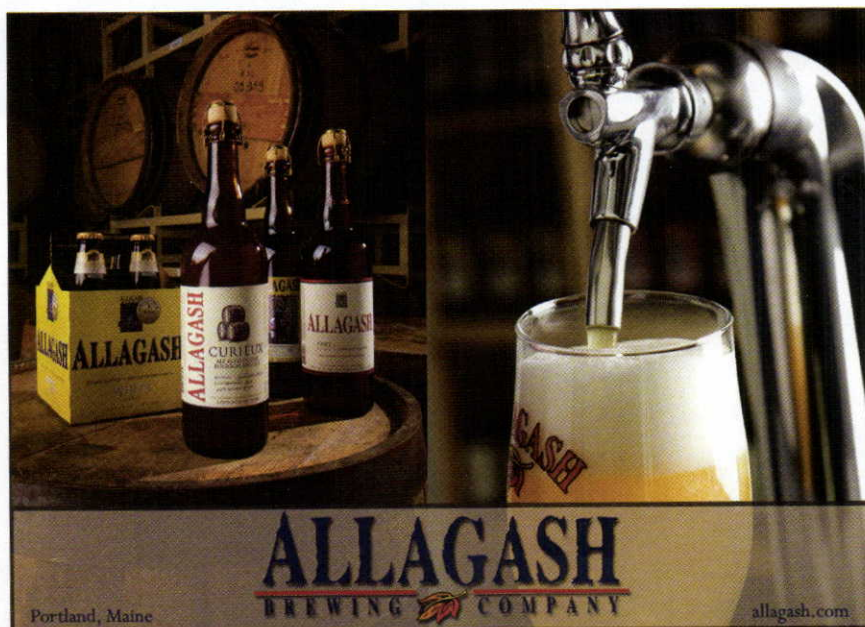
Port's Hop 15 is a great example of using many hop varieties to get great IPA flavor. The goal for most brewers who use this technique is to get hop flavor depth and complexity. One advantage of blending hops, especially the flavor hops and dry hops, is that if you can't obtain a specific variety, reasonable substitutions can be made to approximate the desired flavor.

Overhopping

There is a limit to how much iso-alpha acid can be extracted into wort. The maximum bitterness level is dependent

on wort gravity (higher gravity worts can be more bitter). Brewers of extreme beers often will add more hops than can possibly contribute to additional bitterness, but important hop flavors are extracted from these hops. Too many hops can result in excessive vegetative flavors, so be careful—more is not always better!

Mitch Steele is the brewmaster at Stone Brewing Co. in Escondido, Calif. He was formerly an assistant brewmaster/new products manager at Anheuser-Busch, Inc.



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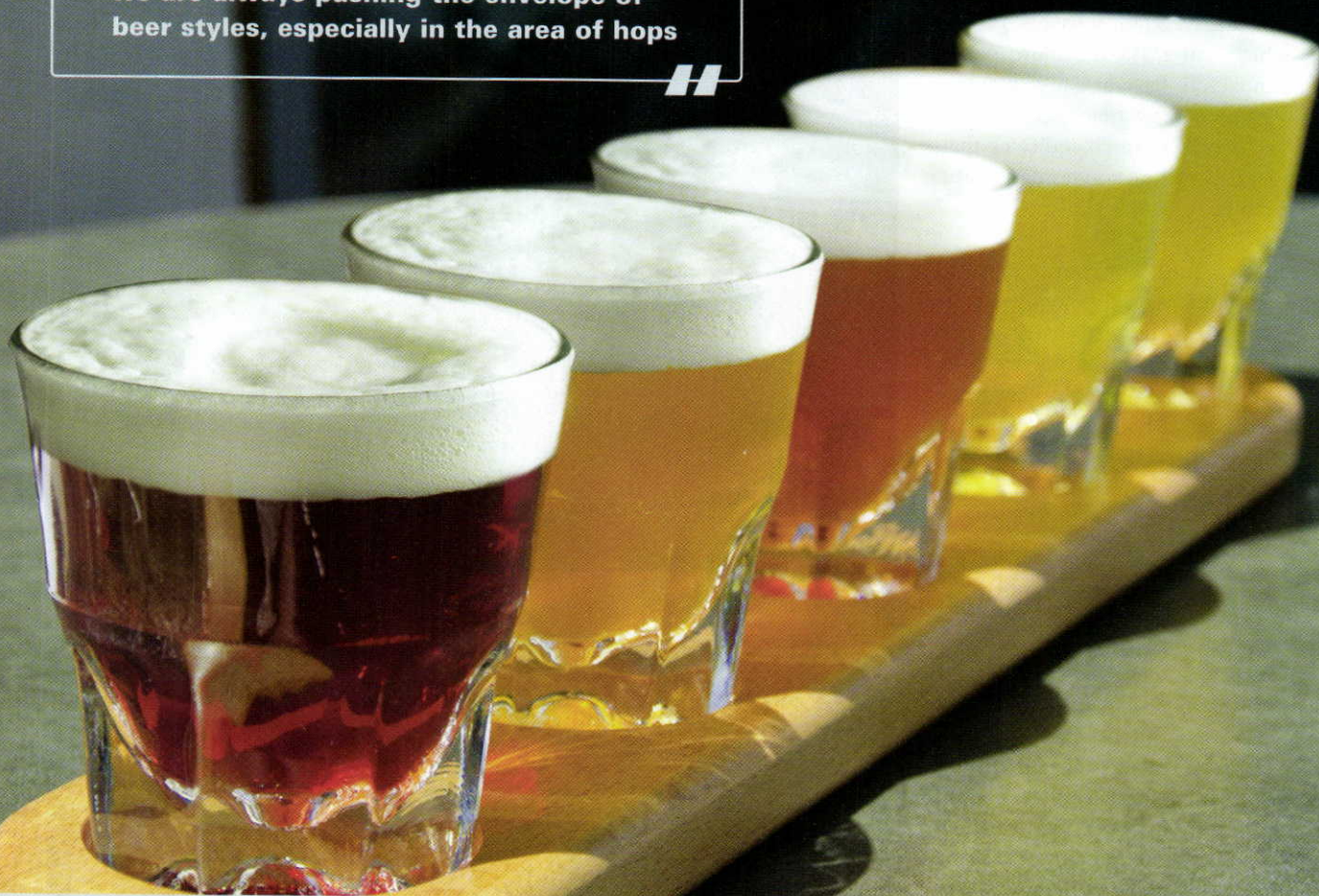
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beer styles, especially in the area of hops

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The **COLORS** of IPA

India Pale Ale is an amazing style of beer that is constantly evolving in colors and flavors, providing myriad hoppy choices. This, coupled with its addictive lupulin qualities, makes it easy to understand why IPA is one of the most sought-after and talked-about styles in the American craft beer scene.

This is also true here at Pagosa Brewing & Grill. IPA has become our most popular beer style, and more customers switch over to it every day. With the increased demand for hoppy beers, we are able to regularly experiment with more and different kinds of hops. Beyond our flagship Powder Day IPA® and Cask IPA, we have created series of beers for head-to-head comparisons of hoppy/bitter wonderfulness. These include Single Hop IPA, Imperial IPA, Red IPA, and Imperial Black IPA. In this article, I will cover how the latter two IPA styles were crafted.

When designing any IPA, the biggest challenge is balance. It's easy to whip up a giant hop bomb that scorches your taste buds. And sure, it's fun to experience that over-the-top sensation. But in reality, quaffability is what makes a beer more enjoyable. We strive to create beers that not only taste great as they first crest your palate, but make you crave another pint...or two!

RED IPA

Our Shreddin' Red is a good example of a quaffable beer. We wanted to craft a red IPA with more malt complexity and even more hop intensity than our Powder Day IPA, but still have it be an easy drinking pint. For a change of perspective, we decided to begin developing the recipe based on our hop selection rather than the malt bill. We chose big, high-alpha hops like Columbus, Nugget, and Chinook. To balance that hop concentration, we then selected two different types of caramel/crystal malts to provide a counterpoint of flavor. Due to those rich caramel malts, we opted to keep the base malts simple. Finally, we added a touch of black malt to achieve a beautiful red color and crisp finish.

We are very happy with the results of our Shreddin' Red recipe. The balance is awesome—not too sweet and not too bitter. Our customers love it too, especially paired with our grilled Reuben sandwich. They drank the heck out of our first 170-gallon batch, which was quaffed (mostly by the pint) in a mere two weeks!

BY TONY SIMMONS

SHREDDIN' RED (RED IPA)

With a beautiful red/amber color, Shreddin' Red has an amazing hop punch and a great malt balance, making for an easy-drinking pint. Pairs well with grilled Reuben sandwiches.

INGREDIENTS for 5 U.S. gallons (18.93 L)

7.0 lb (3.18 kg)	two-row malt
3.0 lb (1.36 kg)	Vienna malt
12.0 oz (340 g)	CaraMunich II malt
8.0 oz (226 g)	60° L crystal malt
1.5 oz (42 g)	dehusked black malt
0.5 oz (14 g)	whole Columbus, 14.80% a.a. (mash hops)
0.25 oz (7 g)	Nugget, 13.3% a.a. (first wort)
0.25 oz (7 g)	Chinook, 13.0% a.a. (90 min)
0.5 oz (14 g)	Nugget, 13.3% a.a. (60 min)
0.5 oz (14 g)	Cascade, 7.6% a.a. (15 min)
0.5 oz (14 g)	Northern Brewer, 8.1% a.a. (10 min)
0.5 oz (14 g)	whole Columbus, 14.80% a.a. (whirlpool)
0.25 oz (7 g)	whole Columbus (dry hop)
0.5 oz (14 g)	whole Nugget (dry hop)
0.5 oz (14 g)	whole Centennial (dry hop)

White Labs WLP002 English ale yeast

NOTE: You can try a more attenuative yeast like WLP001 California, but don't let it get too dry.

Boil Time: 90 minutes

Original Gravity: 1.058 (14.4° P)

Final Gravity: 1.011 (2.8° P) – 80% attenuation (goal)

IBU: 86.4

SRM: 14.5

Brewhouse Efficiency: 75%

DIRECTIONS

Mash grains at 152° F (67° C) for 45 minutes. Ferment at 68° F (20° C).

EXTRACT VERSION: Substitute 3.3 lb (1.49 kg) pale liquid malt extract and 3 lb (1.36 kg) light dry malt extract for the two-row and Vienna malts. Steep remaining grains at 156° F (69° C) water for 30 minutes with mash hops and first wort hops, strain, add malt extract, bring to boil, and proceed with recipe above.

Recipe provided by Tony Simmons

DOUBLE BLACK (IMPERIAL BLACK IPA)

The most extreme and yet deceptively quaffable IPA we've ever crafted, Double Black is not for the faint of heart. First featured during the Opening Reception at the Big Beers Festival in Vail in January 2012, it pairs well with spicy pork empanadas.

INGREDIENTS for 5 U.S. gallons (18.93 L)

11.0 lb (4.99 kg)	U.K. Maris Otter pale malt
2.0 lb (0.9 kg)	flaked barley
1.0 lb (0.45 kg)	cane sugar
1.0 lb (0.45 kg)	U.K. roasted barley
1.0 lb (0.45 kg)	special B malt
8.0 oz (227 g)	chocolate malt
1.25 oz (35 g)	whole Columbus, 15% a.a. (mash hops)
1.0 oz (28 g)	Summit, 16.3% a.a. (first wort)
0.5 oz (14 g)	Magnum, 14.40% a.a. (90 min)
0.5 oz (14 g)	Summit, 16.3% a.a. (75 min)
0.5 oz (14 g)	Chinook, 10.1% a.a. (60 min)
0.25 oz (7 g)	Magnum, 14.40% a.a. (45 min)
0.5 oz (14 g)	Chinook, 10.1% a.a. (30 min)
0.25 oz (7 g)	Magnum, 14.40% a.a. (15 min)
1.0 oz (28 g)	Simcoe, 12.3% a.a. (1 min)
1.0 oz (28 g)	Centennial, 8.0% a.a. (whirlpool)
1.0 oz (28 g)	Chinook (dry hop)
0.5 oz (14 g)	Columbus (dry hop)
0.5 oz (14 g)	Amarillo (dry hop)

White Labs 001 California Yeast (with large starter)

Original Gravity: 1.089 (21.28° P)

Final Gravity: 1.012 (3° P) – 85% attenuation (goal)

SRM: 55.7

IBU: 191 (calculated)

Boil Time: 90 minutes

Brewhouse Efficiency: 75%

DIRECTIONS

Mash grains at 153° F (67° C) for 60 minutes. Ferment at 68° F (20° C).

NOTES: Be aware that you will lose quite a lot of wort to the massive amount of hops. If you can exceed 75% efficiency, try to collect extra wort. But don't over-sparge. You will need to use a yeast starter for this brew. If possible, use pure oxygen when pitching yeast to reduce the ester profile.

EXTRACT VERSION: Substitute 6.6 lb pale liquid malt extract and 1.5 lb light dry malt extract for Maris Otter malt. Steep remaining grains at 156° F (69° C) water for 30 minutes with mash hops and first wort hops, strain, add malt extract, bring to boil, and proceed with recipe above.

