BrewYour Own®

JANUARY 2001, VOL.7, NO.1

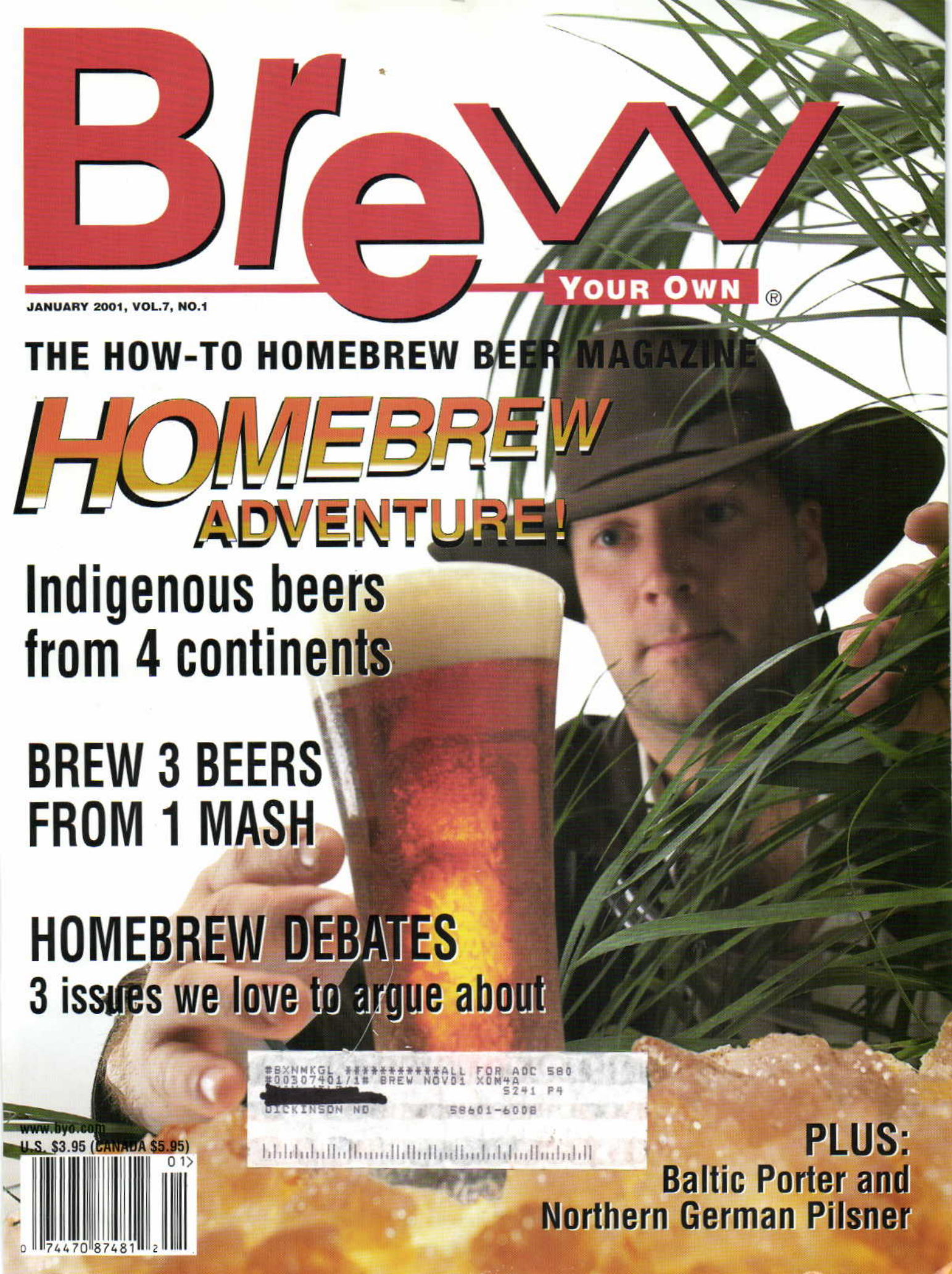
THE HOW-TO HOMEBREW BEER MAGAZINE

HOMEBREW ADVENTURE!

Indigenous beers from 4 continents

BREW 3 BEERS FROM 1 MASH

HOMEBREW DEBATES
3 issues we love to argue about



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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)

In Roy Bailey's local Good Beer Guide Pub, the customers' reaction was *"uniformly complimentary"* and *"most of them thought it was a full-mash ale"*

"I'm really impressed! This is better than many pints I've had in the pub"

BBC Radio 4 food & drink programme (July 2000)

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Editor's Note

Adventures in Homebrew!

Homebrewers tend to be an adventurous bunch, always willing to try new ingredients, new recipes and new ways of making beer. So in this issue we're embarking on an armchair adventure, traveling back in time and across four continents to recreate four age-old beers: chicha from South America, sahti from Finland, chang from the Himalayas and sewa from east Africa.

It's a long, strange trip, for sure. As authors Joe and Dennis Fisher point out, "when setting out to brew the world's indigenous beers, you'll soon find out that you have to leave a lot of baggage at the brewhaus door. So put down the B-Brite and back away slowly; these beers are different! Barley warmth, hop tang and crystal clarity are less likely than opacity, sourness and hints of strange grains like millet, sorghum and spelt."

By following the Fisher's step-by-step recipes, you can recreate beers that'll definitely open some eyes at your next homebrew club meeting. After all, when was the last time you malted your own corn "jora," lautered through a screen of juniper branches, made yeast cakes out of slightly funky ginger root, or fried up some little millet pancakes to ferment with your crystal malts and chopped dates?

Inspired by the article, the entire *Brew Your Own* staff is convening in my kitchen on Friday to brew a batch of Scottish heather ale, an interesting indigenous brew that apparently dates back to 2000 BC. The Picts, cave-dwelling inhabitants of Scotland in pre-Celtic times, supposedly drank heather ale to prepare for battle. Maybe it'll give me enough courage to try something wild — like brewing sewa!

KATHLEEN

Contributors

Brothers, brewers, farmers, writers: Joe (left) and Dennis Fisher in Maine.

The Fisher brothers, Joe and Dennis, are the ideal authors for our cover story on indigenous beers. They own an organic farm outside Bangor, Maine, so odd ingredients like millet and jora don't faze them a bit. They even grow their own hops (they have cultivated three wild varieties that do well in the harsh Maine climate) and barley (so they can malt small, hand-crafted batches of specialty grains).

The Fishers grew up in New Hampshire and went to college in the Northeast: Dennis graduated from Colby and Joe from the Rhode Island School of Design. The brothers have been homebrewing for a decade and are the authors of three great books: "The Homebrewer's Garden," "Brewing Made Easy" and "Great Beer from Kits" (all published by Storey Books). When they're not busy masticating maize to make chicha, Joe likes to brew bitters and Dennis whips up his own brand of steam beer. Cheers! ■

Brew Your Own
THE HOW-TO HOMEBREW BEER MAGAZINE

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Grateful for Guide

I would like to thank you for the special supplement to the December issue. It's really nice to receive something extra and unexpected. Little things like this really stick out in readers' minds and make them appreciate what you do even more.

Eric Cardwell
Sarver, Pennsylvania

Glad you liked the Reference Guide! We figured readers would appreciate the comprehensive charts on grains and adjuncts, yeast strains and hop varieties. Only our subscribers received the 24-page supplement, which arrived with the December issue. We're not selling the guide on newsstands, but we have extra copies available. Call our editorial office at (802) 362-3981 if you'd like to order one.

Sixth Sense

I have been enjoying your November 2000 issue, as I am an avid fan of Belgian beers. There was one error that I would like to call to your attention in "Dubbel Vision" by Scott Russell.

On page 33, Scott states there are six Trappist breweries in Belgium and a seventh in Holland. There are only a total of five Trappist breweries in Belgium. These are: Westvleteren, Westmalle, Orval, Chimay and Rochefort. Unless something has developed within the past several months, I believe this to be accurate. I am not trying to be hyper-critical. I am just adding my two cents for the cause.

Rich Medina
Via e-mail

In his well-researched manuscript, Scott did report that Belgium was home to five Trappist breweries, which has long been the case. As always, we sent the article to several experts for review. The day before the issue went to press, I was told by Wendy Littlefield of Brewery Ommegang that there is now a sixth Trappist brewery in Belgium! She had just returned from a trip to that country and had the opportunity to visit the new brewery.

The new Trappist brewery is run by Father Thomas of Westmalle. It's in the abbey of St. Benedict, better known as the "Achelse Kluis," in the village of Achel. The abbey cultivates fruits and vegetables, which are sold in a monastery shop. The brewery is a very small operation in a restaurant. For more information, go to www.realbeer.com/news/breweries.html.

Hurray for Extract Recipes

I wanted to let you know how much I appreciated reading your October 2000 "Special Extract Issue." As a beginning homebrewer, it can sometimes be discouraging to read articles and recipes that pertain solely to all-grain brewing. While I look forward to trying all-grain someday, I am quite content to experiment with extract and specialty grains for now. This is why I was so happy to see this issue. I am sure the magazine will be falling apart before I'm finished with it. It was especially exciting to read the article by Dawnell Smith titled "20 Great Autumn Beers" in which she gives tips about extract-based brewing as well as some yummy recipes. Thanks again for the great issue!

Kristofer Miller
Ashland, Wisconsin

Renegade Lambic Cultures

After reading your November 2000 issue, I have a couple of questions about lambics. On page 39 it says "... add lambic culture. Condition cool (50° F) for three to

four weeks." Does that mean 3 to 4 weeks additional conditioning after fermenting a week or so with the primary yeast? According to page 45 (as well as Wyeast specs), fermentation temperature for this yeast is 63° to 75° F.

Later in the magazine, you say that once you use a fermenter, tubing, airlocks, stopper, racking cane, and I assume keg for brewing lambics, you should never use them again for anything but lambics because the yeast cultures are hard to exterminate. Even with bleach? Boiling?

Victor McAllister
Sequim, Washington

Author Scott Russell says: "My normal procedure for brewing pseudo lambics is to ferment the primary in a plastic bucket with the 'normal' yeast (Wyeast 1762). Then I rack to a glass carboy, add the lambic culture and condition for an additional three to four weeks. This has always worked for me."

Since there is always another way to do things, we solicited additional advice from Tess and Mark Szamatulski of Maltose Express. Here's their method: "Use a regular yeast in your primary (1762). Rack to secondary and introduce a lambic blend (like 3278) and also a pediococcus (like 4733). Rack onto the fruit and add these two strains. Keep the lambic on the fruit, with the bacteria, for at least six months. And keep it at a warm temperature, at least 70° F."

"The lambic warning only applies to secondary equipment, since you don't introduce the lambic culture until then. Anything that comes into contact with the lambic culture should never be used to brew anything but lambic. These bacteria are very persistent, and no amount of cleaning can eradicate them. A customer had a lambic blow up in his basement. He scoured and repainted the floors and walls, but still, every beer he brews tastes like a lambic! So get a separate set of secondary equipment." ■

Beer On The Move

How one woman's brew room survived a relocation

Charlene Cook • Murfreesboro, Tennessee

PHOTO BY CHARLENE COOK

Charlene Cook can finally relax now that she knows her homebrew is bubbling in the next room.

I LOVED MY HOUSE IN YUTAN, Nebraska. It was perfect for home brewing — a full-size basement that was cool and dark even in the hot months of July and August made an ideal place for brewing and storing my prize homebrews. There was plenty of space for my fourteen cases of beer bottles. It even had a sink where I could do on-the-spot clean-ups. But this luxury became history the day my husband came home and announced that his company was moving us to Nashville, Tennessee.

Before we moved, we sent a wish list to several realtors in the Nashville area, with a basement being at the top of that list. We soon found out that basements in that area are rare.

Middle Tennessee is blessed, or cursed, with an abundance of rock. If you want a basement you have to blast it out. Also, the weather in the state is hot and humid throughout most of the year, hardly ideal conditions for homebrewing. For a moment, the future of my favorite hobby looked dim.

But I didn't give up hope. With a bit of tenacity, we found a house with a room off the kitchen that we thought we could convert into a brew room — if we added an air conditioner and hung heavy towels over the window to block the bright sunlight. Now all we needed to do was move our entire homebrew operation from Nebraska to Tennessee. Easier said than done.

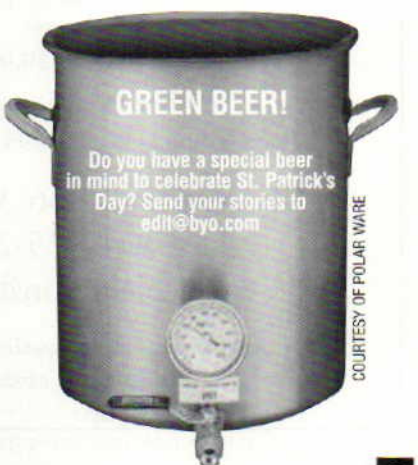
Most of our brews would be bottled by moving day, but there were a couple of batches that would not be finished before our departure date. Our local supplier told me about a client who had successfully transported an actively fermenting batch by duct-taping the stopper and airlock to the top of the carboy. But because my brews would have to travel a couple of days in the back of a hot trailer, I opted to take the loss and dump my actively fermenting carboys.

WE SOON FOUND OUT THAT BASEMENTS ARE RARE IN THE NASHVILLE, TENNESSEE AREA. THE FUTURE OF MY HOBBY WAS BEGINNING TO LOOK DIM.

As for the rest, I carefully wrapped each empty glass carboy and bottle of homemade brew in towels and blankets before packing them in individual boxes. Despite my preparations, I worried that the hot trailer and the bumpy road would cause the bottles to explode. However — incredibly — our beer wagon made it to Tennessee without any problems. None of the bottles were damaged and all of the equipment came through the trip safe and in one piece.

After setting up the new brew room, it was time to find a local homebrew supply shop. To my dismay, our new hometown of Murfreesboro does not have one (or if it does, I haven't found it yet)! The closest shop is a bit of a drive. For now, I'm still calling my old supplier in Omaha to order supplies over the phone. This works out okay, though I do miss browsing and shopping for new items that appear in the stores from time to time. But even so, I find that I am brewing more than ever lately.

One really nice thing that came out of the move is our large back yard. We now have a garden where we grow a wide variety of fruits and vegetables. Almost everything we grow — particularly the raspberries and blackberries — eventually makes its way into one of our delightful brews. →



COURTESY OF POLAR WARE

Great Wall Ale

PHOTO BY RANDY STEWART

Randy, Bob and Phil fortify themselves with some "Great Wall Ale" after a hike along China's 2,000-mile wall.

BREWING PARTNERS Randy Stewart and Bob Haechrel consider themselves novice brewers and pretty much stick to basic extract and specialty grains in manageable five-gallon batches.

Every month, Randy and Bob each brew a five-gallon batch, trying a new recipe each time. That's a lot of beer, so the partners have enlisted a number of friends to share their homebrew. One particularly good sport, Phil, has become the "official taster." Little did he know that the job would lead him across several continents and to the top of the Great Wall of China.

After deciding to take a vacation trip to China, Bob and Randy saw an opportunity to brew a special beer. So the partners brewed up a batch of "Great Wall Ale."

The expedition to uncap and enjoy their own homebrew on the Great Wall required careful planning. The first hurdle was to commandeer a few cubic inches of valuable luggage space from their wives for their precious bottles of homebrew. The final part of the plan was to convince the official taster to join them on this expedition (which wasn't a problem).

The brew survived the trip and after a sporty hike up the Great Wall, Randy and Bob popped the cap and enjoyed a toast to great homebrewed "pijiu" (the Chinese word for beer). Phil claimed it was the best ale he had the opportunity to drink while in China. Of course, it was the only ale any of them found in China. It seems that the Chinese are more than happy to drink lagers (some good and some not so good).

Randy and Bob need little encouragement or reason to start a batch of homebrew. Right now they are in the process of planning their next international adventure and an accompanying "international ale."

They are considering "Istanbul Pale Ale," which would ideally be uncapped along the Bosporus. They are currently researching how to say "beer" in Turkish. ■

Randy Stewart and Bob Haechrel
The Dalles, Oregon

New Year Tips

"Resolutions" to common brewing problems

by Thomas J. Miller

The New Year offers a unique, annual opportunity to fix the niggling problems that have plagued your homebrew over the last twelve months. It is always a good idea to take stock of your brewing successes and failures and use them to improve your next batch of beer. I call these "New Year's Resolutions," though I don't use the phrase in the traditional sense. Instead, it means isolating and resolving brewing problems. In this month's column, our brewing professionals share their advice on finding solutions to problems common to every homebrewer.

Brewer: Steve Wadzinski of Oasis Microbrewery in Boulder, Colorado is a mechanical engineer turned brewer. He took the eight week course at Siebel and has worked his way up from kegger to head brewer. Steve started at Oasis in 1997.

Not having enough yeast when you pitch your wort is a common problem for homebrewers, and something that professional brewers work hard to avoid. The common question for homebrewers is how to make sure you have enough yeast when you pitch. For example, if you get one of those smack packs from Wyeast, you're only getting a little bit of yeast. You'll get a really long lag if you just dump that into the wort without starting it first.

The traditional method for doing a starter is to take some dry malt extract, boil it, chill it and place it in a sterilized container. Use 1/4 cup of extract in 2 cups of boiled water. Then pitch the yeast and, once this is vigorously fermenting, pitch it into your larger batch. This helps to ensure that you have enough yeast cells to handle a five-gallon batch.

The problem with this method is that the grain profile of this starter batch can influence the flavor of your larger batch. Since you are using boiled extract in this starter batch and the quantity of it will be somewhere around one-half of a gallon, when added to the five gallons it will definitely impact the overall taste.

My recommendation lets you get a powerful batch of starter yeast in only 8 to 12 ounces of starter wort. You need a homebrew aeration kit, including an air pump from a fish store, an air filter and a plastic aeration stone. This last piece attaches to the end of a hose and helps to aerate the wort, while the filter helps to make sure you aren't introducing bacteria and dust from the atmosphere.

Aerating this way really boosts the yeast cells' ability to reproduce, since yeast need plenty of oxygen to multiply. By running that pump overnight in those 8 or 12 ounces of wort, you can substantially increase the number of yeast cells and you don't have to worry about distorting the flavor of your final beer with too large of a starter batch.

Of course, this method can be used for aerating the entire batch too. In general, running the pump for 5 to 10 minutes is enough to saturate the wort. There are other ways to aerate wort. Any homebrew book gives ideas on how to do this. The simplest way is to just shake the carboy but this risks mixing unclean air into your brew.

PHOTO BY STEVE WADZINSKI

Brewer: Kevin Matalucci of Broad Ripple Brewing Company in Indianapolis, Indiana took the short course and a course in Microbiology at Siebel Institute. He has been at Broad Ripple for eight years.

Although it's something we have managed to avoid for a long time now, a stuck mash is a common problem that we're familiar with. The problem for a brewpub, of course, is that we are dealing with lots of grain getting stuck in our mash tun, so it's not just an issue of stirring up the mash to break it up. For the average homebrewer, using a paddle to break up a stuck mash is still going to be your preferred method. While stirring the mash works fine for homebrewers, what we use is an alternative method, which eliminates the chances of oxidation in much larger batches.

For stuck mashes, I attach CO_2 to the grant pipe (this is the drainpipe leading out of the mash tun and into the grant). This allows for re-circulation of the wort, or for the wort to be pumped to the kettle. Then I blow the gas up against the underside of the stuck grain. This pushes it up and separates it, eliminating the stuck mash problem.

It's important to use CO_2 for this because oxygen of any sort will oxidize the wort. The best rule of thumb when it comes to oxidation is to completely eliminate oxygen, both on the hot side and the cold side of the brewing process.

Of course, eliminating the stuck mash also requires that we re-circulate the wort for clarity, just as you would do when you lauter and sparge. You need to do this slowly and easily until you get a nice grain bed with a good flow. *(See "The Big Drain," November 2000, for advice on lautering and sparging.)* If you don't do this, your wort will taste grainy and this will influence the taste of your final beer.

Prevention is best, though it isn't always possible. I find that stuck mashes happen only in big beers, where there is more grain to deal with. I try to run the wort off the grain a lot slower. We usually do about 240 gallons in 2 hours, or 10 gallons in five minutes. That rate will be different for homebrewers, but the key is to slow the flow rate down with bigger beers. And, just like homebrewers, we have to eyeball it because we don't have any way to measure the flow rate. Patience is the key.

Brewer: Brian Cellura is a brewer at Great Basin Brewing Company in Sparks, Nevada. He homebrewed for 10 years before joining the brewing staff at Great Basin. He has brewed for them for about one year.

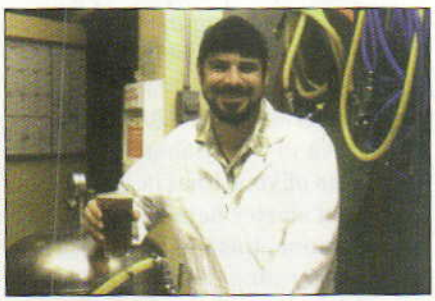


PHOTO BY BRIAN CELLURA

I don't hear a lot of homebrewers talking about a diacetyl rest. Diacetyl is a natural product created during fermentation. As yeast reproduces, it generates this diacetyl flavor, as well as carbon dioxide and alcohol. If brewers don't do a diacetyl rest, then it remains in the beer as an off-flavor.

Probably every homebrewer has smelled and tasted diacetyl, though they didn't know it at the time. It doesn't smell or taste bad, but it also doesn't smell or taste right either. It has a distinct, pungent smell and a buttery flavor. Once you learn to recognize it, it is unmistakable when you come across it.

To eliminate diacetyl, brewers need to do a diacetyl rest. Yeast actually do this naturally at the end of fermentation. When they settle out, they begin re-absorbing all the diacetyl created during the fermentation. This period of settling — when fermentation appears to have ended — is the diacetyl rest.

When fermentation ends, homebrewers often drop the temperature of their fermented beer from 65° F (if it's an ale) to 35° F. This helps to get the yeast to drop out of the beer so you can rack. The problem is, by lowering the temperature so quickly you don't let the yeast finish re-absorbing the diacetyl.

You should do your diacetyl rest at the same temperature as the fermentation temperature. The diacetyl rest usually lasts two days after fermentation is complete, which can be as short as three days and as long as two weeks. Less than that would be far too short and wouldn't be effective at reducing diacetyl. Longer than that — generally more than two weeks — increases the risk of getting the flavors of dead yeast in your brew.

