BrewYour

JANUARY-FEBRUARY 2002, VOL.8, NO.1

THE HOW-TO HOMEBREW BEER [illegible]INE

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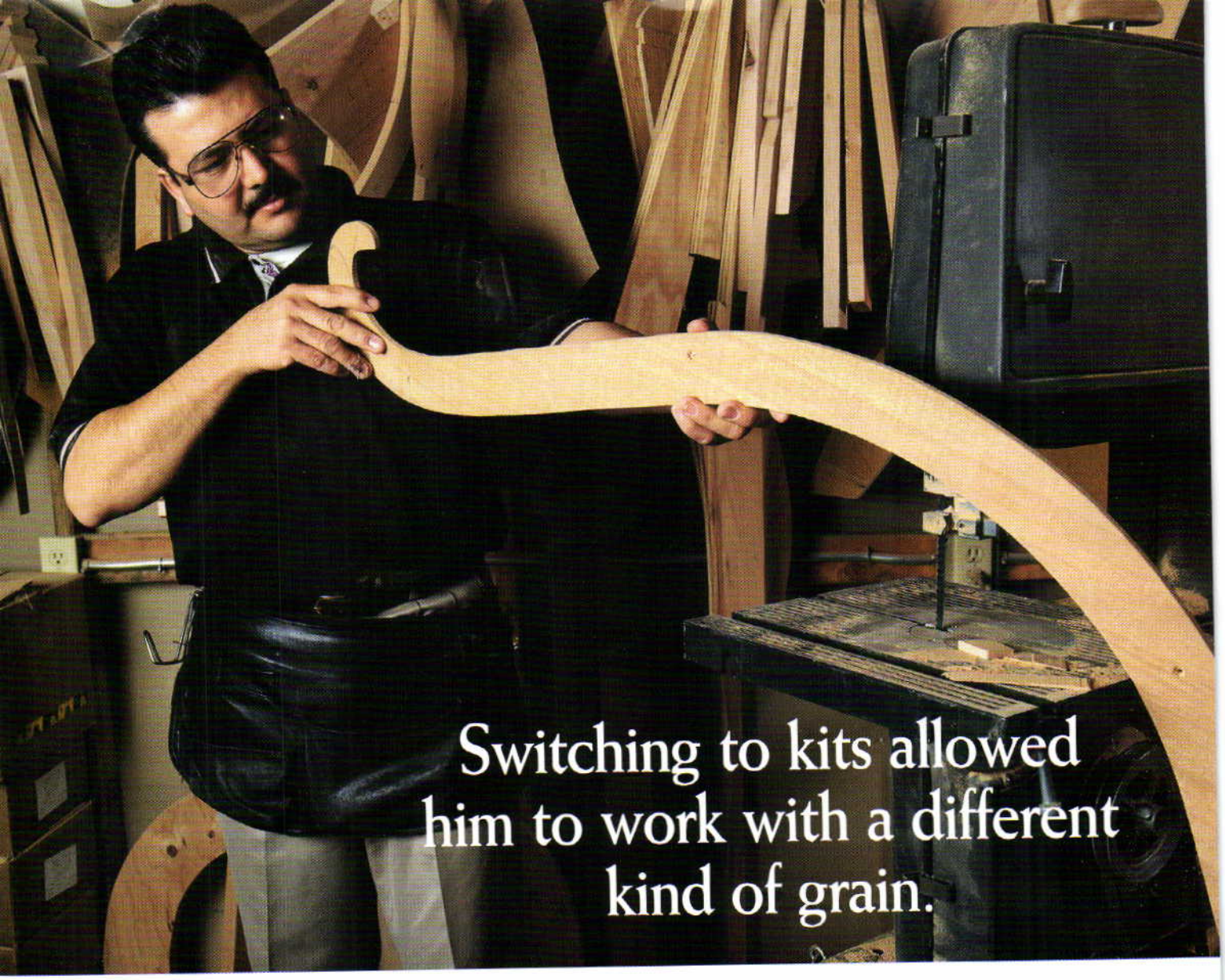

"I wouldn't have believed that a kit beer could be so good"

Roy Bailey - Beer Correspondent
CAMRA's 'What's Brewing' magazine (April 2000)

"It tasted just as good - if not better - than many a pint I've drunk in London pubs."

Richard Neill
'Weekend Telegraph' (April 99)

"It resulted in as good a home-made beer as I have ever tasted"

Maximum 5-point rating in kit review
'Bizarre' magazine (September 99)

This man loves beer and brewing. He's also discovered a talent for crafting fine furniture.

Full grain mash brewing was fine but it was taking up too much of his spare time. So he decided to look for an alternative brewing method that would still provide a satisfying hobby and an equally satisfying brew. The answer was waiting at his local brew store - Smugglers Special Premium Ale, Old Conkerwood Black Ale and Midas Touch Golden Ale - the Premium Gold range of brewkits from Muntons.

Because Muntons use only the finest English 2-row barley and water, the kits give the same quality result you get from full grain mashing - except, it comes in a can, is a whole lot more convenient and frees up more time to do other things.

Since switching to kits our man has never looked back. He's still brewing great beer but Premium Gold means he can see the beauty in other grains.

If you're a slave to full grain mashing, don't be! Switch to Muntons today.

Ask for Muntons Premium Gold at your nearest brew store.

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ADVERTISEMENT FEATURE

Nora's nuts about Muntons brown!

Nora Leslie is a 107 year old beer-quaffing grandma who loves the taste of Muntons Nut Brown. Beer lover Roger Bacon investigates...

Cheers! Nora Leslie hoists another glass of Muntons Nut Brown

Nora Leslie has proudly reached the ripe old age of 107 and puts much of her outstanding longevity down to a love of home made beer.

Born in Stepney, East London in 1894, at the tender age of 17 Nora emigrated with her family from England to Australia. She has enjoyed a glass of beer for as long as she can remember and now, every day without fail, Nora sups a pint of Nut Brown Ale from the Muntons Connoisseurs range.

Nora's Nut Brown is lovingly and carefully brewed for her by her grandson John Travers. A home brewer for many years, John has refined his choice to the kits that he believes provide quality, authenticity and value. He also likes the fact that Muntons kits are easy to use and produce consistent results brew after brew. At 107 Nora has had many years to develop a discerning palate. She would soon recognise a brew which was made with substandard ingredients or one which changed from batch to batch. Stored in the wardrobe, Nora always likes to have a hundred or so bottles of Nut Brown close to hand!

Nora lives with John and her daughter in a quiet suburb of Sydney, Australia. John is a regular customer of Kirrawee Home Brew his local home brew store. It was Kirrawee's owner Kevin Willoughby who first brought Nora's Nut Brown habit to the attention of Muntons - makers of her favourite tipple.

Whilst it would be wrong for us to link long life with the consumption of alcohol, it seems that almost every family has (or has had) an old timer who enjoys life to the full yet still manages to live to a ripe old age. Emily Allard, my own great grandmother, was partial to the odd tipple and, though now sadly departed, regularly enjoyed a glass of malt whiskey eased down with milk stout. She lived into her late eighties and, like Nora, put much of her longevity down to enjoying a drink every day. She also smoked the occasional cigarette but that's another story!

Kevin Willoughby of Kirrawee has now thrown down the gauntlet by issuing a challenge to other countries of the world where home made beers are brewed and enjoyed: "I bet you can't name another Muntons Home Brew drinker who has lived as long as Nora" he challenged. Muntons' Home Brew Manager Andy Janes is unaware of anyone older but believes it would be good to collect stories about senior Muntoneers. Perhaps the US can provide a challenger?

Do you know of anyone out there who is a regular homebrew drinker and qualifies for entry into the 'Oldest Muntons Home-Made Beer Drinker' competition? Remember entrants must be at least 107 years old to be considered! Please send details to Andy Janes at:

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CALL FOR ENTRIES!

Brew Your Own's 7th Annual Homebrew Label Contest

Send us your best homebrew labels and you could win some great brewing prizes from **BYO** advertisers. Enter as often as you like, but you can only win one prize. Winners will see their artwork featured in the July-August issue. Deadline to enter is April 15, 2002.

WIN GREAT HOMEBREW PRIZES!

Rules: Entrants may send labels or labels already stuck to bottles. We need the real thing, so no digital or electronic files will be accepted. All other rules are made up, as always, by the editors of *BYO* as we go along. This year all labels will be judged in one category, open to graphic artists and amateurs alike, so ultimate bragging rights are on the line. And we have a new request: When submitting your labels, tell us a bit about the artwork and its inspiration. Is it hand-drawn? Created on a computer? Ripped off from the Louvre? Send us your best labels and good luck!

BREW YOUR OWN Label Contest Entry Form

THE HOW-TO HOMEBREW BEER MAGAZINE

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Address _____

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Send your entry to:

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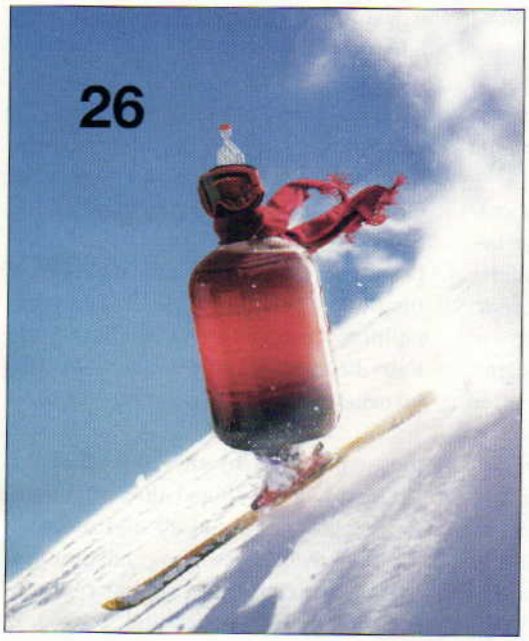
DEADLINE: April 15, 2002

Volume 8 Number 1
JANUARY-FEBRUARY



Departments

Features

Where to find it

Skier Photo: Jonathan Selkowitz/Selko Photo
Carboy Photo and Digital Enhancement: Charles A. Parker/Images Plus

Anita Johnson had to bribe a friend with his favorite meal so he would show her and her husband Jim how to brew. That small investment in fish sticks in 1993 resulted in a passion for the hobby of homebrewing. When a local brew shop closed, Jim convinced Anita to quit her sales job to open Great Fermentations of Indiana in Indianapolis. That was six years ago and Anita has never regretted leaving the corporate world.

Anita brews "in the hood," a custom-made copper exhaust hood in her basement. "I sacrificed my laundry room so I could have a really nice year-round brewery," she says. She loves to escape into her brewery to create new recipes for the store. Anita has often gone on the quest for more hops, more flavor and more alcohol, but is now working on recipes for low-gravity beers that showcase the brewer's skill. Although homebrewing is her passion and her vocation she calls herself "a lazy brewer," always looking for ways to make the process easier and more enjoyable. Anita is a member of the FBI (Foam Blowers of Indiana) homebrew club and a valuable member of the *BYO* review board. She is also competition director for the Indiana State Fair Brewers Cup Competition. Her favorite toast is "Anita 'nother beer."

Just down the road from our office, Norman Rockwell used to ask his Arlington, Vermont neighbors to model for his famous paintings that graced the cover of the *Saturday Evening Post*. We're doing our best to uphold that local tradition by using our friends and neighbors as cover models for *BYO*. Recently we invited the *BYO* beautiful people from the past year or so to share a few pints together. These temporary supermodels seemed remarkably well-adjusted, given the weight of fame thrust on them by the *BYO* spotlight. Nobody had shortened their monikers to a single name and all had resumed their previous lives as carpenters, chefs, insurance salesmen, realtors, ski-equipment testers and photographers. Still, there are rumors floating around that a few are getting agents to negotiate their next big deal. It seems some have grown beyond our six-pack pay scale. So next time you find yourself in Manchester Center, Vermont, don't be surprised if the locals seem very familiar — they are.

Contributing author Glenn BurnSilver remembers his first taste of beer as not altogether pleasant. "My father had been working on the car during one hot afternoon. He went into the house for something and I saw his beer — a Coors — sitting by the wheel and took a big glug," he recalls. "It was flat, hot and repulsive. I was only 10, but it's a wonder I ever tried beer again."

Glenn's first experience with microbrews was in Chico, California during the early days of the Sierra Nevada Brewery. His friend washed bottles — by hand — at the brewery and invited him to tasting parties, showing him a beer world beyond warm Coors. These days Glenn thoroughly enjoys the pleasures of drinking fine brews, though his preference leans toward stronger beers such as stouts, porters, strong ales and Belgians. His approach to brewing is relaxed. He enjoys experimentation (double-chocolate espresso stout is the latest creation) and the results, but is less concerned with the technical aspects of the hobby. "Though I may get into more-advanced techniques someday, for now I am comfortable as a partial-grain homebrewer," he says.

Glenn also writes about music, backpacking, backcountry skiing, rafting, old bicycles and travel for various publications. His previous article, "Out Of Africa: Uncovering The Secret Of Maasai Cucumber Beer" appeared in the January 2001 issue of *BYO*.

Starting with this issue, BYO is adjusting its publishing schedule to eight times per year. We will be publishing issues every other month during the first part of the year, while keeping our monthly schedule during the four busy fall months of the hobby. We believe this new schedule will allow each issue of BYO to contain more information than ever, such as some new departments and special features we will be rolling out shortly. All BYO readers who signed up for annual subscriptions of 10 issues will still receive all 10 issues they paid for. We've already extended your files in our computer system and your new expiration date appears on this issue's mailing label on the front cover. If you have any questions about your BYO subscription, please contact us by e-mail at byo@pcspublink.com.

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Bargain-Basement Helmet

I was very excited to learn from the "TLC for Stainless" article *(November 2001)* that I could get a Speedglas welding helmet for $50. But when I went to the Speedglas Website to check it out, I couldn't find anything anywhere near that price. Can you tell me where I can purchase a Speedglas 9000V helmet for that kind of price?

Warren Stewart
Canon City, Colorado

Hate to be the bearer of bad news, but it sounds like you misinterpreted the text. The section you refer to reads: "Why would you want to spend $100 to $360 on a welding helmet when they're available for $50? Because it's safer and simpler. No more nodding your head violently to flip down a heavy helmet. No more striking your arc half an inch off target. The Speedglas 9000V (Variable) we tried could be adjusted from an 'off' shade that was just dark enough for gas welding to a shade appropriate for stick, MIG or TIG." What we meant to imply was that some cheaper helmets with single non-automatic lenses are available for $50, but the more expensive models are safer and simpler.

Love-Hate Mail

This is a message to Scott Learey, creator of the cool homebrewery featured in "Homebrew Deluxe I" in the November issue of *BYO*. Your brewing system looks really nice, to say the least. I am sure I speak for a lot for homebrewers when I say I hate you. Just kidding, of course. It really is a kick-ass system. Do you have any detailed plans so I can copy it?

Brad Dawson
Elkton, Maryland

Scott Learey, creator of the much-coveted homebrew system, responds: "I did this all in my head, so I have no plans drawn up. It sounds like I need to sharpen my pencil and start sketching. I appreciate your comments. The work of building such a system pays off in the long run — with great beer!"

Deep Gratitude

I've been a *BYO* subscriber since the magazine was launched in 1998, and I've kept every issue. The problem is, some issues are stacked in my basement brewery and others are piled around the house. So when I want to look up a story, let's just say it's almost impossible. That's why I'm writing: to thank you for publishing the comprehensive 1998-2001 Story Index that arrived with the December issue. Not only did it remind me of great articles in years past, it inspired me to gather up my collection, put the issues in order and buy some of your binders. I also tidied up the brewroom. I love you and my wife loves you even more. ■

Terry "Tidge" Stewart
Denver, Colorado

brewer profile

Blown Glass Bottles

• Robert Lichtman • New Fairfield • Connecticut

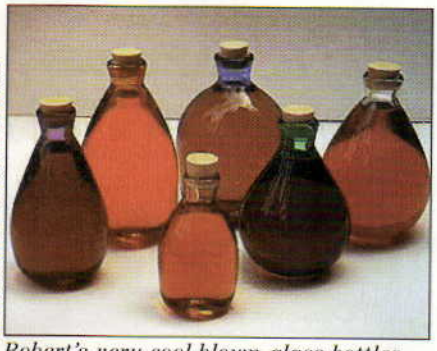


PHOTO COURTESY OF ROBERT LICHTMAN

Robert's very cool blown-glass bottles make great homebrew vessels.

The way I found myself involved in homebrewing was somewhat roundabout. About two years ago, my interest in early-American life led me to a book called "Early-American Beverages." It was in this book that I found my first recipes for ginger beer.

The recipes were copied word for word from the original text. "A large handful of this, a bucket of that, a dash of tincture." So some modern interpretation was definitely needed. After a few attempts at making beer from these dated recipes, some more successful than others, I eventually got a beverage that wasn't too bad.

I usually brew up a batch of homebrew every few months. I brew mostly extract ales and pilsners. I like amber beers and would like to try something really light, like a weissbier. I like simple recipes but try to highlight certain spices or hops. I brew by myself, and my wife Rita is my main taster. She lets me know if I have come up with a "hit" or a "miss."

The next step was deciding to update my brewing equipment to the current century. I originally just used a big boil pot and my first ginger beer was fermented in twist-top bottles. So I went to my local homebrew store and bought the basic starter kit.

My equipment for brewing is still very basic. I use a glass five-gallon carboy for fermenting my extract beers. I found the plastic bucket system problematic. Being a glassblower by profession, I always prefer glass. I make and sell early-American (bullseye window) glass. So I eventually decided to start making my own bottles to hold my beer. My many years spent as a glassblower came in very handy during the process of creating the right bottle.

The bottles I make are fairly thick — about twice as thick as a Grolsch bottle — so they are durable for washing and able to withstand the pressure of carbonation. The biggest challenge was finding a way to bung them down. After several trials with cork stoppers, I tried rubber stoppers (laboratory ones) and it worked better. The corks were too porous and I couldn't get them to seal. They were expensive, too. A bonus of rubber stoppers, though they aren't early American, is that they are reusable. I just twist them down with a wire to keep them tight.

The final step was to add color to the glass. I tried green, blue, purple and gold glass to help protect the beer from light. I make bottles in a variety of sizes so I can bring the right amount of homebrew, depending on the number of people being served.

I like to bring a bottle of my homebrew when Rita and I go to visit friends for dinner. I also bring a bottle or two to share with family at Thanksgiving and Christmas dinner. The response to my beer is mostly favorable. The lighter versions are the most popular, but, without exception, everyone likes the bottles. Although created for utilitarian reasons, their simple beauty is hard to overlook. And even though our hosts would not mind if I left the bottle with them, I must spirit them away to be refilled with my next batch of brew.

reader recipe

Scamp Stout

(5 gallons, extract with grains)
OG = 1.058 FG = 1.020 IBU = 25

Here is a sweet stout that is smooth, rich and full-bodied. It is very popular among my beer-drinking friends, both stout-lovers and non-stout-lovers alike.

Dave Fetty
Darien, Illinois

Ingredients

7 lbs. Muntons light liquid malt extract
0.75 lbs. crystal malt (120° Lovibond)
1 lb. chocolate malt
0.5 lb. roasted barley
0.125 lbs. black patent
0.25 lb. carapils
1 lb. oat flakes
1 brewers licorice stick
6.5 AAU Northern Brewer hops (1 oz. of 6.5% alpha acid)
1 tsp. Irish moss
Irish Ale Yeast (Wyeast 1084)
3/4 cup corn sugar and 4 oz. lactose sugar for bottling

Step by Step

Steep grains in 3 gallons 150° to 160° F water for 30 minutes. Rinse grains with 1 gallon 155° F water. Add liquid extract and bring to a boil. Add 1 licorice stick (chopped into several small pieces) just prior to boil. Stir gently to dissolve licorice. Boil 70 minutes. Add Northern Brewer hops 10 minutes into the boil. Add Irish moss 15 minutes before end of boil. Cool wort, aerate, then pitch yeast. Top off to 5.25 gallons with preboiled water. Ferment 5 to 7 days, then transfer to secondary for two weeks. Prime with corn sugar and 4 oz. lactose sugar, then bottle. Drink in 3 to 4 weeks.

brewer profile

Homebrew Italiano • Nicoloa Zanella • Rovigo, Italy

PHOTO BY NICOLOA ZANELLA

Nicoloa spurns the grape and mashes some grain in his garage.

Homebrewing officially started in Italy in 1995. In that year, Italy adopted a craft-beer law that legalized the production of beer at home, as long as it was dispensed free of charge and only to your relatives and friends. Before 1995, a few Italian pioneers started homebrewing using kits they had bought abroad.

After 1995, the homebrew flower really bloomed. A little shop in Udine started selling kits. They also sold good-quality grains and extracts, hops, liquid yeasts and every ingredient and piece of equipment a homebrewer might need. Nowadays there are at least three homebrewing shops in Italy and they work mainly by mail order.

I am an active member of the "Unionbirrai," a brewing association that includes microbreweries, brewpubs, homebrewers and beer lovers. We founded a homebrew club Website (www.hobbybirra.it) and a Usenet newsgroup (it.hobby.birra) in 1998. The newsgroup has about 50 to 100 regular writers and more than 2,000 subscribers. At the moment there are about 20,000 homebrewers in Italy. That number is growing fast, with about 5,000 new homebrewers added every year. About 80 percent of these homebrewers use kits, but there is also a very active group of all-grain brewers (including me).

Microbreweries and brewpubs contribute to the growth of the homebrewing movement by hosting meetings and competitions and giving homebrewers a high-quality product to emulate. We had two competitions last year and the entries keep increasing every time. We will definitely need more judges for the next competitions. Our aim is to have a competition for every season, with the appropriate styles. We have a craft-brew convention ("Birrissima") every September and try to get well-known industry people to come and speak about different brewing techniques.