Recipe provided by Tony Simmons

DOUBLE BLACK IPA

This IPA was a "challenge" from our friends at the Big Beers, Belgians and Barleywines Festival in Vail, Colo. who dared us to create a big beer that had not yet been produced commercially: an imperial black IPA. We pondered the notion...it's more than just an imperial IPA with a dark color, but it's not an imperial stout. We wanted both distinct black malt flavors and big hop sensations, which is tricky because high levels of roasted malts and hops have a tendency to fight each other. Furthermore, there is also an issue of diminishing returns. As you add more black roasted malts, you lose hop flavor, which throws off the balance. Nevertheless, we accepted the challenge with gusto.

Since there was nothing to compare it to, we started off by blending various big hoppy and black beers in pints to see if we could achieve an imperial black IPA. We discovered right away that we would need just the right proportion of black malts, hop flavor, hop bitterness, and alcohol to achieve the specific flavor profile we were seeking.

We chose Maris Otter malt to provide enough malt depth to hold up all the other intense flavors. For black malt, we found that UK roasted barley had the smoothest flavor profile. We included some flaked barley to provide a certain level of creaminess to offset the potential for astringent flavors from the large quantities of black malt. We added some cane sugar to increase the gravity and lighten the body slightly.

When it came to hops, we went a little bit crazy, but it worked. We added a ton of bittering hops, achieving a calculated 191 IBUs. While it's technically a waste of hops and experts debate if it can really be that bitter, this volume of hops does provide an incredible intensity of hop flavor, which blended seamlessly with the black malt.

It turned out to be one of the most extreme, and yet deceptively quaffable, IPAs we've ever crafted. As such, we called it Double Black, and it is not for the faint of heart. It has an amazing balance

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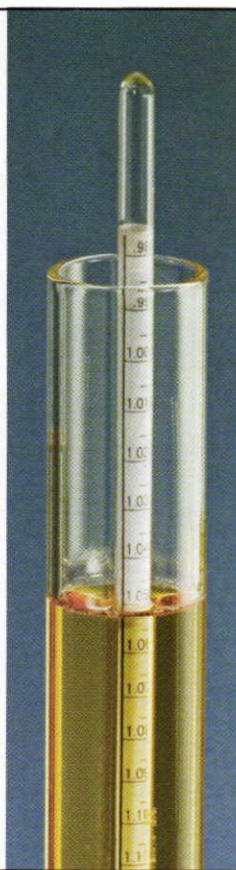
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of black malts and hops with an intense depth of character of rich malts, yet it is not too heavy. It was an enormous success at the opening reception of the 2012 Big Beers Festival, paired with spicy pork empanadas.

So, in the world of IPA you might ask, "What's next?" Well, we are always pushing the envelope of beer styles, especially in the area of hops. We've been testing how certain hop compounds meld with other unique flavors, such as herbs. Our latest Cask IPA combines classic citrusy hops and blue spruce berries. The two flavors work surprisingly well together. I guess you could call it a Blue IPA! The bottom line is that the only limit to the colors of IPA is your imagination.

Tony Simmons is the founder and head brewer of national award-winning Pagosa Brewing Company & Grill in Pagosa Springs, Colo. Tony graduated from the Siebel Institute in Chicago and the World Brewing Academy in Munich, Germany.



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Pushing the Boundaries: **WHITE IPA**

BY BRIAN FAIVRE

White IPA? Well, it was bound to happen. America's love of hops could only continue in a linear fashion for so long.

Back in the earlier days of craft brewing, the traditional English IPA was the style known for the most abundant use of hops in the brewing industry. Then it seemed that American craft brewers were itching for something new. They had brewed all the classic styles. They were blessed with quality hops grown in America. So they did what any good homebrewer would do—they pushed the limits and added more hops, which led to the birth of the American IPA and the variations that we have come to expect and love today.



CHAINBREAKER WHITE IPA CLONE

INGREDIENTS for 5 U.S. gallons (18.93 L)

6.5 lb (2.95 kg)	Pilsner malt
2.25 lb (1 kg)	wheat malt
23.0 oz (652 g)	white unmalted wheat flakes
5 ml	lactic acid
0.75 oz (21 g)	Bravo pellets, 15% a.a. (60 min)
5.0 oz (141 g)	dextrose (30 min)
	kettle finings (30 min)
0.12 oz (3 g)	fresh ground coriander (5 min)
0.34 oz (10 g)	fresh ground bitter orange peel (5 min)
1.0 oz (28 g)	Citra pellets (knockout)
1.0 oz (28 g)	Centennial pellets (knockout)
0.5 oz (14 g)	Cascade pellets (knockout)
yeast nutrient (optional)	
Wyeast 3787 Trappist High Gravity ale yeast	

Boil Time: 60 minutes

Original Specific Gravity: 1.057 (14° P)

IBU: 55

SRM: 4-6

ABV: 5.75%

DIRECTIONS

Perform a multi-stage infusion mash with rests at 125° F (52° C) for 15 minutes, 145° F (63° C) for 15 minutes, 163° F (73° C) for 20 minutes and 172° F (78° C) for 5 minutes. Ferment at 66° F (19° C) for two days, then allow temperature to rise to 74° F (23° C) until fermentation is complete. Drop to 42° F (6° C), rack and condition 5 to 7 days before packaging.

EXTRACT VERSION: Substitute 5.25 lb (2.38 kg) pale malt extract syrup for the pils malt and 2.5 lb (1.13 kg) wheat malt extract syrup for the malted and unmalted wheat. Be sure to dissolve extracts completely before proceeding with the boil.

Recipe provided by Brian Faivre

CONFLUX #2 CLONE

INGREDIENTS for 5 U.S. gallons (18.93 L)

7.0 lb (3.18 kg)	Pilsner malt
3.0 lb (1.36 kg)	wheat malt
29.0 oz (822 g)	white unmalted wheat flakes
4.0 oz (113 g)	flaked oats
5 ml	lactic acid
0.82 oz (23 g)	Bravo pellets, 15% a.a. (60 min)
4.0 oz (113 g)	dextrose (30 min)
	kettle finings (30 min)
0.17 oz (5 g)	fresh ground coriander (5 min)
0.25 oz (7 g)	fresh ground bitter orange peel (5 min)
1.5 oz (42 g)	Citra pellets (knockout)
1.0 oz (28 g)	Centennial pellets (knockout)
1.0 oz (28 g)	Cascade pellets (knockout)
0.75 oz (321 g)	fresh lemongrass (in secondary)
0.25 oz (7 g)	fresh sage (in secondary)
yeast nutrient (optional)	
Wyeast 3463 Forbidden Fruit ale yeast	

Boil Time: 60 minutes

Original Specific Gravity: 1.070 (17° P)

IBU: 55

SRM: 5-8

ABV: 7%

DIRECTIONS

Perform a multi-stage infusion mash with rests at 125° F (52° C) for 10 minutes, 130° F (54° C) for 20 minutes, 140° F (60° C) for 30 minutes, 160° F (71° C) for 15 minutes, and 172° F (78° C) for 5 minutes. Ferment at 65° F (18° C) for two days, then allow temperature to rise to 74° F (23° C) until fermentation is complete. Drop to 42° F (6° C), rack on to fresh herbs and condition 5 to 7 days before packaging.

EXTRACT VERSION: Substitute 7 lb (3.18 kg) pale malt extract syrup for the Pils malt and 2.5 lb (1.13 kg) wheat malt extract syrup for the malted and unmalted wheat. Omit oats. Be sure to dissolve extracts completely before proceeding with the boil.

Recipe provided by Brian Faivre

At Deschutes Brewery, we strive to push the envelope and develop the next great beer you've never had. This is the attitude we took—and found equally matched—when we collaborated with Boulevard Brewing Co. in developing Conflux #2, our take on what eventually became stylized as a White IPA. We combined Boulevard's expertise of wheat beer and Belgian brewing with our passion and knowledge of hops. The result evolved into a modified year-round Deschutes beer that we call Chainbreaker White IPA.

THE INGREDIENTS

Our white IPA malt bills are composed of Pilsner malt, pale wheat malt, and unmalted wheat. We occasionally use flaked oats to add a bit of smooth, creamy mouthfeel. We have also been experimenting with dextrose as an additional carbohydrate source in these beers to increase the ABV and dry them out slightly.

Our hop bill is fairly simplistic—we use Bravo in our first addition for bittering. We don't really see a point in mid to late kettle hopping for this beer. We really want it to have a nice bitterness with an amazing hop aroma, so we choose to hold off any additional hopping until it enters our hopback. We make up for the lack of hop additions in the kettle by overloading our wort stream with copious amounts of hopback hops.

If you have not used Citra hops yet, I insist you place an order today for your next brew—once you use them, you'll see why we love them so much. We add Citra, Cascade, and Centennial hops at various points between knockout and fermentation. To appease the style gods, we add freshly ground bitter orange peel and coriander during the last five minutes of the boil. To annoy them, we spice with fresh sage and lemongrass post fermentation. We like to use Wyeast 3787 Trappist High Gravity and 3463 Forbidden Fruit for fermenting these beers.


The Process

We use lactic acid in our mash-in process and start with a protein rest. We then typically employ two additional rests close to 145° F (63° C) and 160° F (71° C) prior to mashing out. Lautering is fairly straight-

forward with these beers. As I mentioned, we utilize a first hopping at the start of kettle fill to get BUs. We add our kettle coagulant and dextrose about 30 minutes prior to the end of boil. The last five minutes of the boil, we add our freshly ground coriander and bitter orange peel. Then at various points between transferring from the kettle to the hop back to the whirlpool to the fermenter, we inject abundant amounts of Citra, Cascade, and Centennial hops. We start our fermentation with hopped wort close to 66° F (19° C) and one-fourth of the way through fermentation, based on the apparent degree of fermentation (ADF), we like to let the fermentation naturally rise to 74° F (23° C) to accentuate the beer's ester profile. After fermentation and diacetyl rest, we cool to only 42° F (6° C) prior to racking, as we try to keep a decent amount of yeast cells in this beer.

Most homebrewers probably don't have the luxury of using a centrifuge to dial in the desired amount of haze and yeast carried over from the fermenter. I'd recommend pulling a small sample after dropping the beer to 42° F. Transfer to conditioning once you have a visual acceptance, or what we like to call using "magic eyes." The bright tank, also kept at 42° F, is where we add sage and lemongrass. Start tasting small samples every day or so and move off the herbs once you've found a flavor profile you like. For us, this is typically five to seven days. After bottling or kegging, you'll have a hell of time keeping your yeast haze in suspension, so remember to give that last third or so of the bottle a nice swirl before emptying in your glass or give your corny a good roll every once in a while.

Don't be afraid to veer off course. Get your basic guidelines down and then ditch your recipe/style books. Figure out what flavors you love and want to portray in your beers, and then take some risks. Let's continue the ongoing evolution of the IPA!

Brian Faivre is the co-brewmaster at Deschutes Brewery in Bend, Ore. 



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By Mike Hamill

As a mountain guide on the largest, most punishing peaks in the world, my work takes me to all seven continents and the most exotic locales on earth. Although I am very passionate about climbing, I have another love: brewing and drinking good beer. The latter recently led me to explore uncharted territory and pursue a goal I wasn't sure was attainable: to brew the highest batch of beer in history at base camp of the world's tallest peak, Mt. Everest.

Brewing Adventure

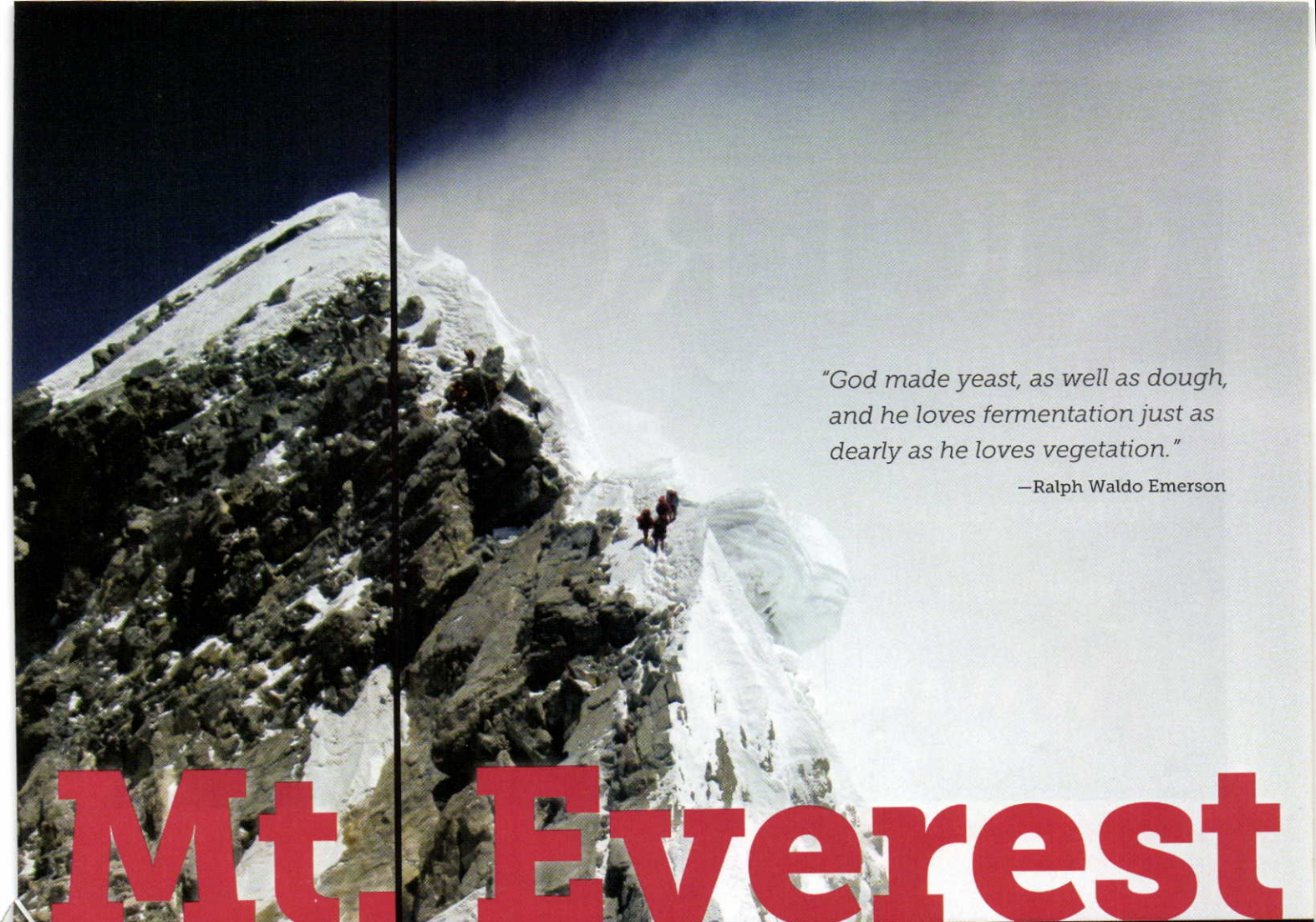
The relationship between beer and adventure extends further back than many realize, and it was my aim to perpetuate this healthy relationship by homebrewing on this storied mountain. As all brewing history buffs know, beer making is as old as civilization itself. As soon as ancient Mesopotamians began cultivating wild grains and domesticating animals in more sedentary communities of the Fertile Crescent as early as 10,000 BCE, humans began brewing, and it quickly became an important part of daily