If you do find diacetyl in your beer before you bottle, you can try raising the temperature back to 65° F for 3 to 5 days. This will let the yeast reabsorb those flavors. Then you can chill the beer back to 35° F for bottling. ■

"Help Me, Mr. Wizard"

Nitrogenated Homebrew

Low-carb brews, delayed boiling and pasteurization

Mr. Wizard

I am an extract/specialty grain beer brewer. I keg 90 percent of my homebrew, brew in 5-gallon batches and use oxygen to aerate my wort. I make full-wort boils, use forced cooling and I also use liquid yeast. I am interested in using nitrogen to carbonate some of my brews. However, I have no information on how to do this. Do I use only nitrogen? Or do I use a mix of carbon dioxide and nitrogen? Do I use the same pressure charts that I used for carbon dioxide, or are there different charts? Does the gas come in a pre-mix (nitrogen and carbon dioxide) bottle? How does temperature affect nitrogen's solubility in beer? Any help that you could give on this subject would be greatly appreciated.

George Patrick
Latrobe, Pennsylvania

The process of adding nitrogen to beer is referred to as nitrogenation. This is somewhat of a misnomer since nitrogenated beers also contain carbon dioxide and the gas blend used for the process is usually 75 percent nitrogen and 25 percent carbon dioxide. This mix is used to dispense draught Guinness Stout and is easy to find in markets that have draught Guinness.

Nitrogenated beers typically contain very low amounts of carbon dioxide, around 2.4 g/L or 1.2 volumes, and an even lower concentration of nitrogen of about 20 mg/L. "Typical" beers contain about 5 g/L of carbon dioxide and no nitrogen. The concentration of nitrogen is much lower than the carbon dioxide content because nitrogen is not very soluble in liquids. When dispensed through a special faucet, the nitrogen "breaks out" of the beer and forms very small, stable bubbles. Nitrogen foams are much more stable than carbon dioxide foams because the atmosphere is about 79 percent nitrogen and there is not much driving force between the gas concentration in the bubble and the concentration in the atmosphere. That's why "nitro" beers have such awesome, stable foam. The density and creaminess of the foam also adds a terrific mouthfeel to the beer.

Unfortunately, there are not many good references on how to nitrogenate beer. This is probably because there is a trick to it and the companies with that knowledge are not anxious to educate their competition. Like many brewers, Mr. Wizard loves nitrogenated beers and has some rules of thumb on the procedure.

For starters, don't bother nitrogenating any beer unless you have the proper faucet. There are many "stout" faucets on the market that are based on the Guinness faucet. All of these faucets have a disc with small holes inserted in the beer flow path and a device called a "flow straightener" placed after the disc. As beer flows through the holes in the disc there is a large reduction in pressure and this pressure drop causes the nitrogen and carbon dioxide to break out of solution. If the gas blend is just right you get a great glass of milky looking beer that settles out with a perfect head.

The other piece of equipment that is very important is a carbonation stone. I recommend the type of stone that can be connected to a stainless-steel rod and attached to the "out" fitting on a Cornelius soda keg. The stone is important because nitrogen is insoluble and it really helps to have small bubbles dispersed in the beer during the nitrogenation procedure. The key is getting the right gas blend. Too much carbon dioxide results in a large foamy head that doesn't settle properly — and too much nitrogen results in "wild beer" that will foam uncontrollably. Too little dissolved gas produces a pint that just seems flat.

Now for the steps required for proper nitrogenation:

Step 1: Rack your beer to a keg after fermentation is complete (add finings if desired) and pressurize the headspace of the keg with mixed gas (75 percent nitrogen and 25 percent carbon dioxide) to a pressure of 10 to 15 psi. This pres-

Mr. Wizard

sure is used to seal the keg and does not serve to nitrogenate the beer. Do not pressurize with 100 percent carbon dioxide because the beer will absorb too much.

Step 2: Transfer the keg to the coldest place you can find, preferably a refrigerator set at about 34° F, and allow the beer to clarify. I recommend about two weeks.

Step 2 (alternate): Filter the beer after holding cold for about one week. I have found that nitro beers pour much better when they are free of yeast.

Step 3: Make sure your beer is cold (between 34° and 38° F) and connect the mixed gas supply to the carbonating stone and set the pressure regulator to 30 psi. Gas will bubble though the beer until the headspace pressure reaches 30 psi. After the headspace pressure is at 30 psi, slowly loosen the pressure-relief fitting on the top of the keg until you hear a very low flow of gas escaping from the fitting. Allow the mixed gas to slowly bubble through the beer for 30 minutes. (If foam begins to come out of the fitting, tighten the fitting and allow the beer to rest for 30 minutes before continuing the slow bleed.) After this 30-minute purge, tighten the pressure-relief fitting and allow the beer to rest for 30 minutes, then do another 30-minute purge.

Step 4: Hook up the mixed gas to the headspace of the keg and set the pressure regulator to 30 psi. Let the beer sit still for a few hours before pouring.

Step 5: Pour yourself a pint of nitro homebrew! If the foam seems excessive you should use a lower pressure the next time around and if it seems a bit flat you can repeat Step 3, using a higher pressure.

Mr. Wizard

I quit brewing several months ago because I'm on a low-carbohydrate diet. I have lost about 35 pounds and I will probably continue to eat the same way for the rest of my life. The only commercial beer that fits into my diet

is Miller Lite (about 3 grams of carbohydrates per 12-ounce can). Have you ever tasted that stuff? It's less than flavorful! Do you know of a way to calculate carbohydrates in homebrew recipes? It seems like there should be a way to brew beer that is low in carbohydrates (3 to 5 grams per serving), but still make it taste good. But I would have to be able to calculate the carbohydrates (not calories, that doesn't count). Is this a possibility and if so, do you have any low-carbohydrate beer recipes?

Jay Beach
Via e-mail

You can approximate the carbohydrate in beer by measuring the specific gravity after fermentation. Suppose you have a beer that finishes fermentation at 1.008. First convert specific gravity to degrees Plato dividing the number after the decimal by 4; in this case, that would be 8/4 or 2° Plato. This conversion method is a shortcut but is pretty close to the real thing. A 2° Plato beer contains 2 grams of dissolved solids per 100 mL of beer or 7.1 grams per 355 mL serving (12 ounces). Most of the dissolved solids in beer are carbohydrates so this number could be used as an approximate carbohydrate content.

I keep using the word approximate because alcohol interferes with hydrometer measurements in beer and the real number is higher than 2° Plato. A beer with a normal alcohol content with an apparent extract (hydrometer reading in the presence of alcohol) of 2° Plato, has a real extract (hydrometer reading taken in the absence of alcohol) of about 2.5° Plato. This means that the carbohydrate content is closer to 9 grams per 12-ounce serving.

Carbohydrate content and flavor are related and most beers that have a very low carbohydrate content don't have much in the way of body and flavor. This is where the joke that compares light beers to sex in a canoe comes from. (You know the one ... "f-ing close to water.") One notable exception to this rule is with draught stouts. As odd as this seems, draught stouts' carbohydrate amounts don't measure up to their mouthfeel.

Take Guinness Stout, for example. Guinness draught stout has an original gravity of about 9.5° Plato, contains about 4% alcohol by volume, contains about 120 calories per 12-ounce serving and has roughly 5.2 grams of carbohydrate (data taken from "Stout" by Michael J. Lewis; Brewers Publications, 1995). So why isn't a pint of Guinness like having sex in a canoe? For starters, stouts get a lot of flavor from the roasted grains, just like a cup of coffee can have rich mouthfeel from dark roasted coffee beans. Also, draught stouts are nitrogenated and nitrogenation adds tremendously to the overall

perceived intensity and complexity of the beer. You could also brew a low-gravity amber ale and serve it on mixed gas to do the same thing with a lighter-colored beer.

I wouldn't recommend brewing an American-style light beer at home because it is actually really hard to brew a beer with almost no flavor. Most light beers are made from highly fermentable worts that leave very little carbohydrate in the finished beer. A long mash rest at 150° to 155° F, the addition of "debranching enzymes" (specifically amyloglucosidase) and high adjunct ratios are some of the common methods used by large brewers to produce light beer.

Unfortunately, most beers do contain a fair amount of carbohydrates. I'm not sold on the whole low-carbohydrate diet for a number of nutritional reasons, but if I were on a carbohydrate-limited diet I would be concerned about my total carbohydrate consumption per day. I'm sure with some budgeting one could figure out how to consume normal beers every now and then without exceeding the daily carbohydrate allowance of the diet. That's just one beer lover's opinion.

Mr. Wizard

Have you ever done a mash, collected the wort and let it sit for a period of time before boiling it? I'm looking for a day or so between mashing and boiling and I would think the hot-break and length of boil would eliminate any infection.

Could I save time on brew day by mashing a day or two in advance and then collecting the run-off in a food-grade plastic container? Eight hours of brewing can be killer on the feet, especially after a busy day or the "mandatory" shopping trip with the wife. Will it effect the body or the character of my beer to go from 168° F to room temperature, and then stay that way for at least 18 to 36 hours before the brewing process?

Jim Stoughton
Oak Harbor, Washington

This idea sounds attractive at first glance. It's kind of like extract brewing, but you are making your own extract a few days before boiling, cooling and pitching the yeast. The major drawback to the idea is that unboiled wort is extremely unstable. Malt has all sorts of microorganisms and the mashing process does not kill all of the bacteria. If you do your mash, collect the wort and let it slowly cool from about 165° F to room temperature, you will have a very rich bacterial soup instead of tasty, sweet wort.

Although boiling this nasty cocktail will kill the bacteria, it will not restore the flavor of the wort to the way it was prior to bacterial spoilage. The flavors associated with sweet-wort spoilage are sour, vegetal and fecal and are caused by organisms including various *Lactobacilli* and *Enteric* bacteria.

I personally don't recommend this method, but if you are adventurous and want to try, I strongly advise quickly cooling the wort to as cold as possible and storing it cold. In fact, if you froze the wort you probably would have the best shot at successfully using this method. Wort can be stored after boiling for some time before spoilage sets in and some brewers use the flotation method to remove cold trub before adding yeast. Unfortunately, this does not exactly save the time you are seeking.

If the long hours at the shopping mall prior to brewing are the root of your problem, you may want to carry out your plan. My thinking is that your experimental brew would be so vile and revolting that when your wife takes one sip of it she may permanently excuse you from the shopping duties.

Mr. Wizard

I have a batch of beer that has obviously been contaminated by something. It has a chalky white film, with several large protruding bubbles growing on top of the beer. Can I heat the beer to kill the contamination and then bottle it? I'm pretty sure that this would also kill my yeast, which would then be unavailable for pressurizing the batch after bottling and I would get flat beer. Any suggestions?

Jeff Ashley
Waterloo, South Carolina

Beer can be effectively heat pasteurized. This method is difficult at home because transferring the beer to a large kettle will almost certainly introduce air and oxidation reactions are accelerated at elevated temperatures. Also, it is important to quickly cool the beer after the heat-and-hold step to minimize cooked flavors.

Commercial breweries usually pasteurize beer in the bottle or can by running the packaged beer through a "tunnel pasteurizer." A

Mr. Wizard

tunnel pasteurizer has a heating zone and cooling zone; the beer is heated up, held at pasteurization temperature for a pre-determined time and then cooled by using water-spraying nozzles. Some brewers flash-pasteurize their beer prior to packaging, in a similar fashion to milk pasteurization. Any method of pasteurization will kill yeast. Bottle conditioned beers that have been pasteurized will get another dose of yeast after pasteurization.

You could use a heat treatment method to kill whatever it is in your beer. However, pasteurization should not be used as a tool to "fix" contaminated beer.

Brewers that pasteurize beer use it as a precautionary method to prevent the beer from spoiling in the marketplace. If your beer tastes odd prior to pasteurization it will most likely still taste that way after pasteurization.

The best bit of advice I can give is to evaluate your sanitation and yeast-handling practices for any potential flaws and record your findings and apply them to future batches. Whenever I suspect that a batch has gone awry because of bacterial contamination, I dump it and rebrew it. The way I see it, the beer probably will turn out to be a disappointment and the sooner I face that reality the less time I waste waiting for the big let down. Good luck! ■

Mr. Wizard, BYO's resident expert, is a leading authority in homebrewing whose identity, like the identity of all superheroes, must be kept confidential.

Do you have a question for Mr. Wizard? Write to him c/o Brew Your Own, 5053 Main Street, Suite A, Manchester Center, VT 05255 or send e-mail to wiz@byo.com. If you submit your question by e-mail, please include full name and hometown.

The Replicator

Otter Creek Pale Ale and Abita Turbodog

by Dawnell Smith

Dear Replicator:

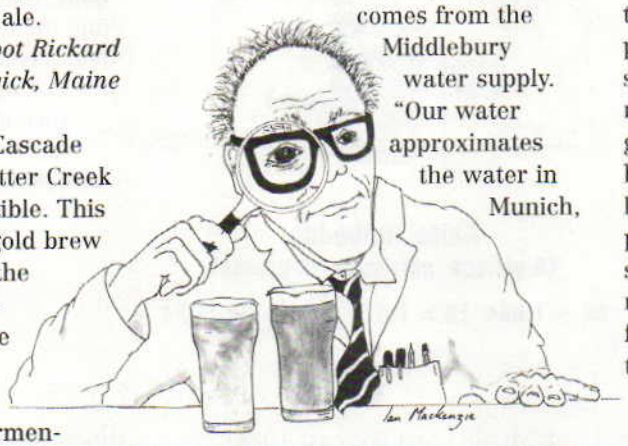
One of my all-time favorite beers comes from Otter Creek Brewing Company of Middlebury, Vermont. Otter Creek Pale Ale is a great American pale ale with lots of Cascade hops. I would really like to get a clone recipe for this ale.

Talbot Rickard
North Berwick, Maine

You can thank dry Cascade hops for making Otter Creek Pale Ale so irresistible. This thirst-quenching, amber-gold brew gets plenty of Cascade in the boil and during conditioning. These hops impart the dominant flavor and aroma profile. The brewery uses Yakima in the fermentation tank to enhance the crisp flavor with an eye-opening aroma.

The bulk of the grain bill calls for pale malt. The remaining twelve percent is a mix of caramel and wheat malts to give the beer color, body and head retention.

One of the beer's key ingredients comes from the Middlebury water supply. "Our water approximates the water in Munich, Germany, in calcium carbonate and other mineral levels," said brewer Tom Brande. (You can look up these mineral levels in "New Brewing Lager Beer" by Greg Noonan.)



When making his own homebrew, Brande has a tough time hitting target gravity when using a plastic bucket for mashing and sparging. "I've never been able to maintain heat (in buckets) and have gotten lower extraction efficiencies," he said. If you have the same problem, increase the grain bill by five percent and start off with a higher strike temperature. Brande recommends adding dry hops after fermentation "to prevent driving off the lighter volatiles."

To learn more, check out www.ottercreekbrewing.com or call (800) 473-0727.

Otter Creek Pale Ale
(5 gallons, extract with grains)

OG = 1.047 FG = 1.012 IBUs = 19

Ingredients

5 lbs. Briess unhopped light DME
9 oz. caramel malt (60° Lovibond)
6 oz. malted red wheat
3.75 AAUs Cascade
(3/4 oz. of 5% alpha acid)
6 AAUs Cascade
(1-1/5 oz. of 5% alpha-acid)
1 tsp. Irish moss
1 package American Ale with a dry finish (Wyeast 1056 or White Labs WLP001) or German Ale (Wyeast 1007)
3/4 cup corn sugar for priming or 1 cup unhopped light dried malt extract

Step by Step

Steep caramel and red wheat malts in 3 gallons of water at 150° F for 30 minutes. Remove grains, add DME and bring to a boil for 15 minutes. Add 3/4 oz. Cascade hops and boil 1 hour. Add Irish moss, boil 15 more minutes and remove from heat.

Put wort in primary fermenter with chilled, pre-boiled water to make 5.25 gallons. When cooled to around 70° F, pitch yeast. Ferment from 68° to 70° F until complete (about 10 days). Transfer to secondary with 1-1/5 oz. Cascade hops and drop the temperature to 36° to 40° F. *(For more dry-hop advice, check out the October 2000 issue of Brew Your Own.)* Leave the hops in the beer for at least two days. Age the beer in the bottle or keg for 10 days or more.

Partial mash option: Mash 3 lbs. pale malt plus specialty malts in 2 gallons of water at 153° F for 45 minutes. Sparge with 2 gallons at 172° F degrees. Decrease DME to 3 lbs. and proceed as from boiling.

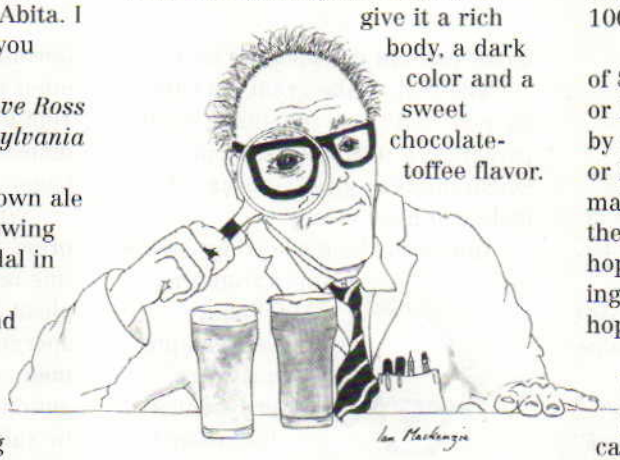
All grain option: Omit dried malt extract and mash 7.5 lbs. pale malt plus specialty malts in about 11 quarts of water to get a single infusion mash temperature of 153° F for 45 minutes. Then sparge with 172° F water to get 5.5 gallons of wort. Bring to boil and add bittering hops after 15 minutes. Boil another 1 hour and 15 minutes, then remove from heat. Proceed as above from boiling and reduce volume to 5.25 gallons.

Dear Replicator,

A few years ago, while I was in New Orleans, I had the great pleasure of tasting Abita Turbodog. This has become one of my favorite beers. I lived in the South then, and was able to find Turbodog every once in a while. Those samples, though few and far between, held me over. I have since moved up North and can no longer get Abita. I need to make it myself! Can you please find us a recipe?

Dave Ross
Philadelphia, Pennsylvania

Turbodog is a dark, brown ale that earned Abita Brewing Company a silver medal in the 1998 World Beer Championships in Chicago and a "highly recommended" rating from the Beverage Tasting Institute of Chicago in 1999. It's well worth trying to replicate this highly regarded beer for yourself. Turbodog's name comes from the old English tradition of calling brown ales "dog ales;" apparently, pubgoers used to tell their wives they were only "going out to walk the dog." The beer comes loaded with Willamette hops and a combination of British pale chocolate and crystal malts that give it a rich body, a dark color and a sweet chocolate-toffee flavor.



Abita Brewing is in Abita Springs, some 30 miles north of New Orleans. In the town's early days as a Choctaw Indian settlement, the local spring water supply reportedly was known for its medicinal purposes. The brewery started modestly 15 years ago, but quickly moved to a bigger site; in 1994, the original facility was turned into a 100-seat brewpub.

The recipe calls for a grain bill of 80 percent Schreier Special Pale or Muntons Pale malt, augmented by 14 percent Schreier Crystal 100 or Muntons Crystal dark. Chocolate malt picks up the slack and boosts the beer's dark, luscious color. For hops, they use Chinooks for bittering, then lay on the Willamette for hop flavor and aroma.

For more information on Turbodog or the Abita Brewery, check out www.abita.com or call (800) 737-2311.

Abita Turbodog

(5 gallons, extract with grains)

OG = 1.054 FG = 1.014 IBUs = 32 to 34

Ingredients

5 lbs. Muntons unhopped light dry malt extract
1.25 lbs. crystal malt (Schreier crystal 100 or Muntons crystal dark)
0.50 lbs. chocolate malt (Schreier chocolate or Muntons chocolate)
7 AAUs Chinook hop pellets (0.6 oz. of 12% alpha acid)
5 AAUs Willamette hop pellets (1.25 oz. of 4% alpha acid)
6 AAUs Willamette (1.5 oz. at 4% alpha acid)
Irish ale yeast (Wyeast 1084)
3/4 cup corn sugar or 1 cup unhopped dried malt extract

Step by step

Heat specialty grain in 2.5 gallons of water at 152° F for 45 minutes. Remove grains, add dry malt extract (DME), bring to a boil and add 1 oz. Chinook hops.

Boil for 85 minutes and add 1.25 oz. Willamette hops. Boil 5 minutes and remove from heat. Hold wort on the stove without heat for a rest, then add 1.5 oz. Willamette hops and let the wort settle for 15 minutes. Bring up to 5.25 gallons with chilled, pre-boiled water.

Cool to 60° F, add yeast, aerate and let ferment for 5 to 6 days at 55° to 58° F, or at the lower end of your yeast manufacturers recommended fermentation temperature (at about 1.016). Cool to around 45° F and age for one week before racking into bottles or kegs.

All-grain option: Cut out DME and use 7.50 lb. pale malt (Schreier special pale or Muntons pale). Heat 10 quarts water to 160° F in a brew pot and slowly mix in milled malt. Hold at 152° F for 45 minutes, then heat the thick mash to 172° F and hold for 5 minutes. Transfer to lauter unit and run-off first wort (should hit 1.070). Sparge with 15 quarts at 172° F. Bring wort to boil and proceed as above. ■

Readers: Send us your homebrew recipes! We love to publish them. E-mail to betsy@byo.com.

Porter and Pilsner

A robust Baltic brew and a thirst-quenching northern German lager

2001

by Tess and Mark Szamatulski

This month we are brewing beers from two different ends of the spectrum: an intense, warming Baltic porter with roots in the trade from England to the Baltic and beyond, and a smooth, refreshing, northern German pilsner. Both of these beers make lagering worth the wait. The Baltic porter is more than a beer, it's a meal, while the pilsner is extremely drinkable and thirst-quenching, brewed with the finest of German hops. These beers will lager well in a cold basement during the frigid winter months. Just knowing you have two entirely different, but incredible beers slowly fermenting, should make winter a little bit easier to endure.