The passion for high-quality beer is growing rapidly and it doesn't seem to compete with wine. Good quality wine and good quality beer are two different products. They work together in satisfying different demands. ■

reader tip

Are you looking for better ways to aerate your wort after it has been transferred to the primary fermenter? Try an industrial-style paint mixer. The mixer sells for under $10 at most home-improvement stores. One end attaches to a power drill. It has a long drive shaft and a mixing fan at the other end. This device is similar to an electric, hand-held beater, like you'd find in your kitchen. The mixer stirs the wort at a very high speed and the intense agitation introduces air. It aerates wort to the point of frothiness in 45 seconds and cuts my lag time in half. It sure beats shaking the carboy! Don't forget to sanitize the mixer before you stick it in your wort. *Seth Townsend • Calabasas, California*

homebrew calendar

January 11 and 12
Big Beers, Belgians and Barleywines Festival
Vail, Colorado

Organized by High Point Brewing, this festival showcases unique and creative beers from across the country and beyond. The two-day event includes educational seminars and tastings, along with a barleywines and strong ales competition. All festivities will be held at the Hubcap Brewery and at the Half Moon Saloon in Vail. Festival admission is $20. For more information, contact Laura Lodge at (970) 524-1092 or llodge@hotmail.com.

February 15 and 16
Kansas City Biermeisters 19th Annual Homebrew Competition
Kansas City, Missouri

The Kansas City Biermeisters annual club competition and pub crawl is held at the Pony Express Microbrewery in Olathe, Kansas. The entry deadline is February 2nd. For more information, go to www.kcbiermeisters.org or call Jackie Rager at (913) 962-2501.

February 27 to March 2
Real Ale Festival
Chicago, Illinois

This festival celebrates cask-conditioned ales with more than 180 brands from across America and Great Britain, as well as a homebrewed real ale competition. It will be held at the Goose Island brewpub in the Wrigleyville neighborhood. For more information, call Ray Daniels at (773) 665-1300 or join the mailing list on the Website at www.realalefestival.com.

Join the Homebrew Nation! Send your homebrewing stories, tips, recipes and events to edit@byo.com. If we publish your tale, we'll send you our groovy Euro-style BYO bumper sticker.

Defying gravity

How to brew a concentrated wort

by Thomas J. Miller

FOR MOST HOMEBREWERS, HIGH-GRAVITY BREWING might mean making a strong barleywine or a doppelbock. Professional brewers — and advanced homebrewers — also understand the phrase as something different: brewing a concentrated wort, fermenting it, and diluting it to "normal" beer strength with clean, de-aerated water.

This method is a favorite of commercial breweries, mostly because it is more economical than smaller-batch microbrewing. Homebrewers can benefit from the technique, too, if they are willing to pay careful attention to the brewing and lautering procedures, and have yeast that can handle the stress of increased gravities and longer fermentation times. Once fermentation of a high gravity beer is completed, homebrewers can then "cut" the beer (dilute the fermented wort), thus doubling or tripling their brewhouse yield. For those who want quality homebrew and serious quantity, but lack the time to brew up several batches, this might be a method worth exploring. It's also a great technique for light-beer brewers, as this is the method most common to the style.

PHOTO COURTESY OF AL MARZI

Brewer: Al Marzi brews at Harpoon Brewery in Boston, MA and Windsor, VT. He started with Harpoon in June 1991. He did a little bit of homebrewing before he was hired, went to the Siebel Institute for the short course seven years ago, and recently returned for a diploma. Marzi began at Harpoon as the delivery guy, was promoted to assistant brewer and then was named head brewer. He's now the vice president of brewing operations. Marzi is currently the president of the New England chapter of the Master Brewers Association of the Americas.

High-gravity brewing has grown in popularity over the past 25 years. In fact, more beer is produced in North America using this technique than by traditional means. The process begins by producing wort of higher-than-normal strength. For instance, a wort that's 12° Plato (1.050 original gravity) might be 16° Plato (1.067 OG) in high-gravity brewing.

This wort is reconstituted with water at some point later in the process. The water (which is sterile and deoxygenated) can be added at any point after the wort is brewed. This includes knockout, during or after fermentation, or even before or after the filter. The added water increases yield. In other words, more product is gained from each individual brew.

A list of advantages for high gravity brewing include increased brewing capacity, reduced energy and labor, cleaning and effluent issues, the possibility of higher adjunct rates, smoother tastes in the finished beer, and improved flavor stability (because the compounds responsible for haze are more easily precipitated at higher wort concentrations).

The disadvantages include decreased brewhouse efficiency, decreased hop utilization, decreased foam stability during the boil (which means increased risk of boilover), decreased yeast performance over time (if you're harvesting yeast) and the need for sterile water for dilution.

Homebrewers who try a high-gravity brew need mostly to calculate an accurate malt bill. If they already know what kind of efficiency they usually have in their home brewery, they can plan to be about 4 percent less efficient. Most homebrewers can count on efficiency between 65 and 68 percent. In high-gravity brewing, the decreased efficiency is due to the increased ratio of carbohydrates to water.

The grain-to-water ratio in a high-gravity beer should be about 1 to 2.5, as opposed to 1 to 3.5 or 1 to 4. This has a positive influence on proteolytic enzyme activity, which leads to the development of free amino nitrogen. This is very important for the vitality of the yeast. Also, plan to be about 2 to 3 percent less efficient in your hop utilization and make recipe adjustments accordingly.

Boiled, sterilized water works for dilution water. After it has cooled, bubble some carbon dioxide through the water if you can. This removes any dissolved oxygen that the water may have reabsorbed, and thus prevents oxidation of the beer.

The increased osmotic pressure and elevated alcohol content may compromise yeast performance. Choose a yeast strain that can handle a high-gravity environment, like Scottish Ale yeast or Bavarian Lager yeast. Make sure the wort is well aerated, as this will improve fermentation. With high-gravity brewing, the number of generations you can get from your yeast strain generally decreases due to increased pressure on the yeast.

During the brew, shoot for a higher sparge temperature — around 172° F. This decreases wort viscosity. But be careful to not overshoot the temperature, or you'll leach out polyphenols from the extra grain husks. Add rice hulls if you fear a stuck mash.

I wouldn't increase the boil time for fear of really darkening the wort and increasing Maillard reactions, which causes bready, cardboard flavors. Just make sure it is a vigorous boil that gets a good hot break.

Brewer: Leo Orlandini is head brewer at Lion Brewery in Wilkes-Barre, PA. He began his career at Lion in 1988 and has been the master brewer since 1995. He attended the Siebel Long Course Diploma program in 1991.

The need for de-aerated water is the biggest issue for homebrewers who want to try high-gravity brewing, because if you introduce oxygen after fermentation, it could create off-flavors in your beer. This de-aerated water will be used after aging to dilute the beer. It should contain no chlorine. The homebrewer can simply boil water and chill it down rapidly.

A thicker mash is prevalent in high-gravity brewing. This means more malt but less mashing and sparging water. A decreased efficiency will occur because there is less sparge water for extraction. Adjuncts like corn syrup can be added to the kettle to make up the decreased efficiency.

Boiling should evaporate five percent of the wort volume. When calculating hopping rates, the brewer must account for this dilution factor and increase his bitterness units accordingly. Normally, high-gravity beers are boiled vigorously for 90 minutes.

If you do not reach your targeted gravity, you need to adjust your mashing temperatures. If you want more alcohol, use lower temperatures. If you want less alcohol, increase your temperatures. The ideal temperature for beta-amalyase enzyme activity is 144° F. This creates more fermentable sugars. The ideal temperature for alpha amylase is 158° F. This creates more non-fermentable sugars. After the boil, the pH of your wort should be adjusted to the 4.9 to 5 range.

The yeast-pitching rate should be [1.25 x 10(6) cells/ml/degree Plato]. In practical terms, for homebrewers who don't count cells, this means you must get a vigorous starter going and pitch a lot of slurry. Aggressively aerate your wort and add zinc sulfate (yeast food).

Fermentation temperatures should be normal. For our high-gravity lagers, we pitch at 54° and regulate to 58° F. Our fermentation cycle is completed in seven days. We then take the beer off the yeast and age for a minimum of 7 to 10 days. An ideal high-gravity beer can be made using 15° Plato wort (1.063 OG) that is diluted to 10.5° Plato (1.044 OG) and is hopped to give 18 to 20 IBUs before dilution. This will give 12 to 14 IBUs post-dilution. ■

All-grain gravity

Dry hops, lame foam, fresh fruit and nasty taps

Mr. Wizard

Help! I have been brewing for about 10 years and have just taken the step to all-grain. I have been reading and trying many of the recipes in BYO, and as long as I stay with extracts or partial mash, I am very close to the OGs. But when I do an all-grain batch, I am about ten points below the target OG. I know I can correct this with some DME, but I don't want to. When you publish recipes, is it assumed that the brewer knows enough to adjust for mash efficiency, or are they already adjusted to some unknown mash efficiency? I run into the same problem with other books and publications.

John "Mick" Barnes
Marcellus, New York

The recipes published in *Brew Your Own* and in other magazines and books are indeed formulated with some efficiency in mind. In the case of regular columns, such as "Replicator," the columnist typically will use his own efficiency factor, based on his system and experience. This is usually between 65 and 68 percent, meaning that a pound of malt will add between 0.65 and 0.68 pounds of extract to the wort. Other recipes are submitted by readers, and it is difficult to know what the brewer had in mind.

I am occasionally asked to review reader recipes. When I review them I begin by checking if the malt (or other sources of extract, when applicable) contributes enough extract to hit the target gravity. In order to do this, some assumption about efficiency must be made, and I personally use between 65 and 68 percent. Sometimes the malt list doesn't match the original gravity and the amount of the primary extract source (usually some type of pale malt for all-malt brews) needs to be increased in order to improve the odds of hitting the target gravity.

When I use other brewers' recipes I look at the malts, their relative proportions and the original gravity. I then re-calculate the recipe based on my own brewing system and, to a large extent, ignore some of the finer details of the recipe. I use a certain mash thickness that works for my system, I get a particular yield influenced by my mill and my mash and lauter vessels, I have certain mash profiles that I like, I typically boil wort in a particular fashion and so on. I imagine that most brewers merge a recipe into their standard procedure in a similar way.

It sounds to me that your system consistently has an efficiency less than that used by most homebrew publications when they check the accuracy of recipes. If I were you, I would adjust recipes by focusing on the pale malt (or other primary source of extract). You may find that simply increasing the amount of pale malt by 20 percent over what is listed in the recipe works out. You may also want to examine the coarseness of your malt. Overly coarse grist may be one of the culprits behind your low yield problem and simply using a finer grist may help out considerably. Regardless of how much tweaking and tuning a brewer does to his system, it will never be able to exactly produce 5 gallons of wort at a target original gravity using a recipe based on another brewer's system unless some modifications are made to the recipe. You could also check out a brewing-calculation software program like ProMash, which makes it easier to adjust base-malt amounts to match target gravities on a given system.

Mr. Wizard

Over the years I have read a number of articles on dry-hopping and hopback use. As I understand it, dry-hopping should not be done in the primary fermenter because the "scrubbing action" of the yeast activity will diminish the desired results of dry-hopping. At the same time, most articles on hopbacks say the unit should process the hot wort directly from the boiling kettle so that the high heat helps to sanitize the hops and to extract the hop oils. But now the wort is in the primary (cooled, of course) and subject to that same "scrubbing action" mentioned earlier! I would appreciate any information you might provide to clear up these issues.

Dude Green
Yuba City, California

Most brewing techniques are touted by a long list of advantages. Dry-hopping, which means adding compressed hop cones or hop pellets to beer or fermenting beer, can be "sold" by its ability to contribute a nice, fresh hop aroma. Why put hops in the kettle or use a hopback when you can add them straight to the fermenter?

Hopback advocates almost always mention the bonus of having the hops and the hopback sanitized in the process. This casts a cloud over the method of dry-hopping, because it implies that hops are covered in bacte-

ria and require sanitization (an argument that is not well supported). Dry-hoppers feel pretty confident about the method — after all, dry-hopping would not be popular if it routinely produced contaminated beer. Plus, dry-hoppers avoid the "scrubbing" action of primary fermentation.

When reading the hype surrounding these methods, it is hard to get a feel for the salient features of each method. When I want a really hoppy beer with a fresh hop oil aroma, I prefer dry-hopping. The aroma of dry-hopped beer is often described as grassy and frequently has the distinct aroma of myrcene (a particularly aromatic hop oil). Hopping rates vary depending on the hop variety and oil content, but 1/4 to 1/2 to ounce of hops per gallon of beer is a pretty normal range for dry-hopping. When I dry-hop, I do it after primary fermentation is complete and before moving the beer to a cool location for aging.

But I personally prefer adding hops to hot wort, usually in the kettle at the end of the boil for most beer styles, because the grassy and oily aromas are less pronounced. The little brewery up Highway 99 from you is well known for the hoppy aroma of its brews, especially its Pale Ale. Sierra Nevada uses a generous late-hop addition in all of its standard beers and only dry-hops the Celebration and Bigfoot. Hops added late in the boil or to a hopback can certainly produce a very hoppy beer, but the hop aroma is less "raw" in comparison to dry-hopped beers. Hopping rates for late-hop additions and hopback additions vary, but 1/4 to 1/2 ounce per gallon will produce beers with pronounced hop aroma.

By the way, some commercial brewers use in-line hopping devices that are similar to the typical homebrew hopback. Many commercial hopbacks are vented — they're like big strainers placed between the brew kettle and the wort cooler — but the in-line devices aren't vented. This means the grassy and oily aromas are extracted from the hops but do not escape from the wort. This method produces an aroma more similar to a dry-hopped beer. The purported advantages are that the hops are sanitized, more oils are extracted because the wort is hot and the hops do not have to be fished from the fermenter after they are spent. But the aroma is still "scrubbed" during fermentation.

Mr. Wizard

I have been homebrewing for several years and still have a persistent problem with head retention. I brew all-extract batches with some specialty grains, but do not mash. I have heard that using carapils and going heavier on the hops can aid in head retention, but I still can't keep a head on the beer for the whole glass. Please help me make better beer!

Steve Thunberg
Rolling Meadows, Illinois

Beer foam is pretty neat-looking stuff and is one of those topics that brewers can only discuss with other brewers. Start talking about the merits of good foam among non-brewers and people will think there is something fundamentally amiss! I have spent a lot of time looking at and thinking about beer foam — in fact, I did my masters thesis on beer foam — and have developed a simplified approach to brewing beer with great foam.

The key item involved in my approach involves malt selection. This means going all-grain. Unfortunately (for extract brewers), all-grain brewers really have a leg up on extract brewers when it comes to foam for a few reasons. First of all, foam is primarily a function of wort or beer protein content and type. Protein (or more correctly polypeptide) content decreases when wort is heat-treated, because proteins come out of solution (the wort) when heated. Extracts are heated and sometimes boiled when produced, and the brewer again boils the wort at home (unless you're making a no-boil beer). Another key factor affecting beer foam is the type of malt used. Extract brewers can select different specialty malts but have no control over the type of malt in the extract, which typically comprises more than 85 percent of the recipe. Plus, some extracts contain adjuncts, for example sugars, which dilute the protein content even more and have a negative affect on foam.

When selecting extracts look for all-malt, low-color types, since these will give you the best shot at good foam. I personally prefer dried malt extract over liquid extracts as a source of extract because I have had better results with that form of extract. I assume this is because DME receives less heating in the process. Some extracts will describe the wort it will produce. If you can find un-hopped, all-malt extracts that use the descriptors "light color" or "lightly modified malt," you will be in good shape.

I recently brewed a pilsner using a new malt, produced by Briess, that's simply called pilsner malt. The malt caught my attention because Briess has spent a lot of time and energy on developing an under-modified malt. Their advertising mainly described its low color and very light flavor. I was more interested in the type of foam it would produce. So I bought some of the pilsner malt and some Czech Saaz hops and got busy!

The first thing I noticed about the malt was its color. This stuff is really pale and the color is a sign of little protein degradation during malting. Darker pale malts are usually well-modified because modification leads to protein breakdown. This leads to an increase in smaller protein bits (polypeptides) and each polypeptide has a reactive site that can participate in the Maillard reaction during kilning. The Maillard reaction is responsible for malt color and flavor. Therefore, color is loosely related to modification.

"Help Me, Mr. Wizard"

During wort collection it was clear that this was going to be a very pale wort. The next observation was indeed memorable! As the wort was heated, large flocs of protein began to form. This is typically seen after the boil, but I have never seen big protein flocs prior to boiling. Then when the wort finally came to a boil, this magnificent meringue-like foam emerged. Now that the wort has been fermented, the beer is lagering. It is currently carbonated, cold and aging. I have taken several samples and have never made a beer with such an incredible foam.

So here is my simplified approach to brewing beer with good foam: 1) begin with under-modified malt if you really want killer foam (use special malts as normal for color and flavor), 2) avoid using protein-free adjuncts like corn, rice and sugar, 3) never use any soapy cleaner or sanitizer without a very thorough rinse, 4) use really clean beer glasses.

There is one major problem with this approach. Most pale malts are not under-modified and there are some real benefits to using well-modified malt. The most obvious come from the Maillard reaction. I would not recommend using pilsner malt plus a bunch of nice British crystal to brew an IPA, because the malt character simply will not be present. There is a trade-off with everything. If I am correct about malt modification being a primary factor in foam stability, then foam stability will progressively decline as malt modification increases.

Mr. Wizard

I have prepared and consumed my first batch of kit IPA. It was pretty good; not bad for a first attempt. I recently found your Website, and browsed your archive and found a recipe for cherry wheat (cherry witbier). I followed this precisely, except I added 1 pound of honey in addition to the malt extracts.

Now I have a question about using cherries for flavoring. I read in a homebrew book that when racking onto cherries, the introduction of fresh fruit might contaminate my beer. Getting fresh cherries this time of year is diffi-

cult, but I found an organic food shop that has freshly frozen cherries. Any tips to reduce contamination? Is this risky? Also, I contacted Sam Adams to ask how they do it. I haven't heard back yet. In the meantime, I am looking to reproduce that great taste.

Al Hollis
via e-mail

There is no doubt that most fresh fruits contain wild yeast and bacteria that may cause off-flavors in beer. Many brewers don't worry too much about this when fruit is added to finished beer, because beer has a lower pH and higher alcohol content than wort and many of the microbes present on fruit don't do well in the beer environment. Basically, when wort turns to beer the pH drops and alcohol is formed. Bacteria don't benefit from either condition.

If you want to be cautious with the frozen, organic cherries you can use Campden tablets (sulfite) to kill bacteria and yeast before adding them to the beer. Campden tablets are widely available at homebrew and home-winemaking supply stores. An easy way to do this is to thaw the cherries and gently mash them up with a wooden spoon. Then add a crushed Campden tablet to the macerated cherries (approximately one tablet per gallon of fruit), stir the mixture and hold for 24 hours. You might want to hydrate the tablets in water before crushing them. After the mixture has marinated, dump it into the secondary fermenter and then rack the beer onto the fruit.

Many commercial brewers who produce fruit beers use either a frozen fruit preparation or some type of liquid fruit extract because fruit is seasonal. I don't know what type of cherry preparation is used in the Sam Adams Cherry Wheat, but I would guess it is not fresh cherries picked from the tree.

If you're ever in Wisconsin you really should make a point to have some of the fruit beers brewed by Dan Carey, co-owner and brewmaster of New Glarus Brewing Company. His fruit beers are intensely fruity and are really fine examples of traditional fruit beer. According to the New Glarus

Website, their Wisconsin Belgian Red has over a pound of cherries in each 750-milliliter bottle. Aseptic cherry purée and cherry extracts are available at most homebrew shops.

Mr. Wizard

I keg my homebrew and have a problem with a black mold that forms in my tap and flakes off into the beer after 3 or 4 weeks. I have a spray bottle of water I use to rinse the tap after drawing a beer but it doesn't help.

Keith Hopkins
via e-mail

The topic of draft-line cleaning is not something most homebrewers discuss. My guess is that there is a lot of homebrew that would taste much better if served out of a clean draft system. Black mold growing on your taps officially qualifies as dirty!

The easiest way to keep your taps clean is to dip the end of the tap into a glass of warm water after use to rinse the beer out of the inside of the tap. Fruit flies and black mold will grow on taps with sticky beer residue. You could also spray the tap with alcohol or any other sanitizing solution. This method, coupled with keeping the area around your taps wiped clean, should help with the mold. If the problem persists the mold may be caused by moisture from the air condensing on your cold beer tap (I assumed it is hooked into a refrigerator), creating a nice environment for mold growth. If this is the case you will need to clean your tap more frequently. Since you are already spraying the tap with water, condensation may be the culprit.

The beer line is the other component to your draft system. I clean my beer lines every two weeks. The easiest way to clean your lines is to mix up some draft-line cleaner (readily available through homebrew shops) in a Cornelius keg, or whatever kind of keg you use for your homebrew. Then flush the line cleaner through your beer line and tap, just like you would dispense beer from a keg. Allow the cleaner to sit in the line for about 10 minutes and then thoroughly flush the line out with water, using the keg as you did with the cleaner. I also recommend taking the tap apart once every two months or so to clean it more completely. ■

Do you have a question for Mister Wizard? Write to him c/o Brew Your Own, 5053 Main Street, Suite A, Manchester Center, VT 05255 or send your e-mail to wiz@byo.com. If you submit your question by e-mail, please include your full name and hometown. In every issue, the Wizard will select a few questions for publication. Unfortunately, he can't respond to questions personally. Sorry!

Beers Cloned

Redhook Winterhook and Widmer Hop Jack

by Steve Bader

Dear Relicator,

I'm a big fan of Winterhook Ale. Can you publish a clone recipe? The information on the Redhook Website seems a little misleading.