life. Back then, I'm sure beer helped to provide our ancestors with an excuse to congregate and drown their sorrows as it does today, but it most importantly facilitated travel over vast distances. Beer was a portable form of nutritious calories that would remain safe to drink for long periods of time; for that reason, it became the drink of choice for adventurers. Think of it as a liquid, alcoholic energy bar.

In the modern era, the first thing climbers do when finished with a long, arduous, death-defying expedition is reach for a cold one back at the pub whether in England, the United States, or the mighty Himalaya. One of the world's great mountaineers, Don Whillans, once remarked that the best way to train for the rigors of extreme altitude mountaineering was to get drunk and climb hung-over the next day to simulate the oxygen-starved environment. Legendary mountain men such as Whillans and Joe Brown finished pints as easily as they conquered hard British gritstone rock climbing routes. Tales of climbers' love of beer, such as the

Homebrewing on

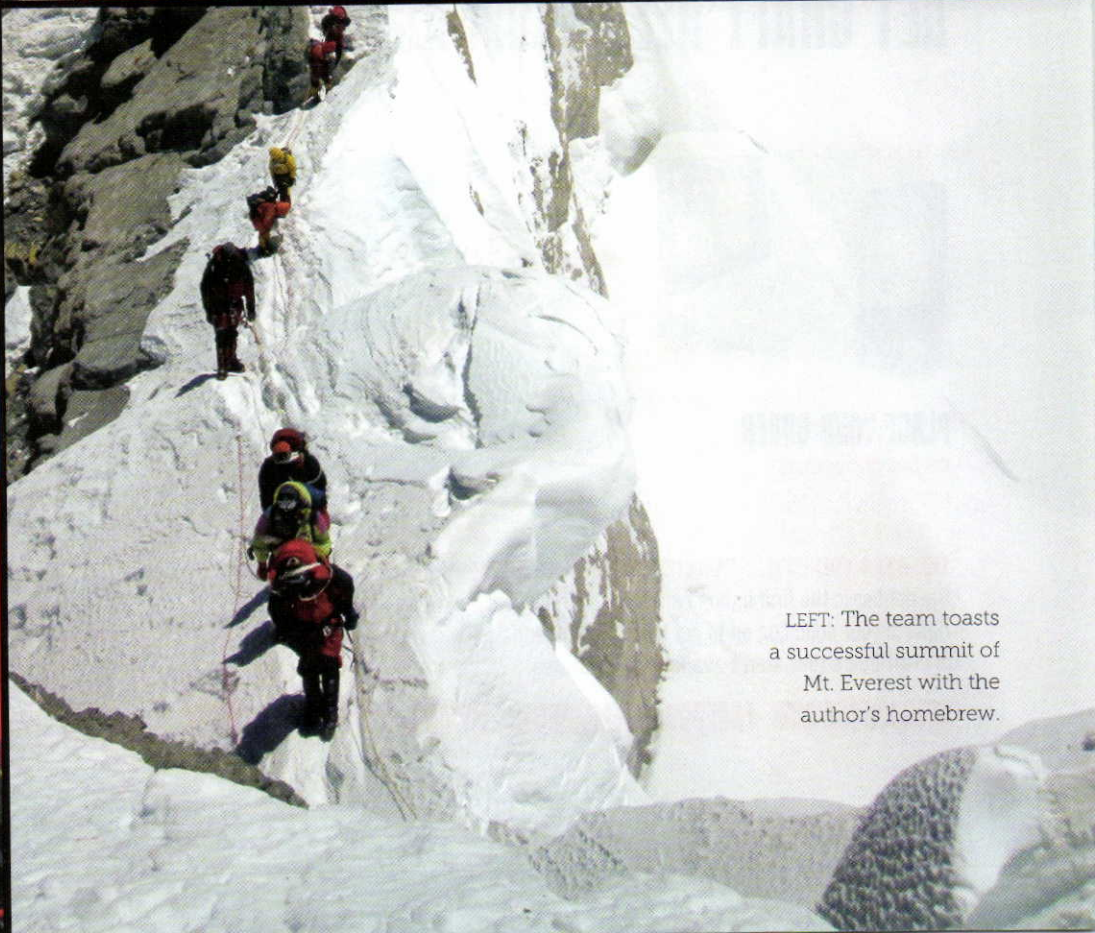
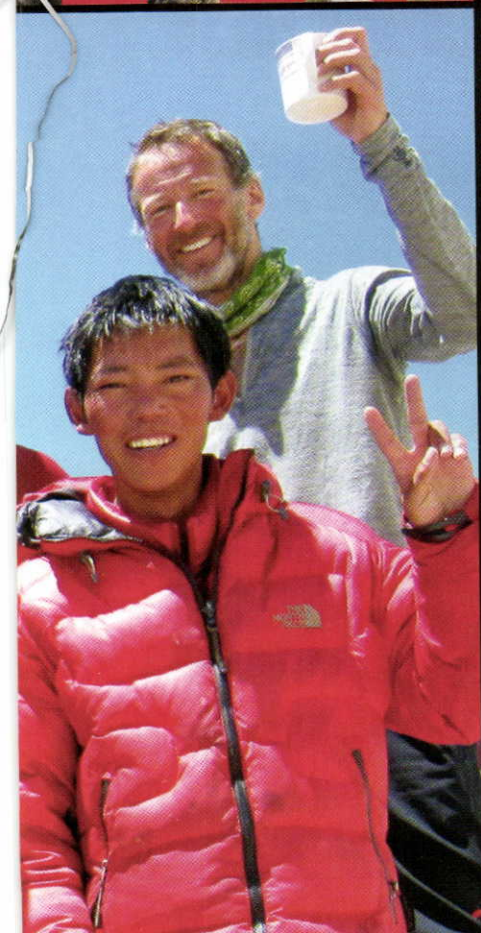




*"God made yeast, as well as dough,
and he loves fermentation just as
dearly as he loves vegetation."*

—Ralph Waldo Emerson

Mt. Everest



LEFT: The team toasts
a successful summit of
Mt. Everest with the
author's homebrew.

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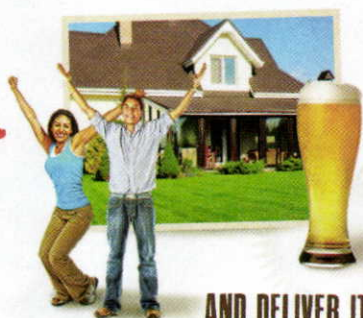
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Burgess brothers stealing cases of suds from the famous Fairview Inn after a Denali expedition, abound. To this day, the first thing we do upon arrival back in Kathmandu after an Everest expedition is head straight for the pub to tell tall tales of our alpine exploits.

For me, climbing and beer have always gone hand in hand. I began brewing around the same time I started climbing during my freshman year in college. My roommate and I could often be found brewing up a batch on an oversized hotplate in our freshman dorm room just before heading into the hills, and toasting with a homebrew post-adventure. Upon gaining access to an actual stove and fully immersing ourselves into an outdoor community in the Outing Club house at St. Lawrence University for three years, we stepped both the brewing and climbing up a notch. Upon graduation, I became a professional mountain guide, climbing around the world full-time. Although homebrewing fell by the wayside for a time, I continued to enjoy my fair share of worldly beer.

Expedition Unknown

It made complete sense to me that the brewing and climbing tradition should be resurrected on Mt. Everest now that I had graduated to the bigger peaks. Much to my delight, I learned that my boss, mentor, and renowned Himalayan climber and expedition leader, Eric Simonson, had brewed a batch of ale at base camp on Tibet's Cho Oyu back in 1998. Cho Oyu is the world's sixth tallest peak, with its base camp at nearly 16,000 feet. After pressing Simonson and a few others who had joined him on the expedition for information, I determined that crafting beer at a slightly higher altitude on Mt. Everest would be possible, although it would take some special techniques and a bit of luck.

Everest base camp lies at 17,600 feet above sea level, a few thousand feet higher than the top of the highest peak in the continental United States, which poses a lot of problems to a brewer. How would the beer ferment at extreme altitude? Could I control the huge daily temperature fluctuations? Would it be possible to

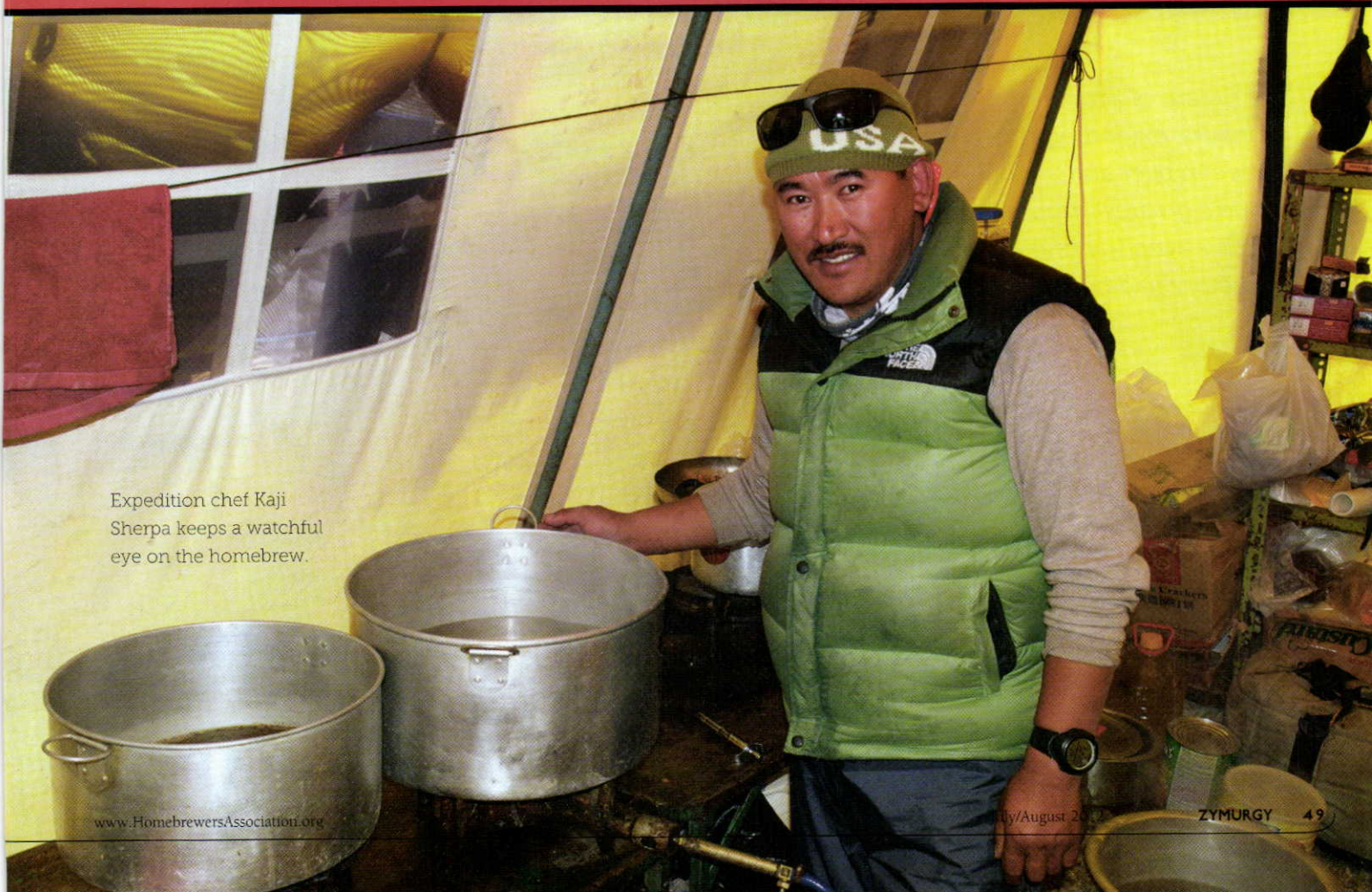
sanitize properly with only a rudimentary camp kitchen tent? There's only half an atmosphere of pressure at 17,600 feet, so water boils at a much lower temperature than at sea level—would the boil be hot enough for wort? Even if everything went as planned, would it actually work? A lot of questions remained unanswered, but there was only one way to find out. With help from my local homebrew shop in Seattle and input from Eric, I devised a system that I hoped would work.