BALTIC PORTER

OG = 1.062 to 1.097
FG = 1.016 to 23 IBU = 29 to 45
SRM = 30 to 100

Baltic porters are a kicked-up version of the porter, brewed to be powerful, brimming with malt and — in certain versions — alcohol. Beer production in Russia officially began in 1796 when Catherine the Great signed a decree on the development of beer. Baltic porters were originally exported from England through the English Channel to the North Sea, then on through to the Baltic Islands and beyond in the late 17th and 18th century. The casks of beer were used as ballast to keep the ships stable through rough seas. They were brewed to high gravity to withstand the long voyage.

The Russians now brew this delicious beer at home. It helps take the chill out of the long Russian winters. This month's recipe for a Baltic porter is Baltica (Bajitnka) Porter. We were fortunate to have the opportunity to taste and clone a true Russian porter when a customer brought a few back from his trip to Russia. This porter was first brewed by the Baltika brewery, located in St. Petersburg, Russia as a seasonal winter offering. It became so popular that, in 1995, it was launched into year-round production. Baltika pours like a ribbon of black silk with a creamy, dark-tan head. The aroma is clean, with just a hint of spicy hops leading to a smooth, big flavor filled with roasted grains. It then trails off with a dry and unassuming finish.

This is a seductive porter that deceptively hides its alcohol. This porter will peak between three and nine months.

Commercial Beers To Try

All of the following fine examples of Baltic porters are available in the United States, with the exception of Baltica Porter from Russia: D. Carnegie of Sweden (6.1% alcohol by volume), Sinebrychoff of Finland (7.2%), Saku of Estonia (7.5%), Okocim Porter (8.1%), and Zywiec Porter (9.3%) of Poland.

The range can be very broad in this style, especially in color and

THE YEAR IN BEER

JANUARY:
Baltic Porter & German Pilsner

FEBRUARY:
Cream Stout & American Dark Lager

MARCH:
Oktoberfest & American Brown Ale

APRIL:
British IPA & Old Ale

MAY:
Dunkelweizen & English Bitter

JUNE:
Fruit Ale & Belgian Strong Dark Ale

SEPTEMBER:
Kölsch & Robust Porter

OCTOBER:
Celebration Ale & Pale Lager

NOVEMBER:
Strong Scotch Ale & Vienna Lager

DECEMBER:
English Barleywine & Doppelbock

alcohol content. It's interesting to taste all of the commercial Baltic porters side by side and note how very different they are. The aroma is rich and smooth, ranging from an earthy graininess to a roasty, stout-like nose. The appearance varies from dark brown to the darkest of black. Head retention should be moderate to good. The palate has a smooth malt flavor, featuring coffee or chocolate notes.

The flavor should be impressive, with strong alcohol and roasted grains, ranging from sweet to moderately sharp depending on grist composition, hop bittering level and roasted grains. The mouthfeel can be medium to very full-bodied, with low to medium carbonation. Baltic porters should always finish smooth, long and memorable.

This is a substantial beer with the robust chewiness of a high alcohol porter and the underlying smoothness of a lager.

Hops, Malt And Yeast

The hops used are European varieties, such as Northern Brewer, German Hallertau, Hersbrucker and Tettnang. The specialty grains are chocolate, a touch of black, crystal, Munich, Vienna and cara-Munich malt. The base grain can be lager, two-row pale or a German pilsner malt.

Our favorite yeast for this style is Munich Lager (Wyeast 2308). Other yeasts that can be used are Bavarian Lager (Wyeast 2206) or Old Bavarian Lager (White Labs WLP920).

If lager temperatures are not possible, use California Lager (Wyeast 2112) and ferment at 62° F. If that temperature cannot be achieved, ferment it as an ale and use Irish Ale yeast (Wyeast 1084) and ferment at 68° to 70° F. Some of the lager smoothness will be lost, but the beer will have a wonderful malt profile.

Serving Suggestions

Baltika is lovely with a spicy chicken mole with some Baltika used in the mole sauce. Accompany with garlic green beans in a brown butter and cilantro sauce and Mexican rice. Don't forget to pass the warm tortillas.

BALTIKA (BAJITNKA) PORTER

Yield: 5 gallons
OG = 1.072 FG = 1.017
IBU = 31

Ingredients

11 oz. British chocolate malt
8 oz. Belgian cara-Munich malt
6 oz. U.S. crystal malt (60° Lovibond)
4 oz. British black malt
5.25 lbs. Muntons extra light dry malt extract
3.5 lbs. Bierkeller light malt extract syrup
10.5 AAUs German Northern Brewer (1.25 oz. of 8.4% alpha

January 2001

S	M	T	W	THURSDAY	F	SATURDAY
	1	2	3	PREP DAY • Prepare starter for Baltic Porter 4	5	BREW DAY • Brew Baltic Porter • Record original gravity • Ferment in primary for 7 days 6
7	8	9	10	PREP DAY • Prepare starter for Northern German Pilsner 11	12	BREW DAY • Rack Baltic Porter to secondary • Brew Pilsner and record original gravity 13
14	15	16	17	18	19	TRANSFER DAY • Rack Pilsner to secondary 20
21	22	23	24	25	26	27
28	29	30	31			

acid) (bittering)
1 AAU German Hallertauer Hersbrucker (1/4 oz. of 4% alpha acid) (flavor)
1 tsp. Irish moss
Wyeast Munich Lager (Wyeast 2308) or Old Bavarian Lager (White Labs WLP920)
1-1/4 cup Muntons extra light dry malt extract for priming

Step by Step

Bring one gallon of water to 155° F, add crushed grain 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 and bittering hops.

Bring the total volume in the brewpot to 2.5 gallons. Boil for 45 minutes then add the flavor hops and Irish moss. Boil for 15 minutes then remove pot from 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 80° F. Oxygenate-aerate well.

Ferment at 60° to 62° F until fermentation begins, then bring fermenter to 47° F to 52° F for 7 days. Rack into secondary (glass carboy) and ferment until target gravity has been reached and beer has cleared. (approximately 5 weeks). Then the beer can be lagered for one to three months. Begin lagering at 45° F and when fermentation is nearly complete, slowly decrease the temperature to 34° F. After the lagering is complete, bring the beer to 60° to 62° F for a day or two. Prime and bottle. Carbonate at 70° to 72° F for 2 to 3 weeks. Then store beer at cellar temperature.

Partial-mash option: Mash 1.66 lbs. German two-row pilsner malt and the specialty grains in 1 gallon water at 150° F for 90 minutes. Sparge with 2 gallons water at 168° F. Then follow the extract recipe, omitting 2 lbs. of Muntons extra light dry malt extract from the boil.

All-grain option: Mash 12.33 lbs. German two-row pilsner malt and the specialty grains in 3.5 gallons of water at 150° F for 90 minutes. Sparge with 6 gallons of water at 168° F. The total boil time is approximately 120 minutes. Add 7 AAU of the bittering hops for the last 90 minutes of the boil. Add the flavor hops and Irish moss as indicated by the extract recipe.

NORTHERN GERMAN PILSNER

OG = 1.044 to 1.050
FG =1.008 to 1.013
IBUs = 25 to 45 SRM = 2 to 4

The northern German pilsner is crisp, clean and dry with German noble hop bitterness emphasized by sulfates in the water. The aroma may feature grain and flowery German noble hops. The appear-

ance is straw to medium gold, crystal clear, with a creamy white head. The flavor is crisp, dry and bitter. Maltiness is low, although some grainy flavors and slight sweetness can come through. The hop bitterness dominates the taste, follows through the finish and stays on into the aftertaste. Hop flavor can range from low to high, but should just be derived from German noble hops. This should be a very clean lager with not a trace of fruitiness or esters. The body is light to medium with medium to high carbonation.

The recipe we have created for this style has a gold color and an off-white head. This pilsner makes a lively entrance with a light hop and toasted malt nose. It's soft and round on the palate with an initial hop attack, a balanced toasted malt and hop flavor and a lingering dry aftertaste. This is a thirst-quenching and drinkable lager that showcases the finest of German hops.

Commercial Beers To Try

The following are classic examples of northern German pilsners: Bitburger Pils, Kulmbacher Moenchshof Pils, Jever Pils, Warsteiner and Holsten Pils. Jever Pils, one of the hoppiest renditions of this style (45 IBU) has just recently been made available in several U.S. states.

Hops, Malt And Yeast

The hops should be of the German noble variety, especially for flavor and aroma. We recommend German Hallertau Hersbrucker, or Tettnang. German pilsner malt should preferably be the base malt, with small amounts of Munich and German light crystal malt used as the specialty grains.

The yeast that is best suited for this style of beer is Pilsen Lager (Wyeast 2007), Pilsner Lager (White Labs WLP800) or Czech Pilsner Lager (Wyeast 2278).

Serving Suggestions

Serve at 48° F (9° C) in a footed pilsner glass with center-cut pork chops that have been grilled and served with butter-roasted apples, toasted walnut and sage, rye bread crumb stuffing and topped with pork gravy rich with wild mushrooms, pilsner and finished with a dash of cream.

NORTHERN GERMAN PILSNER

Yield: 5 gallons
OG = 1.052 FG = 1.012
IBU = 34

Ingredients:

8 oz. German Munich malt (8° Lovibond)
4 oz. German light crystal malt (2.5° Lovibond)
6 lb. Muntons extra light dry malt extract
9 AAUs Northern Brewer (1 oz. of 9% alpha acid) (bittering)
2 AAUs German Perle (1/4 oz. of 8%

alpha acid) (flavor)
1 AAU Spalt (1/4 oz. of 4% alpha acid) (aroma)
1 AAU German Hallertauer Hersbrucker (1/4 oz. of 4% alpha acid) (aroma)
1 tsp. Irish moss
Wyeast Czech Pils (Wyeast 2278) or White Labs Pilsner Lager (WLP800)
1-1/4 cup Muntons extra light dry malt extract for priming

Step by Step

Bring one gallon of water to 155° F, add crushed grain 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 and bittering hops.

Bring the total volume in the brewpot to 2.5 gallons. Boil for 45 minutes then add the flavor hops and Irish moss. Boil for 5 minutes then add the Spalt aroma hops. Boil for 7 minutes then add the German Hallertauer Hersbrucker aroma hops. Boil for 3 minutes then remove pot from 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/s gallons. Add yeast when wort has cooled to below 80° F. Oxygenate-aerate well. Ferment at 60° to 62° F until fermentation begins, then bring fermenter to 47° to 52° F for 7 more days.

Rack into secondary (glass carboy) and ferment until target gravity has been reached and beer has cleared (approximately 4 weeks). Then the beer can be lagered for one month. Begin lagering at 45° F and slowly decrease the temperature to 34° F. After lagering has been completed, bring the beer to 60° to 62° F for a day or two. Then prime and bottle. Carbonate at 70° to 72° for 2 to 3 weeks. Store at cellar temperature.

Partial-mash option: Mash 3 lbs. German two-row pilsner malt and the specialty grains in 1 gallon water at 150° F for 90 minutes. Sparge with 2 gallons water at 168° F. Then follow the extract recipe, omitting 2.25 lbs. of Muntons extra light dry malt extract from the boil.

All-grain option: Mash 9.33 lbs. German two-row pilsner malt and the specialty grains in 2.75 gals. of water at 150° F for 90 min. Sparge with 5 gals. of water at 168° F. The total boil time is approximately 90 min. Add 6.7 AAU of the bittering hops for the last 90 min. of the boil. Add the flavor hops, Irish moss and aroma hops as indicated above in the extract recipe. ■

Tess and Mark Szamatulski are the owners of Maltose Express in Monroe, Connecticut. All recipes are adapted from their new book, "Beer Captured" (Maltose Press, 2000).

PERIODIC TABLE OF BEER STYLES

Forget everything you learned in high school chemistry class. This periodic table addresses a topic that's truly elemental.

by Andrei Chapoval

This table is original material. It was conceived, researched and designed by Andrei Chapoval. Key references include: "Clonebrews" by Tess and Mark Szamatulski (Storey Books); "The New Complete Joy of Homebrewing" by Charlie Papazian (Avon Books); "Michael Jackson's Beer Companion" by Michael Jackson (Running Press); "Winner's Circle" by the American Homebrewers Association (Brewers Publications); and style guidelines published by the BJCP and various homebrew competitions.

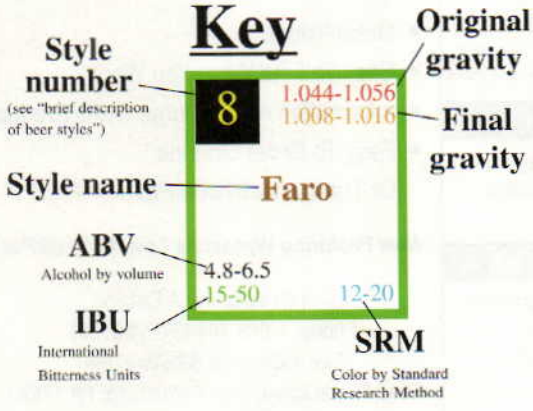
A brief description of beer styles with commercial examples

1. Berliner weisse: Light body. Refreshing. Slightly fruity. Sour. Low influence of hop. *(Schultheiss Berliner Weisse, Berliner Kindl Weisse)*
2. Lambic: the most unusual sour-tasting beer with very little hop aroma. *(Grand Cru Cantillon Bruocsella 1900, Boon, De Neve)*
3. Belgian gold ale: Fruity. Soft malt aroma. Spice aroma. Low bitterness. *(Duvel, Lucifer, La Chouffe, Moinette, Celis Grand Cru)*
4. Belgian white: Refreshing. Cloudy. Spiced with coriander and orange peel. Low bitterness. *(Celis White, Hoegaarden White, Blanche de Bruges)*
5. Gueuze: blend of young and old lambic beers. *(Lindeman's Gueuze Lambic, Belle-Vue Gueuze, Boon, Cantillon, Henssens)*
6. Tripel: Light/pale color, balanced malt and hop aroma. Sweetish. High alcohol content. *(Westmalle Tripel, Affligem Tripel, Grimbergen Tripel)*
7. American wheat: Usually clear in contrast to most other wheat beers. Slightly tart. Very refreshing. *(Samuel Adams Summer Ale, Catamount American Wheat)*
8. Faro: sweetened version of lambic. *(Lindeman's)*
9. Saison: Fruity. Complex aroma and flavor of high alcohol, herbs, and spices. Moderate hop aroma and flavor. *(Saison Dupont, Moinette, Laforet)*
10. Pale ale: Low to medium maltiness. High hop bitterness. Medium hop profile. *(Draught Bass, Samuel Smith Old Brewery Pale Ale)*
11. American lite: Little to no malt aroma. Very low in hops. Crisp and dry. Refreshing. *(Bud Light, Miller Lite)*
12. Munich helles: Mildly hopped and mildly malty. Fuller body than most lagers. *(Black Forest Lager, Spaten Premium Lager)*
13. Helles bock: Malty. Mildly hopped. Relatively high alcohol level. *(Wuerzburger Maibock, Spaten Premium Bock, Pschorr Märzenbock)*
14. Weizenbier: Notable clove and banana aroma from German wheat yeast. Fruity. Cloudy. Low hop profile. *(Erdinger Weisshier, Pyramid wheaten ale, Julius Echter Weizenbier)*
15. Fruit beer: taste and aroma depend on fruit(s) used. Usually dry and winey. Not all fruit beers are lambic based. *(Belle-Vue Kriek, Limdeman's Framboise Lambic)*
16. Belgian pale ale: Low bitterness. Low malt aroma. Slightly fruity and sour. *(Celis Pale Bock, DeKoninck Special Palm Ale, Ginder Ale)*
17. American pale ale: Medium maltiness. High hop bitterness. Medium flavor and aroma from American hop varieties. *(Sierra Nevada Pale Ale, Summit Pale Ale, Geary's Pale Ale)*
18. Ordinary bitter: Low carbonation. Low to medium maltiness. Mild hop flavor and aroma. *(Young's Bitter, HSB Premium Bitter)*

I	II	III	IV	V	VI
1 1.026-1.036 / 1.006-1.009 **Berliner weisse** 2.5-3.6 / 3-12 / 2-4	**2** 1.044-1.056 / 1.006-1.012 **Lambic** 4.7-6.4 / 5-15 / 4-15	**3** 1.065-1.085 / 1.014-1.020 **Belgian gold ale** 7.0-9.0 / 25-35 / 4-6			
4 1.042-1.055 / 1.008-1.012 **Belgian white** 4.5-5.5 / 15-28 / 2-4	**5** 1.044-1.056 / 1.006-1.012 **Gueuze** 4.7-6.4 / 5-15 / 4-15	**6** 1.070-1.100 / 1.016-1.024 **Tripel** 7.0-10.0 / 20-30 / 4-7			
7 1.035-1.055 / 1.008-1.018 **American wheat** 3.5-5.0 / 5-20 / 2-8	**8** 1.040-1.056 / 1.006-1.012 **Faro** 4.5-5.5 / 5-15 / 4-15	**9** 1.052-1.080 / 1.010-1.015 **Saison** 4.5-8.1 / 25-40 / 4-10	**10** 1.043-1.056 / 1.008-1.016 **Pale ale** 4.5-5.5 / 20-40 / 4-11		
14 1.040-1.056 / 1.008-1.016 **Weizenbier** 4.3-5.6 / 8-15 / 3-9	**15** 1.040-1.072 / 1.008-1.016 **Fruit beer** 4.7-7.0 / 15-21 / N/A	**16** 1.040-1.055 / 1.008-1.013 **Belgian pale ale** 3.9-5.6 / 20-35 / 4-14	**17** 1.045-1.056 / 1.010-1.015 **American pale ale** 4.5-5.7 / 20-40 / 4-11	**18** 1.030-1.038 / 1.006-1.012 **Ordinary bitter** 3.0-3.8 / 20-35 / 6-12	**19** 1.030-1.035 / 1.006-1.012 **Scottish light 60/-** 2.8-4.0 / 9-20 / 8-17
27 1.048-1.056 / 1.008-1.016 **Dunkelweizen** 4.5-6.0 / 10-15 / 17-23	**28** 1.042-1.060 / 1.008-1.016 **Flanders red** 4.0-5.8 / 14-25 / 10-16	**29** 1.065-1.098 / 1.014-1.024 **Belgian dark ale** 7.0-12.0 / 25-40 / 7-20	**30** 1.050-1.075 / 1.012-1.018 **India pale ale** 5.1-7.6 / 40-60 / 8-14	**31** 1.039-1.045 / 1.006-1.014 **Special bitter** 3.7-4.8 / 25-40 / 12-14	**32** 1.035-1.040 / 1.010-1.014 **Scottish heavy 70/-** 3.5-4.1 / 12-25 / 10-19
41 1.066-1.080 / 1.016-1.028 **Weizenbock** 6.5-9.6 / 12-25 / 10-30	**42** 1.042-1.060 / 1.008-1.016 **Oud bruin** 4.0-6.5 / 14-30 / 12-20	**43** 1.065-1.085 / 1.012-1.018 **Dubbel** 3.2-8.0 / 20-25 / 10-20	**44** 1.043-1.056 / 1.008-1.016 **American amber ale** 4.5-5.7 / 20-40 / 11-18	**45** 1.046-1.065 / 1.010-1.018 **Extra special bitter** 3.7-4.8 / 30-45 / 12-14	**46** 1.040-1.050 / 1.010-1.018 **Scottish export 80/-** 4.0-4.9 / 15-36 / 10-19

Ale

Key



Key to yeast type

Ale yeast with lactic bacteria
Wheat ale yeast
Ale yeast
Lager yeast

SRM rating

Color	SRM number
Clear	0
Light straw	1.0-2.5
Pale straw	2.5-3.5
Dark straw	3.5-5.5
Light amber	5.5-10.0
Pale amber	10.0-18.0
Dark amber	18.0-26.0
Very dark amber	26.0-40.0
Black	40+

Style family key

I	Wheat beer	XI	American lager
II	Lambic & sour ale	XII	European lager
III	Belgian ale	XIII	Bock
IV	Pale ale	XIV	Alt
V	English bitter	XV	French ale
VI	Scottish ale	XVI	German amber ale
VII	Brown ale	XVII	American special
VIII	Porter	XVIII	Smoked beer
IX	Stout	XIX	Barleywine
X	Pilsner	XX	Strong ale

19. Scottish light 60/-: Low carbonation. Medium maltiness. Low bitterness. Medium to no hop flavor and aroma. Light smoky/toasty character. *(Belhaven 60/-, Caledonian 60/-, Maclay 60/- Light, Highland Dark Light)*

20. English mild: Light brown. Mild maltiness. Low alcohol. Low hop bitterness, flavor and aroma. Light body. *(Bank's Mild, Fuller's Summer Ale)*

21. Dry Stout: Roasted barley and malt aromas are prominent. Some sourness. Hop aroma medium to none. *(Guinness Draught Stout, Murphy's Stout, Beamish Stout)*

22. Foreign extra stout: Roasted grain aroma and flavor are prominent. Flavor range from sweet to dry. Hop aroma and flavor very low. Fruity. *(ABC Stout, Guinness Foreign Extra Stout)*

23. German pilsner: Medium to high hop flavor and aroma. Low maltiness. Crisp, dry, and bitter. Refreshing. *(Kulmbacher Moenchshof Pils, Jever Pils, Wickuler Pilsner)*

24. American standard: Similar to American light but darker. *(Budweiser, Molson Golden, Kirin)*

25. Dortmunder: Smooth. Medium malty sweetness. Medium hop aroma and flavor. *(Dortmunder Gold, DAB Original, Berghoff Original Lager)*

26. Doppelbock: Intense maltiness. Little hop aroma and flavor. Touch of roastiness. A very strong, rich lager. *(Paulaner Salvator, Spaten Optimator)*

27. Dunkelweizen: Low clove and banana aroma. Malty. Low bitterness. Low hop aroma. *(Franziskaner Dunkel-Weizen, Schneider Dunkel Weiss)*

28. Flanders red ale: Fruity. Malty. Slightly sour. Low hop profile. *(Rodenbach, Petrus, Bourgone des Flanders, Vlaamse Bourgogne)*

29. Belgian dark ale: Fruity. Malty. Bitter. High alcohol content. *(Pawel Kwak, Gourden Carolus, Scaldis, Rocherfort 10, Chimay Grand Reserve)*

30. India pale ale: Medium maltiness. High hop bitterness. High hop flavor and aroma. *(Anchor Liberty Ale, Samuel Smith's India Ale, Fuller IPA)*

31. Special bitter: Low carbonation. More malty and higher alcohol than ordinary bitter. Nice bitterness. *(Young's Ramrod, Fullers London Pride)*