Rick Seibt
Mentor, Ohio

The Website isn't misleading. It's just that an old recipe was still listed when you checked it out. Redhook's Winterhook is one of those seasonal beers that microbrewers love to make. These guys love to be creative, just like homebrewers do, and with seasonal beers they often tweak the recipe every year. So I spoke to brewer Al Triplett at Redhook — which has breweries in Seattle and Portsmouth, New Hampshire — about what went into this year's Winterhook.

Al said Redhook's greatest challenge with Winterhook is balancing the malt grist to achieve the blend of malt flavors that Redhook is after. Specifically, he's talking about the Weyermann Carafa malt and the DeWolf-Cosyns Caravienne.

The five-gallon recipe below reflects the ratio quantities of grain that Redhook used when brewing this year's Winterhook. The Weyermann Carafa is dark roasted barley, but with a milder flavor than most roasted barleys. If you can't find the Weyermann Carafa, you could substitute a 50-50 mixture of standard roasted barley and chocolate malt. Redhook also adds a small amount of wheat malt for foam retention, a common practice in many breweries. Winterhook has a mild hop bitterness for a winter seasonal, coming in at 28 IBUs. Many winter seasonals have bitterness above 40 IBUs.

Winterhook uses a proprietary strain of yeast. I would recommend an ale yeast that finishes a bit on the malty side, with no esters (fruitiness) evident. Due to the high quantity of non-fermentable sugars from the grist, avoid yeasts with low attenuation (ability to convert sugar to alcohol).

For more information on Redhook and its beers, go to www.redhook.com or call (206) 548-8000.

Redhook Winterhook

(5 gallons, extract with grains)
OG = 1.056 FG = 1.018 IBUs = 28

Ingredients

3.3 lbs. Briess light malt extract syrup
2 lbs. Briess wheat dry malt extract
0.25 lb. Briess dextrin malt
0.25 lb. Weyermann Carafa malt
0.75 lb. DeWolf-Cosyns Caravienne malt
1.5 lbs. Hugh Baird Carastan malt
6.1 AAU Willamette hops (bittering) (1.25 oz. of 4.9% alpha acid)
2.5 AAU Willamette hops (flavor) (0.50 oz. of 4.9% alpha acid)
4.4 AAU Tettnanger hops (aroma) (1 oz. of 4.5% alpha acid)
1 tsp. Irish moss
White Labs WLP005 (British Ale) yeast or Wyeast 1335 (British Ale II)
0.75 cup of corn sugar for priming

Step by step

Steep crushed malts in 3 gallons of water at 150° F for 30 minutes. Remove grains from wort, add malt syrup and malt powder and bring to a boil. Add Willamette (bittering) hops, Irish moss and boil for 60 minutes. Add flavor hops (0.5 ounce of Willamette hops) for the last 10 minutes of the boil. Add aroma hops (1 ounce of Tettnanger) for the last 2 minutes of the boil.

When done boiling, strain out hops, add wort to 2 gallons cool, preboiled water in a sanitary fermenter, and top off with cool, preboiled water to 5.5 gallons. Cool the wort to 80° F, aerate the beer and pitch your yeast. Allow the beer to cool over the next few hours to 68° to 70° F, and ferment at that temperature for 10 to 14 days. Bottle your beer, age for two to three weeks and enjoy!

All-grain option

Replace light syrup and wheat powder with 7 pounds pale malt and one pound wheat malt. Mash all of the grains at 154° to 156° F for 45 minutes. Collect enough wort to boil for 90 minutes and have a 5.5 gallon yield in the fermenter.

Decrease bittering hops to one ounce of Willamette to account for increased hop extraction efficiency in a full boil. The remainder of the recipe is the same as the extract.

If you have a favorite commercial beer and would like to know how to clone it, send your request to the Replicator at edit@byo.com.

Dear Replicator,

I just tasted Hop Jack Pale Ale, made by the Widmer Brothers Brewery in Portland, Oregon. Would you have a clue how to replicate it?

Mike Schick
Kaneohe, Hawaii

Widmer Brothers opened in 1984 in Portland. The brewery was founded by brothers, Rob and Kurt Widmer. After living in Germany during the 1970s, Kurt returned to America inspired to recreate some of the European beer styles he had enjoyed while abroad. Kurt's quest took him back to Düsseldorf to study beer styles, and he came home with some special brewing yeast from Weihenstephan in Bavaria. Widmer still uses this yeast today.

The Widmer brewery has made a name for itself with its flagship American-style Hefeweizen. And the tasty hefe isn't the only great beer that Widmer makes: Hop Jack Pale Ale has been a Northwest favorite since the company started brewing it in March 1998. Rob Widmer was kind enough to give us some insight on how to brew this wonderfully hoppy brew.

Rob calls Hop Jack a "Northwest pale ale," which Widmer's profile sheet describes as a pale ale that is aggressively hopped for substantial bitterness and potent floral hop aroma, with just enough malt sweetness for balance. Rob adds that there is a "citrus quality and piney note" from the Cascade and Centennial hops in Hop Jack; I've tasted the beer many times, and the citrus-pine note is delicious and unique.

When it comes to homebrewing this beer, Rob stresses using a large amount of fresh yeast. A pitchable vial of yeast from White Labs or Wyeast would be the minimum amount of yeast, and increasing the quantity by either making a starter or using two liquid vials would be even better. There are a lot of hop additions in this beer, so pay attention to the timing of each addition. The hops are critical to successfully replicating this beer.

For more information about Widmer beers, check out the Website at www.widmer.com or call Widmer at (503) 841-2437. ■

Widmer Hop Jack

(5 gallons, extract with grains)
OG = 1.056 FG = 1.013 IBUs = 36 to 40

Ingredients

3.3 lbs. John Bull light malt extract syrup
2 lb. Cooper's light dry malt extract
0.5 lb. Vienna malt
1 lb. Munich malt
1.5 lb. crystal malt (40° Lovibond)
0.25 lb. dextrin malt
2.5 AAU Willamette hops (bittering) (0.50 oz. of 4.9% alpha acid)
6.2 AAU Cascade hops (bittering) (0.75 oz of 8.3% alpha acid)
8.3 AAU Cascade hops (flavor) (1 oz. of 8.3% alpha acid)
4.6 AAU Centennial hops (aroma) (0.5 oz. of 9.3% alpha acid)
4.2 AAU Cascade hops (aroma) (0.5 oz. of 8.3% alpha acid)
1 tsp Irish moss for 60 min.
White Labs WLP001 (California Ale) yeast or Wyeast 1056 (American Ale)
0.75 cup of corn sugar for priming

Step by Step

Steep crushed malts in 3 gallons of water at 150° F for 30 minutes. Remove grains from wort, add malt syrup and malt powder and bring to a boil. Add Willamette and Cascade (bittering) hops, Irish moss and boil for 60 minutes. Add flavor hops (1 ounce of Cascade hops) for the last 10 minutes of the boil. Add aroma hops (Centennial and Cascade) for the last 2 minutes of the boil.

When done boiling, strain out hops, add wort to two gallons cool, preboiled water in a sanitary fermenter, and top off with cool, preboiled water to 5.5 gallons. Cool the wort to 80° F, aerate the beer and pitch your yeast. Allow the beer to cool over the next few hours to 68° to 70° F, and ferment for 10 to 14 days. Bottle your beer, age for two weeks and enjoy!

All-grain option

Replace light syrup and powder with 4 pounds pale malt and increase Munich malt to 4 pounds. Mash your grains at 150° to 152° F for 45 minutes. Collect enough wort to boil for 90 minutes and have a 5.5 gallon yield in the fermenter.

Decrease bittering hops to 0.5 ounce of Cascade to account for increased hop extraction efficiency in a full boil. The remainder of the recipe is the same as the extract.

Schwarzbier

The black beer from eastern Germany

by Tess and Mark Szamatulski

To many, January is synonymous with blizzards and icy roads. For us, January means lagering season has arrived. This time of year, our cellar becomes home to many fermenting beers, chugging along slowly until spring comes. This month we chose to brew a German schwarzbier. Schwarzbier is German for "black beer."

Schwarzbier is not a very well-known style in the United States, but is gradually becoming more popular. It can range from a lovely mahogany color to an opaque blackish-brown. It is very smooth and surprisingly refreshing. There is plenty of depth and character to this style, but it lacks the heaviness of a porter or a stout. These black beers are fuller in body and darker in color than the dunkels of Munich. The slight bitterness is imparted mostly by the hops, with a little of the bitterness brought forth from the roasted grains.

Schwarzbiers were originally brewed as ales in southeastern Germany and eventually metamorphosed into lagers when lager yeast was introduced and modern technology made cold fermentation possible. The black beers remained essentially the same throughout this change, except for the typical smoothness imparted by the lager yeast. The most famous schwarzbier, Köstritzer, is still brewed in Thuringia, Germany. When Köstritzer was first brewed, some drinkers occasionally sweetened the beer with sugar. For a time, to please the sweet tooth of these consumers, the brewery brewed two versions of the style — the original dryer beer and a black beer with added sucrose. When Germany reunited with East Germany and the Reinheitsgebot beer-purity law was applied nationwide, the sugared version was dropped. The new version that resulted was a combination of both versions.

Similar to stout, schwarzbier was sometimes believed to possess restorative or curative effects and was even said to be good for nursing mothers. Some drinkers even went so far as to add a raw egg to their Köstritzer along with the sugar.

Interestingly, the Japanese breweries picked up on this style. All of Japan's major breweries and many of the smaller, newer ones now brew a black beer. The Japanese brewers were greatly influencd by German brewers and brewing techniques. The smooth, easy-drinking schwarzbier serves as a nice change from the typical Japanese light lagers.

You can brew this smooth, opaque lager, with its rich, rounded character and refreshing crispness as a delicious alternative to heavier dark beers. Schwarzbier has a perfect balance of rich, dark malt with a mild, yet noticeable, hop and roasted malt bitterness, which makes for a very unique drinking experience.

Our version of schwarzbier pours with a deep mahogany color and a finely beaded head. The complex aroma is filled with clean malt, yeast, roasted grains and noble hops. The medium-bodied palate is as smooth as silk, with a bloom of hops rising from a background of roasted grains. Unlike some of the commercial schwarzbiers, the finish of this beer lingers long and dry, with just a slight hint of refreshing bitterness.

Schwarzbier (Black Beer)
OG = 1.044 to 1.054 FG = 1.010 to 1.016 IBUs = 25 to 35 SRM = 20 to 40+ ABV = 4.2 to 5.4%

Commerical Beers to Try

Some good German examples of schwarzbier include: Kulmbacher Kloster Mönchshof Schwarzbier, Köstritzer Schwarzbier, Schwarzer Steiger, Berliner Bürgerbräu Bernauer Schwarzbier and the Märkischer Landmann Schwarzbier.

Some good American versions of German-style schwarzbiers include: Black Forest Schwarzbier from Squatters Pub Brewery in Salt Lake City, Utah; Springfield Schwarz Beer from John Harvard Brew House in Wayne, Pennsylvania; King's Peak from Uinta Brewing Co. in Salt Lake City, Utah; Dixie Blackened Voodoo Lager from Dixie Brewing in New Orleans, Louisiana; and Dornbusch Winter Night Lager from Dornbusch Brewing Company of Ipswich, Massachusetts.

There is also a Brazilian version of black beer, the famous Xingu. And, of course, the major Japanese breweries, Asahi, Kirin, Suntory and Sapporo, all produce their own unique versions of this style.

According to style guidelines, the aroma of schwarzbier should be malty, with small amounts of aromatic sweetness and hints of roasted malt. There may be a low hop aroma with no fruity esters or diacetyl. The flavor is rich and malty, perfectly balanced by a mild bitterness from the hops and roasted grains. The palate has a somewhat bitter chocolate-expresso mouthfeel without too much apparent dryness. The hop flavor is low with some bready, residual sweetness.

The aftertaste of a schwarzbier lingers smooth and dry, with hop bitterness and roasted grain nuances. There should be no fruity esters or diacetyl. The roasted grains balance the pale malt base.

Hops, Malt and Yeast

German hops should be used, with the noble hops preferred for both bittering and flavoring. For bittering, the higher-alpha acid hops — such as Northern Brewer, Brewers Gold, Tettnanger or Spalt — can be used. Hallertau Hersbruck or Mittelfrüh may be used for flavor and aroma.

Use German Munich and pilsner malts for the base grain, with small amounts of specialty grains to provide color and subtle roast flavors. We use German chocolate malt, German cara-Munich and German black malt.

For extract brewers, Bierkeller or Weyermann malts are an excellent choice. If a dry malt extract is used, Muntons light dry malt extract is a good choice and readily available. A small amount (4 to 6 ounces) of malto-dextrin can be added for extra maltiness and body.

The yeast should be a clean German lager strain such as Bohemian Lager (Wyeast 2124), Bavarian Lager (Wyeast 2206) or Southern German Lager (White Labs WLP838).

Serving Suggestions

Schwarzbier is best served in a footed pilsner glass at 48° F. It makes a good accompaniment to all things chocolate. Enjoy this beer with a delicious dessert of Black Forest torte.

Schwarzbier
(5 gallons, extract with grains)
OG = 1.054 to 1.055 FG = 1.014 to 1.015 SRM = 45 IBU = 28
ABV = 5.1%

Ingredients

8 oz. Belgian caraMunich malt (56° Lovibond)
4 oz. British chocolate malt (395° to 475° Lovibond)
2 oz. British black malt (500° to 600° Lovibond)
3.5 lbs. Bierkeller light malt extract syrup
3 lbs. Muntons extra-light dry malt extract
4 oz. malto-dextrin
8 AAUs Northern Brewer hops (1 oz. of 8% alpha acid) (bittering)
1 AAU German Hallertau Hersbruck (1/4 oz. of 4% alpha acid) (flavor)
1 tsp. Irish moss
Bohemian Lager yeast (Wyeast 2124) or Southern German Lager (White Labs WLP838)
1-1/4 cup Muntons extra-light dry malt extract for priming

Step by Step

Bring one gallon of water to 155° F, then add the crushed specialty grains and hold for 30 minutes at 150° F. Strain the grain into the brewpot and sparge with one gallon of 168° F water. Add the dry malt, malt syrup, malto-dextrin and bittering hops. Bring the total volume in the brewpot to 2.5 gallons. Boil for 45 minutes, then add flavor hops and the Irish moss. Boil for 15 minutes, then remove the pot from the stove. Cool wort for 15 minutes in an ice bath or chill with wort chiller. Strain into the primary fermenter and add water to obtain 5-1/8 gallons. Add yeast when wort has cooled to below 60° F. Oxygenate-aerate well.

Ferment at 47° to 52° F for 7 days, then rack into secondary (glass carboy). Ferment at 47° to 52° F until target gravity has been reached and the beer has cleared (approximately 4

weeks). Prime and bottle. Carbonate at 70° to 72° F for 2 to 3 weeks. Store at cellar temperature.

Partial-Mash Option

Acidify the mash water to below 7.2 pH. Mash 2.25 pounds German two-row pilsner malt and the specialty grains in 1 gallon water at 153° F for 90 minutes. Sparge with 1.5 gallons of water at 5.7 pH and 168° F. Then follow the extract recipe, being sure that you omit 1.75 pounds of Muntons extra-light dry malt extract from the boil.

All-Grain Option

Acidify the mash water to below 7.2 pH. Mash 9.75 pounds German two-row pilsner malt and the specialty grains in 3.5 gallons of water at 122° F for 30 minutes, then at 153° F for 90 minutes. Sparge with 4.75 gallons of water at 5.7 pH and 168° F. The total boil time is approximately 90 minutes. Add 6.3 AAU of bittering hops for the last 90 minutes of the boil. Add the Irish moss as indicated by the extract recipe above.

Helpful Hints

If your water is soft (below 50 ppm hardness), add 1/8 teaspoon gypsum, 1/8 teaspoon non-iodized table salt, 1.25 teaspoon chalk (calcium carbonate) and 1/8 teaspoon Epsom salts to adjust your water for the style. If your water is moderate (50 to 200 ppm hardness), add 1/8 teaspoon non-iodized table salt. If your water is hard (greater than 200 ppm hardness), dilute it 50-50 with distilled water and add 1/8 teaspoon non-iodized table salt. This beer can be lagered for one month. Begin lagering at 45° F and slowly decrease the temperature to 34° F over a period of two weeks. This schwarzbier will peak between two and five months after it has been carbonated and will last at cellar temperatures for seven months. ■

Tess and Mark Szamatulski are the owners of Maltose Express in Monroe, Connecticut. They are the authors of "Beer Captured" (Maltose Press, 2000) and "Clonebrews" (Storey Publishing, 1998).

DEFINING A FEW TERMS

SRM (Standard Reference Method) and degrees **Lovibond** are two methods of describing beer and malt color. The scales provide roughly the same number, but SRM uses a more sophisticated method and is more accurate. SRM is typically used to describe beer color, while malt color ratings are typically described in degrees Lovibond. A light straw-colored beer, like a Belgian wit, might have an SRM rating as low as 2 to 4, while an almost-black beer, like an Irish dry stout, might rate 40+ on the SRM scale. Malts range from the typical 2° Lovibond for pale American two-row (and even lower for some pilsner and lager malts) to as high as 500° Lovibond for black patent.

CHILL OUT!

Pick the right yeast, keep your carboy comfortable, build a warming box and toast the winter with a pint of fine brew.

by Glenn BurnSilver

PHOTO BY GLENN BURNSILVER

Does your house get a bit nippy? BurnSilver, who lives in the Rockies, offers tips on cold-weather fermentation.

A cold wind howls outside and the first snowflakes of the season tap against the windows. My woodstove is stoked, making the house warm and cozy. It is just the right environment to fire up the brewpot and create a batch of fine beer. Yet, living at 9,230 feet elevation, the cold poses a few challenges in ensuring fermentation temperatures remain consistently high enough for proper yeast utilization and — eventually — a quality brew. My 100-year-old home is full of crannies that harbor cold air, just waiting to chill my carboy and slow the yeast. There have been times when I have wondered if fermentation was taking place at all! While the woodstove works hard to keep my home warm, something must also be done to ensure the beer remains at optimal fermentation temperatures. Whether you live in the mountains or have a chilly basement, don't let the cold weather keep you from brewing your favorite recipe. Below we share some tips that will help winter yeast charge along at top speed.

Keeping the fermentation temperatures constant

In order to produce good beer, the fermentation process should not be allowed to slow down, or worst of all stop, as the yeast needs to fully run its cycle to accomplish the task at hand. Fermentation temperatures should remain stable and consistent for proper beer development. Temperature changes from day to night, which can be considerable in winter, need to be minimized. If fermentation temperatures get too low, the yeast may actually die or go dormant. Beers that suffer from large temperature variations, even if they do ferment to completion, may end up with off-flavors caused by diacetyl, which imparts a butterscotch flavor, or esters, which create a more fruity-smelling beer. These characteristics are acceptable in some beer styles, but not others.

For some, winter may be a good time to brew lagers, since lager yeasts prefer things a touch cooler, operating well around 45° to 55° F. This doesn't mean ales and stronger beers should be forsaken. (After all, there is nothing like a hearty stout on a cold winter day!) But it's important that the brewer choose the proper yeast strain *(for recommended cold-weather strains, see page 25)*. This will lessen the need to create an "artificial" environment for a yeast strain that needs much warmer temperatures to ferment. Depending on which yeast strain you are using, most ales will stop fermenting around 60° F, while lagers quit below 45° F. Of course, part of the fun of homebrewing is experimenting. So brew up that porter, but try a lager yeast that can handle cooler temperatures. If you prefer to brew traditionally, just remember ales tend to ferment best between 68° and 72° F. This means a little more monitoring and using a few tricks to keep the airlocks bubbling along.

Stuck Fermentation

Once temperatures get too cold, fermentation may become stuck and the yeast rendered dormant. Depending on the amount of fermentation so far accomplished (check with a hydrometer), it may be difficult, if not impossible, to then "wake up" the yeast to complete the fermentation. One way to head off this problem is to brew a beer suitable for the temperature. It might not be the right time to brew traditional bocks or abbeys, but a beer with gravity under 1.055 will be much less likely to get stuck. Make sure there is enough yeast, the wort is well aerated and the fermentation temperature is kept close to the recommended temperature for that strain of yeast and problems will be minimized.

Tips and tricks for cold-weather brewing

Should the brew stall out, this does become a tricky area. Waking up the yeast can be hard even in the best of situations. The crux is how much oxygen is left for the yeast to metabolize, something that cannot accurately be measured without sophisticated equipment. It is also important to consider how much alcohol has already been produced and that the pH has also dropped. Both will inhibit any new yeast that is added. So, there are two options: The beer can be left where it is and considered "complete" before racking to a secondary or bottling. In this case, the bottling brewer has the option of reducing the priming sugar, as non-metabolized yeast may feed on the sugar and cause pressure increases that can shatter bottles. The kegging brewer has the safer option, since pressure derived from any yeast activity can be vented off. Or, a riskier approach can be attempted by adding oxygen to the beer and hoping the yeast will wake up and feast on this additional food.

As a pre-step to attempting to "rouse the yeast" in this manner, it is important that the beer temperature be brought back to an acceptable level for the yeast to at least have a chance to metabolize all the added oxygen. One obvious option is moving the carboy to a warmer location. A strip thermometer (see below) can be helpful in determining the amount of warmth needed. If the carboy can't be moved, try wrapping it in a blanket or creating a "warming box" around it. (More on these tricks below.)

The first step in rousing the yeast is to de-gas the beer and remove unwanted carbon dioxide. To do this, remove the stopper and airlock, insert a sterilized racking cane and stir vigorously. This will "free" the trapped CO_2, but will also add more oxygen to the beer. Fermentation should hopefully begin again within 24 to 48 hours. With luck, the fermentation will remain steady and the yeast will metabolize all the additional oxygen. If not, the beer will become oxidized and may have a wet cardboard or dirty diaper flavor. Yum! If you still want to drink it, do so fast, as oxidized beer has a greatly reduced shelf life.