The Brew

I felt a "winter warmer" was an appropriate style choice to warm the souls of brave climbers returning from battling mighty Everest. I went with a hardy lager yeast that could withstand the extreme temperature fluctuations of the arid mountain air high in the Himalaya. Simonson had tipped me off to a kegging device that was highly portable and relied on a chemical reaction within a closed pouch to pressurize the beer (a Quoin Party Pig) rather than using a bulky CO₂ setup that wouldn't be allowed through customs. I tossed a durable plastic carboy in my duffel, filled

Photos © Mike Hamill and Louis Carstensen

Expedition chef Kaji Sherpa keeps a watchful eye on the homebrew.



it with climbing gear for the long flight, and packed the requisite malts, hops, and other supplies to make up a batch. Luckily my ragged duffel came zipping around the luggage belt in Kathmandu with everything still present, although I wasn't surprised to find a TSA search notification next to the carboy and bottling siphon. The security agents must've had a quiz-zical look on their faces while trying to determine why this Seattleite was dragging what probably looked like a portable meth lab halfway around the world to a peaceful Himalayan country.

Upon returning to base camp after our first foray up the mountain, I brewed up the beer. Expedition chef extraordinaire Kaji Sherpa opened his kitchen to me and helped sanitize the equipment. As the malted barley bubbled on the stove, Kaji and I discussed the similarities and differences between western beer and a local fermented beverage called *raksi*. *Raksi* is a rice- or millet-based brew that takes much less time to ferment, is higher in alcohol content, and is served straight out of the vat it's brewed in.

This type of alcohol has been drunk in the Khumbu Valley, over which Everest looms, for hundreds of years, and its history undoubtedly stretches back much further amongst cultures that have continuously inhabited the low-lying areas south of the Himalayan range.

"So, how long have you been brewing *raksi*, Kaji?" I questioned, standing over the roar of the propane stove as Kaji sanitized our brewing utensils. "Oh, I've been brewing all my life," Kaji quietly responded. "*Raksi* is part of our culture and we grow up helping our parents make it." "So there's no drinking age here in the Khumbu?" I shot back, and Kaji responded with a grin.

We boiled the wort for longer than usual to account for the lower boiling temperature due to reduced atmospheric pressure. Kaji and I were extremely careful to sanitize all the equipment to mitigate any chance of contamination. Most importantly, I added a bit of extra lager yeast to ensure proper fermentation in these less-than-ideal conditions.

Once the wort had cooled down, we siphoned it into the carboy, transferred it to another tent, and insulated it with sleeping bags and foam pads to maintain a semi-constant temperature. Sure enough, the airlock soon started to bubble to life and I felt compelled to check in on my brew with the care and frequency of a doting parent checking on a newborn. I checked it one final time as I exited the dining tent and asked Kaji to keep a watchful eye as I headed up the notoriously dangerous Khumbu icefall for our final acclimatization rotation up Mt. Everest before our summit bid.

I returned back to base camp a few days later to find the brewing going as planned. I transferred the beer into the Party Pig, re-insulated this mini-kegging system, and headed up the mountain with my team for the final time in hopes of attaining the crown jewel of high altitude mountaineering, the summit of Mt. Everest. After a week of battling fierce winds, driving snow, and extreme altitude; tiptoeing across airy knife-edged ridges; crossing tenuous ladder bridges;

"My dream of providing beer for thirsty climbers, extending the relationship between beer and adventure on the world's greatest mountaineering stage, and brewing the highest batch of beer in history had been accomplished."

Crossing tenuous ladder bridges is part of the Everest experience.



and climbing nearly 13,000 vertical feet, we returned triumphant in our Everest quest and thirsty for beer.

The Realization of a Dream

I had timed the fermentation to finish when we expected to arrive back at base camp so, after shaking hands and dropping the packs, we settled in for some high mountain homebrew. My anxiety at how the beer would turn out was soon alleviated as compliments filled the dining tent and my teammates opted for my creation over the Nepali Mt. Everest beer. It could be that the climbers were just happy to be finished with the climb, hadn't had a beer in over a month, or that the beer actually tasted good, but the 5 gallons of beer disappeared in the following 24 hours that it took us to pack up and leave base camp for home. We celebrated heartily, and, as our ancestors had done many centuries and millennia before us across Europe and Mesopotamia, used the beer as an excuse to fill our camp with others and share tales of distant lands. In doing so, my dream of providing beer for thirsty climbers, extending the relationship between beer and adventure on the world's greatest mountaineering stage, and brewing the highest batch of beer in history had been accomplished.

While I enjoyed one final brew at base camp before heading down the valley, I felt an overwhelming connection to my distant relatives who had celebrated their exploits throughout the Fertile Crescent in ancient Mesopotamia, to the mountain, and to the friendly and welcoming Sherpa of the Khumbu who also shared my love of brewing and climbing. My elation at summing Mt. Everest was rivaled only by that of my homebrewing endeavor and sharing a great moment with a worthy team.

Mike Hamill is a climbing guide, five-time Everest summiteer, and homebrewer from Seattle. His first book, *Climbing the Seven Summits: A Guide to Each Continent's Highest Peak*, was released in May from The Mountaineers Books. You can find more of his writing, photography, and videos at www.climbingthesevensummits.com.

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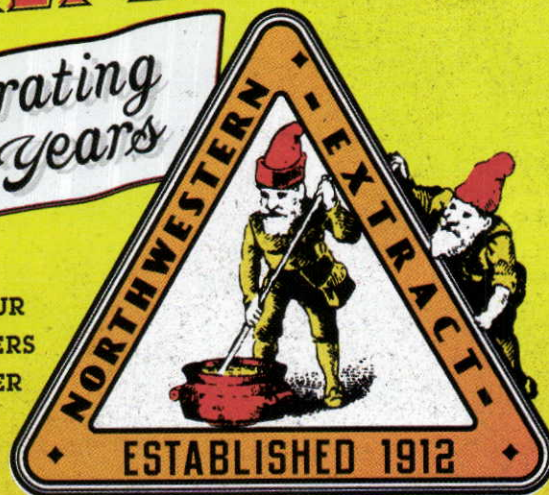
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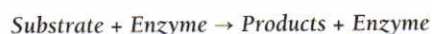
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Enzymes in the Brewing Process

Enzymes are complex protein molecules that act as catalysts for biochemical reactions. Enzymes increase the rate of these reactions, but are not consumed or otherwise permanently changed by their participation in the reaction. The general interaction of a substrate (the reactants) with an enzyme can be written as:



How Enzymes Work

For a chemical reaction to proceed, an initial energy input into the reacting system is required. This required initial energy input is called the "activation energy" (ΔE_a) of the reaction. When molecules within a system have an amount of energy that is greater than the required activation energy, they can then react to form the products of the reaction. In order for the reaction to proceed, the reactants must first get over the "activation energy hump."

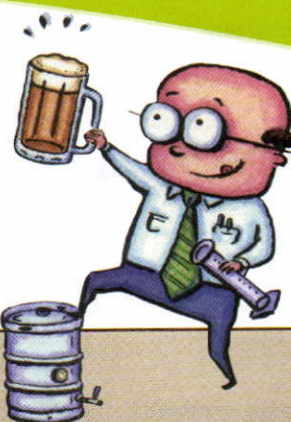
The magnitude of the required activation energy directly affects the rate of reaction. Higher activation energy means that the reaction rate will be slower for the reacting system. Enzymes, like all catalysts, increase the rate of a chemical reaction by lowering the overall activation energy required in order for a reaction to occur. Figure 1 illustrates this concept.

Enzymes lower the required activation energy by temporarily binding with the substrate molecules and influencing bond energies within them. The forces that hold the enzyme and the substrate together can be a combination of hydrogen bonds, ionic bonds, or hydrophobic interactions. Most of the forces that hold them together are very weak, so the successful binding

together of an enzyme with a substrate requires that the molecules are able to approach one another very closely over a relatively large area¹. Enzymes and substrates join together much like a key in a lock. This means that the molecular shape and configuration of the substrate must match that of the enzyme. Figure 2 illustrates this concept.

The need to have such a near-perfect molecular match in shapes between the substrate and enzyme explains the specificity of the action of most enzymes, and also explains how enzyme action can be inhibited when other similarly shaped molecules are present within the reacting system.

In order to work properly, many enzymes require that other, non-protein "co-factors" are present within the reacting system. Co-factors of importance to brewing enzymes include zinc, copper, manganese, sodium, and potassium ions (Zn^{+2} , Cu^{+2} , Mn^{+2} , Na^+ , K^+).



READER ADVISORY: Warning!

These pages are rated XG (eXtra Geeky) by the Bureau of Magazine Mucktymucks. Items in this section may contain raw data, graphic functions, full statistics and undiluted biochemistry. Keep away from poets, squeamish novices and others who may find the joyously technical nature of this prose to be mindbendingly conceptual or socially offensive. Also, because of the complex nature of brewing science, there is no guarantee that you will live longer, brew better or win any awards in the next homebrew competition based upon the conclusions presented here.

Temperature Sensitivity

The reaction rate of most chemical reactions is temperature dependent. A higher temperature usually means that the reaction rate will be faster. This is also the case with enzyme-catalyzed reactions.

Enzymes are very sensitive to temperature. For brewing enzymes, a temperature

FIGURE 1. LOWERING OF ACTIVATION ENERGY BY ENZYME

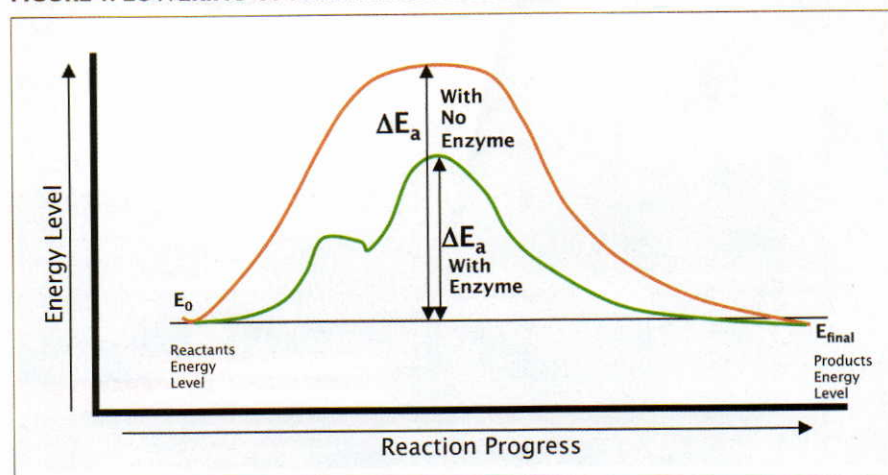
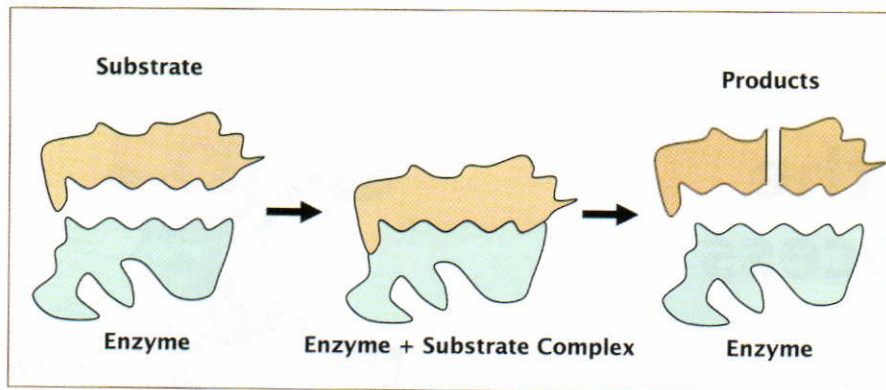


FIGURE 2. KEY-IN-LOCK ILLUSTRATION FOR ENZYME & SUBSTRATE INTERACTION



increase of 10° C (18° F) will typically result in an increase of enzyme activity and a corresponding reaction rate increase of 50-100 percent. Temperature variations as small as 1-2° C can cause reaction rates to change by as much as 10-20 percent.

The observed increase in reaction rate with increasing temperature for enzyme-catalyzed reactions is valid only up to a particular temperature. For enzyme-catalyzed reactions, the reaction rate increases with increasing temperature to a maximum level, then abruptly falls off with further increase of temperature. This is illustrated by Figure 3.

The reason for this is that at higher temperatures, the vibration of the atoms within the enzyme molecule causes it to undergo a physical change in its molecular configuration. The enzyme molecule begins to unfold and becomes "denatured." Since the shape of an enzyme is critical to its function, the change in shape greatly reduces the ability of the enzyme to bind with the substrate. If the enzyme can't bind with the substrate, it can't lower the system activation energy and can no longer increase the reaction rate of the system. The enzyme is effectively deactivated.

