

Brew

YOUR OWN TM

April 1996, Vol.2, No.4
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THE HOW-TO HOMEBREW BEER MAGAZINE

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Overcome Your
Closet Anxieties**

**Homebrew
Weddings!**

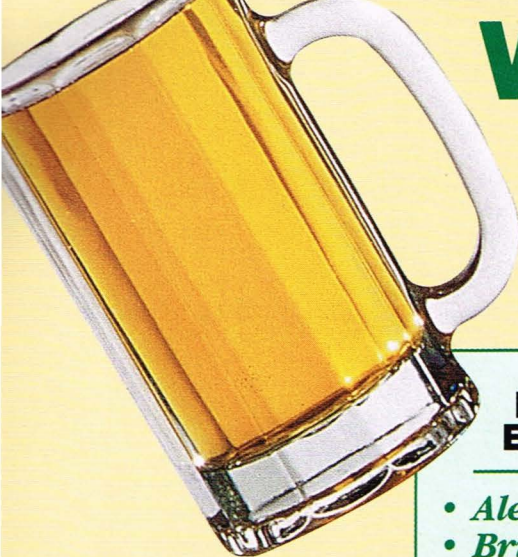
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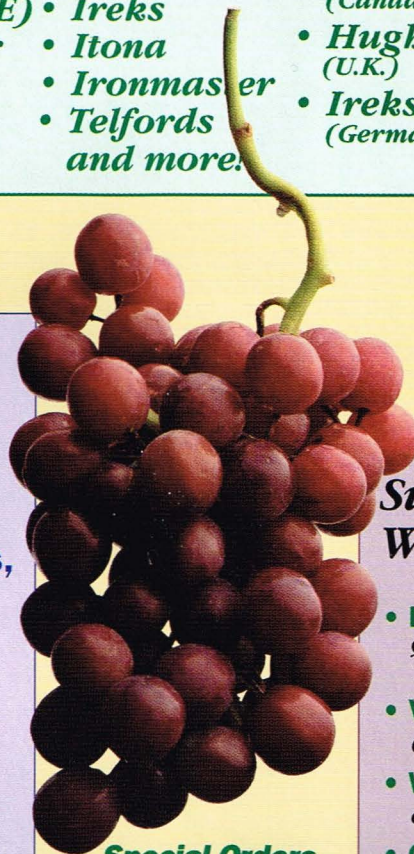
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There's an easy-to-read freshness date on every Samuel Adams.

cation of the brewing community on consumer legible freshness dating.

I hope consumers support the following microbreweries. You can help push for industry-wide freshness dating by calling your favorite microbrewery and urging them to include clear, uncoded freshness dating on each bottle. You'll be doing microbrew drinkers everywhere a favor.

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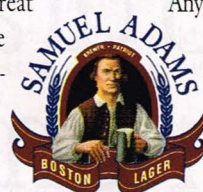
If we have forgotten any breweries that employ consumer friendly freshness labels, please send samples of the labels (so we can include them in any future lists) to: The Boston Beer Company, 30 Germania Street, Boston, MA 02130.

Our industry exists because we take such pride in the quality of our beer. We use better ingredients, and take great care to brew our beers. Don't we owe it to our customers to be honest about the freshness of our beers?

I believe all microbreweries should join the Boston Beer

Company and the other microbreweries listed here in insisting on freshness dating.

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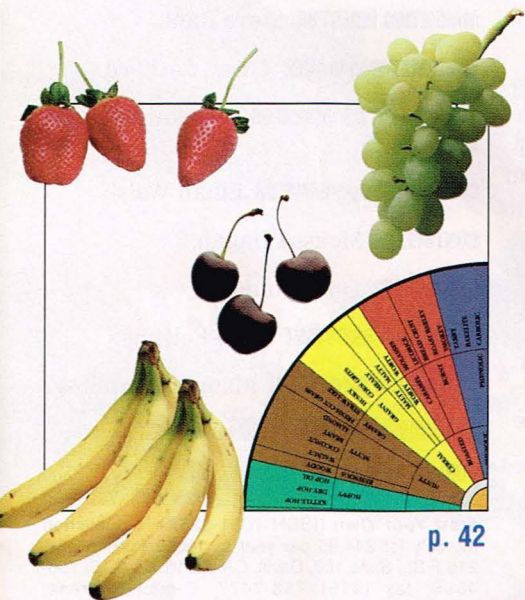
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A Fish Story

I went to a small college in central Maine. There was a pond on campus, behind some of the dorms and generally off the beaten path.