A second option is to recharge the beer by adding new yeast. But don't just pour it into the stalled beer. Instead, give the yeast a fighting chance by making a starter. Make a fresh batch of wort with 1-1/2 cups of malt extract in 3 pints of boiled water, cooled to pitching temperature. Add the yeast with 1-1/2 tsp. of yeast energizer and shake hard to aerate well. Once the starter is active and kraeusening, add to the carboy of stalled beer. Another option is to use a yeast slurry from a previous successful fermentation. A quart of dense slurry has a high-enough cell count — and then some — to start an active fermen-

tation. Fermentation should start anew within 24 hours. Again, keeping temperatures constant will be important to prevent oxidation and off flavors. If this still doesn't work, it may just be best to start over and keep a closer eye on temperatures as you go.

Keeping it warm

Naturally, having to jump-start the fermentation process is about as much fun as jump-starting a car on a frozen lake. Sure, it can be done, but who really wants to be out there? Keeping the beer warm from the beginning so fermentation remains constant is the best option. This is not too hard, as I have discovered in my high-mountain home. All it takes is a little creativity.

Of course, the simplest solution would seem as easy as turning up the heat. But cranking up the heater — mine runs on liquid propane at $1.25 a gallon — wastes energy and costs money. So the easiest method is just to locate a warm place where a carboy can sit undisturbed. Look for a place away from windows, doors and drafty spots where cold air can seep in. Near the hot-water heater is a popular spot, as long as the area doesn't get too hot. Perhaps the best way to find a good location is to place your brew thermometer in different locations around the house before you brew. Periodically record the results and see which area has the most constant temperature. A note of caution here: Be sure the area is not in the heat path of a heater or wall vent. This can contribute to flavor-affecting temperature swings.

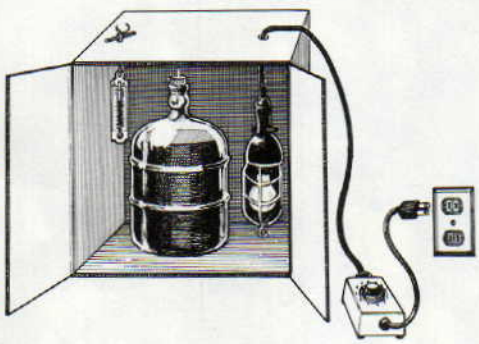


ILLUSTRATION BY DON MARTIN

This simple cardboard warming box uses a garage mechanic's droplight plugged into a timer, with a handy thermometer.

The blanket method

Wrapping the carboy in a heavy blanket, sleeping bag or old jacket is the easiest method to help retain the heat in the carboy (we even dressed ours up for Halloween one year — complete with goggles and a hat!). An electric blanket on the lowest setting may also work, but monitor it closely as each blanket manufacturer may have a different low setting, and some could be too warm. Additionally, fermentation creates heat, and by wrapping a blanket around the carboy of fermenting beer this combined heat will keep fermentation temperatures up — at least initially by as much as 5° F. This might be long enough to get fermentation off to a strong start.

Using a yeast starter will also be beneficial. Prepare the starter the day before as described above. Usually within 18 to 24 hours a yeast starter is going strong, devouring everything it can. By adding the starter to fresh wort, hungry yeast will be feeding happily and the fermentation process begins quickly, sometimes in as little as 30 minutes. Pitching a starter into a slightly warmer-than-normal wort can also be used to the brewer's advantage against cold. By pitching into a wort with a temperature in the upper 70s, though a touch high by conventional standards, the lag-time temperature loss will be less, especially if that blanket is wrapped as soon as possible.

Build a warming box

Once fermentation is underway, it is important that temperatures don't fluctuate too radically. If your house suffers from extreme temperature variations, as mine does, and you don't want to leave anything to chance, a "warming box" might be a good option. This is easily constructed and there are several possible variations depending on how fancy you wish to get.

The basic warming box is little more than a light bulb inside a cardboard box. Take some cardboard — an old refrigerator box works well — and cut a three-sided door flap in one side. (The fourth side of the flap will act as the hinge.) Cut the top of the box off, leaving an extra flap of cardboard to act as a roof. Leave about 8 inches above the carboy for the light bulb to fit. Run the bulb (a Trouble Lamp — about $7 — is the safest) through the top and seal the entire flap with duct tape. It is actually amazing how much heat a 75-watt light bulb can generate, and it is enough to keep the fermenting beer warm. Depending on how warm your house is, this simple method can create temperatures that may actually be too hot and cause accelerated fermentation. A 60-watt bulb will lessen that possibility, but the next option leaves less to chance. Another easy option: Use a garage mechanic's droplight and plug it into a timer *(see the illustration at left)*.

The deluxe warming box

Okay, let's say you want fermentation to remain at 72° F. Go ahead and build the box like above, but this time mount a thermostat inside the box, about halfway up one side. Set the thermostat at 72° F (this should be close enough, though temperatures in the bottle might be slightly lower than the surrounding air temperature), so when the temperature in the box drops below 72° F, the bulb will come on until the ambient temperature returns to 72° F. This will keep the beer fermenting at the proper temperature within expected time parameters. To build this deluxe system you will need a thermostat, 120-volt to 24-volt power transformer, a power relay switch, a light bulb wall receptacle and a 75 or 60-watt bulb. The thermostat and light bulb will run through the relay switch that connects to a power transformer. The transformer converts the standard 120-volt current to the 24-volt current needed for the thermostat. The light bulb will need to be housed in a standard wall receptacle, mounted inside the box. It is definitely best to consult an electrician for exact wiring configurations when setting up this system.

Yet another option that's good for people who wish to keep a closer eye on their brew is to use the standard cardboard warming box, but place a strip thermometer on the bottle. This is a precision lead crystal thermometer that attaches to the outside of the car-

boy. This does a fairly accurate measure of the heat inside the bottle, though the registered temperature will be slightly lower than the actual beer, depending on the thickness of the glass or plastic. Brewers having major difficulties with temperature changes should consider putting these strip thermometers on all fermenters and secondary carboys. By regularly checking the strip thermometer, the light bulb can manually be switched on as needed. For the more technical brewer, a dimmer switch can also be attached to the bulb for more heating control. Disadvantages to this method are the need for constant monitoring and a loss of heat when continuously opening the door. This method is not recommended for places with large day-to-night temperature fluctuations, though a light bulb left on all night could suffice.

Don't let winter put the freeze on your homebrewing

There are many ways to keep your beer warm and properly fermenting in cold climates. It all depends on how cold your house is, and how much time, effort and control you prefer to maintain in the brewing process. Most importantly, don't be afraid to keep brewing even if your house is a touch frigid. At the very least, brew lagers that thrive in the colder environment. They will need to remain somewhat warmer for the initial fermentation, but should do quite well. Even if you prefer stronger brews, as I do, experiment with cold-tolerant yeasts *(see chart)*.

Any of the tips above can make winter brewing more predictable. Besides, think of the fun when friends inquire about the "little man" on the counter. It happens all the time with my fermenting carboy, nattily dressed in a blanket and down jacket. He may look funny, but as the cold winds blow outside and the snow continues to fall, I feel good knowing that under that blanket some fine double-chocolate stout is fermenting to perfection. ■

Glenn BurnSilver is a freelance writer who lives in Colorado. He wrote about Maasai cucumber beer in the January 2001 issue of Brew Your Own.

COLD-TEMPERATURE YEAST STRAINS

"Many homebrewers forget to plan for cold weather, especially the drop in temperatures at night," says Chris White, owner and founder of White Labs. "The constant change is hard on the yeast. Once it slows down, it is not always able to produce enough heat and you end up with a stuck fermentation."

Most ale yeasts struggle below 60° F, though some strains can still perform as low as 55° F. Lager yeasts do well in cooler temperatures, with some able to function as cold as 45° F. "Most of the British-style ale strains do not ferment well under 62° F," says White. "The German ale and American ale strains are better suited for cold fermentations than the British strains, and all of the lagers do well. But many strains will ferment okay at cooler temperatures, as long as an active fermentation is taking place."

"With many strains, less flocculent yeast tend to be more cold tolerant, and more tolerant to temperature fluctuations," adds Dave Logsdon of Wyeast Labs. "Near the end of fermentation, highly flocculent yeast tends to drop prematurely when there is a sudden temperature drop, taking the temperature below the yeast fermentation range. These beers tend to not finish or ferment out. That is one reason why less flocculent yeast tend to perform better in the colder end of the fermentation range."

Pitching with a yeast starter will go a long way toward increasing the possibilities of a successful fermentation when it is obvious that temperature fluctuations will occur. "The single most important adjustment to brewing (in colder temperatures) is to massively increase the pitching rate of the yeast," adds Logsdon. "By increasing the pitching rate, the rate of fermentation stays high and the heat production of the fermentation keeps the wort temperature up. So fermentation is completed quicker, with less possibility of variation."

Here are the yeast strains — mostly lagers — that White and Logsdon recommend for brewing in cold climates.

Lager yeast strains:

White Labs WLP800 (Pilsner Lager)
White Labs WLP802 (Czech Budejovice Lager)
White Labs WLP820 (Oktoberfest Lager)
White Labs WLP830 (German Lager)
White Labs WLP838 (Southern German Lager)
White Labs WLP840 (American Lager)
White Labs WLP885 (Zurich Lager)
White Labs WLP920 (Old Bavarian Lager)
White Labs WLP940 (Mexican Lager)
Wyeast 2124 (Bohemian Lager)
Wyeast 2206 (Bavarian Lager)
Wyeast 2007 (Pilsen Lager)
Wyeast 2035 (American Lager)
Wyeast 2042 (Danish Lager)
Wyeast 2247 (European Lager)

Other cold-tolerant strains:

White Labs WLP003 (German Ale Yeast II)
White Labs WLP036 (Düsseldorf Altbier)
White Labs WLP320 (American Hefeweizen Ale)
Wyeast 2565 (Kölsch)
Wyeast 2278 (Czech Pils)
Wyeast 1007 (German Ale)
Wyeast 3068 (Weihenstephan Weizen)

COOL SKI-TOWN CLONES

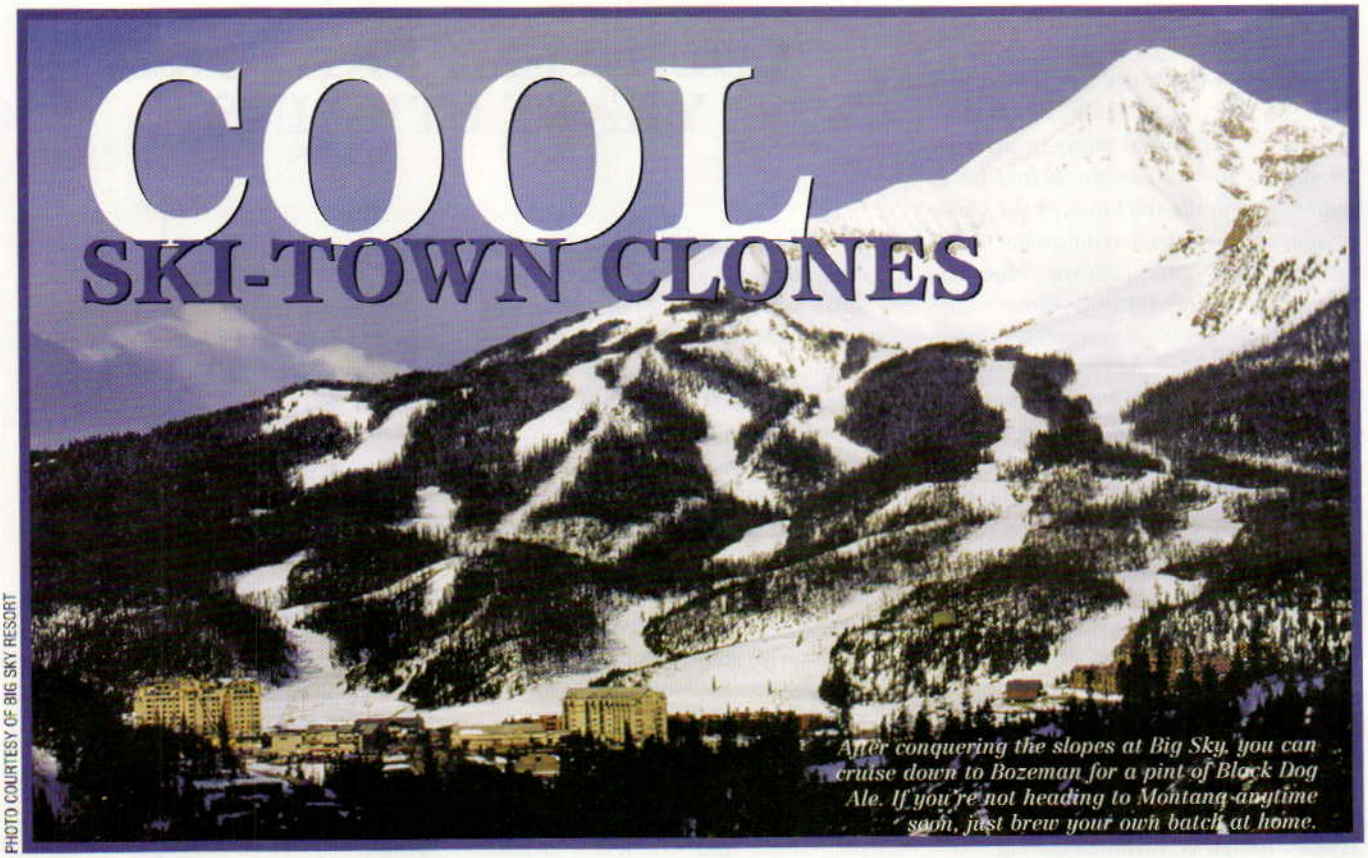


PHOTO COURTESY OF BIG SKY RESORT

After conquering the slopes at Big Sky, you can cruise down to Bozeman for a pint of Black Dog Ale. If you're not heading to Montana anytime soon, just brew your own batch at home.

'Tis the season... the ski season, that is. And nothing tastes better after a day on your board(s) than a hand-crafted beer. With that in mind, BYO offers recipes for replicating eight great beers from eight hopping mountain towns, from Jackson Hole and Killington to Breckenridge, Bend and beyond.

Sunday River Brewing
Bethel, Maine

Sunday River Brewing is in western Maine's ski country, near the White Mountain National Forest. Located at the base of Sunday River ski area, the namesake brewpub opened in 1992. The stainless-steel brewing equipment is on display, visible through large glass windows, and fresh ales are pumped directly from the serving tanks to the upstairs taps.

Sunsplash Golden Ale is a malty and bready beer with crackery notes and several layers of hop flavor and aroma. It finishes nutty and dry. Other beers at Sunday River include 420 India Pale Ale and Black Bear Porter. Go to www.stonecoast.com or call (207) 824-3541.

Sunsplash Golden Ale
(5 gallons, extract with grains)
OG = 1.048 FG = 1.010
IBU = 22 ABV = 4.8%

Ingredients
3 lbs. pale malt
1 lb. light crystal malt (20° Lovibond)
1 lb. carapils malt
4 oz. malted wheat
2 lbs. unhopped Cooper's extra-light dry malt extract (DME)
4 AAU Mt. Hood hops (2/3 oz. of 6% alpha acid)
3 AAU Willamette hops (2/3 oz. of 4.5% alpha acid)
4 AAU Mt. Hood hops (2/3 oz. of 6% alpha acid)
American Ale yeast (Wyeast 1056) or California Ale (White Labs WLP001)
1 cup pale dry malt extract

Step by Step

Heat 2 gallons water to 164° and add crushed pale malt, crystal malt, carapils and malted wheat. Steep at 152° F for 90 minutes. Sparge with 3 gallons of water at 168° F. Add unhopped DME to runnings. Bring to a boil, then add first Mt. Hood hops. Boil 15 minutes, then add Willamette. Boil 30 minutes and add next Mt. Hood hops. Boil 30 minutes, then remove from heat. Cool, then top up to 5-1/4 gallons with chilled, preboiled water. Cool to 68° F, then pitch yeast. Ferment at 68° F for two weeks, then transfer to

secondary fermenter and condition cool (50° to 55° F) for 3 to 4 weeks. Prime with 1 cup pale DME. Bottle and age at 50° F for 3 weeks. **All-grain option:** Substitute 2.75 lbs. pale malt for 2 lbs. DME.

Long Trail Brewing Co.
Bridgewater Corners, Vermont

Long Trail is one of Vermont's twelve breweries and is located in the heart of ski country, between Killington and Woodstock. This 60-barrel brewhouse uses Vermont water, and even some Vermont hops, in its recipes. The first batch of Long Trail Ale was brewed in 1989, back when the brewery was a two-man operation.

Long Trail Ale, a former GABF gold-medal winner, is a full-bodied amber ale modeled after the altbiers of Düsseldorf, Germany. It's brewed in the traditional Düsseldorf manner with top-fermenting yeast and cold finishing temperatures. It has a complex and clean full flavor and is currently one of the best-selling craftbrews in the state. Go to www.longtrail.com or call (802) 672–5011.

Long Trail Ale

(5 gallons, grains with extract)
OG = 1.046 FG = 1.010
IBU = 32 ABV = 4.6%

Ingredients

2 lbs. pilsner malt
8 oz. Munich malt
8 oz. malted wheat
8 oz. medium crystal malt
3 lbs. unhopped Muntons light dry malt extract (DME)
4 AAUs Tettnang hops (1 oz. of 4% alpha acid)
2 AAUs Tettnang hops (1/2 oz. of 4% alpha acid)
2 AAUs Tettnang hops (1/2 oz. of 4% alpha acid)
European or German ale yeast (Wyeast 1338 or White Labs WLP011 or WLP036)
1 cup light dry malt extract to prime

Step by Step

Heat 1.5 gallons water to 164° F. Add crushed malts and malted wheat to liquor and steep at 152° F for 90 minutes. Sparge with 2.25 gallons water at 168° F. Add light DME to runnings. Bring to a boil, then add 1 oz. of Tettnang. Boil 30 minutes, then add 1/2 oz. of Tettnang. Boil 30 minutes, then add last addition of Tettnang. Boil 30 minutes, then remove from heat. Cool, then top up to 5.25 gallons with chilled, preboiled water. Cool to 68° F, then pitch yeast. Ferment at 62° to 65° F for 2 weeks, then transfer to secondary fermenter and condition cold (40° F) for 3 to 4 weeks. Prime with 1 cup DME. Bottle and age at 45° to 50° F for 3 weeks. **All-grain option:** Substitute 5.25 lbs. pale malt for 3 lbs. DME.

Lake Placid Pub and Brewery
Lake Placid, New York

Here's the tale of how Ubu Ale ended up in the Clinton White House: Ubu was a chocolate Lab that hung around Lake Placid, the Adirondack ski town and site of the 1932 and 1980 Winter Olympics (Whiteface Mountain is just up the road). The Lake Placid Pub decided to name a beer after Ubu and put him on a T-shirt. Someone from the White House saw the shirt and sent one to the Prez for his birthday because Ubu looked like Bill's dog, Buddy. Clinton liked the shirt, but was more interested in the beer. A case was promptly shipped and received the presidential thumbs-up.

An English strong ale that leans a bit in the old ale direction, Ubu is fermented with a traditional English top-cropping yeast in open fermenters. Brewer Matt Ray hints that some of the beer's complexity may be the result of "house flavors," but in any event, the room temperature fermentation yields a fruity character. Maris Otter pale ale malt gives the brew a rich texture, and a touch of wheat adds complexity and head retention. The beer's 28 IBUs of bitterness are well hidden behind a big malty profile. Go to www.ubuale.com or call (518) 523-3813.

Ubu Ale

(5 gallons, extract with grains)
OG = 1.065 FG = 1.013-15 IBUs = 28

Ingredients

6 lbs. Muntons plain light DME
1.25 lbs. wheat DME
1 lb. English crystal malt
(50° to 60° Lovibond)
1 oz. chocolate malt
1 oz. black patent malt
7.5 AAUs Fuggle pellet hops (1.5 oz. at 5.0% alpha acid)
7 AAUs Cluster pellet hops (1 oz. at 7.0% alpha acid)
4 AAUs Mount Hood pellet hops (1 oz. at 4.0% alpha acid)
1 tsp. Irish moss
2/3 to 3/4 cup corn sugar for priming
London Ale yeast (Wyeast 1318), Burton Ale (White Labs WLP023) or Danstar London Ale yeast

Step by Step

Steep specialty grains in 1.5 quarts of water at 154° F for 45 min. Remove grains and add DME. Bring to a boil and boil for 20 min. Add Fuggles and boil for 20 min. Add Cluster and 1 tsp. Irish moss and boil an additional 20 min. Remove from heat and add Mount Hood. Cool to about 72° F, then transfer to fermenter. Top up to 5 gallons and pitch yeast. Ferment at 70° to 72° F for 7 to 10 days or until fermentation is completed. Then rack to secondary fermentation, or bottle or keg with priming sugar. Age for several weeks. **All-grain option:** Substitute 9 lbs. Maris Otter pale ale malt and 1.5 lbs. wheat malt for DME.

Deschutes Brewery
Bend, Oregon

You can ski from November to June at Mount Bachelor in central Oregon. When you're finished skiing, head to Deschutes Brewery, just down the road in Bend. Founded in 1988 as a brewpub, Deschutes expanded in 1993 to add a bottling line and production facility. They made 310 barrels that first year and are now cranking out 102,000 barrels annually.

Mirror Pond Pale Ale won a silver medal at the Real Ale Festival in 2001. It's a tawny-colored, full-bodied ale with a distinctive hop flavor that comes from adding Cascade hops throughout the brewing session. Other beers made at Deschutes include Cascade Ale, Black Butte Ale and Obsidian Stout. Their tasty Bachelor ESB won a gold medal at the 2001 GABF. Go to www.deschutesbrewery.com or call (541) 385-8606.