Many brewing enzymes begin to slowly denature at temperatures as low as 38-40° C (100-104° F) and rapid denaturing occurs at a temperature greater than 76-77° C (169-171° F)².

Proper temperature management during mashing is very important. Mash temperature directly impacts the activity of the enzymes that are most important for starch conversion (α -amylase and β -amylase) and the activity of these enzymes directly impacts the fermentability of the wort. Lower mash temperatures favor higher fermentability, while higher temperatures favor more dextrin production and lower wort fermentability.

pH Sensitivity

The effectiveness of brewing enzymes is also dependent upon the pH of the system³. pH affects enzyme activity by causing variation in the surface charge characteristics of the enzyme molecules.

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When surface charges change, the shape of the enzyme molecule is changed. When the shape of the enzyme molecule is changed, the effectiveness of the enzyme is changed.

Different enzymes have different optimal pH ranges (see Table 1). Most brewing-related enzymes have an optimum pH within the range of 4.5-6.0 (which, con-

veniently, is the pH range within which most enzyme-related brewing activity occurs). Exposure to an extremely high or low pH environment will generally result in a complete loss of enzyme activity.

Enzymes in the Brewing Process

The three broad categories of enzyme-catalyzed reactions that occur within the brewing (mashing) process are⁴:

- 1) Starch hydrolysis
- 2) β -glucan breakdown
- 3) Protein and polypeptide hydrolysis

There are many different enzymes that are important within these major reaction categories. Table 1 presents a list of the more important enzymes, and provides information about the optimal temperature and pH ranges for the associated enzyme activity.

Conversion of starches into fermentables (saccharification) is the job of various enzymes. During the mashing process, enzymes such as alpha and beta amylase work their biochemical conversion magic on the starches. Alpha-amylase converts insoluble and solubilized starch into maltotriose and dextrins. Beta-amylase then converts dextrins into glucose, maltose, maltotriose, and alpha-limit dextrins.

Degradation of haze-forming proteins is also the job of enzymes. During the mashing process, a "protein rest" is often used to accomplish this. A protein rest⁵ is a stage of the mashing process during which the protease enzymes decompose

FIGURE 3. EFFECT OF TEMPERATURE ON ENZYME ACTIVITY

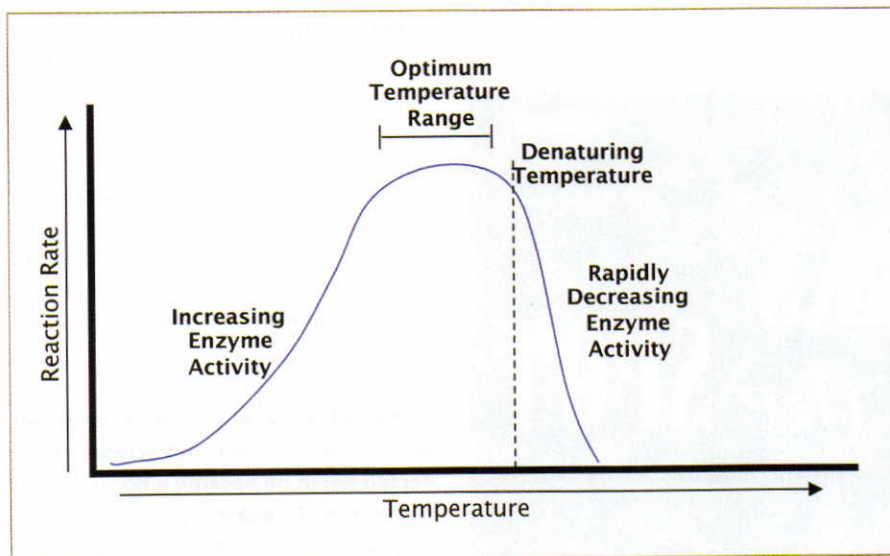


TABLE 1: OPTIMAL TEMPERATURE & PH FOR IMPORTANT BREWING ENZYMES

Enzyme	Action	Optimal Temp. F° (°C)	Optimal pH
α -amylase	Hydrolysis of straight chain bonds in starch. Produces sugars and dextrins.	152-154 (67-68)	5.2
β -amylase	Hydrolysis of pairs of glucose sugars (maltose) from non-reducing end of starch.	143 (62)	5.5
Endoproteases	Break large protein molecules down into polypeptide chains.	113-122 (45-50)	3.9-5.5
Exoproteases Carboxypeptidase Aminopeptidase	Remove small units from polypeptides to produce amino acids. Removes amino acids from carbonyl end. Removes amino acids from amino end.	113-122 (45-50) 122 (50)	3.9-5.5 4.8-5.2
Malt β -glucanase	Breaks cell walls and reduces viscosity	133 (56)	6.0
Endo β -1-4 glucanase	Breaks internal bonds to disrupt the crystalline structure of cellulose and expose individual cellulose polysaccharide chains.	93-113 (34-45)	4.5-4.8
Endo barley β -glucanase	Breaks down beta-glucans and reduces wort viscosity.	104 (40)	4.7-5.0
β -glucan solubilase	Breaks down the cell walls where beta-glucans reside. Breaks the links between beta-glucans and peptides.	140 (60)	6.3

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complex proteins into progressively less complex chemical forms. These proteolytic enzymes are active over a temperature range of about 45-60° C (113-140° F) with optimal activity occurring at the low end of this range (see Table 1).

As brewers, we often create different mashing schedules and conduct the mash at different temperature and time profiles in an effort to optimize the wort for the style of beer we are trying to create. For example⁶, increasing the mash tempera-

ture during the saccharification step will produce more dextrinous wort that will not be attenuated as easily by the yeast during fermentation. A beer style such as alt or Kölsch needs to be highly attenuated in order to be true to style. To ensure that the wort will be as low in dextrins and as well-attenuated as possible, a saccharification mash temperature on the lower end of the spectrum should be selected.

Conversely, the saccharification temperature for a beer style such as a bock or

dopplebock will need to be relatively high in order to create a dextrinous wort that will provide greater body to the finished beer. Generally speaking⁷, conducting the saccharification step of a mash at a temperature between 60-65° C (140-149° F) will yield a maltose-rich, highly fermentable wort with a high attenuation limit. Temperatures between 72-75° C (162-167° F) will produce a dextrin-rich wort that will not be as well attenuated, but will produce a fuller-bodied beer.

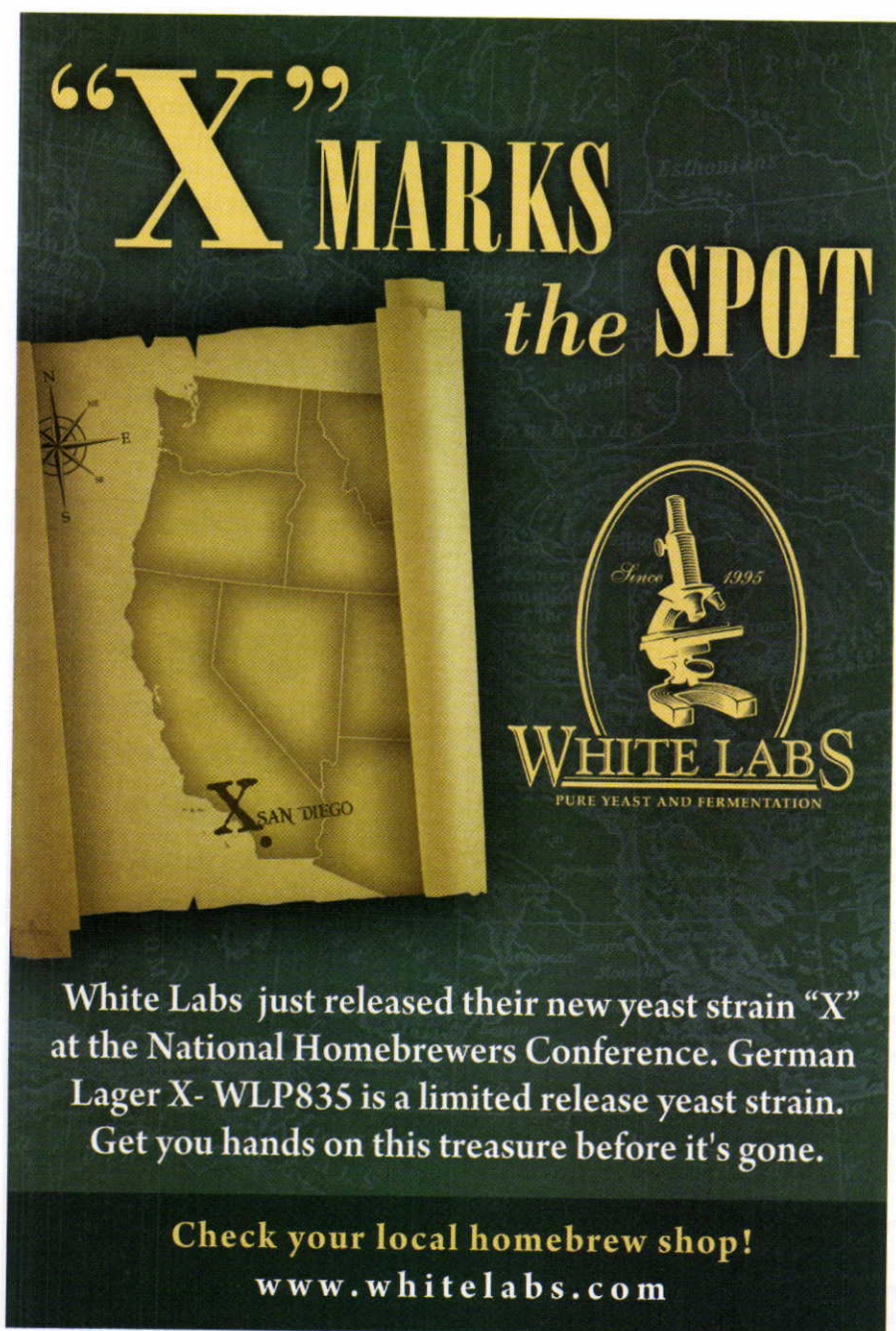
Conclusion

Enzymes are critical to the brewing process. Without enzymes, there would be no beer. Different enzymes are optimally active within different temperature and pH ranges. Management of mash temperature and pH is of critical importance to a brewer who wishes to control the fermentability of the wort and optimize the flavor and aroma characteristics of the finished beer.

Chris Bible is a chemical engineer whose love of beer and science intersected when he became a homebrewer more than 15 years ago. He resides in Knoxville, Tenn. with his wife and son and especially enjoys brewing porters and stouts.

References

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2. Briggs, D.E., et. al. *Brewing Science and Practice*. CRC Press, 2004.
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4. Lewis, Michael and Tom Young. *Brewing*. 2nd Edition, Aspen Kluwer Academic/ Plenum Publishers, 2001.
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6. Daniels, Ray. *Designing Great Beers*. Brewers Publications, 2001, pp. 134 and 186.
7. Goldammer, Ted. *The Brewer's Handbook: The Complete Book to Brewing Beer*. KVP Publishers, 1999, pp.170-174.



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by Amahl Turczyn Scheppach

2012 Mazer Cup

The Mazer Cup International mead competition took place in Boulder, Colo. March 2-3. Started by Ken Schramm, Dan McConnell, and Mike O'Brien, this mead-only competition has been growing steadily since its inception in 2009, with 170 home entries and 100 commercial entries from around the world. The competition has continued to grow, with 2012 seeing 259 home entries and 197 commercial entries.

According to organizer Vicki Rowe, after the International Mead Festival ended in 2007, there was a gap in which there was no large mead competition in the U.S. Rowe, owner and founder of Gotmead.com, had been working with the Mead Festival and didn't want to see the competition disappear, so she and Petar Bakulic gathered together a team of mead lovers and formed the Mazer Cup International

with the intention of making it the largest home and commercial mead competition in the world.

"It has become the world's largest mead-only competition, and pulls in entries from all over the world in both the home and commercial events," Rowe stated. "To date, we've had entries from Poland, Slovakia, France, Nicaragua, England, the Netherlands, Belgium, and even China."

This year's best of show mead at the event was made by Michael Spears and Barry Mulso of the Kuhnhehn Guild of Brewers club in Warren, Mich. They have been making mead for about eight years, after finding it to be a natural extension of brewing beer. Mulso commented, "Many of us in the club began taking an interest in mead, so we decided to give it a try. Mike arranged for the club to meet at B.

Lingonberry Mead

2012 MAZER CUP BEST OF SHOW

Recipe by Michael Spears and Barry Mulso, Warren, Mich.

INGREDIENTS

for 5 U.S. gallons (18.93 L)

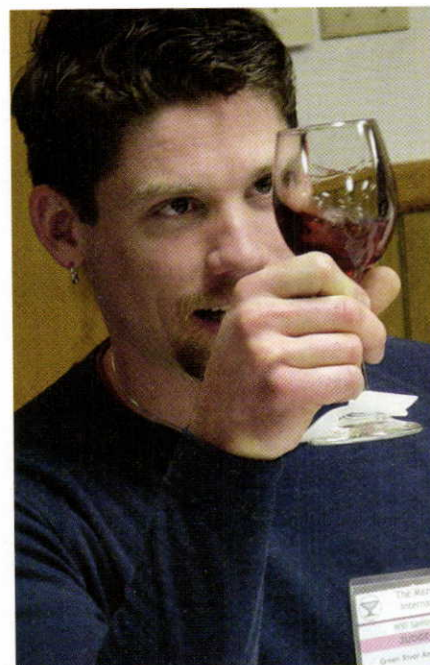
15.0 lb	(6.8 kg) orange blossom honey
2.0 qt	(1.89 L) lingonberry juice
	Di-Ammonium Phosphate
	(DAP) yeast nutrient

DIRECTIONS

Mix honey with spring water to 5 gallons. Add 5 tsp DAP and pitch yeast. Stop fermentation at 1.020. Rack to secondary. Add lingonberry juice to secondary. Fermentation will re-start. Stop fermentation at 1.018. Add acid blend to taste if necessary. Rest in secondary for 4-6 months. Clear with finings.