32. Scottish heavy 70/-: Low carbonation. Moderate hop profile. Mild smoky character. *(Greenmantle Ale, Highland Heavy, Young's Scotch Ale)*

33. American brown: Medium maltiness. High hop bitterness, flavor and aroma *(Pete's Wicked Ale, Brooklyn Brown Ale, Shipyard Moos Brown)*

34. Brown porter: Moderate roastiness. Moderate bitterness. Hop flavor and aroma low to none. *(Samuel Smith Taddy Porter, Fuller's London Porter)*

35. Sweet stout: Overall sweet character. Roasted grains dominate the flavor. Some fruitiness. *(Mackeson's XXX Stout, Samuel Adams Cream Stout)*

36. Imperial stout: Fruity with intense roastiness and maltiness. Evident hop aroma and flavor. High alcohol level. *(Samuel Smith Imperial Stout, Courage Imperial Stout)*

37. Bohemian pilsner: Malty, with a distinctive floral and spicy Saaz hop bouquet. Crisp and refreshing. *(Pilsner Urquell, Gambrinus Pilsner, Budweiser Budvar)*

38. American premium: Darker version of American standard. *(Michelob)*

39. Munich Dunkel: Munich malt aroma and flavor. Mild hop flavor. *(Ayinger Altbairisch Dunkel, Hacker Pschorr Alt Munich Dark)*

40. Traditional bock: Rich and complex maltiness. No hop aroma and flavor. *(Aass Bock, Hacker-Pschorr Dunkler Bock, Dunkel Ritter Bock, Boiler Room Red)*

41. Weizenbock: Malty. Low bitterness. Clove and banana aroma from German wheat yeast. *(Schneider Aventinus, Pyramid Weizenbock)*

42. Oud Bruin: Fruity. Malty. Sherry wine-like. Slightly sour. Very little hop aroma and flavor. *(Liefman's Goudemband, Felix, Roman)*

43. Dubbel: Rich malt aroma. Light to none hop aroma. Full body. Low bitterness. *(Westmalle Dubbel, LaTrappe Dubbel, Affliggem Dubbel)*

44. American amber ale: Medium maltiness. Mild to strong flavor and aroma from American hop varieties. Notable caramel flavor. *(Big Time Atlas Amber, Bell's Amber, North Coast Red Seal Ale)*

45. Extra special bitter: Low carbonation. Very strong bitterness. Malty. High hop aroma and flavor. *(Fuller's ESB, Young's Special London Ale)*

46. Scottish export 80/-: Low carbonation. Very malty. Medium bitterness. Medium to no hop flavor and aroma. Mild smoky/toasty character. *(Highland Severe, Orkney Dark Island, Sherlock's Home Piper's Pride)*

47. English brown: Sweet and malty. Light caramel flavor. Low hop profile. Some fruitiness. *(Newcastle Brown Ale, Samuel Smith Nut Brown)*

48. Robust porter: Roasted malt (coffee-like) aroma and flavor. Hop flavor and aroma moderate to low. *(Sierra Nevada Porter, Anchor Porter)*

49. Oatmeal stout: Mild roasted grain aromas. Low hop aroma. Flavor medium sweet with the complexity of roasted grains. Some fruitiness. *(Samuel Smith Oatmeal Stout, Young's Oatmeal Stout, Brew Moon Eclipse)*

50. Russian imperial stout: Similar to imperial stout but has higher alcohol level and bitterness. *(Harvey & Son's Imperial Extra Double Stout)*

51. American pilsner: Medium to high maltiness. Slight sweetness. Medium to high hop aroma and flavor. Refreshing. *(Pete's Signature Pilsner, Milwaukee Pilsner)*

52. American dark: Malty. Some roasted malt flavor. Low hops. *(Michelob Dark, Lowenbrau Dark, Beck's Dark, Saint Pauli Girl Dark)*

53. Schwarzbier: Malt and roasted malt aroma and flavor. Low hop aroma. Bitterness from roasted malt. *(Kulmbacher mönchschof Kloster Schwartz-Bier)*

54. Eisbock: Aroma and flavor dominated by rich malt and concentrated alcohol.No hop aroma and flavor. An extremely strong lager. *(Niagara Eisbock)*

55. Kölsch: Low maltiness. Light hop aroma and flavor from German noble or Saaz hops. *(Maltzmuehle, Hellers, Hollywood Blonde)*

56. Bière de garde: Malty and slightly fruity. Low hoppiness. Medium to strong alcohol level. *(Jenlain, Castelain, Septante Cinq, Brasseur Bière de Garde)*

57. Oktoberfest: Very flavorful. Distinct German malt aroma and flavor. Moderate hop bitterness and flavor. *(Spaten Ur-Märzen, Ayinger Oktoberfest-Märzen, Paulaner Oktoberfest, Wuerzburger Oktoberfest)*

58. Cream ale: Low hop aroma and bittering. Low maltiness. Light and refreshing. *(Genesee Cream Ale, Little Kings Cream Ale)*

59. Smoked beer: Sweetish and malty similar to Oktoberfest style with evident smoked character. Low hop aroma and flavor. *(Schenkerla Rauchbier)*

60. English old (strong) ale: Well aged. Malty and fruity. High alcohol. Low hop. *(Theakston Old Peculiar, Young's Winter Warmer, Marston Owd Roger)*

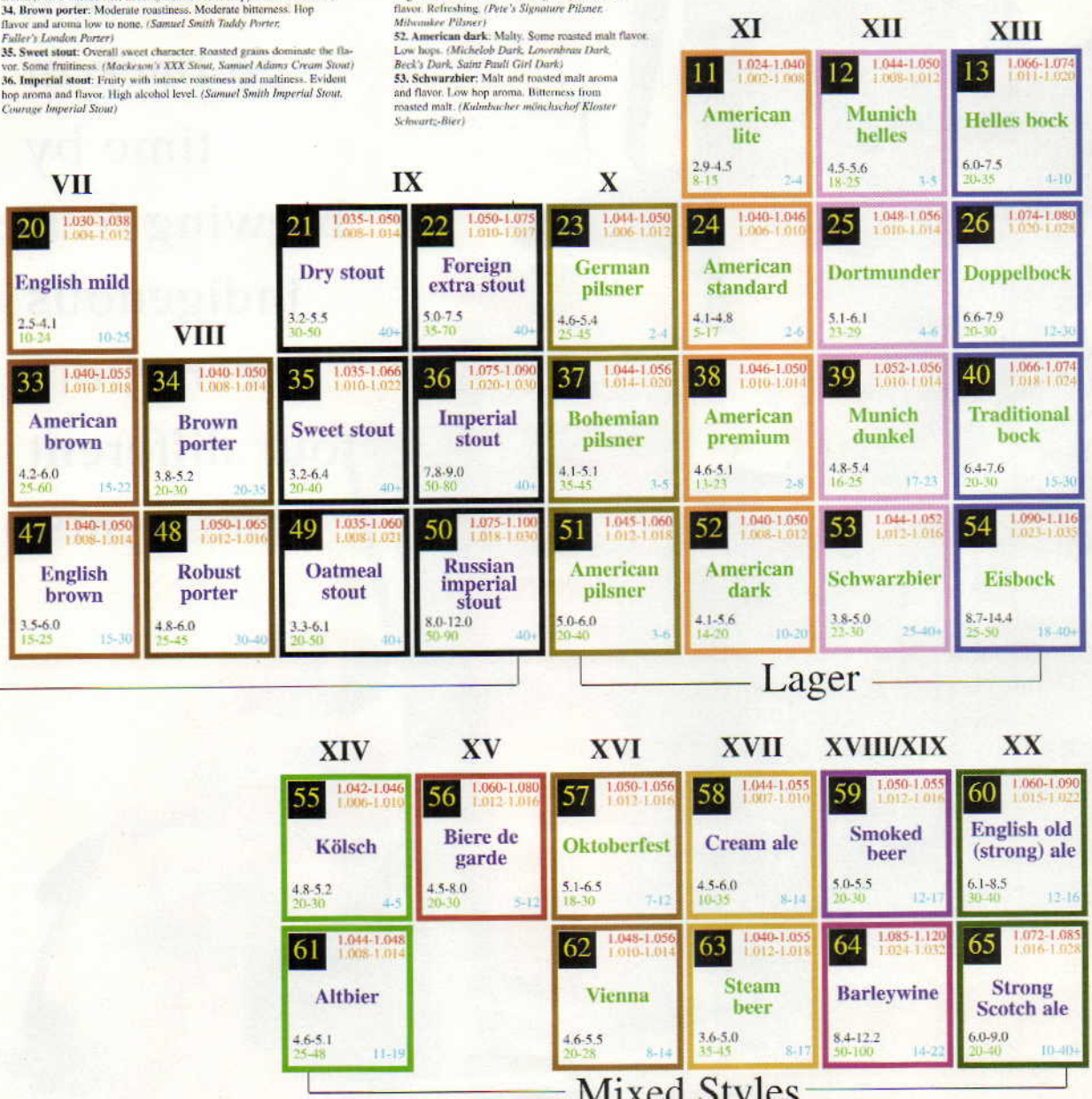
61. Altbier: Malt dominates all aromas and flavors. High hop bitterness. *(DAB Dark, Diebels Alt, Alaskan Amber, Grolsch Autumn Amber)*

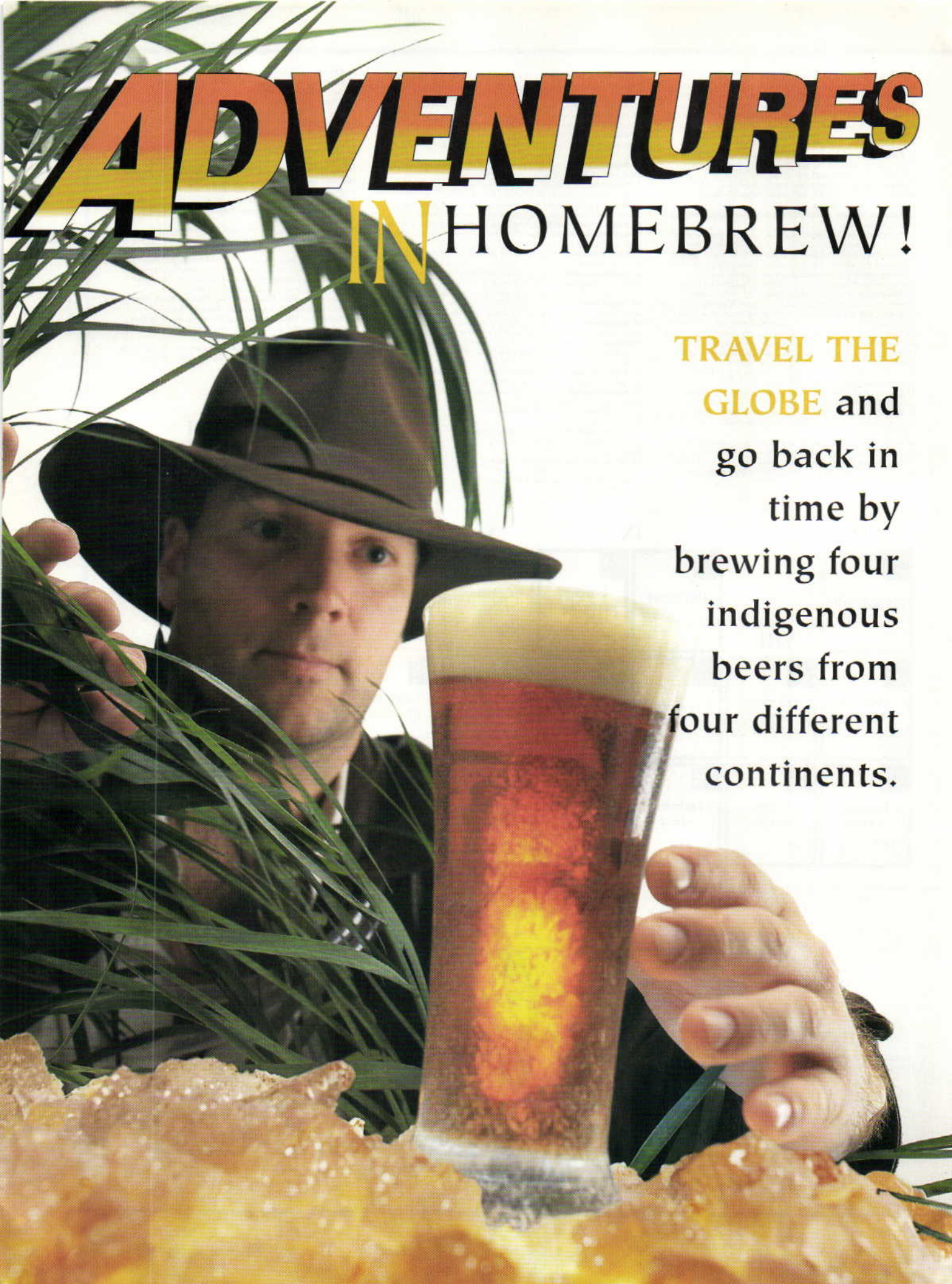
62. Vienna: Dark German malt aroma. Hop bitterness is moderate. *(Negra Modelo, Portland Lager, Leinenkugel Red)*

63. Steam beer: Malty, balanced with hop bitterness. Woody (Northern Brewer) hop flavor. *(Anchor Steam, Old Dominion Victor Amber)*

64. Barleywine: Fruity and malty. High hop aroma and flavor. High alcohol content. *(Young's Old Nick, Fullers Golden Pride, Sierra Nevada Bigfoot)*

65. Strong "Scotch" ale: Malty with caramel apparent. Hint of roasted malt or smoky flavor. Low hop flavor *(Traquair House, MacAndrew's Scotch Ale)*




ADVENTURES
IN HOMEBREW!
TRAVEL THE GLOBE and go back in time by brewing four indigenous beers from four different continents.

chicha! sahti! chang! sewa!

story by Joe and Dennis Fisher • photography by Charles A. Parker

BEER MAY WELL BE OLDER THAN human civilization. One of the first crops grown during the Agrarian Revolution some 10,000 years ago was grain, and one of the first foods to be produced was beer. Whether brewing preceded baking is a hotly debated topic in archaeological circles, but the oldest-known recipe for beer is only 4,000 years old and comes from Sumeria. This brew was "mashed" by mixing unmalted grains and honey to form loaves which were then baked twice. The loaves would be broken up and boiled with honey and dates, which provided wild yeast for fermentation as well as additional sugars.

The idea that grain could be turned into a fermented beverage seems to have been discovered independently in Mesopotamia and South America, spreading as trade routes developed between agricultural areas. Egypt became an important exporter of wheat beer in the ancient world. Millet, spelt, sorghum, barley and buckwheat became the basis for brews flavored with herbs like skirret and oddities like powdered crab claws.

Ancient brewing techniques can be divided into three types: baked beers, fermented mash beers and chewed beers. Fermented mash involved boiling malted or unmalted grain without additional water, allowing a wild yeast or fungus fermentation to occur, then adding water and siphoning off the resulting beer. For chewed beers, grain was ground into flour, masticated by maltsters whose saliva contained enzymes that began the process of starch conversion, and then boiled.

Many of these beers are still brewed and enjoyed even today. From the sorghum-based beers of sub-Saharan Africa to the rye-spiced sahtis of southern Finland, indigenous beers continue to survive and thrive, using techniques and ingredients developed millennia ago. (What separates an "indigenous" beer from an "ancient beer" is that the former is a part of an unbroken, living brew tradition that stretches back into antiquity, while the latter, though it may be enjoying a revival, has been dead awhile.)

When setting out to brew the world's indigenous beers, you'll soon find that you have to leave a lot of baggage at the brewhaus door. The local brewers who create these beers had no way of maintaining modern sanitation and no desire to do so. In fact, native microbial flora and fauna are welcome helpers in the process of traditional brewing. Mashing is often done at fermentation temperatures, beer is fermented in open vessels, and it's enjoyed long before most of us would consider it to be finished.

The idea of making beer with no barley or hops, and inviting lactobacillus and wild yeasts to join the party, is enough to make most homebrewers experience mental meltdown. But if you want to replicate beers from faraway places, you have to give up a few of your cherished disciplines. So put down the B-brite and back away slowly; these beers are different! Barley warmth, hop tang and crystal clarity are less likely than opacity, sourness and hints of strange grains like millet, sorghum and spelt.

The great challenge in indigenous brewing is often in finding the right ingredients to brew with. You may have to beg, borrow or make your own before you can even start brewing. The procedures are also usually unfamiliar. Do you bake the grains before brewing, or do you fry them? Do you add packaged yeast, or just set out wort to capture wild yeasts for a "sourdough" starter?

Indigenous beers play an important role in the culture and diet of local peoples around the world. These beers often have ceremonial and sacred purposes in addition to everyday drinking; in a lot of places, homebrew may be a key source of necessary vitamins. They are ordinarily brewed for fresh drinking and would be consumed within a few days, usually while still fermenting and before they can become too sour. As a result, these traditional beers are often very effervescent, sour-sweet beverages. And they may seem surprisingly delicious even from that first, uninitiated sip.

Chicha

Chicha is the ancient corn beer of the Andes, brewed throughout South America and in Central America to a lesser extent. Chicha has never been brewed as a commercial product, except by chicheras, Peruvian alewives who cater to the local drinkers exactly

MALT YOUR OWN JORA

BEFORE BREWING chicha, you have to acquire some jora (malted maize). It's available in South American ethnic markets, but the cheapest and most practical route is simply to make your own. Always use food-quality dry corn (available at health food stores), not feed or seed corn, which may be treated with fungicide.

Soak the corn for 48 hours, draining and replacing the water at least twice a day. Then drain the corn and place in a sprouting container. A large colander works well for small quantities (up to four pounds), but for larger amounts a tray with holes drilled in the bottom is a better choice. Keep the container covered with a damp cloth to avoid drying out. Rinse the corn twice a day and turn it over completely at least twice a day to prevent molding.

Germination should occur within a few days. Note that the roots appear first; they are thin and white and will be about one inch long before the acrospire begins to grow. When the acrospires begin to sprout, keep the malt away from light, to avoid formation of chlorophyll. Allow the acrospires to grow to a length 2 to 3 times that of the kernel. The corn may develop a strong smell during germination; it's normal.

After germination is complete, the malted corn can be dried either in the sun on a plastic sheet, or in an oven at the lowest setting for electric models or with the pilot light on for gas. When it is dry, malted corn can be stored indefinitely in a sealed container away from moisture.

Note: Mills designed to crush barley malt, such as the Philmill, won't crush jora. You'll need to use a Corona grain mill or a heavy-duty electric mill.

like their great-great-and-so-on-grandmothers did. In the Andes, women retain their ancient role as the sole brewers, and on brewing day each house becomes a tiny pub.

Chicha is essentially brewed two ways: ancient and modern. The ancient method calls for grinding dry maize into flour, then chewing it into a soft paste called muko, which is used as the basis of a long, slow boil. Human saliva contains digestive enzymes that begin the long and mysterious process of starch conversion. These enzymes take the place of diastase in malt.

The modern method of chicha-making requires that the maize first be malted. Corn malt is called jora *(see sidebar at left)*. The beverage is slowly mashed, with or without the addition of barley malts, then boiled with spices and supplementary fermentable sugars. Chancaca, a local unrefined cane sugar similar to treacle, is often added to the boil. Ordinary brown sugar or piloncillo, a spicy Mexican raw sugar, can be substituted. Traditional brewers allow the wort to be colonized by wild yeast, but packaged brewer's yeast may also be used.

However it's mashed, chicha is always consumed at the frothy height of fermentation, never bottled or primed. Sometimes fresh strawberries are added to chicha, to make a drink called frutillada. Scott Kaczorowski, a homebrewer from Long Beach, California, recommends a ratio of 16 ounces of chicha to 1/2 cup chicha-strawberry slurry. "I'm here to tell you that frutillada is heaven!" he says. "The fresh berries add a little body and sweetness and are a perfect complement to the corn."

Chac Mool Chicha
(five gallons)

OG = 1.045 FG = 1.010
Bitterness = N/A

Ingredients

4 pounds yellow corn jora
2 pounds blue corn jora
1-1/2 pounds two-row pale malt
1-1/2 pounds chancaca, piloncillo or brown sugar
3/4 cup dried sweet orange peel
1 packet Windsor ale yeast

Step by Step

Mash-in jora and malt with 3 gallons water at 130° F for 20 minutes. Raise heat to 155° F and hold for 50 minutes. Bring mash to a boil. Sparge with 4 gallons boiling water. Collect 7 gallons runoff.

Add sugar and orange peel. Boil for 1.5 hours until wort reduces to 5 gallons. Cool the wort and pitch the yeast. Ferment at 60° to 70° F.

After 48 hours, taste the chicha. It should be sweet, corny, slightly sour from lactic fermentation and drinkable. If it's not, wait 24 to 48 hours and taste it again. According to Kaczorowski, "Chicha ferments out in as little as four days. It seems to be at its best on the second or third day, when it still has some sweetness and body."

Sahti

Sahti is the traditional beer of southern Finland, brewed with malted barley, rye and oats, flavored with juniper branches and sometimes hops. Although it's available commercially today, traditional sahti never was brewed from recipes but through a generational understanding of the process, which

varied from village to village. These days, sahti is brewed as both a low-gravity beer for daily consumption, and a high-gravity version that is reserved for important guests at ceremonial occasions.

Modern sahti malt is a blend of pale, crystal and enzymatic malts. Lahden Polttimo Oy, Finland's biggest malt producer, makes a sahti malt that contains 85 percent pilsner malt, 10 percent light crystal malt (40° Lovibond) and five percent enzymatic malt to aid in starch conversion. Some brewers will add one percent chocolate malt and two or three percent dark crystal malt for a deeper color. One 44-pound bag of malt is enough to brew a 15-gallon batch of sahti.

Sahti consumption can be tracked through sales figures for sahti malt. Judging by those statistics, sahti brewing is confined to two small regions in southern Finland, just north of Helsinki (although the practice has recently spread to the capitol as well). Rye malt is readily available in Finland, though it's rarer here. Rye berries or flaked rye, which can be found in health-food stores, can be substituted for the malt, if necessary.

Traditionally sahti was brewed in the sauna, which maintained a constant temperature for aid in starch conversion and also kept bacterial infections to a minimum, since the sauna was kept scrupulously clean, and its hot, dry environment was inhospitable to microbes. The large copper kettles used to produce a steamy sauna bath did double duty as sparging tuns. The beer is often consumed in the sauna as well. A friend of ours offered her sauna for the sahti experiment, but we decided to brew first and have a sahti sauna later.