Mirror Pond Pale Ale

(5 gallons, extract with grains)
OG = 1.050 FG = 1.014
IBU = 75 ABV = 4.7%

Ingredients

6 lbs. Coopers light malt syrup
1 lb. Munich malt (10° Lovibond)
1 lb. Great Western two-row pale malt
20 AAU Centennial hops
(2 oz. of 10% alpha acid)
5 AAU Cascade hops
(1 oz. of 5% alpha acid)
5 AAU Cascade hops
(1 oz. of 5% alpha acid)
1 tsp. Irish moss
3/4 cup corn sugar for bottling
California Ale yeast (White Labs WLP001)

Step by Step

Steep crushed malted grain in 2 gallons of 150° F water for 30 min. Remove the grain from water with a strainer, then bring to a boil. When boiling starts, remove from burner and add malt syrup. Return to a boil, then add Centennial and Irish moss, and boil for 60 min. Add 1 oz. Cascade with 15 min. left in the boil. Add 1 oz. Cascade for the last 5 min. of the boil. Fill your carboy with 2 gallons of cold water. Pour the hot wort into the carboy and top off to the 5 gallon mark. Add yeast when wort is less than 78° F. Ferment and bottle. **All-grain option:** Substitute 6.5 lbs. pale malt for syrup.

Spanish Peaks Brewing
Bozeman, Montana

Bozeman is in south-central Montana, between Butte and Billings. The area is home to both Big Sky resort and Spanish Peaks Brewing. Founded in 1991, Spanish Peaks was named after the peaks that frame the Gallatin Valley. The brewery's Black Dog Ale is named after a real dog — Chug, a black retriever. Chug has won many canine awards in addition to being featured on his namesake beer label.

Black Dog is an English-style special amber ale. It won silver medals at the 1995 and 1998 World Beer Championships. The full body imparts a malty, robust palate and fruity bouquet. Slightly sweet, mild and clean, it's

PHOTO COURTESY OF SUNDAY RIVER SKI RESORT

No New England ski town is complete without one of these — or without some lip-smacking microbrews.

a beer that's easy to drink. The color is deep gold, and the aroma has hints of caramel and a touch of peppery spice. Other Spanish Peaks beers include Monterey Pale Ale, Honey Raspberry Ale and Monterey Lager. Go to www.spanishpeaks.com or call (800) 810-CHUG.

Black Dog Ale

(5 gallons, extract with grains)
OG = 1.045 FG = 1.010
IBU = 20 ABV = 4.5%

Ingredients

2 lbs. pale malt
1 lb. medium crystal malt
(50° Lovibond)
12 oz. malted wheat
3.5 lbs. unhopped Muntons light malt extract syrup
4.5 AAU Willamette hops
(1 oz. of 4.5% alpha acid)
4 AAU Mt. Hood hops
(2/3 oz. of 6% alpha acid)
American ale yeast (Wyeast 1056) or California Ale (White Labs WLP001)
1 cup pale dry malt extract (DME)

Step by Step

Heat 1.5 gallons water to 164° F. Add crushed pale malt, crystal malt and malted wheat to liquor and steep at 152° F for 90 min. Sparge with 2.25 gallons water at 168° F. Add extract syrup to runnings. Bring to boil, then add Willamette. Boil 45 min., then add Mt. Hood. Boil 15 min., then remove from heat. Cool, then top up to 5.25 gallons with chilled pre-boiled water. Cool to 68° F, then pitch yeast. Ferment at 68° F for 2 weeks. Transfer to secondary fermenter and condition cool (50° to 55° F) for 3 to 4 weeks. Prime with DME. Bottle and age at 50° F for 3 weeks. **All-grain option:** Substitute 4 lbs. pale malt for extract syrup.

Great Teton Brewing
Victor, Idaho

Grand Teton Brewing has been brewing handcrafted beers in the Tetons since 1988. Originally named Otto Brothers Brewing Company, after founders Charlie and Ernie Otto, it changed names in 2001.

The Ottos built their first brewery in Wilson, Wyoming, not far from Jackson Hole. It was the first modern microbrewery in the state. After fighting to reform Wyoming alcohol laws, the brothers opened a brewpub in 1992. The Ottos, of German descent, are said to have reintroduced the "growler" beer jug to the American drinking public. Their new brewery is in Victor, Idaho, on the west side of Teton Pass between Jackson Hole and Grand Targhee ski resorts.

Moose Juice is a sweet, bottle-conditioned stout. It has a roasty nose and smooth flavor and a bit of Cascade aroma. Chinook and Cascade hops offset the sweetness of the rich, dark malts and add a dryness. Moose Juice was a silver-medal winner at the GABF in 2000. Other beers include Old Faithful Ale (a golden ale), Teton Ale (an amber ale), Teton Huckleberry Wheat and various seasonals. Go to www.grandtetonbrewing.com or call (888) 899-1656.

Moose Juice Stout

(5 gallons, extract with grains)
OG = 1.055 FG = 1.012
IBU = 45 ABV = 5.5%

Ingredients

3 lbs. pale malt
8 oz. dark crystal malt
8 oz. roasted barley
8 oz. black malt
3.5 lbs. unhopped Muntons dark dry malt extract (DME)
6 AAUs Chinook hops

(1/2 oz. of 12% alpha acid)
4 AAUs Chinook hops
(1/3 oz. of 12% alpha acid)
4 AAUs Cascade hops
(0.8 oz. of 5% alpha acid)
British Ale yeast (Wyeast 1098 or White Labs WLP005) or Scottish Ale (Wyeast 1728)
1 cup pale dry malt extract (DME)

Step by Step

Heat 1.75 gallons water to 164° F. Add crushed malts and roasted barley to water and steep at 152° F for 90 min. Sparge with 2.5 gallons water at 168° F. Add unhopped DME to runnings. Bring to a boil, then add first Chinook hops. Boil 60 min., then add second Chinook hops and Cascade hops. Boil 30 min., remove from heat. Cool, then top up to 5.25 gallons with chilled, preboiled water. Cool to 65° F, pitch yeast. Ferment at 65° F for 2 weeks, transfer to secondary fermenter and condition cool for 3 to 4 weeks. Prime with 1 cup pale DME. Bottle and age at 50° F for 3 weeks. **All-grain option:** Substitute 4.5 lbs. pale malt for 3.5 lbs. DME.

Salt Lake Brewing Co.
Salt Lake City, Utah

Salt Lake City is the nexus of Utah's ski country. It's just a half-hour drive up the canyons to Park City and Deer Valley and not much farther to Alta, Brighton and Snowbird. It's also, of course, the host city for this year's Winter Olympics. As you're passing through town, be sure to stop at Squatters, which was Salt Lake's first brewpub when it opened in 1989. In 1997, Squatters rolled out in 12-ounce bottles and is now available statewide.

Full Suspension Ale is a hoppy, but not too bitter, pale ale. It's brewed to be a great session beer. Other beers at Squatters include Emigration Amber, Mill Creek Cream Stout and Vienna Lager. Go to www.squatters.com or call (801) 363–2739.

Full Suspension Pale Ale
(5 gallons, extract with grains)
OG = 1.048 FG = 1.012 IBU = 45

Ingredients

6.6 lbs. Coopers light malt extract syrup
1 lb. De Wolf-Cosyns caraMunich malt
10 AAU of Nugget hops
(1 oz. of 10% alpha acid)
15 AAU of Columbus hops
(1 oz. of 15% alpha acid)
15 AAU of Columbus hops
(1 oz. of 15% alpha acid)
1 tsp. Irish moss
California Ale yeast (White Labs WLP001) or American Ale (Wyeast 1056)

Step by Step

Steep specialty grain in two gallons of 150° F water for 30 min. Remove the grain from the hot water with a strainer, then bring to a boil. When boiling starts, remove from burner and add malt syrup. Return to a boil, then add Nugget hops and Irish moss, and boil for 60 min. Add first Columbus hops with 5 min. left in the boil and the rest at knockout. Fill your sanitized carboy with 2 gallons of cold water. Pour the hot wort into the carboy and top off to the 5-gallon mark. Add yeast when wort has cooled to 68° F. Ferment and bottle as usual. **All-grain option:** Substitute 7 lbs. pale malt for DME.

Breckenridge Brewery
Breckenridge, Colorado

Breckenridge Brewery's founder, Richard Squire, had a dream — to ski all day and to drink great beer every night. What started out as a passion for homebrewing turned into a business enterprise that's still growing. In 1990 Squires opened Breckenridge Brewery in the quaint mountain town of Breckenridge, Colorado. They are now producing 30,000 barrels a year from three locations. Luckily for Richard, the brewery is within spitting distance of the Peak 10 chairlift.

Breckenridge's seasonals include an Autumn Ale and a Christmas Bock. Their regular offerings are Breck Light, Oatmeal Stout, Pale Ale and their best seller, Avalanche Ale. Avalanche is an amber ale that has a caramel maltiness with a subdued hop character. The beer has a clean finish and a light body. Call (970) 453-1550 or go to www.breckbrew.com.

Breckenridge Avalanche Ale
(5 gallons, extract with grains)
OG = 1.054 FG = 1.013 IBUs = 19
ABV = 5.4%

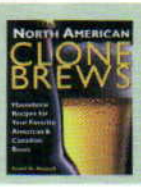
Ingredients

6 lbs. Coopers dry malt extract
0.5 lbs. crushed crystal malt (60° Lovibond)
3 AAUs Chinook hops
(1/4 oz. of 12% alpha acid)
1.25 AAUs Willamette hops
(1/4 oz. of 4.5% alpha acid)
1 AAU of Tettnang hops
(1/4 oz. of 4% alpha acid)
2 AAU of Hallertau hops
(1/2 oz. of 4% alpha acid)
English Ale Yeast (Wyeast 1098 or White Labs WLP002)
1 tsp. Irish moss
1/2 cup corn sugar for bottling

Step by Step

Steep crushed grains in 3 gallons of water at 150° F for 30 min. Remove the grains from the water and add dry malt extract. Bring to a boil and add Chinook and Willamette. Add Irish moss with 20 min. left in the boil. Add Tettnang with 15 min. left in the boil. Add the Hallertau at the end of the boil. At the end of the 60 min. boil, chill the wort as quickly as possible. Pour wort into sanitized fermenter with enough chilled bottled water to equal 5 gallons. Aerate well. Pitch yeast and ferment. **All-grain option:** Substitute 8.5 lbs. pale malt for all malt. ■

Four recipes adapted from "North American Clonebrews" by Scott Russell. Copyright © 2000 by Scott R. Russell. Reprinted with permission from Storey Books (www.storeybooks.com). The rest of the recipes were contributed by these helpful homebrew-shop owners: Steve Bader, Bader Beer and Wine Supply, Vancouver, WA (Mirror Pond); Paul Dyster, Niagara Tradition Homebrew, Tonawanda, NY (Ubu); Anita Johnson, Great Fermentations of Indiana, Indianapolis, IN (Avalanche); and Mark Alston, The Beer Nut, Salt Lake City, UT (Full Suspension).

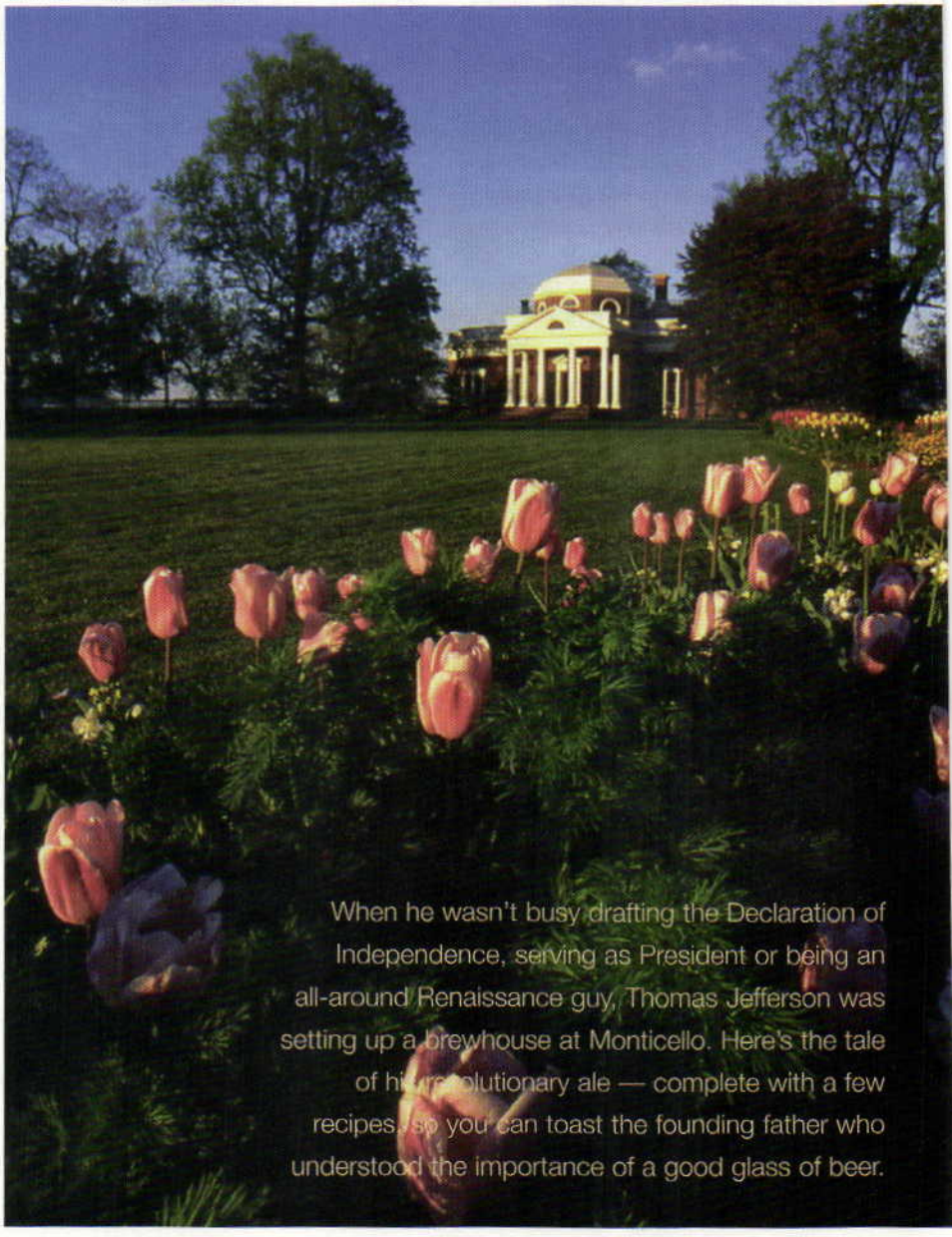


Thomas JEFFERSON was a homebrewer.

SHOULD THAT REALLY SURPRISE ANYONE?

PHOTOS COURTESY OF THE THOMAS JEFFERSON FOUNDATION

BY GREG KITSOCK



When he wasn't busy drafting the Declaration of Independence, serving as President or being an all-around Renaissance guy, Thomas Jefferson was setting up a brewhouse at Monticello. Here's the tale of his revolutionary ale — complete with a few recipes, so you can toast the founding father who understood the importance of a good glass of beer.

IN THOMAS JEFFERSON'S era, America was a vast, underpopulated nation whose few urban centers were separated by wide expanses of meadow, marsh and forest. The fastest means of travel was by stagecoach, and even then a trip from Baltimore to Philadelphia took an average of five days. In the absence of WalMarts and 7-11s, farmsteads had to be as self-sufficient as possible. And strong drink was a necessity. Alcoholic beverages were consumed not merely as a diversion, but were a source of nutrition, served as medicine in lieu of aspirin or penicillin, and also provided an analgesic against backbreaking labor, boredom and loneliness.

If you were a housewife during colonial times, brewing was part of your domestic chores as surely as cooking, cleaning and sewing. If you were the lord of a manor, you probably maintained a malthouse and brewhouse on your property, and trained your servants in the art of beermaking. Jefferson's brewmaster, during his later days at Monticello, was a slave named Peter Hemings ... brother of the famous Sally Hemings, who is said to have borne Jefferson several children.

Admittedly, beer was not Thomas Jefferson's favorite beverage. That honor belonged to wine. During his first year in the White House, Jefferson spent nearly $3,000 on imported

European vintages, probably more than he paid for food. Jefferson's dream was to see the United States become a great wine-producing nation like France or Italy. He dabbled in viticulture, but the grape cuttings he imported from Europe were destroyed by insects and fungal diseases.

Our third president, however, did enjoy beer at the table, and when the War of 1812 made it difficult to import his favorite wines, his interest in brewing was rekindled. With some help from an English sea captain who had brewed professionally, he practically turned Monticello into a microbrewery — except he never intended it to be a commercial operation. "I am lately become a brewer for family use," he wrote in 1815.

Jefferson was corresponding with Joseph Coppinger, a tireless self-promoter who was trying to interest him in a scheme to establish a national brewery in Washington, DC. Jefferson replied that he was too old for such a venture, and at any rate undertakings of this sort belonged to the private sector, not the government.

He did sympathize, however. Jefferson believed that if beer and wine were more readily available, it would encourage temperance in his countrymen. "I wish to see this beverage become common," he wrote about beer in an 1816 letter, "instead of the whiskey which kills one third of our citizens and ruins their families."

Jefferson was born in 1743 in Albemarle County, Virginia. County deeds show that his father, Peter Jefferson, once acquired 200 acres of land in return for a large bowl of "Arack punch" at the Raleigh Tavern in Williamsburg. Peter was a homebrewer himself; his library included a copy of the "London and Country Brewer," a 1742 textbook penned by an anonymous author.

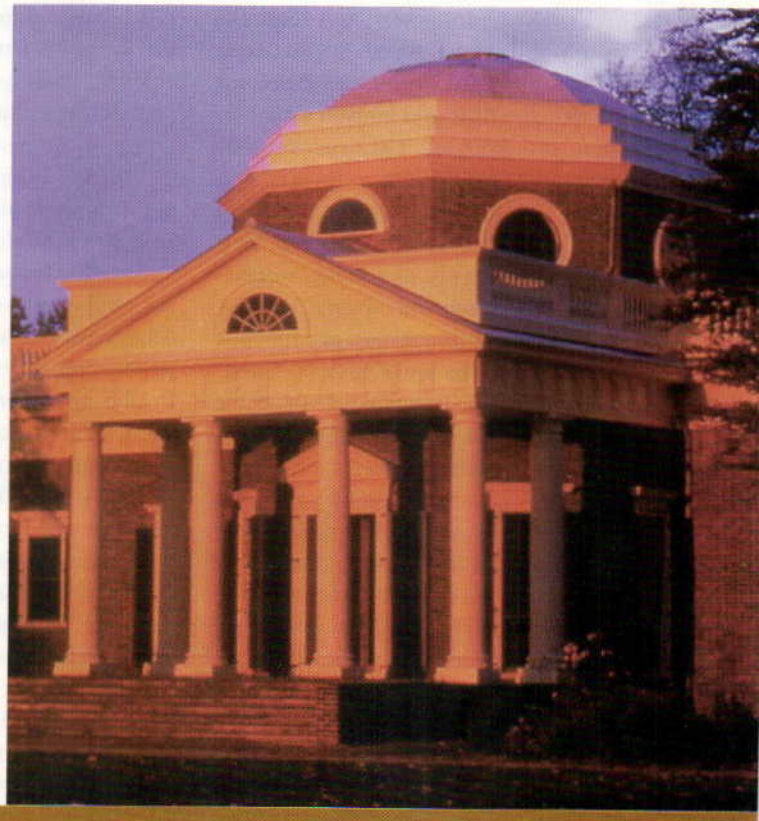
Thomas Jefferson married Martha Wayles Skelton, a young widow, on New Year's Day in 1772. No sooner had she settled in at Monticello than she began brewing. Her household records show that between 1772 and 1774, she brewed a 15-gallon cask of small beer roughly every two weeks. (Small beer had a low alcohol content and was intended for daily consumption.) In his book "Jefferson and Monticello: Biography of a Builder," author Jack McLaughlin estimates that 35 twelve-ounce servings of beer were being quaffed every week at Monticello.

Martha's beer was brewed from wheat, and was probably consumed within a week, as soon as primary fermentation was complete. Apparently, it was well-hopped by that day's standards. On one occasion, Martha wrote in her journal, "Bought 7 pound hops with an old shirt." In her final brewing entry, recorded in March 1774, she mentions adding 10 pounds of sugar to a 15-gallon batch.

Jefferson's ten-year marriage was a happy one, if interrupted by tragedy. Of his six children, only two survived, and Martha died in 1782. A bereaved Jefferson plunged himself into public service, and from 1784 to 1789 he served as special envoy and later as the diplomatic minister to France. In his spare time, Jefferson tramped around and about Europe, visiting great vineyards and acquiring an encyclopedic knowledge of wine. He preferred vintages that had a taste sensation he described as "silky." He defined silkiness as "a compound in their taste of the dry dashed with a little sweetness, barely sensible to the palate." This preference for balance and subtlety carried into his brewing.

Jefferson returned to the United States in 1789, and for most of the next 20 years served his country, first as Secretary of State, then as Vice President, and finally as the young nation's third President. Before the White House was built, the capital was in Philadelphia, which was also a major brewing center. Jefferson's ledgers contained occasional expenditures for beer, including two dozen bottles of porter during July and August of 1790. (His political colleague George Washington also enjoyed porter.) Evidently, Jefferson tried to duplicate this style at Monticello. In 1793 he wrote to a Virginia planter named George Gilmer that he "would certainly attempt to rival" him in the production of porter and macaroni. He planted some hop vines in 1794, but never grew enough to be self-sufficient.