Photos courtesy of Mazer Cup International



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KUDOS—BEST OF SHOW

AHA/BJCP Sanctioned Competition Program

February 2012

KLCC Microbrew Festival Homebrew
Competition, 154 entries—
Tyrone Reitman, Eugene, OR.

Beer Quest UK Ales, 22 entries—
Chris Evans, Lincoln, NE.

Clarens Craft Beer Festival, 28 entries—
Andre de Beer, Cullinan, Gauteng, ZA.

March 2012

Homebrew @ the W.E.B., 1,036 entries—
Sam Firke, Ann Arbor, MI.

Patriot Club Brewfest 2012, 13 entries—
Mark Maeder, Bellevue, NE.

Bockfest Cincinnati, 39 entries—
Bob Stephenson, Cincinnati, OH.

Kona Brewers Festival Homebrew
Competition, 302 entries—Jimmy King &
Jacen Hamm, Kailua-Kona, HI.

17th Annual Shamrock Open, 429 entries—
Bill Lynch, Charlotte, NC.

Joint Cascade Brewers Cup & Puget Sound
Pro-Am, 513 entries—Roger Kee, Everett, WA.

Drunk Monk Challenge, 837 entries—
Amanda Kertz, Effingham, IL.

TRASH 22, 568 entries—
Ryan Slicker, Pittsburgh, PA.

CBA (UK) Club Only Competition - Bitters,
25 entries—James Sutton, Bristol, UK.

Palm Springs Craft Beer Conclave Homebrew
Competition, 31 entries—
John Russell, Escondido, CA.

Ultimate Brew-off Homebrew Challenge, 4
entries—Kelye Robertson, Halifax, NS, Canada.

Amber Waves of Grain, 625 entries—
Dan Cassetta, Buffalo, NY.

Bluebonnet Brewoff, 1,805 entries—
Mike Haws, Arlington, TX.

March Mashness, 249 entries—
Chris Smith, Minneapolis, MN.

Celebrewtion!, 248 entries—
Rob Conticello, Menlo Park, CA.

Lonerider Brew-it-Forward, 141 entries—
James Lafferty, Jacksonville, NC.

Hudson Valley Homebrewers Competition, 330
entries—Bruce Franconi, Red Hook, NY.

ACBF Regional Homebrew Competition, 100
entries—Joshua Meyers, Decatur, GA.

AHA Club-Only Competition, Stout it Out
Loud!, 99 entries—Mac Butcher, Tulsa, OK.

Baja Beer Fest 2012, 61 entries—Armando
Rodriguez, Ensenada, Baja California, Mexico.

Lethbridge Werthogs 12th Annual Homebrew
Competition, 182 entries—
Greg Zeniuk, Edmonton, AB, Canada.

19th Annual Peach State Brew Off, 412
entries—Rodney Kibzey, Lombard, IL.

Joseph James Brewing Pro Am Competition,
45 entries—Jan Antonson, Las Vegas, NV.

Iowa Brewers Union Open, 360 entries—
Chris Sweborg, Galesburg, IL.

Brew Masters Competition, 43 entries—
Ross Ziegenthaler, Spring Lake, MI.

Peak-To-Peak ProAm, 418 entries—
Thomas Malowski, Omaha, NE.

Champion of the Pint, 233 entries—
Dave Blue, St. Peters, MO.

Suwanee Beer Festival, 185 entries—
Josh Rachel, Alpharetta, GA.

April 2012

Ocean State Homebrew Competition (OSHC),
2nd Annual, 272 entries—
Thomas Jermin, Wallingford, CT.

Snow Goose Homebrew Break-Up, 32
entries—Aaron Christ, Anchorage, AK.

2012 Nebraska Shootout - Club Competition,
50 entries—Brian Haas, Norfolk, NE.

Brewster's Cup 2012 April Open, 58 entries—
Eric Haas, Middletown, OH.

2012 ALES Home Brew Open/AHA NHC
Qualifier Competition, 541 entries—
Greg Zeniuk, St. Albert, AB, Canada.

Thirsty Orange Brew Extravaganza, 47
entries—Tim Jenkins, Elizabethton, TN.

Members of Barleyment Beaus Pro-Am
Homebrew Competition, 69 entries—
Patrick Boisvenue, Ottawa, ON, Canada.

World Cup of Beer, 713 entries—
Jeff Pieper, Bossier City, LA.

7th Annual Capitol Brewers Oregon Garden
Homebrew Classic, 262 entries—
Randy Scorby, Baker City, OR.

Alamo City Cerveza Fest, 530 entries—
Corey Martin, Austin, TX.

The Great Basin Brew Off, 82 entries—
Jeff Current, Reno, NV.

Crown Challenge, 56 entries—
Bob Heinlein, Crown Point, IN.

Wort Hog Brewers Summer Beer Festival
Competition, 40 entries—Paul Sonnendecker
& Paul Barnard, Pretoria, Gauteng, ZA.

The Upstate New York Homebrewers
Association (UNYHA) 34th Annual/23rd
Empire State Open Homebrew Competition,
321 entries—Jim Gorman & Mark Petrie,
Lockport, NY.

St. Louis Microfest Homebrew Competition,
258 entries—Joe Phillips, Maryland Heights,
MO.

Between the Bluffs Homebrew Competition,
128 entries—Dave Beyer, La Crosse, WI.

Siciliano's Market 9th Annual Homebrew
Contest, 220 entries—
Russ Smith, Grand Haven, MI.

Black & Tan Competition, 69 entries—
Adam Davidson, Two Rivers, WI.

World Expo of Beer Commercial Competition,
600 entries—Amber/ESB Saugatuck Brewing,
Saugatuck, MI.

May 2012

ASH Homebrewer of the Year Round 3, 6
entries—Sam Patterson, Phoenix, AZ.



AHA/BJCP SANCTIONED COMPETITION PROGRAM CALENDAR

For complete calendar, competition and judging information go to
www.HomebrewersAssociation.org/pages/competitions

July 1

San Diego County Fair Homebrew Competition
Del Mar, CA. Entry Deadline: 5/30/2012.
www.sdfair.com/entry

July 1

2012 WanCup2
Hamamatsu, Shizuoka, Japan. Entry Deadline:
6/22/2012. wancup2.org

July 1

Keep Austin Beered ProAm
Austin, TX. Entry Deadline: 6/24/2012.
www.austinzealots.com

July 6

Indiana State Fair Brewers' Cup Competition
Indianapolis, IN. Entry Deadline: 6/8/2012.
www.BrewersCup.org

July 7

Brewster's Cup 2012 July Open
Dayton, OH. www.brewtensils.com

July 14

2012 Buffalo County Fair Beer/Mead/Wine Competition
Kearney, NE. Entry Deadline: 7/9/2012. 2012BCF.
brewcompetition.com

July 14

Spirits of Baker County Homebrew Competition
Baker City, OR. Entry Deadline: 7/5/2012.
www.bakercounty.org/fair/_fair.html

July 14

Ohio State Fair Homebrew Competition
Columbus, OH. Entry Deadline: 6/20/2012.
ohiostatefair.com

July 14

E.T. Barnette Homebrew Competition
Fox, AK. Entry Deadline: 7/11/2012. www.mosquitobytes.com/Den/Beer/Events/Events.html

July 14

Amador County Fair Homebrew Competition
Plymouth, CA. Entry Deadline: 6/30/2012.
brewangels.com

July 20

The Empire Cup
Syracuse, NY. Entry Deadline: 7/5/2012.
www.empirebrewfest.com

July 21

2012 Battle of the Brews
Harrington, DE. Entry Deadline: 6/1/2012.
battleofthebrews.webs.com

July 28

2012 German Fest Stein Challenge
Milwaukee, WI. Entry Deadline: 7/14/2012.
germanfesthbc.beerbarons.org

July 28

All American Brew Off
Fort Smith, AR. Entry Deadline: 7/9/2012.
rivervalleyaleraisers.com

July 28

16th Annual NJ State Fair/SCF&HS Homebrew Competition
Augusta, NJ. Entry Deadline: 7/14/2012.
www.scubabrewclub.com

July 29

Ventura County Fair Amateur Beer Contest
Ventura, CA. Entry Deadline: 7/28/2012.
www.venturacountyfair.org

July 29

Brisbane Amateur Beer Brewers (BABBs) Annual Club Competition 2012
Brisbane, Queensland, Australia. Entry Deadline:
7/14/2012. www.babbrewers.com

July 29

Gnarley Barley Brewfest
Loveland, CO. Entry Deadline: 7/20/2012.

July 29

Battle of the Home Brews 2012
Littleton, CO. Entry Deadline: 7/18/2012.
www.arapahoecountyfair.com

July 29

Nevada County Fair
Grass Valley, CA. www.nevadacountyfair.com

July 31

The Great Brewholio
Santa Cruz, CA. Entry Deadline: 7/22/2012.

August 4

25th Annual Southern California Homebrew Championship
Corona, CA. Entry Deadline: 7/21/2012.
www.inlandempirebrewers.com/comp.html

August 4

17th Annual Montgomery County Agricultural Fair Homebrew Competition
Gaithersburg, MD. Entry Deadline: 7/28/2012.
mcaf.brewcompetition.com

August 5

2012 Michigan Beer Cup
Webberville, MI. Entry Deadline: 7/15/2012.
www.michiganbeercup.com

August 9

Denver County Fair-Craft Brew
Denver, CO. Entry Deadline: 7/22/2012.
www.denvercountyfair.org/competitions

August 10

National Capital Homebrewing Competition
Ottawa, ON, Canada. Entry Deadline: 8/3/2012.
www.nationalcapitalbeerweek.com

August 11

Blues & Brews Homebrew Competition
Hubbardston, MA. Entry Deadline: 7/27/2012.
www.foambrew.com

August 11

Deer River Bar-b-que & Brew Fest
Deer River, MN. Entry Deadline: 8/10/2012.
www.deerriver.org/events/event.php?number=116

August 11

19th Annual Dominion Cup
Richmond, VA. Entry Deadline: 7/28/2012.
dominioncup.jrhh.org

August 18

AHA Club-Only Competition, Porter
Nampa, ID. Entry Deadline: 8/10/2012.
www.homebrewersassociation.org/pages/competitions/club-only-competitions

August 19

4th Annual Beehive Brew-Off
Salt Lake City, UT. Entry Deadline: 8/15/2012.

August 19

5th Festival Internacional de la Cerveza Artesanal Buenos Aires 2012
Buenos Aires, AR. Entry Deadline: 7/19/2012.
www.somoscervceros.com.ar

August 25

New Mexico State Fair Pro-Am
Albuquerque, NM. Entry Deadline: 8/12/2012.
www.dukesofale.com

August 25

Malt Madness VI
Allentown, PA. Entry Deadline: 8/9/2012.
www.lvhb.org

August 25

Byggvir's Big Beer Cup
Shakopee, MN. Entry Deadline: 8/12/2012.
www.rennfestbeercup.com

August 26

KC Irish Fest Scottish or Irish Ale Brewing Contest
Kansas City, MO. Entry Deadline: 8/18/2012.

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Nektar Meadery in Ferndale, Mich., where professional meadmakers Brad Dahlhofer and Paul Zimmerman gave everyone a great meadmaking demo. Since then, we've won many medals for meads."

Among these victories, Mulso won best of show at the World Expo of Beer homebrew contest in 2010 for a sack mead, and Spears won best of show for a mandarin orange-ginger mead at the 2009 Michigan Renaissance Festival. But winning the Mazer Cup, they both said, is the highlight of their homebrewing careers.

The duo has picked up several valuable techniques for brewing award-winning mead over the years. "One important step is to de-gas your mead daily for at least the first two weeks of fermentation in order to remove CO₂ from the must so the yeast can have a healthy fermentation. Whereas you generally don't want to introduce additional oxygen into beer once fermentation starts, the oxygenation from the de-gassing process helps mead's longer fermentation time and needs."


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American Amber Ale

by SCOTT



Ultra Blonde
Belgian Pale Ale

by KYLE

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1.011 FG


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by CHARISSA

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Spears and Mulso were kind enough to share the recipe for their best of show winning lingonberry mead, and related that their inspiration came from an unexpected source. "Mike needed to pick up some furniture at IKEA and needed a pickup truck, which I was happy to supply," Mulso remembered. "While at IKEA, we bought a lingonberry flavored soda and quickly thought it would make an interesting mead. We tracked down some lingonberry juice and the rest is history. Batch #2 is underway now."

AHA SPECIAL EVENTS

Visit the Events section of HomebrewersAssociation.org for more information.