Juniper branches served triple duty: as a flavoring in the beer, as a lautering screen and as a natural preservative, keeping evil spirits who would spoil the beer at bay. Sahti has a characteristic phenolic flavor, comparable to that produced by German weizen yeasts, which can be attributed to the use of Finnish baker's yeast.

On its own turf commercial sahti is disappearing fast, due to heavy taxation pressure on alcohol. As of this writing, only six commercial sahti breweries still survived: Finlandia Sahti, Hollohan Hirvi, Joutsan Sahti, Lammin Sahti, Panimo-Ravintola Sahtirouvi and Stadin Panimo. Luckily, breweries and patrons have found a way around this: The breweries provide the unfermented wort, which the customers can turn into beer at home. Homebrewers have also been known to brew a clandestine batch for sale.

Commercial sahti is not exported; since it isn't pasteurized, it has a very short shelf life. If you find yourself in Helsinki, Zetor, the Black Door and St. Urlo's Pub have sahti on a fairly regular basis. St. Urlo's even hosts Sahti week, starting on Kalevala Day (February 28), a holiday devoted to Finland's national epic and celebrated with parades, recitations, lectures and, of course, sahti drinking.

Vainamoinen Sahti (five gallons)

OG = 1.058 FG = 1.012
Bitterness = 8 IBUs

Ingredients

3 pounds pale malt
3 pounds pilsner malt
1 pound carapils malt
1 pound rye berries
(or rye malt, if available)
3/4 pound English mild ale malt
1/2 pound crystal malt
(60° Lovibond)
1/2 pound flaked oats
1/4 pound chocolate malt
2 pounds juniper branches
(with berries)
3.5 AAU of Cluster hops
(0.5 oz. of 7% alpha acid)
1 packet Nottingham ale yeast
1/2 cup corn sugar for priming
(optional)

Step by Step

Boil rye berries in 1 gallon water until gelatinized (about 30 minutes). Add oats to last 10 minutes of boil. Mash-in grains at 104° F to 1-1/2 gallons water. Add rye and oat mash. Cover and leave to sit overnight.

Bring 7 gallons of water to a boil, along with 3 or 4 juniper branches. Meanwhile, form a filter in the lautering vessel with the remaining juniper branches.

Add 1/2 gallon juniper water to mash. Stir and take temperature. Temperature of the mash should be about 180° F. Continue additions every 30 minutes for 6 hours. Then slowly bring the mash to a boil.

Pour mash into lautering vessel, sparge with 4 gallons of boiling juniper water. Collect 6 gallons runoff. Force-cool 1/2 gallon runoff to 75° F, add yeast. Add hops and boil wort 30 minutes. Remove hops and cool to 75° F. Pitch yeast starter. Ferment at ale tempera-

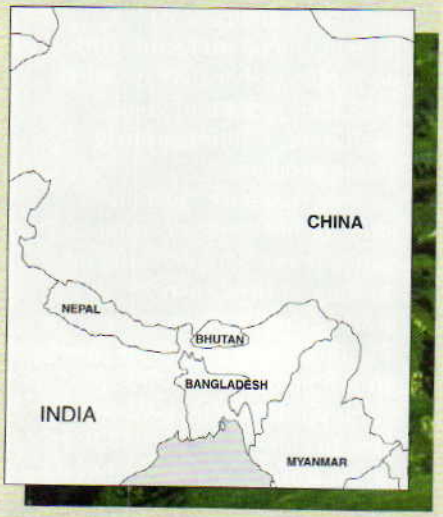
Storing Indigenous BEERS

MOST INDIGENOUS BEERS are short-lived: You can store them for a while in a covered container in the refrigerator, and that's about it. We've bottled chicha and sahti with no problems because we used packaged yeast and good sanitation, yielding a fairly stable product.

For the more "primitive" kinds of beer, we recommend either immediate drinking or bottling in Grolsch-type bottles, the kind you close with a bail. This way you can ease off the pressure to prevent burst bottles. Also, it's a good idea to store your bottled beer in the fridge. Any sewa that Sean Richens can't finish immediately is frozen rather than bottled; the only downside to this treatment is that the beer turns bright green.

tures (65° to 70° F). Bottle when fermentation is complete (about two to three weeks).

Traditional sahti is consumed while still in active fermentation; priming is optional, but may be desirable.



Chang

Chang, also known as tchang or chung, is the name given to beers brewed throughout the Indian subcontinent and the Himalayas. The grain used varies from country to country. In India it's brewed from rice, in Nepal from rice, barley, millet and sometimes corn. Tibetan chang is usually made from barley, though it's sometimes made from buckwheat or millet.

Chang comes in two types, gruel chang and beverage chang. The first kind involves adding a little water to fermented grains, then crushing and drinking the whole thing. The second uses a gallon or so of water over the fermented grain, then the brewer draws that off and drinks it. Several batches of beverage chang can be produced from a single batch of grain.

The key ingredient in chang is the yeast cake, which goes under various local names. It's made of a combination of barley flour, ginger and water and it promotes the growth of a complex of different yeasts, molds and fungi. We made our own using fresh ginger that had started to get a little funky. Aspergillus fungi naturally colonize ginger roots, and can be encouraged to ferment chang. This method requires a bit of luck and a leap of faith, but can produce something resembling authentic chang — without requiring a field trip to Asia.

First, obtain some ginger roots and refrigerate them for a few weeks, until they are slightly soft but still firm. Examine the ginger roots and discard any that have bluish penicillium colonies on them. Grate the ginger to a very fine consistency (a microblade grater works well for this). Combine the ginger at a 1-to-1 ratio with barley flour to make a paste, adding a little water if necessary. Form the paste into small round cakes, cover with a damp cloth and allow to ferment for a few days at room temperature. Don't allow the cakes to dry out.

The cakes are ready when they smell strongly of fermenting ginger and have a slick outer surface. At this point they can be used for brewing or dried in a food dehydrator for later use. When a successful strain of chang microflora has been found, it might be prudent to save it through yeast culturing.

Kangamangus Chang
(three one-gallon batches)

OG = N/A FG = N/A
Bitterness = N/A

Our recipe breaks one of the rules of chang-making; it has malted barley for extra enzymatic power. Traditional chang relies on fungal action to break down starches to the point where they can be consumed by wild yeast. Millet and barley flour are available at health-food stores.

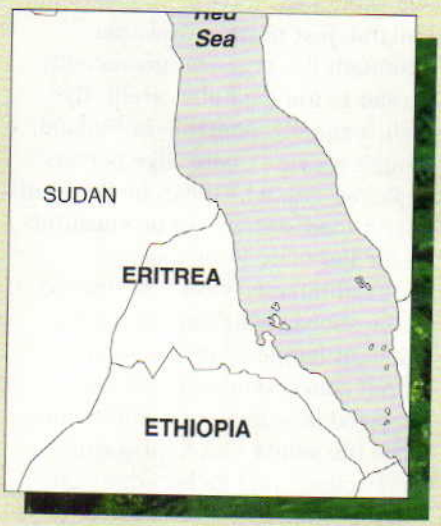
Ingredients

1/2 lb. millet
1/2 lb. long grain rice
1 lb. crushed pale barley malt
1/2 gallon water
1 yeast cake

Step by Step

Add grains to 1/2 gallon cold water and bring slowly to a boil. Boil until grain is thoroughly cooked and all water is absorbed (30 to 45 minutes). Pour mash out onto a jelly roll pan and allow to cool to room temperature. Crumble yeast cake over mash and mix to thoroughly incorporate. Transfer to a sanitized fermenter bucket and allow to work for 3 to 5 days.

Pour 1 gallon cool water over the grain and allow to stand for several hours. Draw off the liquid and refrigerate or drink immediately. Additional water can be added over a two- to three-week period. Young chang is milky and fairly bland, with a faint taste of grain and ginger. The next few batches will be stronger and more sour.



Sewa

To learn about sewa, an indigenous African brew, we turned to an unlikely locale: the Twin Cities of Minnesota. Chris Schiller of Northern Brewer, a leading St. Paul homebrew supply store, gave us a firsthand description.

"We have a local East African immigrant population, mostly from Somalia, Ethiopia and Eritrea," he explains. "They brew a potent and sweet beer called sewa, which is

pronounced SU-wa. In Africa the beer is made with millet and a dark barley, approximately 40° Lovibond.

"The version my St. Paul customers brew has about eight pounds of mixed crystal malts and some adjunct sugar, such as honey. It is fermented quickly, using a powdery yeast, and is drunk fresh, say within a week or two of brewing. It is flavored with what one customer said was 'African hops.' Others have described it as 'grass' or 'herb from Africa.' It is possible some of its potency comes from this herb. The examples I've tried are dark brown, hazy, sweet and potent."

Sewa is an Eritrian name; the same beer is called tella in Ethiopia. The beer is flavored with "African hops," also known as "gesho." Gesho is made from the powdered leaves or shredded bark of a tree (*Rhamnus prinoides*). Finding it in the Western hemisphere can be tough, though (*see sidebar*).

Sean Richens, a homebrewer from Winnipeg, generously sent us his recipe for sewa. He uses frying to convert grain starches, as opposed to mashing. This style of brewing is similar in concept to "ancient" baked beers like sikaru and keptinus alus from Lithuania, except that sewa is made with a fried tortilla-like bread, called mattaka, instead of baked biscuits.

"This recipe is pretty sophisticated," Sean told us. "It has all the modern techniques, except for heating the mash and boiling the brew. Actual sewa or tella recipes vary greatly according to the area where the brewer lives. I made mine using barley malt as the enzyme source, and millet as my unmalted grain.

"Sewa starts out (about two days after filtration through cheesecloth) with some residual sweetness and only a mild lactic sourness. Over the next couple of days, the sweetness disappears, the lactic sourness increases and is joined by an acetic sourness. It never quite reaches the sourness of a lambic.

"More importantly, under the sweet-sour balance, a complex aroma develops. It's somewhat reminiscent of a good old blue cheese, but milder. The butyric acid-propionic acid aromas never completely go away, but fade and blend in to the mix. It also has a texture — it should not be filtered clear. There should be enough solids to leave a somewhat gritty feel in the mouth."

GESHO: THE AFRICAN HOP

THE "AFRICAN HOP" IS NOT in the *humulus* family at all: It's actually a buckthorn native to East Africa. The leaves and bark are both used in making "tej" mead, but Sewa uses only the leaves. The bark is often called "woody hops" in recipes and the leaves "leafy hops."

Gesho is expensive and hard to find. You need to look in a major city with a good-sized Ethiopian or Eretrian population, such as Washington or Los Angeles. Once there, you should look for stores with names starting with "Merkato." Also try Ethiopian or Eretrian restaurants. Our Web search turned up a few possibilities, but the only source we are certain about is: Ethiopian Spices, 60 Kensington Avenue, Toronto ON MST 2KI; (416) 598-3014.

Chris Schiffer of Northern Brewer says the local sewa brewers in St. Paul get their gesho from relatives back in Africa, and he's been able to barter for some. Never try to substitute ornamental or native Californian buckthorn species; these are dangerously laxative. If you want to make this beer but can't locate any gesho, Sean Richens has this suggestion: "If I had to substitute, I would try a small amount of aged hops (like those you would use in a lambic) for the antibacterial action and a handful of yellow birch twigs for a vague wintergreen-citrus flavor."

East African Sewa
(two gallons)

OG = NA FG = NA
Bitterness = NA

This recipe has three steps. First, make a starter and let it ferment three days. Then make mattaka and use it to brew the sewa.

To make starter:
1 lb. pale barley malt, crushed
1 cup powdered gesho leaves
2 gallons water

Combine barley malt, gesho and water in a sanitized fermenter. Allow to ferment 3 days.

To make mattaka:
1 lb. millet flour
Water

Mix millet flour with enough water to make a thin batter. Fry about 20 thin pancakes, each eight inches in diameter. Use as little oil as possible. Cool and tear up.

To make sewa:
20 mattaka cakes, shredded
1/8 lb. crystal malt
1 lb. dried dates, chopped

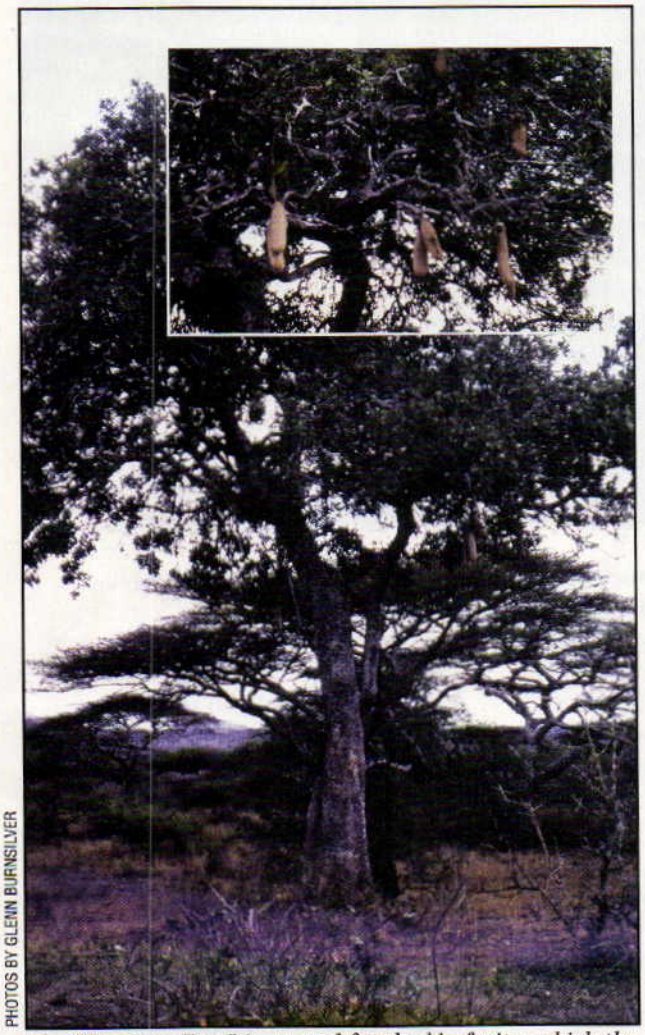
Add mattaka, crystal malt and dates to the starter. Allow to ferment two or three days and strain. This can be a challenge; the particulate matter in sewa can clog cheesecloth till it's watertight. Start with small amounts and use your ingenuity. Return the beer to the fermenter and allow it to work for two or three more days before drinking. The beer is drunk while still fermenting. Traditionally, the first day it's suitable for kids as a vitamin supplement. The second day it's suitable for respectable women, and by the fourth day you invite the men of the village to finish it off and enjoy a good drunk. ■

Joe and Dennis Fisher are frequent contributors to Brew Your Own.

Out of Africa

By Glenn BurnSilver

Uncovering the secret of Maasai cucumber beer



PHOTOS BY GLENN BURNSILVER

The "Sausage Tree" is named for the big fruits, which the Maasai also call "cucumbers," that hang from its vines.

GOOD BEER SPEAKS TO me. But in Kenya, where I lived during the past year, the local beer selection fell into two categories: bad and worse. I could only dream of brewing a batch of my beloved "Blacker than Dread" stout again.

That all changed when my wife and I were invited to attend a traditional Maasai wedding. It was a beautiful event, with women adorned in beaded jewelry and multi-layered shukas (cloth wraps), singing and dancing. Another thing that got my attention was the beer, which as an "Mzee" (elder man) I was allowed to sample. The beer is produced from the wild "cucumbers" of the Sausage Tree *(Kileglia Africana)*, known locally as "Oldarpoi." The beer, which is called Enaisho Olmomo, is slightly cloudy and sweet like mead. It went down easily — too easily, in fact. And boy, was it strong! One glass and I gave the car keys to my wife.

My curiosity was piqued, so I asked our research assistant, Richard Solonga Supeet, if he knew the recipe for cucumber beer. As a child, he said, he had watched his grandmother make the beer, stealing sips when she wasn't looking. The recipe was common knowledge and very simple.

I was excited about the prospect of brewing again. So while I purchased the sugar and honey, Supeet borrowed the cucumbers from his cousin (they can be re-used numerous times) and the traditional gourd — called an "Olmosori" — that we would brew in. No yeast was needed — somehow the cucumbers occupy that role.

The "sausage tree" is named for the large fruits that hang down from thin vines like sausages in a deli. They aren't like real cucumbers at all, but the Maasai call them cucumbers because the dried insides of the fruit resemble a cucumber. The fruits are boiled for five days before the hard outer skin can be broken and the insides used for making beer.

The Olmosori gourd is imperative for producing good beer, Supeet explained, and in the past was obtainable only in trade for a cow — a valuable investment, as cows represent the livelihood of the pastoral Maasai. The gourd imparts a flavor to the beer, because the inside is seasoned with smoke from a burning tree branch. Though it is now common to find this beer being brewed in plastic cans, we opted to brew in the traditional method by using a gourd.

Two weeks after the wedding, we brewed at our bush camp situated on the savanna just north of 19,560-foot Mount Kilimanjaro. The entire process took just 30 minutes: boil water, dissolve sugar, add half to the Olmosori, coat cucumbers with honey and add to gourd with remaining water. Finished! We then placed the gourd inside a black plastic bag and positioned it in the hot sun by day and near the fire at night. Each day the contents were shaken to keep the brew "cooking."

After five days Supeet noted that the audible "sizzling" heard when uncorking the Olmosori had stopped, signaling the beer's completion. Being neophytes in brewing Maasai beer, and unsure if it was truly finished, we decided to call in an expert and friend, an older Maasai Mzee wise in the art of homebrewing. Kamunyu Lekina

took one sip and pronounced the beer "perfect."

"The Maasai historically say you could taste your future in Enaisho Olmomo," Lekina told us around the campfire. "If you put everything in accurately and the beer turns out well, you will be prosperous. But if it is bad, then trouble lies ahead. This is very good beer. You have a good future ahead."

Elated at our good fortune, we toasted our success and embarked on a cross-cultural exchange of brewing stories. For his part, Lekina shed light on the beer's history. It is unclear when the secret of Enaisho Olmomo was first discovered, but the "Oloiboni" — Maasai seers — for centuries have used the beer to "talk" with the future. Legend reveals that two centuries ago the famous Oloiboni Mbatiany consumed a batch of beer and foresaw a time when "a big snake would cross all Maasailand." This message foretold the railroads and roads that eventually crisscrossed the area.

Today the beer is usually reserved for cultural ceremonies, such as a "Supukuu" (wedding), "Emuratare" (circumcision) or to celebrate a birth. Only elder men and women are culturally allowed to drink — although others choose to imbibe as well. For us there was no ceremony, just an opportunity to act as "elatia" or neighbors. "It is sharing everything, sharing a beer with friends," he said. "If you give it to a friend then they feel protected."

Lekina stood up and slowly walked toward a nearby tree. "Another sign of good beer," he called out as he disappeared into the darkness, "is that if it is good, then you will really need to pee." Laughing, we got up to follow him.

Enaisho Olmomo: Maasai Cucumber Beer

OG = 1.095 FG = 1.016 ABV = 10.1%

Here's the recipe we followed to make our cucumber brew. The beer is pale yellow, almost translucent in color. It is not filtered, so a lot of dark-green particles float around in it, giving the beer a cloudy appearance. The bigger particles settle to the bottom of the cup; this sediment is never drunk. The taste is sweet, sugary and sticky. It is usually consumed warm.

A practical note: If you want to make Enaisho Olmomo, you have to procure the fruits of the African "sausage tree." This will probably prove impossible unless you pack your bags and head to Kenya. Still, I offer this recipe in the spirit of "armchair homebrewing," and also in the hope that some intrepid homebrewer might figure out a workable substitute! The best hint I can offer is that the "cucumbers" resemble a loofah when dried; the insides are coarse and rough.