Jefferson entertained frequently, and there were plenty of witnesses to



"I am lately become a brewer for family use."
Thomas Jefferson

his drinking habits. Typically, he drank beer or cider with his meal, and enjoyed two or three glasses of wine afterwards (occasionally four or five with close friends). This was enough alcohol to produce a buzz and loosen his tongue, but not enough to impair his senses. Isaac, a slave at Monticello, testified that he never viewed his master "disguised in drink."

When his second term ended in 1809, Jefferson looked forward to life as a gentleman farmer. But hostilities with Great Britain had depressed the export market for wheat, which was the staple crop at Monticello. Perhaps Jefferson resumed brewing to get rid of a surplus of grain.

In 1813, Jefferson met Captain Joseph Miller, an English subject who had travelled to Virginia to claim an inheritance. He found himself stranded when the War of 1812 broke out. Jefferson helped Miller with his legal affairs and also vouched for his character ... as a citizen of a hostile power, Miller might easily have been imprisoned and charged with spying. Miller—who had worked in a brewery for four years—repaid his benefactor by teaching the art of beermaking to Peter Hemings. Hemings was a quick study, and was soon able to brew on his own.

Brewing was a seasonal activity at Monticello. In 1820, Jefferson wrote that "about the last of Oct. or beginning of Nov. we ... malt and brew three sixty-gallon casks ... ." He apparently upped production the following year, writing that "we brew 100 gal. of ale in the fall and 100 galls. in spring ...." Because no barley was grown at Monticello, Jefferson used malted wheat as the primary, if not exclusive, fermentable. He recorded that he brewed eight gallons of strong beer from a bushel of wheat, adding 3/4 lbs. of hops for every bushel. He complained that public breweries tried to derive 15 gallons from an equal amount of grain, making their beer "meagre and often vapid."

What did Jefferson's beer taste like? In 1819, a visitor to Monticello named Charles Clay gave the not-too-flattering assessment, "Your Ale was vinose on the Palate but rather ventose [producing gas] on the stomac." Other guests — including former president James Madison — were so impressed with the beer that they asked Jefferson for advice on setting up a brewery.

You'll search Jefferson's logbooks in vain for more detailed information on brewing, or for a complete recipe. In fact, Jefferson wrote to James Barbour in 1821, "I have no receipt for brewing, & I much doubt if the operations of malting & brewing could be successfully performed from receipt."

This is a little odd, because Jefferson kept voluminous notes on almost every aspect of his life. If he gave a grandchild fifty cents for a birthday present, he duly recorded the gift in his ledgers. He carefully noted the dates his fruit and vegetable crops ripened each year. His logs contain such trivia as the number of kernels in a pint of cottonseed.

On the other hand, Jefferson was seventy years old when he brewed his first batch of ale under Miller's supervision. The immense amount of his correspondence had begun to weary him. Money was a constant worry. A steady procession of visitors to Monticello literally ate Jefferson out of house and home. When he died in 1826 he was bankrupt, having racked up a debt of $40,000. And finally, Jefferson in his old age had undertaken a major project: the founding of the University of Virginia at Charlottesville. Despite his far-ranging interests, Jefferson could not possibly have supervised every single activity that went on at Monticello.

One unresolved question is whether Jefferson purchased barley for use in his beer ... and how he would have coped otherwise. Barley has a husk which acts as a natural filter during the mashing process. Wheat does not. If you ask ten modern brewers what their least favorite beer to brew is, eight or nine will reply that it's some wheat-based style, because of the laboriously slow runoff. It's possible that Jefferson scattered some straw in the vessel to act as a filter. Cidermakers of his day used a similar technique to help separate the apple juice from the pomace. Of course, Jefferson could easily have begged, borrowed or bought enough barley from his neighbor and son-in-law, Thomas Mann Randolph, who did experiment with growing the grain on a large scale.

In 1993, to celebrate the 250th anniversary of Jefferson's birth, Dock Street Brewing Co. in Philadelphia (now closed, sadly) tried to recreate Jefferson's beer. Brewer Nick Funnell (who currently works for the Sweetwater Tavern chain in northern Virginia) pored over Jefferson's logbooks trying to glean whatever information he could. Figuring that an English brewer like Miller wouldn't have been comfortable doing an all-wheat brew, Funnell settled on a grain bill of 40% wheat, 50% pale malt, 9% caramel malt and 1% chocolate malt. For hops, Funnell used low-alpha-acid English Fuggles ("we picked the oldest variety we could find"). He employed a simple infusion mash at 150° F, which would have been a common procedure at an English brewery.

Funnell fermented the beer with a modern ale yeast strain. ("They didn't even know back then what yeast was. It would have been impossible to guess the characteristics of the yeast they used.") To simulate the wooden vessels used in Jefferson's era, Funnel threw a few oak chips into the fermenter. The beer was kegged after a quick fermentation of 11 days.

Thomas Jefferson Ale (1.098 original gravity, 8.6% alcohol by volume) turned out to be lighter on the palate than you'd expect for a beer of that strength, a result of the citrusy sharpness contributed by the wheat. Funnell summed it up as "a smooth bock with a tang." In my own tasting notes, I described it as having a tart, fruity flavor reminiscent of a Belgian sour brown ale. *(See recipe at right.)*

Earlier this year, Susan Stein, curator at Monticello, shed some additional light on Jefferson's brewing by providing two recipes that were allegedly used at Monticello. One is for a persimmon beer. "We think he got it from a female acquaintance," says Stein. This is how it appeared in the 1822 edition of Cottom's "Virginia and North Carolina Almanack:"

"Gather the Persimons [sic] per-

fectly ripe and free from any roughness, work them into loaves, with bran enough to make them consistent, bake them so thoroughly that the cake may be brown and warm throughout, but not burnt, they are then fit for use; but if you keep them any time you must dry them frequently in an oven moderately warm, of these loves [sic] broken into a coarse powder, take eight bushels pour on them forty gallons cold water and after two or three days draw it off, boil it as other beer, hop it, and it makes a very strong beer; by putting thirty gallons of water in the same powder and letting it stand two or three days longer you may have a very fine small beer."

The other Monticello recipe is for a "summer beer," which comes by way of Nicholas Trist, Thomas Jefferson's grandson-in-law: "Put four ounces of hops and one gallon of West India molasses into a barrel — fill it with water — stop the bung and vent-holes tight; then place the barrel on blocks, ready for drawing. Fit for use in 9, 10 or 15 days, according to heat of the weather. Admit as little air as possible."

Stein also noted that, thanks to a $20,000 donation from Anheuser-Busch and a matching grant from a Houston distributor, the Thomas Jefferson Foundation is restoring the beer cellar at Monticello. Measuring 12 by 14 feet, the cellar shared the lower level of Monticello with a dairy, smokehouse, ice house and kitchen. The exhibit, expected to open to the public in late 2002 or early 2003, will include a display of casks, bottles and tapping equipment from Jefferson's time, as well as "information and illustrations" on brewing in the early 1800s. Still to be located is Jefferson's brewhouse. But Stein believes ongoing archaeological surveys will eventually pinpoint the spot. "We might even reconstruct the brewhouse, since we have the plans that Jefferson drew up," says Stein. ■

Greg Kitsock is the editor of Mid-Atlantic Brewing News and American Brewer magazine. A resident of Washington, DC, he is currently researching a book on the drinking habits of U.S. presidents.

JEFFERSONIAN HOMEBREW

Persimmon Ale

Persimmons are reddish-orange fruits that tend to ripen in late fall. They're used in marmalades, pies and other confections. In colonial days, settlers employed them as a brewing adjunct when malt was wanting. A recipe for a persimmon beer, purporting to belong to Thomas Jefferson, has been preserved at his estate at Monticello.

In 1995 Ralph Bucca — homebrew columnist for *Mid-Atlantic Brewing News* and a self-styled "fermenter of strange liquids" — was asked to formulate a persimmon beer for a colonial-themed dinner. The dinner never came off, but Bucca did produce a beer. He used the following ingredients:

4.8 lbs. dried persimmons
6 lbs. light dried malt extract
1 lb. corn sugar
1 oz. Galena hops
Red Star ale yeast

Bucca's plan was to brew a generic light ale first, then add the persimmons during fermentation. First, he sanitized the fruit by placing it in boiling water with a quarter teaspoon of sodium metabisulfite. When rehydrated, the dried fruit expanded so much that Bucca had to transfer the fermenting wort from a six-gallon to a twelve-gallon vessel to fit everything in.

Primary fermentation took five days. The persimmons tended to rise to the top of the fermenter, forming a cap, and had to be punched down twice daily. Using a colander over a plastic bucket, Bucca strained the liquid after fermentation was complete, collecting six gallons of murky, orange liquid in a carboy and a gallon jug. A frugal fellow, Bucca decided also to make a small beer by adding 2.5 lbs. of sugar to a gallon of boiling water, then pouring it over the yeast-encrusted persimmons he'd salvaged.

As for the original full-strength brew, it clarified somewhat after a month of aging. Bucca and several of his homebrew acquaintances sampled it at that time and judged it "a fruity, cidery, pleasant-tasting beverage ... just the thing to quench the thirst of an 18th-century colonial."

Bucca has a word of advice for homebrewers who might want to try this recipe with fresh persimmons: make sure the fruit is ripe. Ideally, you should allow the persimmons to fall from the tree, instead of plucking them ahead of their time. Unripe persimmons are very astringent. "They'll suck the moisture right out of your mouth," he warns. "You won't be able to get to a glass of water fast enough."

Thomas Jefferson Ale

Ever since brewer Nick Funnell formulated Thomas Jefferson Ale at Dock Street Brewing in 1993, George Hummel, proprietor of Home Sweet Homebrew in Philadelphia, has been fielding inquiries from customers who'd like to brew a piece of American history. Basically, the ale is a weizenbock without the banana-clove flavors characteristic of Bavarian wheat beers. Here's George's all-grain recipe for a five-gallon batch.

10 lbs. pilsner malt
5 lbs. malted wheat
1 lb. crystal malt (60° Lovibond)
1/4 lb. chocolate malt
1.5 oz. of low-alpha Tettnang or East Kent Goldings hops
Wyeast 1388

Employ a single-infusion mash at 155° to 158° F. Boil for 60 to 90 minutes. Add half the hops at the beginning of the boil, and the other half five minutes before the end of the boil. Primary fermentation should take one week at 60° to 65° F, followed by secondary fermentation for 4 to 6 weeks at cellar temperature. Serve with toasts to life, liberty and the pursuit of happiness.

From the central train station in Düsseldorf, I was making my way toward the charming Altstadt district. Düsseldorf is a bustling city on the Rhine river in western Germany, and Altstadt, which means "old city," is the historic part of town. On its centuries-old streets you can find many of Düsseldorf's traditional culinary treasures, such as mettwurst, Mainzer beer cheese, and the world's greatest pretzels and hot mustard.

The pretzels alone are worth the trip, but I wasn't in Düsseldorf to eat. I was there to learn how to brew the city's legendary altbier.

Ales have been brewed in Germany for 3,000 years, and alt is the ale that has long defined Düsseldorf. "If you ask for a beer in Düsseldorf, you get an altbier," writes Horst Dornbusch in "Altbier" (Brewers Publications, 1998).

Ales have been brewed in Germany for 3,000 years, and alt is the ale that defines Düsseldorf. If you ask for a beer in one of these Düsseldorf pubs, you'll get an alt.

"If you want pils or weizen, you have to ask for it specifically." The name, which means "old beer," describes an ale fermented cool with top-fermenting yeast, then aged near the freezing point in the Düsseldorf style. Alt is a full-bodied beer, a bit like a British brown ale or bitter. Since it's not exported, this style can be hard to find in the United States. Take it from me: It's worth flying across the Atlantic to taste Düsseldorf alt from the tap.

Altstadt's cobblestone streets are lined with cozy, old-time taverns that have plenty of Old World charm ... and plenty of altbier. Walking into a Düsseldorf pub is like stepping into a time warp. Single-tap wooden barrels dispense alt into traditional straight-sided, 0.3-liter glasses, one after another. Once you've been served an altbier, the coaster under the glass serves as a tally for the number of beers consumed. The only way to stop your glass from being filled is to place the coaster on top of the glass, which tells the waiter you're finished. The blue-aproned waiters carry revolving trays of altbier while collecting empty glasses on the fly. The glasses are then half filled, let to stand, and topped up to establish a dense, frothy head. The waiters will occasionally pause to enjoy an altbier at the customer's expense, usually finishing it in one or two gulps.

In Altstadt, you will find three of the four breweries that have defined the style: Zum Uerige, Im Füchschen and Zum Schlüssel. The fourth brewery, a mile outside the historic district, is the Brauerei Ferdinand Schumacher. Founded in 1838, Schumacher is the oldest continually-operating altbier brewpub in the city. "The founder, Ferdinand Schumacher, took the traditional Rhineland ale as he found it, but added a bit more hops than was customary at the time, brewed it stronger, and started to experiment with aging the beer in casks to let it mature," writes Dornbusch. "In these innovations lie the roots of the modern altbier style: a robust, coppery, slow-fermented and lagered ale."

These classic breweries have a rustic atmosphere. Patrons gather around the old wooden barrels, used as tables, and drink glasses of alt while munching on aged cheeses and blood sausage. Some of the brewpubs even have their own in-house butchers, who serve the freshest meats and cheeses imaginable. Other pubs serve hearty full-course meals of wild boar, duck and eisbein (boiled knuckle of pork).

Making Alt the Düsseldorf Way

During the two days I spent in Düsseldorf, I took extensive tours of the Füchschen and Uerige breweries. The brewers were happy to share their alt techniques with a colleague from the United States, though they were guarded about their proprietary yeast strains. I followed along as they described their alt in German; in both pubs, an accommodating waiter helped me translate. The head brewer at Füchschen even gave me his recipe. (I have that beer on tap at my brewpub.)

Replicating a quality altbier is a challenge. The original gravity should range from 1.045 to 1.052. Alts are copper to brownish-amber in color and medium- to full-bodied, with a firm malt character that is not overwhelming. Altbier has a medium to high bitterness level, with a minimal hop aroma. The hop character must balance the overall impression of the beer. It has a crisp, dry finish, complemented by a nutty malt character without roasty overtones.

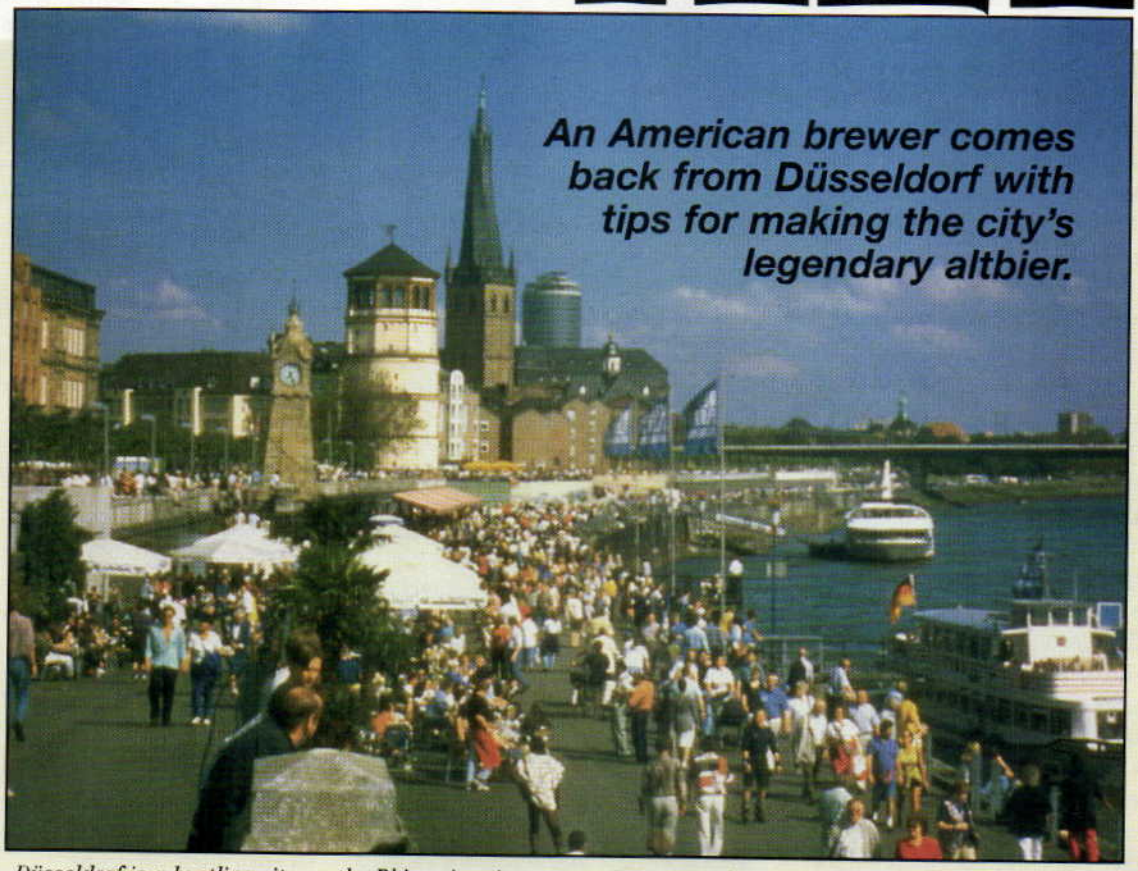
Altbiers are fermented cool, using a top-fermenting ale yeast, in open fermentation squares. Then they are lagered for an extended period of time, usually four to six weeks. Cold secondary conditioning is required for the clean, dry taste that typifies the style. Due to the low fermentation temperatures, you'll want a high pitching rate (double the size of your yeast starter). Aerate your wort aggressively.

Brewing water, medium hard

The brewing water should have a medium hardness. If you add salts, use calcium chloride rather than calcium sulfate. This will enhance the beer's fullness and maltiness and produce a mellower mouthfeel. Some Düsseldorf pubs use untreated tap water and lower the pH of the mash by adding acid malt at 1 to 2 percent. Always remember to de-chlorinate your water.

By Matt Cole

OLD-WORLD ALT



An American brewer comes back from Düsseldorf with tips for making the city's legendary altbier.

Düsseldorf is a bustling city on the Rhine river in western Germany. The cobblestone streets of its centuries-old historic district, the Altstadt, are lined with almost 200 pubs that serve authentic altbier and traditional German fare, such as pretzels with hot mustard, wild boar, aged cheeses and pork knuckles.

Malt for your authentic alt

Good altbier starts with good German malts. Altbiers have higher hopping rates that require a firm malt presence throughout. The base malt is German pilsner, while the addition of Munich malt at 5 to 20 percent will lend a mild sweetness and add some color. Most Düsseldorfer alts include a small percentage of CaraMunich (5 percent) and black or chocolate malt (1 to 2 percent). I use a bit of de-husked, de-bittered chocolate malt, such as Carafa III, at 1 to 2 percent. This will lend a deep, tawny copper color to your alt. Some pubs also use a little German dextrin malt (CaraHell) to add body and head retention. American brewers tend to add too much caramel malt and not enough hops.

Fresh German hops

Fresh hops are critical for producing a classic Düsseldorfer altbier, which ranges in bitterness from 35 to 55 IBU. Most Düsseldorfer pubs use Spalt hops for bitterness. My favorite brewery, Im Füchschen, uses Hallertau Tradition for bitterness. Other suitable hop varieties would include German Tettnang and Czech Saaz. American varieties also work well. I suggest Liberty, Mount Hood, Ultra and Crystal. Pound for pound, pub alts are bitter beers, so focus on getting two-thirds of the bitterness at the beginning of the boil. The average boil is 80 minutes, and most breweries use three additions in the kettle: the first at 80 minutes, the second at 60, and the third 5 minutes before the end of the boil. Use a light hand during the last two additions. For added complexity, try dry hopping your alt in the secondary.

Yeast and fermentation

Arguably, alt yeast is the most important ingredient in reproducing

the classic altbier style. Altbier should only be made with alt yeast. This "alt" to be a rule!

Alt yeast has a unique ability to ferment at cooler-than-normal ale temperatures. These cooler temperatures produce a cleaner, less fruity and more delicate flavor profile. The cooler fermentation temperatures reduce fruity esters and produce lager-like results. Fermentation should be conducted between 60° and 64° F for 3 to 6 days. Alt yeasts are low-flocculating strains. This increases its ability to hang in suspension. As a result, the yeast removes compounds and refines beer flavors. Altbiers produce a dense, rocky head of krauesen, so allow plenty of headspace in your fermenter. My favorite strain is Wyeast 1007 (German Ale), which is similar to the Düsseldorfer pub yeast in its dry, crisp character.

After primary fermentation, condition the beer for three to six weeks at near-freezing temperatures. This will help clear the alt, refine the flavors and soften the overall character of the beer. Excessive fruity esters, caused by abnormally warm ale fermentations, can be reduced by lagering at very cool temperatures for extended periods of time. These beers require patience.

Sticke Alt is a more intense version of altbier. These "secret beers" are brewed stronger, are slightly darker, and are dry-hopped in the conditioning tank for four to six weeks. The result is a bittersweet, ultra-crisp ale with a fresh, flowery aroma. These traditional brews are available once or twice a year, usually in September and January. I was fortunate enough to taste Sticke Alt straight out of the aging tank at the Uerige brewery. It was possibly the best beer I have ever tasted.

At right are two homebrew recipes I created after my trip. Have fun making your own alt, and here's a toast to the legendary beer of Düsseldorf! ■

Matt Cole is head brewer at Rocky River Brewing Company in Rocky River, Ohio, where he always has alt on tap. He is an active member of the Brew Your Own editorial-review board and won two bronze medals at the 2001 Great American Beer Festival.

BREW SOME ALT!