August 2012 (TBA)
AHA Rally at Tröegs Brewing Co.
Hershey, PA

August 4
AHA Rally at Moonlight Meadery
Londonderry, NH

August 4
AHA Mead Day

October 11
Great American Beer Festival
Pro-Am Competition
Denver, CO

October 11-13
Great American Beer Festival®
Denver, CO

November 3
AHA Learn To Homebrew Day

A photograph of a plate of food. On the left is a large ear of yellow corn. To its right is a portion of ribs covered in a dark, glossy sauce. In front of the ribs are several pieces of vegetables, including red bell peppers and yellow squash. The plate is set on a red and white checkered tablecloth. In the background, there is a white rectangular sign with a black dotted border, which is blank. The background also shows a wooden fence and some greenery.

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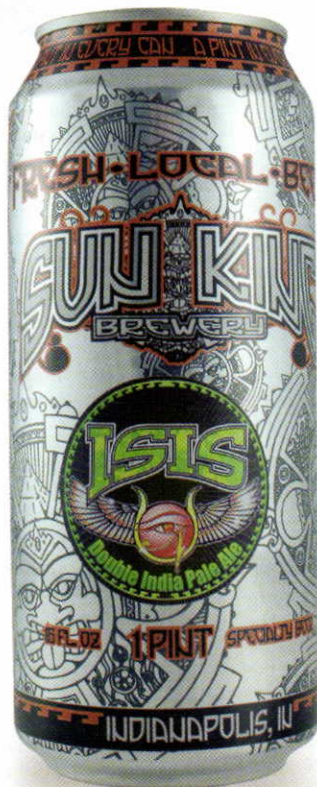
Saturday
August 4, 2012

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American Homebrewers Association
A Division of the Brewers Association
www.brewersassociation.org



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 www.bjcp.org, pick up a bottle (or can) of each of the beverages and judge along with them in our Commercial Calibration.



structure of the hop cone to get to the essence of this beer," the brewery explains on its website.

At 103 IBU and 9.1 percent ABV, Sixpoint says that Resin "can be loosely described as a double IPA." To learn more about Resin, watch the brewery's video at www.sixpoint.com.

As of mid-May, the website craftcans.com listed 566 beers from 184 craft breweries that are currently canning their beers (including 26 double/imperial IPAs), and that list is growing on almost a daily basis.

ON THE WEB

Sun King Brewing Co.
www.sunkingbrewing.com

Sixpoint Brewery
www.sixpoint.com

BJCP Style Guidelines
www.bjcp.org

Commercial Calibration
www.HomebrewersAssociation.org/pages/zymurgy/commercial-calibration
(Note: This is a Members Only area of the website)

OUR EXPERT PANEL includes David Houseman, a Grand Master IV judge and competition director for the BJCP from Chester Springs, Pa.; Beth Zangari, a Grand Master level judge from Placerville, Calif. and founding member of Hangtown Association of Zymurgy Enthusiasts (H.A.Z.E.); Scott Bickham, a Grand Master II 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 V judge, principal author of the 2004 BJCP Style Guidelines and president of the BJCP board who lives in Beavercreek, Ohio.

Following along with the theme of this issue, we knew we wanted to send our judges some IPAs. But these weren't just ordinary IPAs. With the current trend of stuffing huge, hoppy beers such as the newly released Oskar Blues Deviant Dale's into cans, we found two new canned imperial IPAs to send to our panel.

First up was Isis, a double IPA from Sun King Brewing Co. in Indianapolis that was released in February. Isis was supposed to be a one-off batch, but "it will be remade at some point," said Sun King's Dave Colt. Isis checks in at 9 percent ABV and 91

IBU. It is brewed with two-row, crystal rye, and Vienna malts. Warrior hops are used for bittering, and Centennial and Nugget are employed for flavor, aroma, and dry hopping. Isis was dry hopped at a half-pound for each barrel. The spicy rye malt base helps to balance the citrusy hop quotient.

Next up was Resin, a new offering from Sixpoint Brewing Co. in Brooklyn, N.Y. Packaged in a slim, lime-green 12-ounce can, Resin was named after the sticky, golden, resinous qualities of the core of a hop cone. "We zeroed in on the botanical



Sun King Isis—Sun King Brewing Co., Indianapolis, Ind.
BJCP Category: 14C Imperial IPA

THE JUDGES' SCORES FOR SUN KING ISIS



Aroma: Bright citrus hop aroma with supporting pale malt backbone and moderately high alcohol. Some fruity, apricot, and peach esters. No DMS, no diacetyl. Very inviting aroma. (10/12)

Appearance: Light orange-amber color. Hazy but acceptable for high hopping rates. Dense, tan, rocky, long-lasting head. A brighter clarity would make the appearance more appealing; still, within expectations for an IPA. (3/3)

Flavor: Sweet pale and caramel-noted malt up front with high hop bitterness and a citrus, peachy hop flavor. Moderately high alcohol leaves a drier finish. No DMS. Low diacetyl—OK. Well-balanced for a big IPA with a bitter finish. (17/20)

Mouthfeel: Smooth mouthfeel. Medium to medium-full body. Generous yet subtle alcohol warming. Bitterness lingers but there is no to very low hop-derived astringency. Carbonation a bit low, perhaps due to the canning process. (4/5)

Overall Impression: A showcase for hops that has not forgotten the roots of malt underpinnings. Very easy to drink despite the substantial alcohol. Well crafted. Initial impression is sweet malt then lingering bitterness with a body/mouthfeel north of medium. Attention to haze and carbonation would be welcomed. Quite drinkable in quantity, but really good with wings and jalapeño poppers to help manage the heat. (8/10)

Total Score: (42/50)

Aroma: Piney, grapefruit-citrus hop aroma dominates, though strong caramel malt backs it up, with light esters of peach and pear for a slightly fruity fermentation. (9/12)

Appearance: Golden amber with good clarity, though not brilliant. Moussy white foam persists at half-inch thickness to end of the glass. (3/3)

Flavor: Caramel malt oriented; malt dominates the first impression, gives way to a low, light yellow grapefruit hop flavor with assertive hop bitterness. The hop bitterness is amplified by evident alcohol, and lingers long into the finish. Toward mid- to end, a note of acetaldehyde creeps in, but disappears behind the dominant hop character. (13/20)

Mouthfeel: Medium bodied, carbonation is on the soft side for a silky texture. Warming alcohol character (though not hot) combines with the herbal astringency of hops, and lingers at the finish. (4/5)

Overall Impression: This beer reflects an exuberance of youth, with kind of a rough-and-tumble, over-the-top presentation of caramel malt and assertive hop character. The soft carbonation level gives a sort of pub-draft texture and adds to the drinkability. For the bitterness fan, it leans toward session quality, though the alcohol level appeals more to fans of the extreme. Would be a great complement to pepperoni pizza. (7/10)

Total Score: (36/50)

Aroma: Malt-forward with caramel, toffee and biscuit, along with some sweetness, ripening into moderately intense oxidation notes of sherry, almond, and caramelized raisins. Reminds me of bread pudding. Alcohol is present with a clean ethanol aroma but also some higher alcohols that penetrate into the sinuses. I pick up some citrus notes, but they are muted and do not have as much hop character as classic examples. (7/12)

Appearance: Burnished copper in color with excellent clarity and a thinnish white head that lasts surprisingly well. It appears to be well-conditioned with decent carbonation in spite of some possible leakage during shipping. (3/3)

Flavor: Starts with a medium-high malt flavor, with toasty and caramel notes, and then transitions to an assertively, even intensely, bitter finish. Moderate esters in the middle—some pears, but mainly the almond and dark fruit character of oxidized melanoidins. A little citrusy, resinous hop flavor would add complexity and brightness and improve the balance. The long, intense hop bitterness makes up for some of the weaknesses noted above. (15/20)

Mouthfeel: Medium creaminess from the malt, and the moderate carbonation is appropriate for style. Some warmth from the alcohol, but not hot. Nicely done. The lingering astringency from the hops is a little high, leaving a mouth-puckering sensation that mars the otherwise smooth finish. (3/5)

Overall Impression: This is a good beer, but the balance is a bit out of kilter—perhaps due to handling? The aroma was loaded with oxidative notes rather than being hop-forward like the classic examples of this style. The hop bitterness is appropriately present in full force, but would be complemented by some fresh hop flavor. Good job on the creamy mouthfeel and appearance. (6/10)

Total Score: (34/50)

Aroma: Quite fruity, like apricots and tropical fruit. Light alcohol sharpness. Moderately low malt sweetness—very clean and supportive. An interesting take—the hops are very fruity and prominent but not piney or overly citrusy. Some light citrus notes. Has a very clean quality to it. (10/12)

Appearance: Light amber color. Fairly clear. Lightly effervescent. Low off-white head, frothy with large bubbles, poor retention (settled quite fast). (2/3)

Flavor: Strong but mostly clean bitterness. High hop flavor with a fruity, citrusy quality similar to the aroma. Malt has a clean, supportive note with a light grainy sweetness. Light alcohol flavor. Smooth finish with only a touch of harshness in the aftertaste, more from alcohol than hops. Impression of some balancing sweetness in finish, but I think that's more an expression of a clean bitterness with low harshness rather than residual sugars. (17/20)

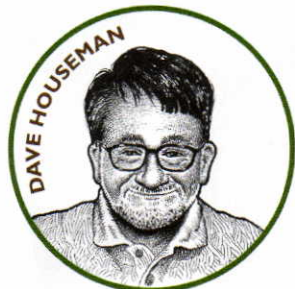
Mouthfeel: High carbonation. Noticeable warmth but not hot. Medium body—seems like a bit more with the carbonation; a bit heavy. Astringency low—good for the style. (4/5)

Overall Impression: Strong but quite drinkable. Very clean flavors with low harshness—always a plus in my book. The hop choice plays up the fruity aspects with stone fruit and tropical fruit present. Alcohol is a touch forward, but might smooth with age. A bit heavy and bubbly. More attenuation and lower carbonation would improve the drinkability. However, the clean flavors and low harshness make this a very enjoyable beer. (8/10)

Total Score: (41/50)



THE JUDGES' SCORES FOR SIXPOINT RESIN



Aroma: Sweet pale malt with a moderate, resinous hop aroma. Light fermentation fruitiness. No DMS. No diacetyl. Alcohol not particularly evident in aroma. Very clean, understated ale for the style. (10/12)

Appearance: Fairly clear with a light haze—OK for a highly hopped beer. Light orange/amber color. Dense, tan, rocky, long-lasting head. (3/3)

Flavor: Balanced pale malt and resinous hop flavor with high hop bitterness. Sweetness lingers in aftertaste as long as the hop bitterness. No DMS. No diacetyl. Some non-descript, fruity fermentation esters. Noticeable, but subtle alcohol. (18/20)

Mouthfeel: Medium to medium-full body. No astringency. Sense of bitterness lower than the stated IBUs for a soft mouthfeel and palate. Deceiving alcohol warming. Carbonation a bit low but in synch with this beer. (5/5)

Overall Impression: An understated double IPA, nearly an English barleywine. Great hop presence and balance. Nice to have an alternative to a citrus assault. The beer belies the high hop bittering rate. On a chilly night, it warmed well and was a great nightcap when accompanied by some aged cheddar. (9/10)

Total Score: (45/50)



Aroma: Orange zest citrus dominates, with subtle sweet malt in the background. Clean fermentation with evident alcohol. Clean maltiness becomes stronger as the sample breathes, though hop aroma remains. (10/12)

Appearance: First poured golden colored, with slight haze. Creamy, off-white, persistent rocky head with a few uneven bubbles, leaves lace on the glass. (3/3)

Flavor: Sweet, lightly bready malt supports a highly pronounced orangey hop flavor and clean fermentation character. Assertive hop bitterness grows in intensity until it totally dominates the long, lingering finish. On subsequent sips, malt flavor gains complexity, with notes of ripe plum and cherry, but balance is all about the hop flavor and bitterness. (16/20)

Mouthfeel: Medium bodied with moderate carbonation. Low alcohol warmth emerges, and intensifies the lingering, herbal astringency in the finish. Dry. (5/5)

Overall Impression: Deliciously drinkable for all the intensity of flavors. The malty sweetness is surprisingly intense, and provides support necessary for the assertive hop bitterness. The hop flavor is particularly engaging, living up to the brand name. Also the 9.1 percent ABV doesn't dominate the overall mix, but sits in the background as a supporting characteristic. It's a perfect beer for a late summer afternoon, when nothing is left to do but watch the sun and swat mosquitoes. (8/10)

Total Score: (42/50)



Aroma: First impression is light sherry, nutty notes from oxidation, balanced and brightened by moderate citrus and piney notes from American hops. Alcohol is apparent, but it is clean without the warming sensation of higher alcohols, and complementary. More hop character emerges as it warms, mainly pineapple and resinous notes. Malt is somewhat subdued, with light caramel and biscuit notes in the background. (10/12)

Appearance: Amber in color, with a head that forms nicely with compact, tight, white beads. It falls rather quickly, perhaps due to the alcohol. The clarity is excellent. (3/3)

Flavor: The malt is present in enough force to provide a backbone, and the caramel notes add complexity without upstaging the hops. The hops are the focus, not so much in the flavor as in the long, intense bitterness that would leave any hophead satisfied. The hop flavor has floral notes, as well as the citrusy/lemony character from American hops. Alcohol and light fruity esters are in balance with the malt and hop character. (16/20)

Mouthfeel: Medium-high alcoholic warmth, but not hot. Carbonation is low to medium, with a touch of residual sweetness from dextrins. Nicely done. A light astringency from the hops, but not above the limit for this style. (4/5)