It was a moderately well-kept secret that each spring the pond was filled with young trout grown to stock the local river. A sign by the pond promised that anyone caught fishing or littering would be "fined or jailed."

A while back I was in town visiting a friend who had maintained a certain affiliation with the college. This friend, coincidentally, was a homebrewer.

We were discussing various theoretical brews: Seaweed Ale, Apple Pilsner. He became fixated on the idea of a fish-flavored brew. But how do you get the fish flavoring in the beer? Add fish heads to the hops bag?

He had a batch in the carboy going through secondary fermentation. He also had a plan. We took a fishing line, a cooler filled with water, and two bottles of homebrew and set out for the pond.

The homebrews weren't even open yet when we felt the first nibble. We pulled out a nice four-inch trout and tossed it — alive — into the water in the cooler. Fifteen minutes later we had caught our quota, three.

That's when a campus security officer pulled up. He shined a flashlight at us, saw the fishing line, and commanded us to "Stop right there!" We stopped.

My friend explained that sure, we had been fishing. But the fish were still alive, see, and we were just going to use them for a short time, then put them back. He spoke with the passion of someone who, due to his certain affiliation with the college, had something to lose. The officer frowned and shook his head to show that he was not someone to be toyed with.

We gave him the two homebrews, and promised him more. He agreed that we would meet the next night to redeposit the fish in the pond. If we didn't show, he would hunt us down and heads would roll, Jack.

We hurried back to my friend's place. We took the airlock off the carboy, removed the fish from the cooler, and placed them in the beer. All they had to do was swim around a bit, breathe in some beer, let off some fish taste.

The next morning we checked on our experiment: Disaster! Two of the fish were belly up. One lingered at the bottom of the carboy. I had read somewhere that you could resuscitate fish by moving them backward in water over and over again. We frantically moved them around for a good 20 minutes. The two dead ones didn't revive, and the other one died!

That night we headed back to the pond to face the music, hoping our guy wouldn't show up. In case he did, however, we brought an entire case of beer.

Well, of course he came. We told him our sorry story. We showed him the fish, which we brought to prove we hadn't eaten them. We gave him the beer.

He was not amused.

He handcuffed us and drove us to the local police station for booking. On the way I asked my friend if he was concerned about losing his job with the college.

"No," he said. "After all, it's April first."

Enough Already!

Please! Don't call, don't write, don't e-mail to say Carl Landau, publisher of *BYO*, is *dead wrong*. He admits it!

Last month I mentioned we had received 200 calls responding to my plea to let Carl know that people enjoy the Editor's Note. Little did we know, things hadn't even heated up yet. We've now received more than 900 calls. Carl is humbled! Ethan, our executive manager in charge of circulation, is busy with lots of new orders. Thanks everyone!