Sly Fox Altbier

(5 gallons, all grain)
OG = 1.052 FG = 1.010 to 1.012
IBU = 30 to 40 SRM = 15 to 18

Ingredients

6 lbs. German pilsner malt
2 lbs. German Munich or Vienna malt
1.25 lbs. Weyermann CaraMunich III or crystal malt (60° Lovibond)
1 to 3 oz. Weyermann Carafa III or black patent malt
6.4 AAU German Spalt hops (1.25 oz. of 5.5% alpha acid) for 80 minutes
1.5 AAU Saaz or Liberty hops (0.5 oz. of 3.1% alpha acid) for 20 minutes
3.1 AAU Saaz or Liberty hops (1 oz. of 3.1% alpha acid) for 5 minutes
Starter of alt yeast (Wyeast 1007 or White Labs WLP036)
3/4 cup corn sugar to prime

Mash grains in one quart of water per pound of malt at 100° F for 15 minutes. Raise to 122° F for 20 minutes, then do a conversion rest at 150° F for 60 minutes. Mash out at 170° F. Sparge with 170° water. Boil time is 80 minutes. Alternatively, a single-step infusion mash can be used at 152° F for 60 minutes. Ferment at 60° to 64° F for six days. Rack to secondary for three weeks at 32° to 40° F. Force-carbonate or prime with 3/4 cup of corn sugar and bottle. Wait two weeks. Extract brewers can substitute 4.25 pounds light DME for the pilsner malt.

Above: Sweet wort is drawn off into a grant during lautering. Below: A dense head of krauesen tops a batch of alt in an open fermenter. Matt took both photos in Düsseldorf.

Sticke Alt

(5 gallons, extract with grains)
OG = 1.052 to 1.055 FG = 1.010 to 1.014 IBU = 30-40 SRM = 14 to 16

Ingredients

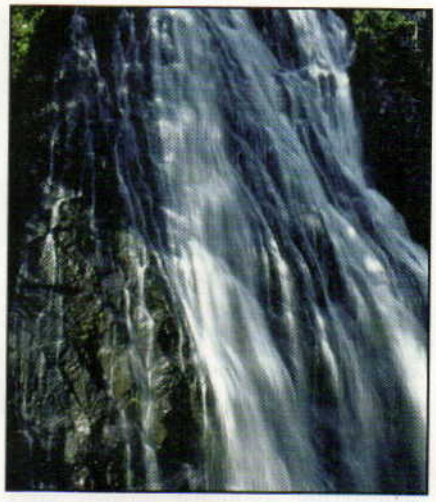
3 lbs. pilsner dry malt extract
2.5 lbs. German Munich malt
2 lbs. Weyermann CaraMunich III or crystal malt (60° Lovibond)
0.75 lb. German CaraHell or CaraPils
3 to 4 oz. Weyermann Carafa III or black patent malt
6.4 AAU German Spalt hops (1.25 oz. of 5.5% alpha acid) for 80 minutes
1.5 AAU Saaz or Liberty hops (0.5 oz. of 3.1% alpha acid) for 20 minutes
3.1 AAU Saaz or Liberty hops (1 oz. of 3.1% alpha acid) for 5 minutes
1 tsp. Irish Moss at 20 minutes
Starter of alt yeast (Wyeast 1007 or White Labs WLP036)
3/4 corn sugar to prime

Bring 1.25 gallons of water to 155° F. Add grain and hold for 30 minutes at 150° F. Strain grain into the brewpot and sparge with 1/2 gallon of 168° F water. Add the extract and bittering hops. Bring the total volume in the brew pot to 2.75 gallons. Boil for 60 min. Add the flavor hops and Irish moss. Boil for 15 min., then add the aroma hops. Boil 5 min, then remove from stove. Cool wort. Strain into fermenter and add chilled, preboiled water to obtain 5.5 gallons. Add yeast when wort has cooled to 70° F. Aerate well. Ferment at 60° to 64° for 7 days. Rack into secondary (glass carboy). Condition at 32° to 40° F for approximately 5 weeks. Force carbonate or prime with corn sugar and bottle. All-grain brewers can swap 4.5 pounds of pilsner malt for the DME.

Clear Water

A simple guide to treating your brewing water

by Don Million



Most homebrewers start brewing with water that comes straight from the faucet. At some point, however, many start thinking about water treatments. In a nutshell, water treatment involves changing the chemistry of your brewing water in an attempt to change the resulting beer.

There are many reasons why you might want to treat your water. Some reasons — such as removing unwanted substances — depend on your water source. All-grain brewers often treat their water to adjust the pH of the mash. You also might treat your water to adjust the taste of your beer or to mimic the water from a famous brewing city. Keep in mind that the simplest option — not doing anything — is an option many homebrewers take.

Removing contaminants

The presence of some things — fecal coliform bacteria, excessive lead or anything that makes the water unfit to drink — will render water unusable for brewing. If you get your water from a well, you should get a water analysis before using it to brew with. (In most places, this analysis is required before water can be used for human consumption.) Things that render a water source unusable should not be present in municipal water supplies. A nearly infallible rule of thumb is, if your municipal water tastes good enough to drink, it's good enough to brew with.

Chlorine

Although municipal water sources are almost always safe for use in brewing, most contain one thing that will adversely affect your beer — chlorine. Cities add chlorine or chlorine-based chemicals to the water for sanitation. Too much chlorine in your brewing water can make your beer taste like Band-Aids. So, how do you know if your water has chlorine? Well, pour yourself a glass of water and drink it. If it smells or tastes like chlorine, you'll want to do something to eliminate it.

There are two simple ways to deal with chlorine, boiling or filtering. Chlorine can be eliminated by boiling water for five to ten minutes. Nowadays, however, many cities use chloramines instead of chlorine. Chloramines cannot be boiled away; they must be filtered out with an activated charcoal filter. A counter-top filter that connects to your faucet will cost about $30 at most hardware stores. The alternative is an under-sink filter with replaceable cartridges that will cost at least $50. I prefer filtering because it takes less time and effort on brew day. Plus, you get the added benefit of filtered water for drinking and cooking. A water filter will also work on ordinary chlorine.

Water pH

All-grain brewers may have to treat their water to achieve the proper pH of their mash. Mash pH should fall between 5.2 and 5.6, with the lower end of the range preferred. In this pH range you will get the best extraction from your grains. If you're an all-grain brewer, you should test your mash pH with pH test strips or a pH meter. If the pH of your mash is not between 5.2 and 5.6, you should adjust it. If the pH is high, you have two choices: acid or salts. The acids most commonly available to homebrewers are phosphoric and lactic. These are generally available as dilute solutions. The term "salt" refers to a compound formed by the reaction of an acid with an alkali (or base). What we know as common table salt is, in fact, a salt — but so are gypsum (calcium sulfate), Epsom salt (magnesium chloride), calcium chloride and calcium carbonate. In water, salts dissociate (break apart) into ions, which are charged particles. In the case of calcium sulfate, the salt forms calcium (Ca^{2+}) and sulfate (SO_4^{2-}) ions in solution. The superscripted number on the ions gives the charge on that ion. *(See page 40 for more salts and the ions they supply.)*

Most homebrewers use salts containing calcium to lower their mash pH. The best salt to use depends on what you're brewing and what minerals are already in your water. The two most popular choices are calcium chloride and calcium sulfate (gypsum). For my example, we'll keep it simple and use gypsum. To lower the pH of a mash, add one-half teaspoon of gypsum and stir it in. Wait a couple of minutes, then take a sample of mash and check the pH. Repeat this process until your mash pH is in the right range, but don't add over 2 tsp. of gypsum to a 5-gallon batch. If your mash pH is low, you need to add calcium carbonate. Again, add one-half teaspoon at a time until your pH is in the right range.

Many brewers make the assumption that if the pH of the strike water is high, then the pH of the mash will necessarily be high. This is not true. I used to live in Des Moines, Iowa, where the average pH of the tap water is almost 9. Nonetheless, I rarely had to adjust the pH of my mashes. How can that be? Very simply, it is the mineral content of

the brewing liquor and the kind of grains you are using that determines the final pH of the mash. The initial pH of your water is not the only factor, or even the most important factor, in determining mash pH. So, check and adjust the pH of the mash, not the pH of the water you are mashing with.

Sparge water is a different matter. If you sparge to the point that you collect an excessive volume of runoff relative to the volume of the mash, then the pH of your runoff can climb too high. If it gets above 5.8 you begin to extract tannins into your wort. These tannins can cause an astringent taste in your beer. For that reason you either need to monitor your runoff and stop sparging when the pH climbs above 5.8, or you need to lower the pH of your sparge water to 5.8. If you choose to lower the pH of the sparge water, use acid rather than trying to adjust it with salts. Calcium affects mash pH through chemical reactions with calcium and chemicals (phosphates) in the malt. Simply adding gypsum to water will not affect the pH to any great degree.

If the pH of the mash is right, and the pH of the runoff stays within range, then the pH of your wort — and hence the final beer — should be within the proper range. Finished beer should have a pH of 4.0 to 4.4. If your beer is still too high in pH, you can add acid directly to the fermenter.

If you brew exclusively with extracts or only steep specialty grains, you probably don't have to worry about pH. The company that produced your extract took care of the pH when they mashed the grains. Unless your water is extremely hard or soft, or its pH is extremely high or low, your wort will end up in the right pH range.

Flavor: Adding Brewing Salts

So, what else is there to water treatment? The answer is flavor. Certain minerals affect the flavor of the final beer. The minerals that homebrewers deal with most are those containing sulfate, chloride and sodium. Sulfate gives a sharp, crisp edge to the hop bitterness of a beer — especially one that has fairly high hopping rates. Sodium enhances the sweetness and

gives a soft fullness to the malt flavors of the beer. Chloride gives body and fullness to the beer and enhances the malt flavors similarly to sodium. One important note is that combining high sodium levels with high sulfate levels may result in an unpleasant astringency in your beer.

Okay, so you're making an IPA and want that traditional sharp edge to the bitterness. Add sulfate, right? But how much? This is where you have a choice to make. You have to decide between leaving your water alone or jumping into the deep end. By jumping into the deep end, I mean getting a water analysis and using it to calculate mineral additions. *(For more on this, see "Homebrew Science" on page 41.)*

Flavor: Subtracting substances

What if you want to decrease the levels of things in your water? Brewing with softer water leads to softer, more rounded beer flavors. Czech pilsners are traditionally brewed from water with very few minerals. In addition, very hard waters may interfere with your mash pH. If your water is high in calcium or magnesium, you can reduce these by boiling. When you boil the water, the calcium and magnesium react with phosphates or carbonates. A precipitate will form and settle out as a white powder in the bottom of the kettle. After boiling, decant off the water. The only problem with this method is that, without careful calculations, you won't know how much calcium and magnesium you've removed.

Another method for reducing mineral content, and one that allows you to know by exactly how much you have reduced all the minerals in the water, is dilution. If you want to reduce the sulfate level in your water by, say, 25 percent, all you have to do is mix three gallons of tap water with one gallon of distilled water. Since distilled water has no minerals, you have reduced the levels of all the minerals in your tap water by 25 percent. Now you can use salts to increase the levels of any other ions back to where you want them.

Classic Brewing Waters

Many homebrewers treat their water in an attempt to duplicate the minerals in the waters of classic brewing capitals of the world. Probably the most common treatment involves adding gypsum to pale ales and IPAs. The intent is to duplicate the hardness, particularly the high sulfate levels, found in the birthplace of pale ales: Burton-on-Trent, in Great Britain. High sulfate content results in a sharper, crisper hop bitterness. If you look at the guide on the next page, you can see the water profiles from several cities well-known for their beers.

Now you know the basics of dealing with chlorine in your water, adjusting the pH of your mash, and adjusting the minerals in your brewing liquor to get the taste effects you want. You're ready to swim with the sharks when it comes to water treatments! ■

BYO Water Treatment Guide

Water Stats

Chemical Formula: H_2O
Molecular Weight: 18.01
Boiling Point: 212° F (100° C)
Melting Point: 32° F (0° C)
pH (of pure H20 at 25° C or 77° F): 7

Common Ions

Calcium (Ca^{2+}): Helps acidify the mash by reacting with phosphates and amino acids from malt; stabilizes enzyme reactions; aids in the precipitation of haze-forming materials; for most beers 50 to 100 ppm is recommended range.

Magnesium (Mg^{2+}): Acidifies the mash, although to a lesser degree than calcium; an important co-factor with many brewing enzymes; keep under 30 ppm.

Bicarbonate (HCO_3^-): Can raise the pH of a mash, increasing the extraction of color and tannins, as well as decreasing flavor stability; for pale beers, less than 25 ppm is recommended; over 100 ppm, only use for dark beers.

Sodium (Na^+): Gives a salty and sour taste in high concentrations; at lower concentrations may give palate fullness and sweetness; for most beers, 70-150 ppm is the recommended range.

Iron (Fe^{3+}): Damaging to yeast; can give a metallic character to beers even in low concentrations; can cause beer haze; iron also causes oxidation, especially when introduced to beer during filtration from filter media; should be less the 0.5 ppm.

Zinc (Zn^{2+}): Is required in trace concentrations for good yeast metabolism; should be less than 0.2 mg/L.

Sulfate (SO_4^{2-}): Gives a dry aftertaste; increases the perception of bitterness; over 450 ppm not recommended.

Chloride (Cl^-): Contributes to palate fullness; favors maltier characters by reducing the perception of bitterness; not noticeable under ~200 ppm; should not be confused with chlorine (Cl_2).

Flouride (F^-): Has no influence up to 10 ppm.

Water Analysis: Famous Brewing Centers

	Burton	Munich	London	Pilsen
Sodium	25-30	1-10	10-24	2-3
Magnesium	4-62	18-20	4-5	1-2
Calcium	268-295	75-80	90	5-7
Chloride	25-36	1-60	18	5
Sulfate	450-725	5-120	40-58	5-6
Carbonate	141-300	150-200	123	9-15

Molecular Weights of Brewing Salts

Formula	MW
Calcium Sulfate/Gypsum ($CaSO_4 \cdot 2H_2O$)	172.17
Magnesium Sulfate/Epsom Salts ($MgSO_4 \cdot 7H_2O$)	246.48
Calcium Chloride ($CaCl_2 \cdot 2H_2O$)	147.01
Sodium Chloride/Table Salt (NaCl)	58.44
Calcium Carbonate/Chalk ($CaCO_3$)	100.09

Molecular Weights of Brewing Ions

Ion	MW
H^+	1.01
K^+	39.10
Na^+	22.99
Cl^-	35.45
HCO_3^-	61.02
Ca^{2+}	40.08
Mg^{2+}	24.31
SO_4^{2-}	96.06

Chemical	Calcium Ca^{2+}	Magnesium Mg^{2+}	Sodium Na^+	Sulfate SO_4^{2-}	Chloride Cl^-	Bicarbonate HCO_3^-	Carbonate CO_3^{2-}
Gypsum ($CaSO_4 \cdot 2H_2O$)	61.5			147.4			
Epsom Salts ($MgSO_4 \cdot 7H_2O$)		26.1		103.0			
Calcium Chloride ($CaCl_2 \cdot 2H_2O$)	72				127		
Sodium Chloride (NaCl)			103.9		160.3		
Chalk ($CaCO_3$)	105.8						158.4
Baking Soda ($NaHCO_3$)			72			192	

1 gram added to 1 gallon of water gives the following parts per million increase in the respective ions.

Deep water

H_2O chemistry, from ions to salts to alkalinity

by Steve Parkes

I've been a professional brewer long enough to know what subjects scare brewers. Water chemistry is perhaps the area where most brewers — professional and amateur — are likely to bluff their way through. When asked about the subject, brewers shrug and talk about the historical importance of water from the world's great brewing centers. Or they trot out statistics concerning the amount of water in beer. Few can discuss what particular characteristics different waters will impart to their beer, or when a water treatment is even advisable.

The facts are that all water is different and most water can make good beer. The impact of water quality on beer quality is simple and logical, and homebrewers — though they have less reason for concern than their professional counterparts — would do well to master this topic. Although much of the discussion in brewing texts focuses on other ingredients, water makes up more than 90% of the beer we drink. It is a crucial raw material.

Basic Water Chemistry

A water molecule consists of two hydrogen atoms bonded to an oxygen atom. Water weighs 18 grams/mole. A mole is the amount of a substance that contains as many particles as there are atoms in 12 grams of carbon 12. This number, called Avogadro's number, is 6.022×10^{23}. This leads to another term, molecular weight. That's the sum of the weights of the atoms in a molecule. The molecular weight of a substance is equal in value to the weight of one mole of the substance in grams. So, since water weighs 18 g/mol, it has a molecular weight of 18.

Normally the molecular weight of a molecule has a lot to do with the volatility of the molecule, or its ability to become a vapor. According to predictions based on molecular weight, water should have a boiling point of 15° C (59° F), well below the actual boiling point of 100° C (212° F). But additional forces affect the boiling point of water. Water molecules form hydrogen bonds to other water molecules in solution. Hydrogen bonds are weak associations of the hydrogen of one molecule with the oxygen of another molecule of water. These bonds are weak, but since there are so many of these bonds, they keep water from vaporizing at lower temperatures. A small portion of any volume of water exists in its dissociated form as hydrogen (H^+) and hydroxide (OH^-) ions.

The pH scale

The pH scale describes how acidic or basic a solution is. The equation is:

$$pH = -\log [H^+] = \log 1/[H^+]$$

Because the pH is the reciprocal of the H^+ ion concentration, the lower the pH, the higher the H^+ concentration. Since the pH scale is logarithmic, each whole number change represents a 10-fold increase or decrease in H^+ ion concentration. At 25° F pure water has an equal amount of H^+ ions and OH^- ions, which translates to a pH of 7. Solutions with a pH lower than 7 are acidic; solutions with a pH greater than 7 are basic (or alkaline). The addition of acids to water increases the H^+ ion level, decreasing the pH. The addition of bases, or alkalis, increases the levels of OH^- ions, which increases pH.

Buffers and pH

Weak acids or bases have the ability to act as buffers in solutions. The degree to which they give up hydrogen or hydroxide ions into solution is influenced by the pH of the solution. So, they can react to resist a change in pH. This is particularly important in a brewer's mash, where acid buffers work to maintain a stable mash pH and can tolerate the presence of compounds in the water that may otherwise raise or lower the pH.

Ions in Brewing Water

Water comes to us out of the faucet with a number of additional things, including a variety of ions in solution *(see page 40 for a guide to common ions)*. There are many ions that would be considered pollutants in water, such as nitrates or phosphates. Luckily, in the United States, the mandated levels for these pollutants in drinking water are low enough to avoid any problems.

Altering Your Water Chemistry

Once you know the ionic composition of your base water, you can decide what proportion of salts you wish to add to your water. When you are attempting to adjust your brewing salts, you should keep in mind that it is difficult, if not impossible, to exactly emulate traditional brewing waters. This is because you cannot add individual ions, but must rather add "salts" consisting of several ions bound together. For example, if you wish to add calcium to your water, you must chose whether to add gypsum (calcium and sulfate) or calcium chloride (calcium and chloride). In either case, you will be adding other constituents that will have an effect on your beer.

Say we have water with 55 mg/L of calcium. We wish to adjust this up to 100 mg/L of calcium and we will be using 10 gallons of water. We are going to use gypsum for the adjustment, and this will also add sulfate (SO_4^{2-}). First, let's determine how many milligrams of calcium that we need:

100 mg/L - 55 mg/L = 45 mg/L of calcium to be added. So 10 gallons of water x (3.785 L/gallon) x (45 mg/L Ca^{2+}) x (1g / 1000mg) = 1.7033 g Ca^{2+}

Since there is no way to add pure calcium, we will add gypsum to get the

correct amount of calcium. Another complication is that gypsum is not simply calcium and sulfate. It also contains 2 molecules of water, which raises the molecular weight of the molecule of gypsum. So if we multiply by the molecular weight of the gypsum and divide by the molecular weight of calcium (a ratio called the mole fraction) we will get the correct amount of gypsum:

1.7033g Ca^{2+} x (172g gypsum / 40g Ca^{2+}) = 7.32g gypsum

Now you can calculate the mg/L of sulfate that you are adding:

7.32g gypsum x (96g / 172g gypsum) x (1000mg / 1g) / (10 gallons x 3.785 L/gallon) = 108 mg/L

So by adding 1.7033 g of gypsum, we have added 108 ppm of sulfate along with the 45 ppm of calcium.

Hardness

The most important characteristic of your water that you're likely to change is its hardness. Hardness is an expression of the concentration of calcium (Ca^{2+}) and magnesium (Mg^{2+}) ions. Water with high concentrations of these ions is described as hard because it leaves behind hard deposits when the water is boiled. It would seem that the hardness could simply be expressed by adding the concentration of the Ca^{2+} and Mg^{2+} (in mg/L) together. However, the units for hardness are often expressed "as $CaCO_3$." This means that the hardness is measured as if all of the Ca^{2+} and Mg^{2+} ions were actually calcium carbonate ($CaCO_3$). This changes the molecular weight calculation. By using a ratio of the molecular weight of $CaCO_3$ and that of Ca^{2+} and Mg^{2+}, we can derive the following equation to determine the hardness:

Hardness (mg/L) as $CaCO_3$ = 2.5 [concentration of Ca^{2+} (mg/L)] + 4.1 [concentration of Mg^{2+} (mg/L)]

Hardness is quite important with regards to your water's quality, particularly for mashing and sparge. Calcium and magnesium ions will react to lower

the mash's pH. Lowering the mash pH into a favorable range will lower color extraction, lower the extraction of astringent characters from malt and improve flavor stability. This is particularly important when making pale colored beers using primarily pale malt. Dark malt tends to provide more acids that lower the mash pH and this dark malt is missing from pale beers.