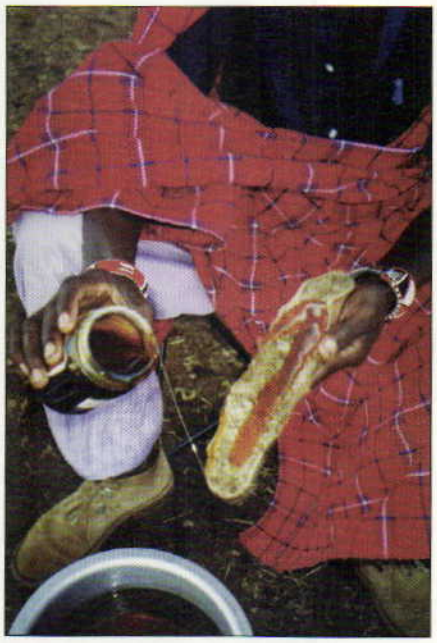
Ingredients

5.5 lbs. sugar
1 lb. honey
1.25 lbs. Oldarpoi, dried and cut in half lengthwise

Step by Step

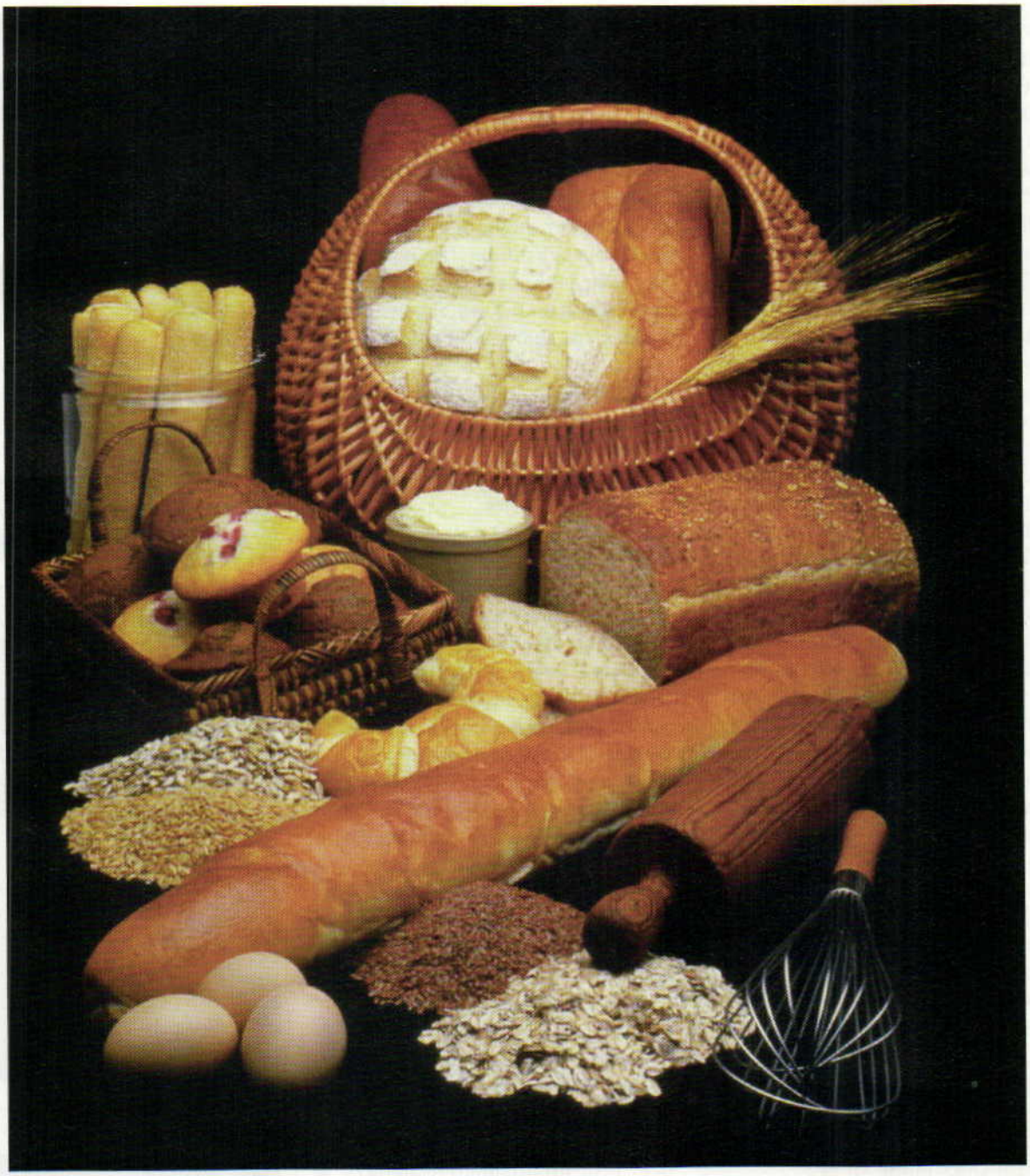
Bring 3 gallons of water to boil. Moisten cucumbers with 2 cups water and dissolve sugar in remaining liquid. Add half the water to an Olmosori gourd (a glass carboy or plastic fermenting bucket also will work). Coat the cucumbers with honey and add to gourd with remaining water. Cork and shake vigorously for several minutes. (The Maasai leave the gourd tightly corked, but it might be safer to use an airlock and stopper.)

Cover with black plastic and place in warm location. Shake daily. Uncork after five days. If "sizzle" has stopped, rack to secondary. If not, check each day until finished. "Belch" secondary daily, though filtering sediment and natural yeasts might stop secondary fermentation. Beer lasts approximately 30 days. ■



Just like brewing in the good old USA: First you harvest the "cucumbers" and boil them for five days. Then you coat them with honey, stick them in a gourd, add water and cork it. A few days later, toast with Maasai tribal elders.

BAKING



WITH BEER

Use homebrew, malt extract and spent grains to make tasty breads and desserts

MONASTIC BREWERS CALLED beer "liquid bread," while the legendary French baker, Lionel Poilâne, reportedly refers to his bread as "solid beer." It's not a case of culinary confusion, just the mixture of human history through eating and drinking.

That's because, when baking with beer, you are partaking in the origins of brewing. Sumerian earthenware jars excavated in 1996 point to both bread-making and beer-brewing evolving side by side, about five thousand years ago.

Certainly, baking with today's beer is a snap. To bake a fresh crusty loaf, you just have to open a bottle and pour it into a quick-bread mix. But baking with beer in a yeast dough or dessert can be more challenging, due to the presence of hops and aromatics. Hops can alter the flavor of bread because the bitter flavor intensifies while baking.

When "real ale" is available, the yeasty bite of this unfiltered beer pairs well in savory baked goods, as well as some desserts. In quick breads, fritters and scones, the carbonation of beer adds light texture.

Malt is a miracle for bakers

But it's really malt that's the miracle of modern baking. Diastatic malt powder or barley malt extracts are often used in professional bakeries to add nutrition, improve crumb texture and appearance, and enhance the keeping quality of the finished loaves. Breads that require second rises (pumpernickel, rye and other hearth breads) can benefit from a dose.

That's because professional bakers evaluate bread by many characteristics beyond flavor and freshness. Breads are judged by their volume, symmetry, crust color, crust crispness, break and shred, grain, texture, aroma and mouthfeel. Many bakers agree that adding malt to bread dough will contribute to yeast baking success.

Susanne Stoeger-Moore, director of food sales for Briess Malts in Chilton, Wisconsin, explains how diastatic malt differs from the malt extract formulated for homebrewers. "Diastatic malt contains natural enzymes, mainly amylases and proteases. This type of malt acts as a dough conditioner; for example, a pizza dough will relax, roll out and not shrink up badly during baking." In addition, the amylase also breaks down starch into sugars, which helps feed the yeast and aids in browning. The proteases break the proteins in the flour down into amino acids, which also spurs yeast growth, as well as improving the flavor and aroma in breads.

Malt extract is made from diastatic malt ... so it also contains natural sugars to feed the yeast and aid in browning as well. Extract also contains amino acids. It does not have any enzyme activity and contributes more natural sweet malt notes, which are wonderful in hearth breads.

Just replace a tablespoon of sugar in your favorite bread recipe with a half-teaspoon of diastatic malt powder, or two tablespoons of malt extract. Add malt extract to the warm water used to dissolve the yeast, stir till blended, and mix it into the dough for the first rise.

Non-diastatic malt is added simply as a sweetener. With that in mind, be sure to use unhopped malt extract. Eden Natural Foods makes a food-grade unhopped amber malt extract as a sugar replacement. Packaged in a re-sealable jar, the product is more convenient for baking than opening a can of homebrew extract that's pre-measured to make a five-gallon batch of beer. You can find diastatic malt powder at baking supply stores or through the Baker's Catalogue (800-827-6836, or online at www.KingArthurFlour.com).

Beware of adding too much malt extract or diastatic malt powder, since the increased yeast activity can cause problems. As homebrewers know, carbon dioxide and alcohol are the byproducts of yeast metabolism. Though alcohol is delightful in beer, it is less so in dough. The bread will be "overproofed," a baker's term that translates into gummy dough that's difficult to handle, and upon baking, yields a loaf that smells of alcohol, with a dense, unpalatable crust.

Baking with beer

Beer can elevate the texture of cakes, muffins and other baked goods. Scones are delightful alternatives to biscuits, at both brunch and dinner. In her recent book, "The Beer Cook Book" (Faber&Faber, sold through the Campaign for Real Ale, camra@camra.org.uk), author Susan Nowak includes a chapter on baked breads and desserts made with beer. In her scone recipe *(see page 35)*, she uses Red Leicester cheese, full of robust, rounded flavors.

by LUCY SAUNDERS

BAKING with SPENT GRAINS

The mash is complete, the wort is chilled and you're staring a a pile of spent grains. Should you haul them to the compost heap or try to recycle them yet again as an ingredient in bread?

Spent grains are too soggy to use for baking straight from the brew kettle. I recommend draining the grains in a colander overnight, then toasting them lightly in the oven. Spread a thin layer of spent grain on a greased baking sheet and toast at 300° F, or until the grains seem dry and roll about when the pan is shaken. The amount of baking time will vary according to the sogginess of the grains, so open the oven to peek, and turn the baking pan every 10 minutes or so. Let the grain cool to room temperature, then add to dough.

At this point, the spent grain has no flavor left, and simply adds texture to a baked loaf. Try sprinkling the toasted grain with a bit of spice to add some punch. For example, dust one-half cup of toasted spent grains lightly with chili powder and then add to a cornbread mix. Or sprinkle with Italian herbs and add to pizza dough.

Here is a recipe for spent-grain pizza dough from Hale's Ales Brewery and Pub in Seattle. The recipe yields dough for four 20-inch pizzas.

3.25 lbs. high-gluten flour
1.5 T salt
2 T dry baking yeast
2 oz. spent grains
1 cup porter or other tasty ale
1 cup olive oil
2 cups tepid water
2 T cup honey
2 T garlic powder

Dissolve yeast and water together. Add yeast, honey and porter to mixing bowl. Combine dry ingredients and add to mixing bowl. (Amount of flour will vary depending on wetness of grains.) Mix until dough is smooth. Let dough double in size and then punch down. Form dough balls. Let them stand until they double in size, then form into pizza.

—Lucy Saunders

HALE'S ALES BREWERY & PUB

Derek Wilson, sous chef of the Great Lakes Brewing Company in Cleveland, makes jalapeño biscuits with Dortmunder, as well as adding stout to chocolate cheesecakes. "I think chocolate is the best flavor for desserts made with beer," says Wilson. "Otherwise, the bitter hop notes compete with more delicate flavors such as vanilla or fruits."

Spicy cakes, such as gingerbread and apple-spice cake, blend with mild ales, while caramel desserts can also stand up to the bitter edge that beer contributes. You'll get terrific results from the following recipe for porter gingerbread cake, glazed with caramel.

Porter Gingerbread

This recipe is adapted from Marie Simmons and Richard Sax, in the book "Classic Home Desserts" (Chapters Publishing, 1994).

2 sticks softened butter
1 cup packed brown sugar
2 large eggs
8 oz. blackstrap molasses or dark cane syrup
8 oz. unhopped barley malt extract
3-1/2 cups all-purpose flour
2 tablespoons ground ginger
1/2 teaspoon ground cloves
1/4 teaspoon white pepper
1-1/2 teaspoons baking soda
1/2 teaspoon salt
8 oz. porter
1/3 cup soft crystallized ginger (Buderim or Pitter's Pantry)

1. Preheat oven to 350° F. Brush the inside of a tube pan with melted butter or spray with cooking oil.
2. In a large bowl, beat the butter with an electric mixer at medium speed until fluffy, and gradually add the brown sugar. Beat in the eggs, one at a time. Gradually beat in the molasses and malt and blend well.
3. Sift the flour, ground spices and leavenings. In a blender, mix the beer and crystallized ginger until the ginger is ground very fine. If your blender blades are dull, try chopping the ginger by hand. Grease the blade of your knife with oil to

prevent the ginger from sticking.
4. Mix the cake batter with the dry ingredients, alternating with the beer, in thirds. Stir gently after each addition, but do not overmix.
5. Spoon the batter into the prepared pan. Bake for 50-60 minutes, or until cake begins to pull away from the side of the pan.

Caramel Glaze

1/4 cream
1/2 cup sugar
2 tablespoons barley malt extract

1. Boil the cream and sugar together until the sauce is thick and bubbly, with an even rolling boil, and evenly coats the back of a spoon.
2. Remove from heat and let cool 3 minutes, then stir in malt extract. Drizzle glaze over cooled cake.

PHOTO BY IAN MACKENZIE

Eight ounces of porter gives these spicy gingerbread muffins a nice kick.

Ale-Cheese Scones

Sue Nowak is an accomplished cook and editor of CAMRA's best-selling guidebook, "Good Pub Food." She writes often about beer and food for the *London Telegraph* and BBC's *Good Food Magazine*, and has produced elegant banquets for the Guild of British Beer Writers.

In her "Beer Cook Book," Nowak used the award-winning Hopback Summer Lightning, a straw-colored ale full of wheat and grassy notes, to mix in her scone batter. Not having that lovely ale on hand, I used a German wheat beer, Weheinstephan hefeweiss, with a Golden Dragon Ale and Mustard Seed cheese (a Welsh cheese imported from the United Kingdom). I moderated the bitter taste of the unfiltered wheat beer with a tablespoon of sugar. You could also try making this recipe with a sharp Cheddar cheese, grated and mixed with a half teaspoon of brown mustard seed. (Recipe (c) Sue Nowak, 1999)

8 oz. all-purpose flour
pinch salt
1 teaspoon baking powder
1/4 teaspoon baking soda
1 tablespoon sugar (optional)
2 oz. softened butter
1 teaspoon powdered mustard
4 oz. grated Red Leicester cheese, or sharp cheddar
5 oz. golden ale
1 oz. melted butter, whisked with 1 oz. ale for glaze

1. Preheat oven to 425° F. Sift flour and leavenings into a large bowl, and rub in the butter lightly, until the flour clumps a bit. Stir in 3 oz. of the grated cheese, and then the ale, mixing lightly with your fingers to make a soft dough.
2. Place the dough on a floured surface and gently pat it to a thickness of about one inch. Keep the dough tender and light by patting it by hand, and do not use a rolling pin.
3. Cut out triangles of the dough, about 3 inches, brush the tops with melted butter-beer glaze, and sprinkle on the remaining cheese.
4. Arrange scones on a greased baking sheet. Bake at 425° F for 12-15 minutes, or until puffy and golden brown.

Jalapeño Bread

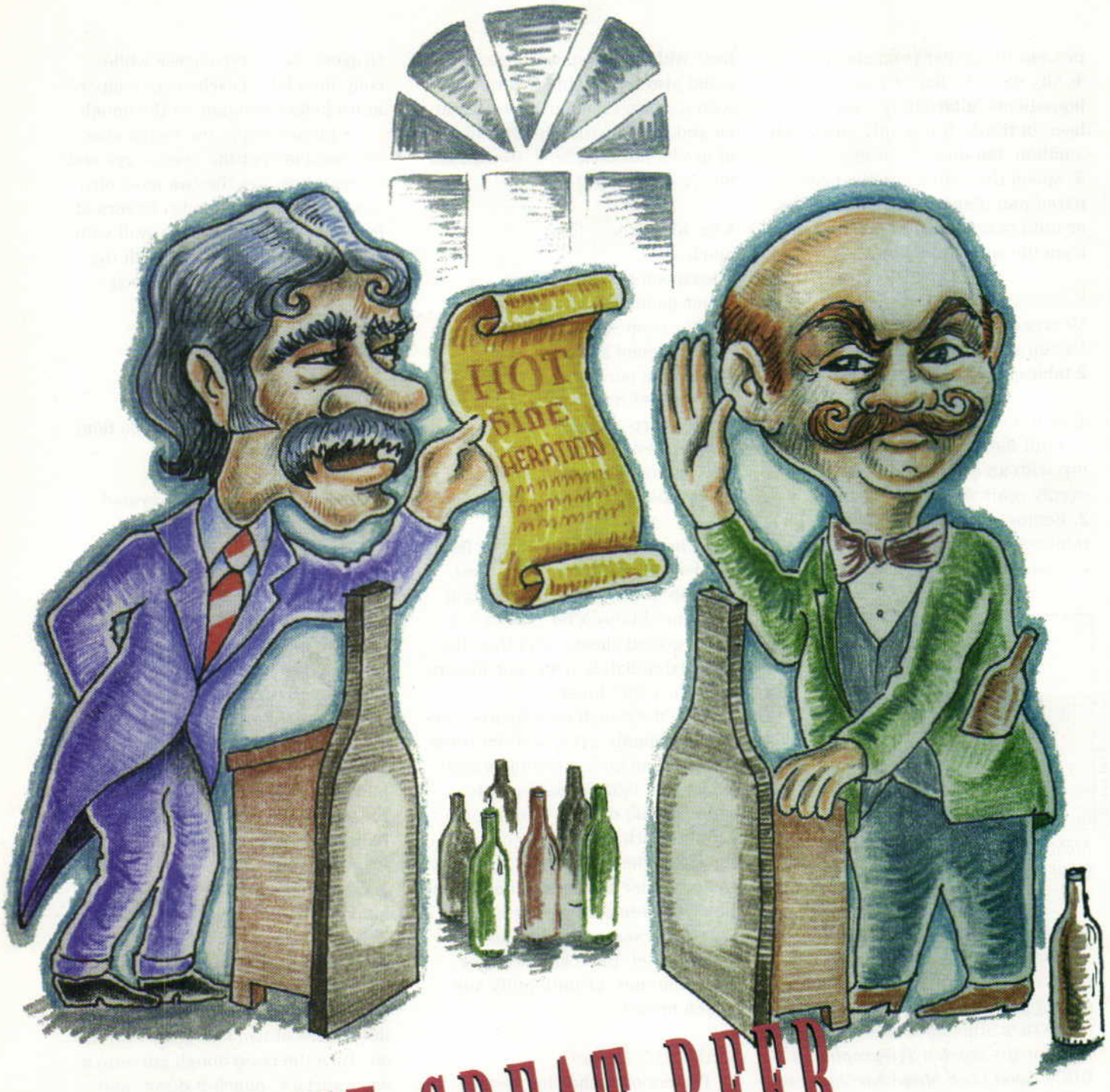
Professional chef Joe George conducts classes on cooking with beer in upstate New York, near his hometown of Buffalo. He offers the following tips for baking with beer:

- When using beer in a yeasted recipe, make sure the beer is at room temperature or gently warmed. Cold beer makes the yeast dormant. Malt extract is easier to blend when warmed as well.
- Cheeses are compatible flavors for beer breads. The obvious choice is cheddar, but other strong cheeses work also, such as Gorgonzola and Gruyere. Grate the cheese while cold, then let it reach room temperature before blending in the dough.
- Flour used in the recipe also can complement the beer — rye and whole wheat are the two most obvious choices. The complex flavors of fresh or dried chiles pairs well with beer also, not to mention with the cheese, as in the following recipe.

Yield: 2 loaves
2-1/4 cups warm beer
2 tablespoon active yeast
1 teaspoon salt
6 cups unbleached all purpose flour
5 fresh jalapeño peppers, seeded and minced
6 ounces cheddar cheese, grated
1 whole egg

1. In a small bowl, combine the beer, yeast, sugar, salt, and 2 cups of the flour. Stir until all the ingredients are incorporated, cover with plastic wrap or a damp cloth and let rest in a warm place for 30 minutes or until bubbling and frothy.
2. In a large mixing bowl combine the remaining 4 cups flour, minced jalapeño, and cheddar cheese. Add the beer-yeast mixture into the flour, cheese, and jalapeño. Stir with a spatula until incorporated enough to handle, then turn it out onto a work surface.
3. Knead the dough for 5-10 minutes, place in a covered bowl and let rest in a warm place for 30 minutes or until doubled in bulk. Brush the insides of two loaf pans with the oil. Turn the risen dough out onto a work surface, punch it down, and cut it into two even pieces.
4. Preheat the oven at 375° F. Shape into loaves and place in the oiled pans. Cover and let rest for 20-30 minutes. Whip the egg and brush it lightly on the loaves. Bake for 25-35 minutes or until golden brown and sounds hollow when tapped. (Recipe (c) Joe George, 2000) ■

Lucy Saunders is the author of "Cooking with Beer" (Time Life Books, 1997). She wrote "Beer Meets Meat" in the Summer issue.



THE GREAT BEER DEBATES

story by CHRIS COLBY • illustration by JIM WOODWARD

YEAST PITCHING, HOT SIDE AERATION AND ALUMINUM KETTLES: A CLOSER LOOK AT THREE ISSUES THAT HOMEBREWERS LOVE TO ARGUE ABOUT.

There's nothing like having a beer with a fellow homebrewer. Nothing, that is, except for having a beer with a fellow homebrewer and telling him that his brewing practices are all wrong. Homebrewers love a good argument, and there's no shortage of good arguments within the hobby. If it's possible to do something more than one way, there will be homebrewers in each camp who adamantly insist that their way is the right way. In this article, I'll review three homebrew controversies and try to sort fact from fiction.

Yeast Starters

If you pick up a copy of *BYO* ten years from now, there might be articles about brewing with nanobots or stories about which gene sequences to insert into your brewing yeast. There might also be an article on whether to pitch your entire yeast starter or whether to collect the yeast sediment and pitch only that. The "whole starter" versus "yeast sediment" controversy has been around a long time and probably won't go away soon.

Pitch the Whole Thing!

Homebrewers who advocate pitching the whole starter claim that pitching the whole starter ensures that yeast health is maximized. If the starter is pitched at high kraeusen, the yeast are actively fermenting. They have taken in oxygen, built up their cell walls, and are actively taking in sugar and producing alcohol and CO_2. Yeast in this condition can "hit the wort running." The time between pitching and when active fermentation is visible (the lag time) is minimized. So the opportunity for a wild yeast or bacterial infection to take hold is minimized, too.

Whole starter advocates claim that yeast in the sediment is not as healthy as actively fermenting yeast. Yeast sediment is formed by yeast that have stopped fermenting and dropped out of solution, or yeast that have dropped out of solution when the starter is crash cooled. In either case, this yeast will need to recover before it can start fermenting. And while it is recovering, other microorganisms can be growing within the wort.

Pitch the Sediment!

Homebrewers who advocate pitching only the yeast sediment see things differently. By pitching the whole starter, you are also pitching the metabolic byproducts produced by the yeast during the growth phase. In particular, pitching the whole starter means adding diacetyl to your wort.

Diacetyl is a molecule that forms early in fermentation, when oxygen is still present in the wort. The precursor of diacetyl, alpha-acetolactic acid, is formed by yeast metabolism. Yeast excrete alpha-acetolactic acid into the wort, where it can react with oxygen and form diacetyl. Diacetyl lends a buttery taste and smell to beer. Although diacetyl is desired in some beers, most brewers strive to get rid of it. Most beer drinkers perceive beer without perceptible diacetyl to be "cleaner" than beer containing diacetyl.

Yeast absorb diacetyl later in fermentation. A good clean yeast will absorb diacetyl until it is at a concentration below its taste threshold. Wyeast 1056, reputedly the same yeast Sierra Nevada uses and a favorite among homebrewers, is a good diacetyl reducer. Other yeasts, especially some British ale yeasts, tend not to reabsorb all the diacetyl they produce.

By pitching only the sediment, you pitch the yeast but leave behind their wastes produced in the growth phase. This is the heart of the "sediment only" position. But, there are other practical reasons to pitch only the yeast sediment. If you pitch the whole starter, you will need to make the starter similar in color and gravity as your beer. This isn't always practical. When making a barleywine, for example, most brewers make a starter of average gravity and pitch only the yeast. Pitching the whole starter would dilute the barleywine wort.