Craig Bystrynski

Brew

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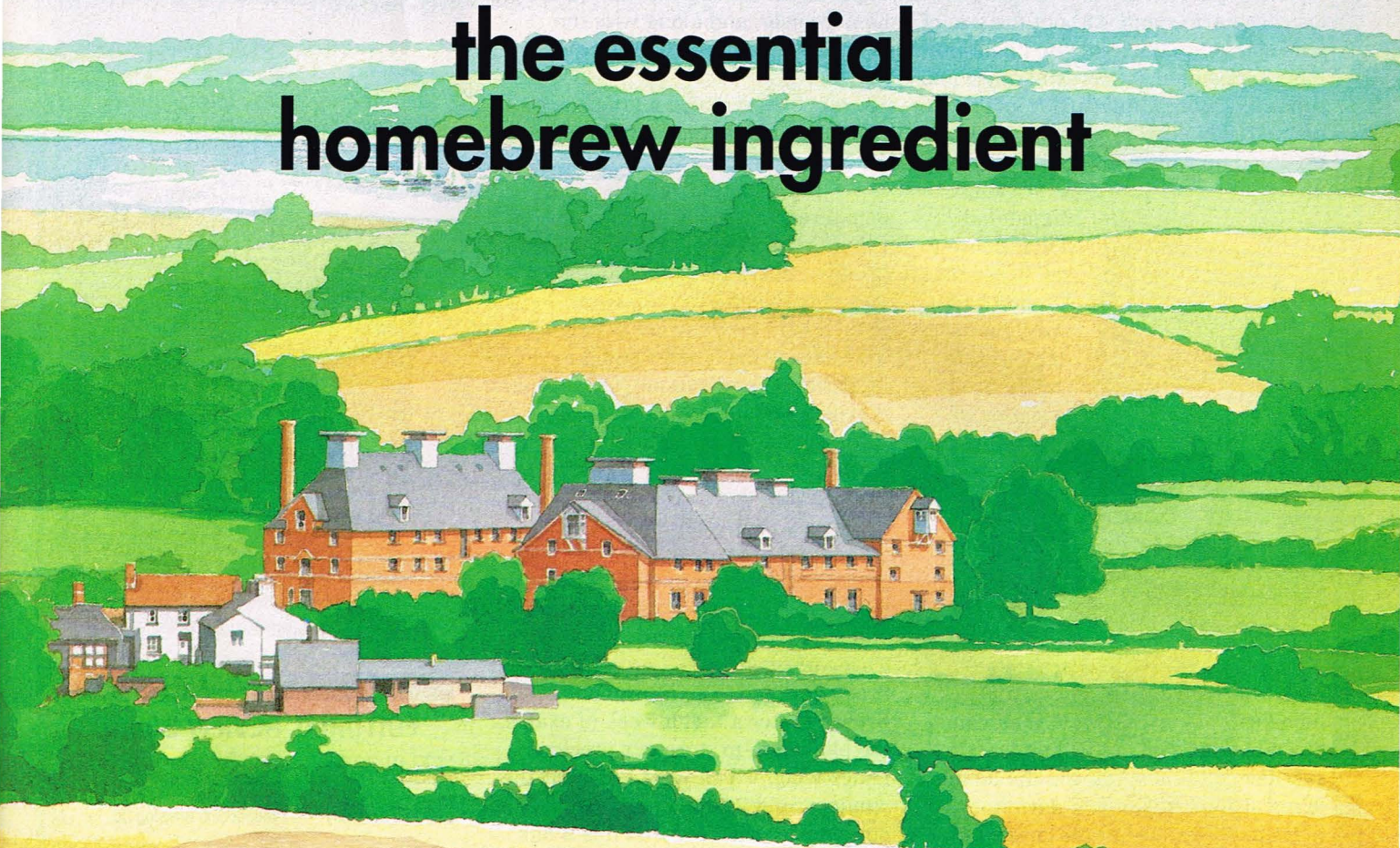
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John Carlisle Pomona College

Being a homebrewer while you are in college is a challenge. While kegs are not exactly an unknown commodity on the average college campus, carboys sure are. I decided to take on the obstacles one at a time.

First was the "where." Since the average dorm room is about the size of a fermentation tank, I knew I'd have to move off campus to have the space and privacy to store a full carboy, not to mention a kitchen in which to brew.

I teamed up with some friends and we found a dilapidated rental house to call home. The kitchen had two functioning burners and a pretty reliable (if leaky) refrigerator, so that took care of the first problem.

The next problem

that presented itself was the cost. Of course, all homebrewers hit this wall. It all comes down to what you are willing to sacrifice, and I'll spare you the details of my all-ramen diet and dormitory toilet-paper raids. Suffice to say, I scrimped and cut corners, haunted local thrift shops and yard sales, and recycled every bottle and can I could get my hands on. I also snuck into keg parties and stopped buying the "store stuff."

Scouring the thrift shops led me to my most precious find, a reward for my patience and bland diet — an old, working refrigerator that had been converted into a keg chiller. When I saw that tap fitted into the door, I jumped — and I would have done battle with anyone who tried to buy it before me. I plugged it in outside the house under a small overhang, and with a keg donated by a campus fraternity (don't ask, don't tell was the policy on the origin of

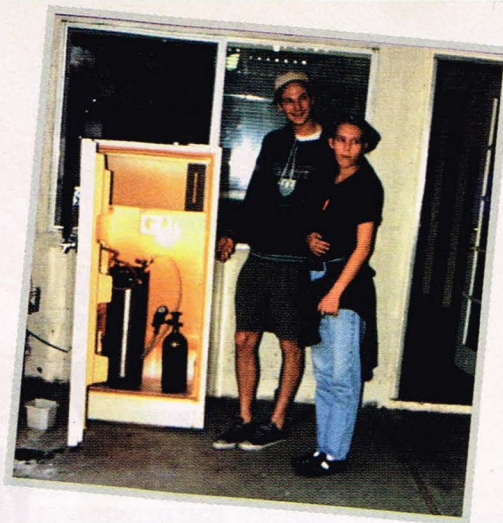
that keg) I was ready. I had a stirring paddle donated by the same frat, a stainless steel pot found at a yard sale, and a motley assortment of other stuff that my dad had let me take from home.

I had been helping my dad brew for a few years. He had gotten into it when he moved in next door to a homebrewer, and along with the neighbor's kids, we all brewed together.