Alkalinity

The other key component for brewing liquor is alkalinity. Like hardness, alkalinity has an effect on the pH of the mash. However, unlike hardness, alkalinity will increase the pH of the mash. The main water constituent responsible for alkalinity is bicarbonate (HCO_3^-). The amount of alkalinity is often correlated to the amount of hardness for most waters. Alkalinity is also expressed "as $CaCO_3$," a convention that leads to some confusion. A rough calculation of the alkalinity would be:

Alkalinity (mg/L) as $CaCO_3$ = 1.67 [concentration of HCO_3^- (mg/L)]

The bicarbonate in solution can combine with the hardness and precipitate (drop out of solution), particularly when boiled. This leads to two other terms: temporary and permanent hardness. Temporary hardness is the hardness that disappears upon boiling, generally due to precipitation with bicarbonates. Permanent hardness is the amount that remains after boiling.

Alkalinity is important when making darker beers because it can compensate for the acidity of dark malts, particularly chocolate and roasted malts. By increasing the mash pH by using water with high alkalinity you will get better color extraction from your dark malts, and neutralize some of the acidity they provide.

Residual alkalinity

So, calcium and magnesium drive pH downward while bicarbonate drives pH upward. We have to determine which will win this tug-of-war. This requires you to perform a calculation.

Residual alkalinity = mv HCO_3^- - mv Ca^{2+}/3.5 - mv Mg^{2+}/7

Mv stands for millivals and is calculated by dividing the mg/L (or ppm) by the equivalent weight. The equivalent weight is defined as molecular weight divided by number of charges on the ion. So the millival figure is a measure of the amount of a substance available to participate in a reaction, and its ability to react. So for a water sample with the following analysis:

	ppm	molecular weight
HCO_3^-	60	61
Ca^{2+}	250	40
Mg^{2+}	25	24

mvals HCO_3^-
= ppm/(molecular weight/charge)
= 60/(61/1) = 0.9836
mvals Ca^{2+}= 250/(40/2) = 12.5000
mvals Mg^{2+} = 25/(24/2) = 2.0833

And so residual alkalinity calculation is 0.9836 x 12.5/3.5 x 2.0833/7 = -2.2898 or a negative number.

This water will have the effect of reducing the mash pH. How much this will affect the pH can be gauged by multiplying the residual alkalinity change by 0.08. Thus a change in pH of (-2.2898 x 0.08 = -0.18) in the mash can be expected using this water.

Interpreting A Water Analysis

Before you decide if you need to change your water, you need to know what is in your water. If you have a well, you can hire a lab to test your water. If you're on the city supply, you can get an analysis from the water authority. However, in most cities you should be wary of the information. Town water often comes from multiple sources, each with its own (sometimes radically different) composition. Also, water from reservoirs change with rainfall, yet water analyses are only published a few times a year. Another thing to remember is that calcium and magnesium react with carbonate when heated. This reaction forms minimally soluble salts. This means that there is "chemistry happening" in a hot-water heater before a homebrewer ever opens the tap. Water flowing from the tap may not be exactly the same as the city water. In addition, water from the hot-water faucet should contain less temporary hardness.

Your water analysis may have all the information you need to perform the residual alkalinity calculation. But more often than not it is difficult to read and hard to discern which numbers to use. The majority of the analyses are of little interest to brewers. The state-mandated allowable levels of the ions that are troublesome to brewers (such as ion and copper) are too low to cause problems in the brewery.

Most of the useful information is found in the "Additional Constituents Analyzed" section. Because of the buffering action of acids and ions in the mash, the pH of the water is of little concern. However, the total hardness (as $CaCO_3$) does have some value. Unfortunately this measure shows both

the magnesium and the calcium, which we want reported individually for our calculations. In addition, the measure is reported "as $CaCO_3$" which seems incorrect. What this measure shows is the total hardness (both Mg^{2+} and Ca^{2+}) as if they were precipitated with CO_3^- in the solution. This will throw off the weight of the molecule. That is why the amount of Mg^{2+} and Ca^{2+} shown in the specification sheet may not add up to the total hardness measurement. If you are given only the total hardness value in your specification sheet, you can make some assumptions.

First, assume that all of the hardness is actually Ca^{2+} rather than a combination of Mg^{2+} and Ca^{2+}. The magnesium concentration is usually much lower than the calcium and is divided by 7 in the calculation anyway. This assumption will throw off your calculation, but it is all you can do with the information that you have. Then you must compensate for the fact that your calculation uses the pure Ca^{2+} measure to determine the residual alkalinity, while the hardness value is in terms of $CaCO_3$. Since these measures are in mg/L, you can convert between them by the proportional molecular weights of the molecules. Ca^{2+} has a molecular weight of 40, while $CaCO_3$ has a molecular weight of 101. So 40% of the hardness value will equal the mg/L of calcium ion. If you multiply the hardness by 0.40, you will get an approximation of the concentration of calcium ion in solution.

The same adjustment must be made for the alkalinity. Alkalinity consists of carbonate, bicarbonate and hydroxide ions in solution. However, we will assume that it is only bicarbonate since at the mash pH, most of the alkalinity will be in the bicarbonate form. The units for alkalinity are often given in terms of $CaCO_3$ so the same conversion you did for hardness will apply. The difference is that the bicarbonate makes up about 60% of the weight of the calcium carbonate, so you should multiply the alkalinity by 0.60 to get the concentration of bicarbonate in solution. Once you have the numbers for calcium and bicarbonate, you can carry out the residual alkalinity calculation shown above. Note that if your analysis shows the actual concentrations of Ca^{2+} and Mg^{2+}+ in mg/L, you should use these values rather than converting the hardness value.

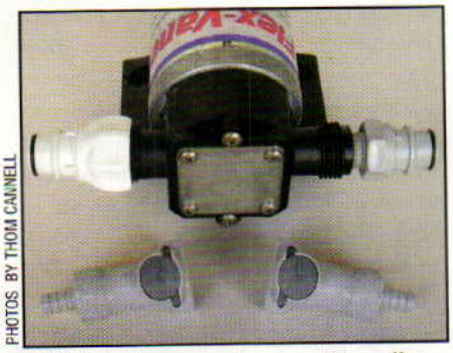
You may notice that alkalinity is not shown on the specification sheet. Unfortunately, there is no simple way to derive this value. You can hire a local water lab. Or you can measure the alkalinity with a test kit. (You can buy kits at an aquarium supply store).

Many brewers treat their water to remove all ions, then add brewing salts to achieve the levels they want. Reverse-osmosis filters capable of removing almost all salts are common in microbreweries and low-priced units can be purchased for home. This water can be used to dilute unwanted ions in water that has too many. ■

Get Connected

Pumps, tubes, clamps and disconnects

by Thom Cannell



PHOTOS BY THOM CANNELL

This brewing pump has a soft impeller to accommodate brewing debris and prevent bits of grain from jamming the works during recirculation.

Clear tubing (right) is not meant to handle hot wort. A safer bet is Tygon with woven internal braid (left) or the opaque Norprene Formulation (center).

In the December issue of *Brew Your Own*, we turned a low-cost mash tun into an inexpensive Recirculating Infusion Mash System (RIMS). Once my new RIMS was complete, I realized how much it would change the way I brew. Instead of opening a ball valve and running off wort directly into a container, the valve was now connected to my pump's inlet with a hose. I would need reinforced, high-temperature hoses to carry heated, pressurized liquid. And instead of batch sparging, I would be pumping wort, and recirculation would be continuous. So I would need a sparge arm. I also had to consider how to clamp my hoses to tubes or barb fittings, as well as the importance of quick-disconnects.

In this issue, we'll focus on the succesful operation of our RIMS: how to select and use a pump, how to choose the right hoses and clamps, and how to quickly change all the connections between the pump and the brewing vessels. We'll also build a simple spiral sparge arm *(see page 50)*, so you can sprinkle water gently and evenly across your grain bed when you recirculate your heated wort.

Choosing a pump

The soul of a RIMS is the pump. Pumps used in brewing should not contain any cast iron, carbon steel, nylon, silicone or Buna-N rubber (although there is a food-grade Buna-N). Those materials will contaminate your beer with metallic ions or off-flavors or both. Homebrewers use one of two basic types of pumps — those that are self-priming and those that are not. Most direct-driven pumps (which means the motor and impeller are on a common shaft) are self-priming.

Self-priming pumps can start their own liquid flow, sucking the air out of the line and pulling liquid from a source. But they are likely to be so tightly constructed that bits of brewing matter — coagulated protein, hops or grains — can jam the pump. (The SHURflow pump I used in my RIMS has a special soft impeller to accommodate debris.) Direct-drive pumps don't like to have their output restricted and restricting output is a necessity in our RIMS system. It's how we adjust wort flow volume and pressure.

In a magnetically driven pump, the impeller is connected to the motor via a magnet at the end of the motor shaft; the motor and impeller are physically separate. Because most magnetic pumps are not self-priming, you must fill their inlet line and pump house with liquid — typically by gravity — before starting the pump. Magnetic pumps don't have the motor physically connected to the pump impeller, so they can be run even when restricted by a ball valve on the output side or with a debris-jammed impeller.

Here are several things to consider when choosing a pump:

•Head or "shut-off height" is the distance above the pump when it no longer delivers liquid (measure from lowest point in your system to highest to determine needs).

•Flow (gallons per minute) is a figure that changes the closer the pump outlet is to its shut-off height.

•Temperature rating is important: Don't pump boiling water with a pump rated to 190° F unless you want to buy a new one.

•Inlet-outlet configuration: Some pumps use National Pipe Taper (NPT) threaded fittings, some use garden-hose fittings and there are other varieties. Plus, the inlet and outlet can be located in different places.

All RIMS pumps need a method to reduce output pressure. Otherwise you'll suck the mash bed down so tightly you'll have trouble running off the wort. The normal way to reduce pressure is with a ball valve attached to the outlet. Reducing output slows the intake flow without running the pump dry, but if you pick the wrong hose it may collapse and cause the pump to stall or burn out.

Selecting the best tubing

To understand the correct tubing for a RIMS I checked several homebrew Web pages, then called Saint Gobain, manufacturer of Tygon and Norprene tubing. We all love PVC tubing and many of us buy home-improvement-grade generic tube instead of genuine Tygon. Not me; at least not any more. Tygon's non-wetting surface drains completely and cleans with relative ease. It is lightweight and flexible for easy, quick installation and meets FDA and NSF criteria for food safety.

Most homebrewers continue to use the same clear tubing they originally bought as a racking tube or a blow-off tube. But with a pressurized RIMS the clear tube doesn't quite cut it — and the risk is greater than losing a little beer. That clear tubing is not meant to handle liquids above room temperature! Regular 3/8-inch Tygon clear tubing (formulation B-44-3) is rated to handle only 26 pounds per square inch (psi) at 73° F. By the way, 26 psi won't blow up a balloon and 73° F is below typical yeast-pitching temperature.

One safe tubing is Tygon pressure tubing (formulation B-44-4X I.B.), the stuff with woven internal braid. It is rated to handle four times the pressure of non-reinforced tubing; for example, 3/8-inch B-44-4X I.B. tube (5/8-inch outer diameter) is rated to handle 100 psi at 160° F. This popular and inexpensive hose has an open mesh polyester braiding fused between PVC layers. There is a distinct difference between Tygon and generic home-improvement tube. Tygon is NSF rated and far more flexible.

The ultimate homebrew hose is Norprene Formulation A-60-F by Saint Gobain. This hot food and beverage tubing is temperature-resistant from -60° F to 275° F. You can clean Norprene with anything found in your brewhouse. It may be autoclaved (cleaned by sterilization) repeatedly, and Norprene food-process tubing fully complies with FDA 177.2600 criteria, the 3-A Sanitary Standards and the NSF Standard 51. Norprene is higher cost and opaque but lasts far longer.

Clamps and quick-disconnects

Like most homebrewers — before I built my RIMS, that is — I would run off my wort from the kettle into the fermenter using gravity. In the beginning, I siphoned with a racking cane and later installed a ball valve in my brewpot. One hose was all I needed — before I made my RIMS. Suddenly, I needed hoses to attach the pump and hot liquor tank, hoses for recirculating wort, hoses to connect the pump to the kettle and the wort chiller. Worse than using the wrong tube is using the wrong kind of clamp and connector.

Barbed fittings and hose clamps are adequate — as long as you don't have to change the hose in the middle of your brewing session or add pressure. RIMS requires attaching a pump to the mash-tun outlet and sparge arm, then changing to pump hot liquor to the sparge arm, then pumping wort to the kettle, and, finally, pumping wort through the counterflow chiller. That's why you need quick-disconnect fittings and Oetiker clamps.

Most of us have used quick-disconnect fittings to hook up garden hoses to sprinklers, other hoses and hand sprayers. They're generally plastic or brass, sold in pairs, and make connecting hoses to implements quick and easy. You can have that same simplicity in your brewhouse.

The kind of quick-disconnects used

A close-up view of the correct clamping position for any type of clamp.

A female garden hose fitting, for simple attachment to your pump.

in homebrewing come in a variety of materials, including stainless steel, brass, polypropylene and polysulfone (the latter two mostly in 3/8-inch inner diameter.) Polysulfone is rated to 280° F at 125 psi, while polypropylene is rated to only 160° F at 60 psi. Both polysulfone and stainless products, as well as less expensive garden-hose quick-disconnects made of brass, are available. (If you choose these, you'll also need garden-hose to 1/2-inch barb-hose connectors and 1/2-inch inner diameter tubing.)

After examining the polysulfone quick-disconnects, I contacted the manufacturer. Brad Ferstan of Colder Products explained that quick-disconnects approved by the NSF (National Sanitation Foundation) come in two families, those with and without internal shutoff. Having a shutoff means you wouldn't need a ball valve. Although that sounds like a great idea, it's actually not, because you need a ball valve to regulate flow volume.

A Moving Brews rep says you should only consider the straight-through variety because "we know of no 'shut-off' quick-disconnect that has fluid flow rates adequate for use with a pump, nor do we know of such connectors that could deal with grain, hops or trub in the flow without clogging hopelessly." Brad at Colder says that quick-disconnects " can be a trap for bacteria and yeasts unless cleaned and sanitized, and if used in the transport of finished and carbonated beer, you may want to seek out medical-grade straight-through bodies and inserts with extremely smooth bores."

Most disconnects are sold in two pieces. The more expensive female side is called the coupling body, and the male connector is called a coupling insert or plug. Prices for bodies are about twice the price of inserts, so design your system with more inserts.

Quick-disconnects are available with male and female NPT, garden hose, barbed fittings and others.

Sealing the threaded parts is easy. A bit of Teflon tape makes disassembly and sealing easy and will prevent thread distortion from over-tightening. If you choose to simply screw a plastic quick-disconnect to another fitting without Teflon tape, tighten it until finger tight, then give it one more turn.

Oetiker Hose Clamps

Regan Dillon at Beer Beer & More Beer introduced me to a kind of hose clamp I had not considered, an all-stainless clamp manufactured by Oetiker, Inc. It has a single "ear" and a smooth inner band circumference. Its tongue-in-groove design provides a 360° seal with no steps or gaps. These clamps also incorporate a built-in spring action so they can "breathe" as dimensions change when they are heated. Most industrial supply shops sell Oetiker Stepless Ear Clamps.

Why is it better? Regan says: "Hose clamps tend to cut into the tubing as the screw tightens and they don't apply even pressure around the circumference." Plus I have never found any hose clamps really small enough for 3/8-inch tubing.

You will need a special Oetiker pincer tool that resembles wire cutting "nippers." This tool is available from industrial supply stores and mail-order homebrew outlets. Regan has a tip for sealing hoses to barb fittings. "Most barb fittings are connected incorrectly. Most homebrewers slide the hose on as far as it will go, then apply the clamp in the middle or at the base of the barb." Instead, Regan recommends leaving a slight gap between the barb shaft and hose end. Clamp on the bump just in from the flow end. That way, as the hose expands, no liquid will be trapped in the line above the hose clamp.

Now that our new RIMS is properly connected, we need a way to gently sprinkle the hot wort across the grain bed as it is circulated by the pump. In other words, we need a sparge arm. For instructions, turn the page.

The specialized Oetiker clamping pincers resemble wire-cutting nippers.

The all-stainless Oetiker clamp has a single "ear" and a smooth inner band.

RIMS Sparge Arm

To complete our RIMS in fine fashion, here's a spiral sparge "arm" to circulate wort or hot liquor and sprinkle it evenly across the grain bed. I adapted our project from a photo of Scott Learey's stainless-steel sparge ring in "Homebrew Systems That Will Make You Drool" *(November 2001)*. The most significant design feature is its many holes — a total void area equaling 2 to 4 times the cross section (Pi x R squared x holes = 3 square inches) of the 1/2-inch pipe. Large exit volume means low pressure and gentle sprinkling. To make this spiral, you'll need a drill motor and 1/8" and 1/4" drill bits, a hammer and pliers (or adjustable wrenches). If you have a spring-type tubing bender, even better.

Parts List

1. 4' to 12' of 1/2" copper or stainless steel tube ($10)
2. 1/2" x 3/8" MIP connector (compression fitting) ($2)
3. 3/8" x 3/8" barb-to-FIP adapter (barb fitting) ($1)

Step by Step

1. Gently wrap your copper tube around a cylindrical form like a CO_2 tank.
2. Form the coil into a spiral that will fit your mash tun.
3. Hammer the inner end flat (no need to worry about leaks when you're already filling the tube with holes).
4. Drill 1/8" pilot holes randomly every 1 to 3" along the tube, leaving 18" to 36" with no holes for your support/inlet tube.
5. Enlarge the holes to 1/4."
6. If you build your spiral to be in contact with liquid in the mash tun, face the holes up to prevent clogging. If you will spray or dribble water onto the grain bed, face the holes downwards.
7. Slip a spring-type tubing bender over the inlet tube and gently bend in two angles to allow the spiral to fit into the mash tun with the undrilled arm extending out. If you don't use a form or tubing bender, you will kink (collapse) the tube and restrict flow.
8. Attach compression fitting; tighten using two pairs of pliers or two wrenches. Attach barbed fitting or quick disconnect male insert connection, wrapping with Teflon tape or a bit of Teflon food grade pipe dope.
9. Attach female barb fitting or quick disconnect. ■

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Burning Man Beer

Bringing some homebrew to the desert

Scott Lothamer
Moraga, California

PHOTO COURTESY OF SCOTT LOTHAMER

Chris Graham and Scott Lothamer manning the taps on the homemade jockey box.

PHOTO COURTESY OF SCOTT LOTHAMER

The full moon rising over the temporary city that appears in the desert each September.

PHOTO BY JOHN WENDT

The impressive wooden-and-neon "Burning Man" awaiting a match.

Every August, Black Rock City, Nevada is home to the Burning Man Project, a free-form festival and funky gathering that describes itself as "an annual experiment in temporary community, dedicated to radical self-expression and radical self-reliance." For one week each year, a temporary city springs up in the desert north of Reno. At the end of this week a 40-foot man, made of wood and neon, is ritualistically burned in a large-scale ceremony.

But the Burning Man experience is more than just a bonfire involving a large stick figure. To some, it is an eclectic gathering of art and free-form self-expression. To others, it's a chance to do some desert camping with 20,000 of your friends. This event is also billed as an ordeal of self-reliance. After all, the desert is a harsh and unforgiving place. The only instructions given are to bring everything you will need to survive for one week.

Nothing is sold in the temporary city (except ice and coffee), but bartering is encouraged. Some people drag unimaginable amounts of stuff on this pilgrimage. It's not unusual to see an entire living room set up at someone's campsite — complete with lamps and end tables. Nor is it unheard of to see a motorized four-post bed go driving past as you are preparing breakfast. Many people set up impromptu cocktail lounges where everyone is welcome. "Art" is the theme and my art is beer.

The weather in this desert environment is not conducive to homebrewing onsite, so I abandoned that idea. There is far too much wind and dust, and the heat, along with the shortage of water, would make it very difficult to cool the wort enough to pitch the yeast.

In light of this, I decided that the two things our little "patch-o-heaven" needed were a shower and, of course, access to cold homebrew on draft. So that's when the planning started. I like inventing and making homebrew gadgets almost as much as I like brewing the beer. I can always rationalize the need for a new piece of brewing equipment. What I needed for this endeavor was something to hold the beer and keep it cold for a few days. (I doubted the beer would last much longer than that.)

I decided to custom-build a two-tap jockey box. I fit a standard Igloo cooler with two tap handles. These were fed beer through coils of stainless-steel tubing immersed in an ice bath. This sat on top of a foam-insulated, 40-gallon trash can with room enough to hold two Corny kegs and three blocks of ice. I made a cylinder from galvanized sheet metal, placed it in the trash can and injected expanding foam around it. I then capped this off with a 2-inch-thick piece of foam. This setup really kept the kegs cold in the desert heat.

Since I had the capacity to serve two brews, I wanted one beer that would satisfy most of the thirsty population, as well as one not-so-commonplace offering. (Considering the heat of the desert, I doubted anyone would really enjoy a Guinness clone!) I brewed about two months before the event so everything would be well aged. I decided on an American pale ale and a refreshing Berliner weisse.

It's amazing how fast the word of draft homebrew spread throughout the desert. I met and talked to many people, including other homebrewers, as well as several pro brewers from brewpubs as far away as New York City. I even heard of a camp with a sign that read "homebrew for homebrew," but I never located it in the vast city. We did meet some meadmakers along the way. My friend Chris brought along some of his mead, so we exchanged and had a tasting with some newfound friends.

Now I use my mobile tap for picnics and outdoor parties. Whenever I use it, I can't help thinking about the brew I served to the guy in the kangaroo suit driving by in a king-sized bed. ■

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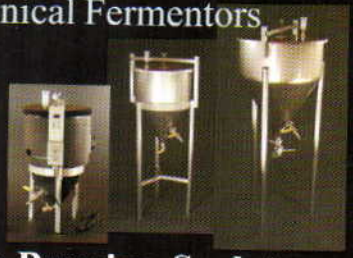

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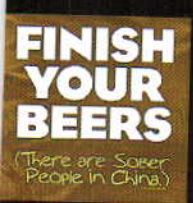

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