Both Sides Respond

Advocates of sediment pitching insist that the criticisms of sediment pitching aren't compelling. While lag time is increased when only the yeast is pitched, infection is not a problem if you clean and sanitize your equipment well. In addition, yeast are hardy and will bounce back quickly when given a nice home in a well-aerated wort.

The "whole starter" folks likewise don't buy the sediment-only critiques. A clean yeast strain will eventually take up the diacetyl it produces. Likewise, other metabolic byproducts get absorbed or are blown off during fermentation. In addition, it only takes a little planning to ensure that your yeast starter's gravity and color is compatible with your wort.

Resolution?

So who's right? Well, as is the case with many long-standing controversies, neither side is right or wrong. Whole starter advocates see a starter at high kraeusen as a population of maximally healthy yeast. Sediment pitchers see a population of yeast swimming in their own wastes. Conversely, whole starter advocates see sediment as a pile of sickly yeast, while sediment pitchers see it as a blanket of dormant cells. The point that often gets lost in the whole debate is that you can brew good beer using either method. When choosing between the methods, you simply have to determine what factors are the most important to you. Do you worry about infection? Do you get nervous during the time between pitching and the first signs of fermentation? If so, you will probably prefer pitching the whole starter. When pitching the whole starter, make your starter as similar to your wort as you can. And pick a clean yeast strain, unless you want diacetyl and other fermentation byproducts in your finished beer. Finally, plan to leave room in your fermenter to hold the entire volume of wort plus your starter.

Do you worry about your beer being as clean as it can be? Would you prefer to not bother matching your starter to your wort? If so, and you are comfortable with a few extra hours of lag time, you should consider pitching the yeast sediment only. If you pitch the yeast sediment only, either crash cool an active starter or use yeast that has just settled. Don't use yeast sediment that has been sitting around for more than a couple days. If possible, separate out and pitch only the white middle layer of the yeast sediment. This layer is made up of the healthiest yeast. If you can't separate the layers, don't worry. Also, be sure to clean and sanitize your fermenter thoroughly. Don't give bacteria or wild yeast a chance to get a foothold during the lag time. Finally, aerate your wort thoroughly. Your yeast will need to recuperate somewhat, and they'll need plenty of oxygen to do so.

Hot Side Aeration

My first homebrewing book was "The Complete Joy of Homebrewing" by Charlie Papazian. So for years I would pour my hot wort through a strainer into my fermenter (as the book called for) to separate the hops and trub from the wort. These days, I do things differently. I take care to avoid disturbing hot wort. For example, I now cool my wort before separating it from the hops and trub. I don't splash hot wort or do anything that might introduce oxygen into my beer-to-be when it is hot. Why the change? To avoid hot side aeration.

Hot side aeration is the introduction of air into mash or wort, on the "hot side" of brewing. The "hot side" of brewing begins when hot water and grains are mixed together in the mash. It extends through the boil and up the point when the wort is cooled. George Fix, the author of several homebrew books and the man most responsible for bringing concerns of HSA to the homebrewing public, suggests that 86° F (30° C) is the transition point between the hot side and the cold side of brewing.

Avoid HSA!

Hot side aeration supposedly results in staling compounds that eventually develop in finished beer. Brewers who feel that HSA should be avoided attempt to minimize any oxygen introduction on the hot side. Specifically, they avoid mash abuse and any agitation of hot wort. Mash abuse includes excessive stirring of the mash, rough transfer of the mash from the mash tun to the lauter tun, and any sparging technique that involved excessive splashing of the wort. HSA avoiders likewise treat their wort gently. Many minimize the number of times they stir the wort. At a minimum, these brewers stir gently enough not to raise any bubbles or foam. Straining hot wort is, of course, out of the question.

There will always be some splashing or agitating of wort during brewing. Most brewers who try to minimize HSA simply try to treat their beer as gently as possible on the hot side.

Don't Sweat It!

Although many homebrewers altered their brewing practices when information about hot side aeration first emerged, there is a growing skepticism that the dangers of HSA are overstated.

Critics of HSA have two main points. First, the experiments demonstrating the problems associated with HSA also show that the size of the effect is not that great. Unless you are seriously abusing your mash and wort, the negative effects of HSA may be so slight as to be undetectable. Second, many homebrewers' beers are consumed before the symptoms of hot side aeration would develop. Even if the dangers of HSA are real, they may not develop in time to be a problem for your average homebrewer.

Resolution?

Should you worry about HSA or not? Opinions differ, and much of the argument is very technical. There are layers to the controversy

I haven't addressed here, including enymatic versus non-enymatic staling mechanisms and the affect of temperature on level of dissolved oxygen in solution. Approaching the problem from a theoretical standpoint may not be the best way to go for most homebrewers.

Well, there's one way to find out if HSA is worth worrying about if you have the ambition. Brew two batches of beer using recipes and procedures that are identical except for how you treat the hot mash and hot wort. Purposely subject one batch to HSA. In the other batch, strive to minimize HSA. Taste both batches and see if you can detect any negative affects from HSA.

In the HSA batch, be a little rough on the hot side. Stir the mash more vigorously than you normally would. If you have a separate mash tun and lauter tun, dump the mash roughly into the lauter tun when you're transferring it. Splash the sparge water around a bit, stir the boiling wort noisily — in short, go nuts. For the most severe effect, pour your hot wort through a strainer, Papazian style.

In the minimal HSA batch, treat the mash and wort on the hot side with kid gloves. Stir gently. Don't splash, and don't move your wort anywhere until it's been cooled.

Once the batches are brewed, try a series of side-by-side taste comparisons as the beer ages. Ask yourself: Are there any differences between the beers when they are young? Do they age differently?

Many brewers have tried this (or a similar) experiment and their results differ greatly. Some agree that HSA harms their beer. Many commercial breweries have changed the design of their equipment to minimize hot side aeration. Other brewers say they can't tell the difference between beer subjected to HSA and beer that was not. Papazian recently wrote to the *Homebrew Digest (HBD)*, an online forum, to say that he still pours his wort through a strainer and it's never caused him any problems. One *HBD* participant even claimed that, in a blind taste test, beer drinkers preferred a beer aerated on the hot side to a beer in which HSA was minimized.

Clearly, there is a diversity of opinion about the dangers of HSA. If you really want to know how HSA affects your beer — your recipes, using your procedures and your equipment — you will probably have to do the experiment yourself. Keep in mind that commercial breweries have procedures that differ from homebrewers. They may be able, in some instances, to better control HSA than a homebrewer. For example, some breweries wet-mill their grain in an oxygen-free environment. The wort is then pumped into the mash tun from the bottom, further avoiding contact with air. However interesting, this isn't an option for homebrewers.

Homebrewers love a good argument, and there's no shortage of them.

Of course, brewing two batches for experiment's sake is a lot of work. Some homebrewers, myself included, subscribe to the brewer's version of Pascal's wager — HSA may or may not be real, but it doesn't cost me much to avoid it.

Aluminum Fears...

No part of brewing is safe from controversy. Even the equipment you use to brew can be controversial. For example, some homebrewers claim that using plastic fermenters is an invitation for infection because bacteria can hide in the small scratches that plastic buckets invariably accrue. More seriously, some people claim that one type of material used in some breweries may have serious health consequences. Specifically, it has been suggested that using aluminum pots during brewing can lead to Alzheimer's disease.

...Are Justified?

Alzheimer's is a degenerative brain disease that primarily affects older people. Symptoms include memory loss and dementia. Autopsies of Alzheimer's sufferers have shown that Alzheimer's patients had an unusually high concentration of aluminum in their brain tissue. A British medical journal, *The Lancet*, even published a paper linking aluminum in drinking water to Alzheimer's.

One potential source of aluminum exposure is from cookware, especially cookware used to cook food that have low pH values. At lower pH values, aluminum can be leached from cookware into food. The pH of wort is optimally between 5.2 and 5.6 — not as low as tomato sauce or other high-acid foods, but potentially low enough to cause concern if aluminum were a health risk. Some people jumped to the conclusion that using an aluminum brewpot would lead to aluminum in your beer.

...Are Not Justified!

Critics were quick to point out that finding elevated aluminum levels in the brains of Alzheimer's suffers does not mean that aluminum caused the disease. It is possible that high aluminum levels are a symptom of the disease, not a cause. The change in brain tissues caused by the disease may lead Alzheimer's sufferers to retain more aluminum than non-affected people.

In addition, researchers also pointed out that aluminum is an abundant element. In fact, it's the third most abundant element on earth. The average person receives almost 21 mg of aluminum per day in their diet. Aluminum is found in baking powder. Likewise, antacids may contain up to 50 mg of aluminum. Following the directed

dosage, an upset-stomach sufferer may ingest up to 1000 mgs per day. Using aluminum cookware increases the daily amount of aluminum injested only slightly (some sources say by less than 0.5 mg). Critics of the aluminum-Alzheimer's link say that if aluminum really did cause Alzheimer's, cookware would be the least of our worries.

Follow-up studies to the original study have been inconclusive. Some researchers claim to have found a general link between age and aluminum levels in the brain. Thus, the aluminum found in the brain tissue in the original study may have been there due to age, not Alzheimer's. Other studies have found no link between suffering from Alzheimer's and the presence of aluminum in the brain. Still other researchers have suggested that the metal found in the neurofibrillary tangles of Alzheimer's patients in the original study actually came from the water used to prepare the tissue samples. They claim the aluminum was introduced by the experiment.

Resolution?

Researchers have judged the studies linking aluminum ingestion to Alzheimer's to be inconclusive at best. Almost no one who studies Alzheimer's believes aluminum is a primary factor that causes the disease. Most, in fact, think it has nothing to do with Alzheimer's. The evidence that aluminum contributes to Alzheimer's is disputed by most major Alzheimer's researchers and support groups. If you have an aluminum brewpot, there is no health-related reason to worry about it. Some homebrewers claim that using an aluminum pot adds a metallic taste to their beer, but that's another controversy for another time.

And in Conclusion...

As a beginning homebrewer, I would frequently read about some homebrewing controversy and decide I needed to change my brewing practices. These days, when I read about these controversies, I think, "Do I really need to worry about this?"

Before rushing off to change the way you brew, pour yourself a homebrew and ask, "Do I need to change my brewing practices ... or does my beer taste fine?" It's easy to get caught up in theoretical arguments about brewing procedures. (Hell, I think it's fun to get caught up in theoretical arguments about brewing procedures!) But keep your eye (or tastebuds) on the beer you are producing. The point of homebrewing is to brew quality beer . . . and to tell other homebrewers that they're doing it wrong. ■

Chris Colby is a contributing writer to BYO. He writes the "Techniques" column in every issue.

Parti-gyle Brewing

One mash, three beers: Getting the most from your grains

by Chris Colby

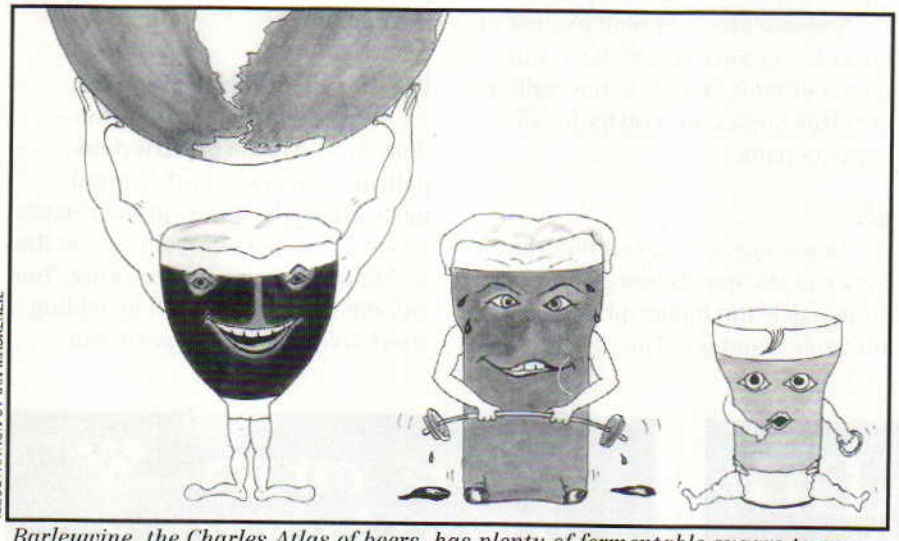


ILLUSTRATION BY IAN MACKENZIE

Barleywine, the Charles Atlas of beers, has plenty of fermentable sugars to go around. Use second and third runnings to make a pale ale and a "small" beer.

IT'S BREWING DAY. YOU'RE brewing your barleywine. The mash tun is full to the brim. The ample hop additions await the boil and your yeast starter bubbles happily. You are a master brewer making a monster brew. You feel great. Great, that is, until a nagging voice — your inner Martha Stewart — pipes up. "Shouldn't you be doing something with all the residual sugars in your grains?"

When you follow the normal procedure for brewing a barleywine a lot of sugar is left in your grains. Only the early, high-gravity runnings are collected for making this big beer. If you sparge completely, and rinse all the sugars out of the grain, you will dilute your wort with the low-gravity final runnings. You'd have to boil the wort for an extended period of time to concentrate it to an acceptable barleywine gravity. (A barleywine should have an original gravity of at least 1.085, according to BJCP guidelines.) So what should you do with the residual sugars in your grain? Brew another beer (or two) with them!

The British pioneered the brewing of barleywines. Traditionally, barleywines were brewed alongside other, lower gravity beers, allowing brewers to get the most from their grains. This system is called parti-gyle brewing. In parti-gyle brewing, the grains are mashed and the wort is run off without any sparging. Then the grains are re-mashed and another wort is run off. Three worts, each lower in gravity than the one before, were collected from the same grains.

The first runnings (wort run off from the first mash) were used to make a barleywine. The second runnings were often used to make a pale ale. A small beer was made from the third runnings. A small beer is any low-gravity beer made from a previously used mash. Small beers were typically consumed when they were only a few weeks old, in contrast to barleywines, which were aged at least a few months, sometimes years.

Variables to Consider

There are two key variables a brewer should remember when using the parti-gyle system: gravity and pH.

Gravity

Consecutive worts drawn from the same grain bed are each lower in gravity than the last. If a medium-thick mash is made each time, and the grain bed is run off without sparging, the gravity of the worts is fairly predictable. The first runnings usually have a specific gravity of 1.080 to 1.090. The second runnings usually measure 1.040 to 1.045. The third runnings, the final usable run-off, are usually in the vicinity of 1.020. Basically, the wort from each subsequent mash is half the gravity of the previous one.

Because the wort is not sparged, the volume of wort collected from each mash is the same. In the second and third mashes, the amount of water added to the grains will be equal to the amount of wort collect-

ed. In the first mash, the volume of water added to the grains is greater than the volume of wort collected. This is because the grains absorb some of the water.

Any of the three worts can be concentrated by boiling. To reach high gravities, barleywine worts are usually boiled for one and a half hours or more. The worts made from the second and third runnings can likewise be boiled for an extended time to concentrate them. Use this formula to calculate the gravity of a wort after boiling:

Equation 1.

G(pre-boil wort)V(pre-boil wort)=C(post-boil wort)V(post-boil wort)

Note: G stands for the gravity in "gravity points," the decimal portion of a specific gravity reading, and V stands for volume.

For example, let's say you have 6 gallons of wort at 1.080; you plan to boil until you have 5 gallons left. What will the specific gravity be?

Example 1.

80 (6) = 5 (X) X= [80 (6)]/5 = 96

In this example, the original gravity would be 96 gravity points, a specific gravity of 1.096. Estimating specific gravities this way yields slight overestimates. Proteins and lipids in the pre-boil wort increase its gravity and these substances precipitate out upon boiling. Thus, the boiled wort is lower in gravity by 3 to 4 points.

You can also add malt extract to boost the gravity of any wort. One pound of malt extract in one gallon of water boosts the gravity by 45 "gravity points."

pH

One often-overlooked difference between the first runnings and later runnings is the higher pH values of the later runnings. The pH of first runnings will be equal to the pH of the mash, usually 5.2 to 5.6. Second and third runnings will have higher pH values unless you adjust the pH.

To counteract the rise in pH, lactic or phosphoric acid should be added to the second and third mashes to bring their pH values between 5.2 and 5.6. Add a small amount of acid, check the pH, and repeat until you hit the proper pH value. If left untreated, a high pH can lead to excessive tannin extraction from the grain. High tannin levels can produce a harsh, astringent-tasting beer.

Parti-gyle, homebrew style

Here is the recipe and procedure for 3 gallons of barleywine, pale ale and small beer brewed parti-gyle style. I've kept the recipes as simple as possible to focus on the technique of parti-gyle brewing. You can modify the grain bill by adding specialty grains if you wish, but

keep them under 5% of the total grain bill. I've only included bittering hops; add flavor, aroma or dry-hopping to suit your taste. See box *(page 44)* for the recipe and a summary of the key points.

The First Mash

In your mash tun, add 4 gallons of water at 165° to 170° F to 16 pounds of crushed grain to produce a mash temperature of 150° to 152° F. Check the pH. If it's higher than 5.6, adjust to between 5.2 and 5.6 with calcium (gypsum or calcium chloride). Mash for an hour at 150° to 152° F.

After mashing, recirculate your wort until it's clear. Then, run-off all the wort to collect about 3.4 gallons at a gravity of 1.080 to 1.090. You can run off the wort faster than the run-off rate you use for a sparged beer. When you don't sparge, the entire wort has the same gravity. The wort you collect from the unsparged first mash (the first runnings) is your barleywine wort.

If you boil your barleywine wort down to three gallons, the original gravity will be 1.090 to 1.102. If you'd like you can further increase the gravity by boiling the wort longer than an hour. Or you can add malt extract.

Select an appropriate yeast strain and build a large yeast starter. Your wort should be well aerated and the fermentation should be temperature controlled.

The Second Mash

To collect the second runnings for your pale ale, add 3.4 gallons of water at 170° F to your grain bed. In the second and third mashes, the temperature of the grain bed need-n't be tightly controlled. Starch conversion is completed during the first mash, so you don't need the mash to be between 150° and 158° F. The temperature shouldn't exceed 168° F, because tannins may be extracted. Likewise, the mash should not get so cold that draining off the wort becomes difficult.

Let the water and grain sit for about five minutes, then take the pH. Adjust the pH to between 5.2 and 5.6 using lactic or phosphoric acid. Adding calcium will probably not help much. Calcium lowers pH when it reacts with phosphates. Once the grain bed has been "used," the amount of phosphates available to react with calcium ions is lower than in a "fresh" mash bed.

Recirculate and drain 3.4 gallons of wort as before. This time, the gravity of the wort should be between 1.040 to 1.045. Brew a pale ale from this wort.

The Third Mash

Finally, collect the wort for your small beer. Add 3.4 gallons of 170° F water to your grain bed. Let sit for five minutes and adjust the pH

Brewing Three Beers With Parti-Gyle Brewing

Recipe:

16 lbs. pale malt
12 AAU (boiled for 1 hour) Northern Brewer hops (for barleywine)
9 AAU (boiled for 1 hour) Northern Brewer hops (for pale ale)
6 AAU (boiled for 1 hour) Northern Brewer hops (for small beer)
Wyeast 1056 (make three starters)

Procedure:

	Beer #1 Barleywine	Beer #2 Pale Ale	Beer #3 Small Beer
Grain	16 lb.	"Spent" grain bed	"Spent" grain bed
Water	4 gallons at 165° F	3.4 gallons @ 170° F	3.4 gallons @ 170° F
Wort collected:	3.4 gallons @ 1.080	3.4 gallons @ 1.040	3.4 gallons @ 1.020
Post boil volume:	3 gallons @ 1.090	3 gallons @ 1.045	3 gallons @ 1.022 (*)

(*) 3 gallons @ 1.045 if 1.5 lbs. malt extract added

with acid as before. Recirculate and run-off 3.4 gallons of wort. The wort should be at a gravity of 1.020.

Boiling for one hour will yield an original gravity of 1.022. This is a low gravity but keep in mind that you can add malt extract to boost the gravity of your final "small" beer. One and a half pounds of malt extract added to this beer will raise the gravity to 1.045.

"Partly-Gyle" Brewing

It's rewarding to re-create an old style of brewing and make three different beers at the same time, but it's a lot of work. You can simplify the process by combining the three worts into two.

The first wort and half of the second wort can be combined to yield 5.1 gallons of wort with a specific gravity of about 1.066. The other half of the second wort can be added to the third wort, yielding 5.1 gallons of wort at 1.033. You'll need to boil these worts for a while or add extract to boost the gravity, but dealing with two worts is much easier than dealing with three.

If you brew using this "partly-gyle" procedure, you're still collecting the wort the old fashioned way, but you don't have to boil, cool and ferment three separate worts. This leaves you plenty of time for other home-improvement projects. ■

Chris Colby is a regular contributor to BYO. He lives in Bastrop, Texas.

Clean Water Act

Build your own simple water treatment system

by Thom Cannell

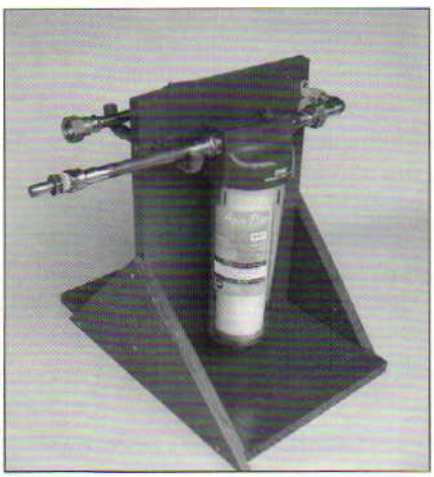


PHOTO BY THOM CANNELL

From the land of sky-blue waters: The author built a portable filtration device that can hook up to any garden hose.

THE WATER SUPPLY IN MY hometown is somewhere between hard and soft, with a curious mix of ions. It will not allow me to emulate the hard water of England by adding Burton salts, yet it's much harder than water from, say, the Czech brewing center of Pilsen. It also contains chloramines, which my city uses to kill bacteria. While chlorine can be removed from water by boiling, chloramines can not.

I wanted clean, chemical-free water — with all the right minerals and nothing else — to use in every step of my brewing. So I built a relatively simple water filter system. Since my brew house is the back porch and most of my friends brew in the garage, or out on the driveway, I wanted to build a portable filtration system that can hook up to any water hose.

Before starting my project, I did some quick research into how my local water supply is treated.