Overall Impression: A solid example of a strong IPA. The fermentation is well done, providing some complexity from light fruity esters without allowing them to dominate. The alcohol content is appropriately high without adding the baggage of harsh fusels. The hop character is evident, but a bit subdued, and the sherry notes are evidence of age, but these are not completely unexpected for this style, whether from bottle or can. (8/10)

Total Score: (41/50)



Aroma: Moderately strong hop nose—woody, piney, citrus/grapefruit rind, some grassy-fresh notes. Mild malt sweetness in background, fairly neutral. Light esters, like peaches or apricots. Slight alcohol sharpness, not bad. Hops are prominent but not extreme. (9/12)

Appearance: Deep golden color, pushing close to amber. Moderately frothy off-white head, average retention. Fairly clear, just a touch of haze. Quite effervescent. (3/3)

Flavor: Strong bitterness, tongue-coating. Certainly follows its name—resinous finish and aftertaste. Some alcohol adds to the bitterness impression. Woody/piney flavors are quite strong. Some grapefruit rind. Finish is full with a long, lingering bitterness. The hop bitterness is fairly harsh and the hop flavor is aggressive. Neutral fermentation character with very low esters. The malt almost is an afterthought—neutral, grainy-clean flavor in background. (14/20)

Mouthfeel: High carbonation—mouth-filling bubbles. Medium body, but the carbonation makes it seem bigger. Astringent hop bite. Definitely warming but not burning. (3/5)







Overall Impression: The name certainly fits, but the quality of the hop bitterness and flavor is not to my liking. The bitterness has a lingering harshness and the flavor is very woody and resinous. I like how the malt is clean and supportive but the body and carbonation reduce the drinkability. An aggressive beer for those who prefer their IPAs to be rough and palate-assaulting with over-the-top bitterness. Well-made and fits the style, but the drinkability suffers in my opinion from heaviness and harshness. (7/10)

Total Score: (36/50)



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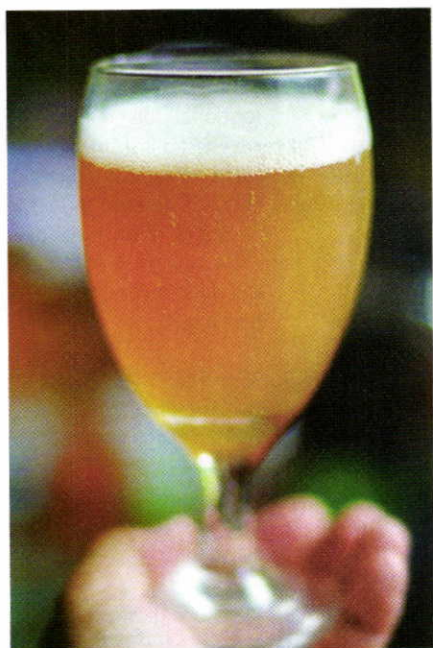
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by Charlie Papazian



Triumphant Saison



The Belgians and French did not invent seasonal beers, but they sure have tickled the fancy of beer enthusiasts who love to say “saison,” which means “season” in French. Where the corners of France, Belgium, and Germany merge, all assumptions are upended. The special way of brewing that emerges from this area defies definition.

Imported French and Belgian “saison-style” brews are matched in quality by both homebrewers and small craft brewers around the world. But what is a saison? I mentally shrug my shoulders at this question. I know one if I taste it and if someone tells me it’s so. They are yummy and come in many different flavors. Generally I might say they are kinky and delicious. Some I enjoy more

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than others. What seems part of the equation is that they shimmer. Saisons are fruity, yeasty, and earthy, compelling one to dance.

Here's a recipe emphasized by the suggested strains of yeast. You can add herbs, spices, fruits, and wishful thinking all in moderation, so as not to overpower the earthy, herbal, fruity characters derived from fermentation.

This beer will age gracefully when kept in a cool environment, developing complex fruit and yeast flavors that intrigue and expand your brew horizons.

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

Triumphant Saison

MALT EXTRACT RECIPE

INGREDIENTS

for 5 U.S. gallons (19 liters)

- 3.0 lb (1.4 kg)** light malt extract
- 2.0 lb (0.9 kg)** wheat malt extract
- 0.5 lb (225 g)** crystal malt (10° Lovibond)
- 1.5 lb (0.7 kg)** light honey or cane sugar
- 1.25 oz. (35 g)** Styrian Golding, Fuggle or English Kent Golding hops: 5 HBU (140 MBU) (60 min)
- 0.5 oz. (14 g)** American Crystal or German Saphir (flavor/aroma) (1 min)
- Herbs, spices, and fruits in moderation (optional); be creative
- 0.25 tsp (1 g)** powdered Irish moss
- Saison-style ale yeast such as White Labs WLP566 Belgian Saison II Yeast or Wyeast Labs 3711 French Saison
- 0.75 c. (175 ml)** corn sugar or 1.25 c. (300 ml) dried malt extract (for bottling)

Target Original Gravity: 1.052 (13 B)
Target Extraction Efficiency: 75%
Approximate Final Gravity: 1.010 (2.5 B)
IBUs: about 22
Approximate color: 7 SRM (14 EBC)
Alcohol: 5.5% by volume

DIRECTIONS

Add the crushed malt to 2 gallons (7.5 l) of water and let steep at 150-160° F (65-71° C) for 30 minutes, then remove the grains with a strainer. Add the malt extracts, honey or sugar, and 60-minute boiling hops for the 60-minute boil. Add Irish moss for the last 10 minutes of the boil. Add the aroma hops for the final 1 minute of the boil. Strain, sparge, and transfer immediately to 2 gallons (7.5 l) of cold water in the fermenter. Top off with additional water to make 5 gallons (19 l).

Pitch the yeast when temperature of wort is about 70° F (21° C). Ferment at about 70° F (21° C) for about one week or when fermentation shows signs of calm and stopping. Rack from your primary to a secondary and add optional herbs or other flavoring ingredients. If you have the capability, "cellar" the beer at about 55° F (12.5° C) for about one week. Prime with sugar and bottle or keg when complete.

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Triumphant Saison

ALL-GRAIN RECIPE

INGREDIENTS

for 5 U.S. gallons (19 liters)

- 4.0 lb** (1.8 kg) pale two-row malt
 - 3.5 lb** (1.6 kg) wheat malt
 - 0.5 lb** (225 g) crystal malt (10-Lovibond)
 - 1.5 lb** (0.7 kg) light honey or cane sugar
 - 1.25 oz** (35 g) Styrian Golding, Fuggle or English Kent Golding hops: 5 HBU (140 MBU) (60 min)
 - 0.5 oz** (14 g) American Crystal or German Saphir (flavor/aroma) (1 min)
- Herbs, spices, and fruits in moderation (optional); be creative
- 0.25 tsp** (1 g) powdered Irish moss
- Saison-style ale yeast such as White Labs WLP566 Belgian Saison II Yeast or Wyeast Labs 3711 French Saison
- 0.75 cup** (175 ml) corn sugar (priming bottles) or 0.33 cup (80 ml) corn sugar for kegging

Target Original Gravity: 1.052 (13 B)

Target Extraction Efficiency: 75%

Approximate Final Gravity: 1.010 (2.5 B)

IBUs: about 22

Approximate color: 7 SRM (14 EBC)

Alcohol: 5.5% by volume

DIRECTIONS

A step infusion mash is employed to mash the grains. Add 8 quarts (7.6 l) of 140° F (60° C) water to the crushed grain, stir, stabilize and hold the temperature at 132° F (53° C) for 30 minutes. Add 4 quarts (3.8 l) of boiling water and add heat to bring temperature up to 155° F (68° C) and hold for about 30 minutes. Raise temperature to 167° F (75° C), laut and sparge with 3.5 gallons (13.5 l) of 170° F (77° C) water. Collect about 5.5 gallons (21 l) of runoff. Add 60-minute hops and bring to a full and vigorous boil.

The total boil time will be 60 minutes. When 10 minutes remain, add the Irish moss. When 1 minute remains, add the 1-minute hops. After a total wort boil of 60 minutes, turn off the heat and place the pot (with cover on) in a running cold-water bath for 30 to 45 minutes. Continue to chill in the immersion or use other methods to chill your wort. Strain and sparge the wort into a sanitized fermenter. Bring the total volume to 5 gallons (19 l) with additional cold water if necessary. Aerate the wort very well.

Pitch the yeast when temperature of wort is about 70° F (21° C). Ferment at about 70° F (21° C) for about one week or until fermentation shows signs of calm and stopping. Rack from your primary to a secondary and add optional herbs or other flavoring ingredients. If you have the capability, "cellar" the beer at about 55° F (12.5° C) for about one week. Prime with sugar and bottle or keg when complete.

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By Matt Allen

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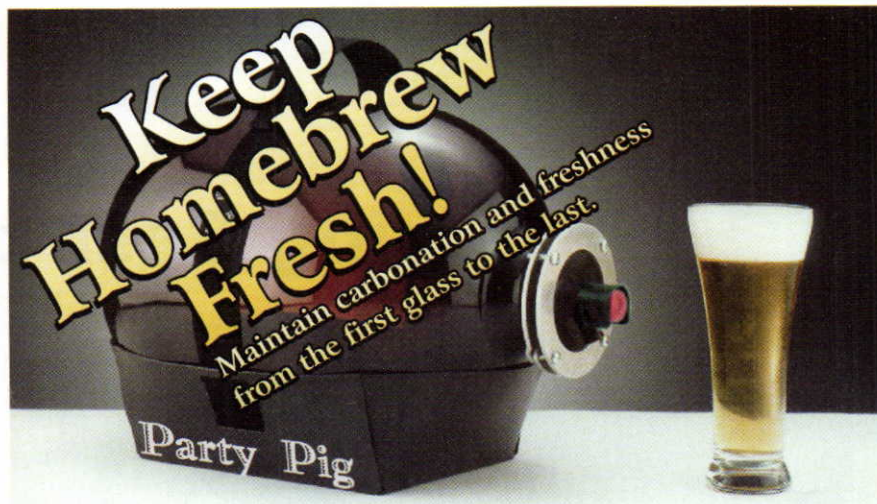
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Bringing Beer to the Table



I am the chef of a restaurant where wine receives nearly all the attention on our drink menu, but as a beer lover, I knew we were missing an opportunity to celebrate our cuisine in a different light. Hosting our first beer dinner this past fall offered me the chance to continue my beer education and to show others the full potential of beer.

We assembled a simple menu of five courses: appetizer, salad, main course, soup, and a light dessert. All but one beer came from our home state of Colorado. Our goal was not extravagance or mind-blowing creations, but amazing and informed beer pairings with delicious, exciting food.

We intentionally chose not to use the beer as an ingredient in our dishes because we wanted to demonstrate how beer and food can meet on the palate and create a new interaction of flavors instead of mirror each other. A beer's flavors speak loud and clear, but can take on so many different foods.

Here's a closer look at a few selections on our beer pairing dinner menu:

Fennel and orange salad/New Belgium Mothership Wit

Fennel and Belgian yeasts both have an intense taste and unique effect on the palate, constantly asking to be tasted again, but with restraint. The high-in-the-nose, anise aroma of fennel keeps up with the yeasty, bready character of witbier.

Raw vegetables and citrus keep the palate sharp, alive, and refreshed in contrast to the slight richness of a wit. Cilantro garnished the salad not only to provide a light herbal note, but also because it is the plant that produces coriander, a staple in witbiers.

Spiced ribeye, chanterelles, and sweet potato fries/New Belgium Abbey

A warm, sweet dubbel reflects the heft and sweetness of a well-marbled steak rubbed with brown sugar, nutmeg—not enough to fully notice (a traditional use of this spice)—garlic, allspice, and chiles.

CAFÉ TERRACOTTA BEER PAIRING DINNER MENU

Steamed mussels with cherry tomatoes, celery, and fennel seed/
Dry Dock Hefeweizen

Fresh fennel and orange salad/
New Belgium Mothership Wit

Spiced ribeye, chanterelles, and sweet potatoes/New Belgium Abbey

Coconut green curry soup with shrimp/
Great Divide Titan IPA

Intermezzo of First Snow goat cheese and grissini/Rockyard Old Gaffer Barley Wine

Orange-glazed pecan tarts/
Shipyard Pumpkinhead Ale

Chanterelles added a singular, grounding earthy note.

Coconut green curry soup with shrimp/Great Divide Titan IPA

The interplay between spicy food and hoppy beer is so exciting to experience, and so unexpected: the strong hops calm the spices, while the spices negate the bitterness. If someone thinks an IPA is too bitter, they should try it with a spicy Thai meal. Beer and food have never given me such an education in flavor interaction as this course did.

For our next beer pairing dinner, we'll surely cook with beer, as another experiment in developing our "beer cuisine."

Andy Read's family jokingly reminds him that in his youth, he "hated the flavor of beer" until he was about 22 (then it all changed). He is the executive chef of Café Terracotta in Littleton, Colo., where he occasionally brings in homebrew for a staff shift drink.

Photo courtesy of Andy Read

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In my wallet is a tattered Fat Tire label which I've had for 11 years. Ever since my first one, I immediately fell in love with this refreshing ale and the company's eco-conscience ways. Amongst friends, this label has led to many discussions such as,

"Is it possible to jump a recycling bin on a banana seat bike?"

(Yes, but next time don't pedal so fast!) Thanks Fat Tire for making recycling and biking so much fun.

Frances M. of South Carolina



A lot of people have discovered the tasty joy bottled and canned in Fat Tire Amber Ale. Join them on newbelgium.com and enjoy the ride!