Clean Water and Public Safety: Chlorine and Chloramines

Chlorine has been a part of municipal water supply safety since the late 1800s. Chlorine successfully killed water-borne diseases such as cholera and typhoid and made the nation's water supply safe. Because of its low cost and ability to kill almost everything nasty, chlorine became the main chemical used to disinfect our water. Chlorine breaks down quickly, which is good news for homebrewers: If your water contains a mild amount of chlorine, you can drive off this volatile compound with a brisk, ten-minute boil.

Because chlorine lacks staying power, many towns are now using chloramines, a combination of chlorine and ammonia that is easier to use than chlorine and equally effective. Chloramines are considered safer than chlorine because they keep the bacteria-killing disinfectant in the pipelines longer.

Unfortunately, chloramines do not evaporate when heated or even boiled, so unless you take other steps to remove these compounds, they remain in the water you use for brewing. And during brewing, chloramines may react with other organic compounds to create trihalomethanes (THMs). This reaction can contribute off-flavors and aromas to your beer.

That's the bad news. The good news is that you can remove chloramines by putting the water through an activated charcoal filter or by using chemicals specifically designed to remove them (available at pet and pond supply stores).

The only effective non-chemical method of removing chloramines from water is filtering through activated charcoal. Which led me to my next research topic: the proper filter for my portable system.

Charcoal Filters: Which One is Right for the Job?

Granular activated charcoal (GAC) cleans water by absorption at the surface of the carbon particles. The particles are sponge-like and have a huge surface area in relation to their size. Some GAC filters are

What You Need

Wood or marine plywood, sealed and painted:
base 11-1/2 inch x 18 inch;
upright 11-1/2 inch x 16 inch;
triangular supports with 7-inch sides.

four 1/2-inch elbows; 24 inches of 1/2-inch copper pipe; four 3/4-inch by 1/2-inch male connectors; two 1/2-inch unions; one 1/2-inch female and one 1/2-inch x 1/2-inch barb; one 1/2-inch male and 1/2-inch garden hose.

Two "Aqua-Pure" AP51T filter housings; one "Aqua-Pure" AT117 sediment/GAC filter; one "Aqua-Pure" CBA10PB carbon block filter.

Here's how the plumbing goes together. The lower filter is the carbon block.

compacted into "carbon block" filters and will remove almost every contaminant. Some very effective filters are made of ceramic and may contain silver as a bacteriocide.

But GAC has some limitations. While activated carbon is quite effective in removing some contaminants like lead, chlorine and chloramines from water, it does not soften water, nor does it remove bacteria, viruses, most dissolved metals, hydrogen sulfide, fluoride or nitrate.

Also, when the activated carbon becomes saturated, contaminants can flow from the carbon back into your water. Since you cannot tell when this is happening, it is best to change filters after a certain number of gallons have been treated (the manufacturer's instructions should specify this number; if they don't, be sure to find out). To eliminate this risk, I chose to use two activated carbon cartridges in a series. One note: Only cold, microbiologically safe water should be used with these filters; again, they cannot strip away bacteria. That means water you can safely drink (and brew beer with).

Faced with a bewildering array of filters, I called the Aqua-Pure division of Cuno Corporation for advice (www.aquapure.com/systems). Aqua-Pure makes systems for the food-service industry and other high-end applications. You see their systems in fast-food applications and in breweries where the water has to be nearly identical in flavor world-wide.

A GAC filter will remove limited quantities of rust, but particulate matter or high iron levels will clog the unit. If you have a well or know you have lots of particulates in your water, using a pre-filter that removes debris will be necessary before you use your GAC. The Aqua-Pure rep confirmed that a sediment filter followed by GAC filtering would be best for areas with troubled water supplies. Their AP117 filter combines the two and fits a standard AP51T housing.

What I didn't realize is that filtration slows down water delivery. If you had an unrestricted flow of water of four gallons per minute (gpm), for example, after the filter is installed it slows to 1 to 2 gpm. This longer, slower flow offers more contact time in the filter and better cleaning. Their carbon block

CBA10PB filter removes particles to 0.5 microns, plus all the other contaminants, but slows delivery to 0.75 gallons per minute.

I decided to construct this project as if the water supply was basically clean — which it is — and I wanted maximum purity. So I ordered the AT117 sediment/GAC filter and a carbon block CBA10PB for final treatment and two AP51T filter housings. All in all, the filter equipment cost me $170, including replacement filters.

Tool Time: Putting the Portable Filter Together

For this system I neglected to order Aqua-Pure's optional mounting brackets. I could have used inexpensive CPVC barbed fittings and regular vinyl hose, but instead I used copper all the way.

This project has two parts, the filters and their support. First I measured the filter's height and built a hefty wooden structure that would easily support two filter housings, plumbing and the extra weight of the filled filter housings.

The filter support was constructed of scrap wood. Any water-resistant wood or marine grade plywood will do. I cut two large flat pieces to form a base and an upright, plus two triangles for support. The whole set-up measures approximately 18 inches long and 18 inches high. The goal was stability rather than a petite size.

The triangles were rabbited (grooved) 3/8-inch at the base and vertically through the apex. Then everything was sealed and painted. Finally, I secured the pieces with exterior-grade construction screws (regular drywall screws will rust.)

The plan was to mount one filter housing on each side of the upright, remembering to allow at least two inches extra depth for removing and replacing the disposable filters. The

Fully assembled plumbing parts: Inlet pipe, outlet pipe and two connections.

The garden hose water inlet, barbed outlet and the support that holds them.

filter housings are about 13 inches tall and have 3/4-inch inlets and outlets. That decided how I would mount the filter housings.

Since each filter housing has an "in" and "out" port, I joined the "out" of one to the "in" of the other with rigid 1/2-inch copper pipe. The sequence is: a 3/4-inch times 1/2-inch male fitting screwed into the "in" or "out," a short piece of 1/2-inch pipe, a 1/2-inch by 1/2-inch copper union, another short piece of 1/2- inch pipe, and a 1/2-inch by 1/2-inch elbow. The two are joined by a longer piece of pipe.

At the "in" of the AP117 sediment/GAC filter I screwed in the required 3/4-inch male NPT pipe connection, soldered to a length of 1/2-inch pipe and a 1/2-inch male fitting. That let me screw on a garden hose connector for our inlet water.

On the other (outlet) side, the carbon block filter side, I screwed in another 3/4-inch male NPT connector, this one joined to a barbed fitting for connection to vinyl tube. That's the hose fitting we'll use for all of our brewing water needs.

Next, I needed support for the filter housings. The pipes connecting the two filter housings, outlet to inlet, form a solid mechanical connection. I used two plastic pipe hangers, one on each side of the wooden upright, to secure the center of the "C" shape.

At the other end is a very elegant solution. Since I needed support for the weight of the combined housings, I simply drilled a hole through the wooden upright and inserted a piece of 1/2-inch copper pipe, sized to fit, with 1/2-inch elbows soldered on. To make sure the elbows always point upwards, I drilled a lengthwise hole into the wooden upright and screwed in another exterior grade screw.

That's it. The project is finished. Well, almost finished: How about adding a "Y" manifold to the inlet side to divert cooling and washing water from the filters? Regardless, hook up your hose and fill your hot liquor tank and your boil kettle with all the clean water you need.

Note: Newly installed Activated Carbon Filtration Devices should be flushed with water, following the manufacturer's instructions. For pour-through models, water should flow slowly through the unit to assure adequate contact with the carbon. And one caveat: All water contains some bacterial contamination. If you're brewing regularly, this isn't a problem. But draining the filter housings, if they'll be unused for an extended period, is advised. And follow the manufacturers directions; flush a few gallons through the system before use. ■

Thom Cannell is a veteran automotive writer and editor and a contributing writer to BYO.

Homemade Root Beer

A great old American tradition ... with twigs, roots and bark

by Stephen Cresswell

IN YEARS GONE BY, THE GOAL on American farms was self-sufficiency. You built your house, knitted your sweaters, grew your vegetables and made your drinks. Along with wine, cider and beer, most families also made nonalcoholic beverages flavored with the roots, bark, sap and leaves of local wild plants. The most famous of these is, of course, that great American favorite — root beer.

For homebrewers, turning out a batch of root beer should be a snap, because making soda is similar to making beer. You use many of the same techniques and equipment. In fact, the only technical difference between these two procedures is that for the soft drink, you should allow the yeast and sugar to work together for only an hour or so before bottling. And after bottling, the root beer should only be allowed to "work" for two or three days. As soon as the carbonation is right (open a test bottle to check), move the bottles to the refrigerator to stop fermentation. If you have a kegging system, force-carbonating your root beer is also an option.

The easiest way to make root beer is to use extract, which you can buy at many homebrew supply stores. You simply add water, sugar and yeast, and your batch is ready to bottle. You can also make your own extract *(see sidebar at right).*

I prefer to do things the old-fashioned way, so I make my root beer with twigs, roots and bark. If you can't find them growing wild in your neighborhood, try a health-food store or surf the Internet to find a supplier. Below are three tried-and-true recipes from my book, "Homemade Root Beer, Soda and Pop" (Storey Books, 1998).

Basic Root Beer

Root beer, made from sassafras, is the quintessential soft drink. Native Americans used sassafras root to make tea and also used it to flavor a mixture of bear fat and crushed blackberries. Appalachian mountaineers used sassafras tea as a spring tonic, and root beer was a tasty thirst-quencher on a hot day. This recipe is simple, but it makes an incredibly good beverage.

Ingredients

1/4 ounce dried sassafras root bark
3 to 4 quarts water
2 cups sugar
1/8 tsp. ale (or bread) yeast
1/4 cup lukewarm water

HOMEMADE EXTRACT

This recipe will yield enough extract to make 8 gallons of root beer. You can prepare one-gallon batches by adding water and yeast to the extract and bottling.

Ingredients

1-1/2 cups chopped raisins
3 cups boiling water
2 gallons water
1-1/2 ounces dried sassafras root bark
7-1/2 pounds (15 cups) sugar

Step by Step

1. Pour 3 cups boiling water over raisins, cover, let steep.
2. Place 2 gals. water in the brewpot over a medium heat, add the sassafras root bark. Stir in the sugar, simmer uncovered 40 min.
3. Strain raisin water into the brewpot. Let sit, covered, for 30 min.
4. Pour extract into 1-qt. canning jars. Put lids in place and process in your canner.

For one gallon of root beer, empty the contents of one jar of extract into a pan with 3 qts. of water. Heat gently to mix, keeping temp. lukewarm. Add 1/8 tsp. ale yeast to the liquid. Bottle and store in a dark place. Check carbonation after 48 hours and again after 72 hours. When carbonation is right, refrigerate.

Bottling Soft Drinks

For a one-gallon batch of drink, you will need eleven 12-ounce bottles and caps or eight bail-top pint bottles with their reusable rubber gaskets.

Make sure your bottles have been sanitized ahead of time with hot water to which some plain chlorine bleach has been added (about 2 tablespoons of bleach per gallon of water). Remove bottles from the sanitizing soak and rinse them well in very hot tap water. Using a small funnel, fill each bottle from the jug. Then cap the bottles using the bottle capper.

Allow bottles to work (ideally at a room temperature of 62° to 77° F), checking after 48 hours and again after 72 hours. During this period of "working," the yeast is consuming some of the sugar, and natural carbonation results.

Carbonation time will depend on the quality of your yeast and the temperature of the room, among other factors. If the room is really hot, you may want to check after 36 hours. When carbonation is just right, refrigerate the bottles immediately.

For better flavor, it's best to wait a couple of days before drinking. The flavor will improve after a few days because the yeast settles out, thus allowing your flavoring agents to shine through.

Step by Step

1.Place the root bark into a large pot. Add 2 quarts of the water and all the sugar. Simmer, covered, for 25 min. Still covered, remove from heat and let cool for 25 min.

2. Pour 1/4 cup of lukewarm water into a teacup, then add the yeast. Let sit for several minutes.

3. Pour 1 quart cool water into the glass jug. Using a large funnel, slowly pour in the warm sassafras liquid, straining as you go.

4. Aiming to make the overall temp. of the liquid in the jug lukewarm (70° to 76° F), adjust the temp. of the remaining water and add it to the jug. Leave about 2 inches of headspace.

5. Put the cap on the jug and agitate vigorously for a few seconds.

6. Remove the cap and add the yeast in its water. Cap again and shake the jug. Leave capped and let sit about 15 min.

7. Finally, top off with warm water, cap loosely, and proceed immediately to bottling.

8. Bottle according to the instructions in sidebar on this page.

Three-Root Root Beer

Ingredients

20-inches fresh-dug sassafras root, the thickness of a pencil
2 tsp. chopped dried burdock root
2 tsp. chopped dried licorice root
3 to 4 quarts water
1-2/3 cups table sugar
1/8 tsp. ale yeast
1/4 cup lukewarm water

Step by Step

1. Place roots in 2 quarts of water and simmer, uncovered, for about 25 min., adding the sugar toward the end. The water should take on a pronounced red or orange color and the room should be filled with a strong sassafras aroma. If the color and aroma are weak, add more sassafras root. Remove from heat, cover, and let cool for 30 min.

2. Pour 1 quart of cool water into the jug or carboy. After the sassafras mixture has cooled 30 min., strain slowly into the jug. Add water, leaving a headspace of 2 inches and aiming for a lukewarm temperature (70° to 76° F). If the temp. is too high, allow to cool with the cap on. Agitate vigorously.

3. In a teacup, combine the yeast and 1/4 cup lukewarm water; let sit about 5 min. Add the yeast liquid to the jug, agitate and bottle.

4. After about 48 hours — sooner in warm rooms, later in cool rooms — check the carbonation. If it's sufficient, refrigerate the bottles.

Rich Root Beer

This is my take on an imported English root beer. It has a delightfully full-bodied flavor.

Ingredients

20 inches sassafras root, the thickness of a pencil
1 piece vanilla bean, 3 inches long
3 to 4 quarts water
1-3/4 cups dark brown sugar, gently packed
1/8 tsp. ale yeast
1/4 cup lukewarm water

Step by Step

1. Place the root and vanilla bean in 2 quarts of water and simmer, uncovered, for about 25 min., adding the sugar toward the end. Water should take on a pronounced red or dark orange color. If the color and aroma are weak, add more sassafras root. Remove from heat, cover, and let cool for 30 min.

2. Put 1 quart of cool water into the jug. After the sassafras mixture has cooled 30 min., pour it slowly into the jug. Add water to the jug, leaving a headspace of about 2 inches and aiming for an overall lukewarm temperature (70° to 76° F). If the temp. is too high, allow the liquid to cool with the cap on; this may take time. Agitate vigorously.

3. In a teacup, combine the yeast and 1/4 cup lukewarm water; let sit about 5 min. Add the yeast liquid to the jug, agitate and bottle.

4. After about 48 hours, check the carbonation. If it's sufficient, refrigerate the bottles. ■

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BREWER'S MARKETPLACE

Last Call

Fear Of Brewing

A second-generation homebrewer learns a lesson from "Pa"

by Marty Blaker

PHOTO BY MARTY BLAKER

The farmer and homebrewing legend himself, Pa at home enjoying a hard-earned beer.

I'VE BEEN SOMETHING OF A wimp when it comes to brewing. I'm not sure why. There's really no danger in brewing beer. Just follow a recipe calling for four basic ingredients — barley, hops, yeast and water. So why have I always been so afraid?

I've struggled with this question for years, perhaps since my childhood back in the Sixties and Seventies, when I remember my grandfather (Pa, us grandkids called him) brewing his own beer. Beer making wasn't just a hobby with Pa. It was a necessity. Being a child of the Depression, he worked hard for everything he earned. And beer was no exception.

I remember Pa brewing down in the basement of his farmhouse in Missouri. He would come in from the forty acres he farmed, dressed in work clothes, with the barley and hops he had cleverly bartered for corn and tomatoes.

Pa arranged his bottles of homebrew in rows on a special shelf in the basement. I remember eyeing them with avid curiosity. Especially after my older cousins told me stories about the bottles sometimes "blowing up" without any provocation.

Maybe this is why my early impressions of homebrewing ran the gamut from fascination to foreboding. The fascination won out a decade or so later when I signed up at a brew-it-yourself shop in California. Plunking down my hundred bucks entitled me to ingredients, a kettle, bottles, labels and, most importantly, a brewmaster. He would provide the crutch I needed to quell my fears. What could go wrong? Plenty, as it turned out.

My first brewing experience turned into a nightmare. The "brewmaster" watched as I naively boiled my wheat beer for an extra two-and-a-half hours. We added several gallons of water to the thick, sticky mess, "just like the pros do it," he said. Mysteriously, my thick, overcooked paste turned out "terrific" according to everyone who tasted it. Having learned basically nothing, I gave up on brewing.

A few years later I was forced once again to confront my brewing ambivalence when my friend Chris, a long-time master brewer, gave me his brewing equipment. He was moving and couldn't take it along. Hoses, airlocks, bottle caps ... everything I needed. "Brewing is easy," were his parting words. For years that white bucket sat in the garage, tormenting me. I resisted until one day my microbiologist friend, Karen, spied the bucket. "You have all this beer brewing equipment and you're *not* using it?" And so my brewing career was relaunched with my new brewing partner — Karen. We started out with a simple extract brew. And nothing went wrong. In fact, our beer was pretty good. I brewed another batch, by myself. Again, nothing went wrong. I made several more successful batches, but still I remained anxious. So what's wrong with me? Did I need to go to a brewing shrink?

No, I realized one day as I was enjoying a brew after a hard day at work. I just needed to stop trying to create the perfect brew and get back to my old Pa's basic values.

Pa was not a sophisticated brewer — he didn't even use a hydrometer. He made simple beer to provide himself and my Granny with their favorite beverage. I remember the two of them sitting in lawn chairs under the big shade trees in the front yard enjoying one — only one — beer on hot Missouri evenings. And isn't that what it's really all about?

When you come to the end of a hard day of work, whether in the fields or at the computer, a good beer is just that — a good beer, and a darn fine way to end the day. ■

Marty Blaker now brews with confidence at his home in Redmond, Washington.

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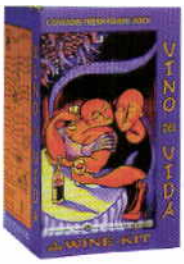

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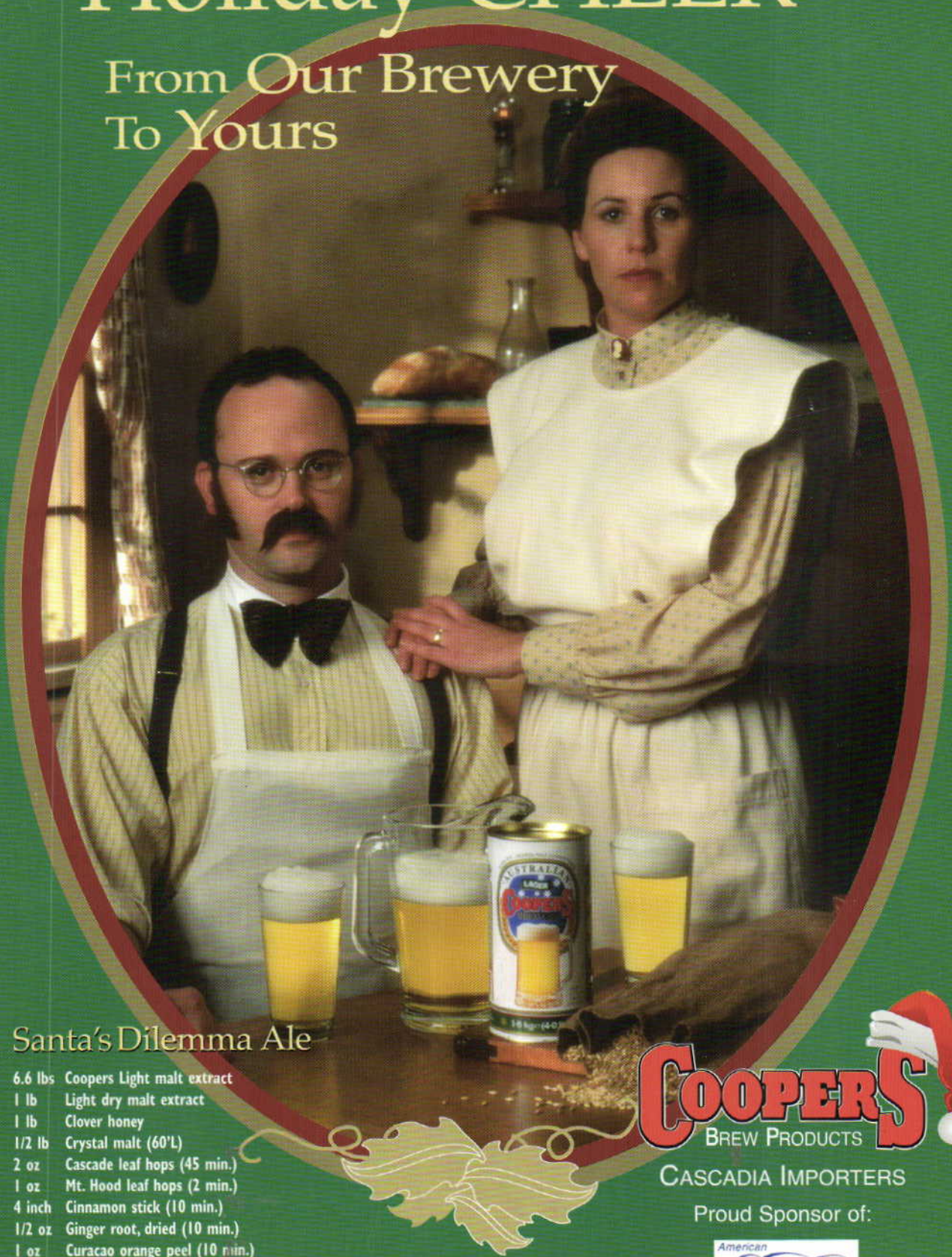

Santa's Dilemma Ale

6.6 lbs	Coopers Light malt extract
1 lb	Light dry malt extract
1 lb	Clover honey
1/2 lb	Crystal malt (60'L)
2 oz	Cascade leaf hops (45 min.)
1 oz	Mt. Hood leaf hops (2 min.)
4 inch	Cinnamon stick (10 min.)
1/2 oz	Ginger root, dried (10 min.)
1 oz	Curacao orange peel (10 min.)
	Coopers Ale Yeast (10 grams)
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Original Gravity — 1.064

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