After I assembled all the equipment and scraped together the money for ingredients, it seemed pretty lonely to start brewing on my own. So I began recruiting. There were lots of volunteers to sample the finished product, but most people thought I was nuts to actually *make* beer. I stood firm — only the brewers could enjoy the fruits of the labor. I found a couple of brave souls to join me, but I think they thought I was nuts as well. Even so, they were willing to try anything at least once.

That first batch wasn't fantastic, but we all got to experience the phenomenon of having it magically taste better because you made it. And of the five brewers I started with, two are still brewing with me a year later. That's pretty good — two converts who really appreciate an afternoon of brewing after a tough week of exams. We pitched in to store our precious fridge when we all went home for the summer, and it is still our best piece of equipment. The beer that fills it has gotten better, too — the last batch was a pumpkin beer we brewed from BYO's recipe ("In Search of the Great Pumpkin," November '95).

We are not as strict any more, and we share our beer with non-brewers. Our parties have become sort of famous around campus, and we try to have drinkers who will appreciate a good brew and not just "pound one down." All in all, I'm really glad I got over and around the hurdles. We manage to brew once or twice a semester, and even though none of us is ever going to start our own brewery, I think we're homebrewers for life. We've learned stuff we'll take with us a lot further in the future than Psych 101, that's for sure!



John Carlisle shows off his prize possession — a converted refrigerator — with fellow student and brewing convert Maryanne Black.

How WEIRD CAN YOU GET?!

Tell us about the strangest ingredient you've ever brewed with...and send us a picture of your brewing set-up! There's a really cool BYO t-shirt in it for you. Send your story to Pot Shots, c/o Brew Your Own, 216 F. Street, Suite 160, Davis, CA 95616. Or send us email at edit@byo.com. Be sure to include your mailing address!

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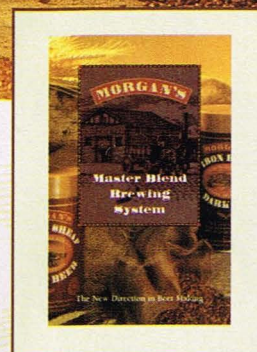
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BRING HOME THE GOLD

Flawed Law

Dear Brew Your Own,

It seems the "Ugly American" is still alive and well. At least there was one in Saudi Arabia last year according to the offensive and insulting article "Outlaw Brewer in Saudi Arabia" (January '96 BYO). It behooves anyone who is a guest in another country to abide by the rules and laws of that country as much as possible. Certainly not to boast about flouting them. I feel you owe your readers — and the Saudis — an apology.

Monica Michenfelder
Oronoco, Minn.

Some believe "When in Rome..." but Oliver Cromwell said "Necessity hath no law." Here at BYO, we say "To each his (or her) own."

Something Bubbly and Dry

Dear BYO,

I'm a subscriber and an avid homebrewer and would like to find some soft-drink recipes that I could use to supplement my beer brewing. There are always non-beer-drinking friends around and I would like to give them a treat also. Do you know of any vanilla creme soda or root beer recipes around?

John McKusker
Gainesville, Va.

Brewing sodas is easy: Combine sugar, water, and the flavoring and carbonate. Many homebrew stores carry soda kits and soda flavorings.

Starting Over

Dear BYO,

While traveling in Europe I had the opportunity to visit many notable breweries, and some not-so-notable ones. Being exposed to the process of brewing beers sparked an interest that had always lain dormant. I would like to learn the process of brewing beer, and after my retirement in a couple of years, I'd like to establish a small brewery.

Are there institutions that teach the craft of brewing beer? I am a

teacher and have the summer months free to study.

John T. Strunk
Harriman, Tenn.

The American Brewers Guild in Davis, Calif., and Siebel Institute of Technology in Chicago both offer in-depth brewing courses.

Saving Some for Later

Dear BYO,

I brewed my first batch (a pale ale) with a "pilot" brew kit. It came out great. However, I embellished on it a bit, using corn sugar to prime. Their kit came with a small can of extract that is impossible to find. My local homebrew supply shop carries a much larger can. If I use only part of the can of extract, how long will the remainder keep, and under what storage conditions?

Also, I'd like to try priming with fruit juices or brandies. What is the effect of a trade-off between those items and priming sugar? Is there a formula?

Jim Carabetta
Meriden, Conn.

Malt syrup should be stored in a closed container and refrigerated after opening. It will last for several weeks and perhaps a couple of months under these conditions. Any priming solution is based on the amount of fermentable sugars present in the solution. Fruit juices and brandies have varying levels of fermentables. Experiment with different amounts of the juice and brandy in 10 to 12 bottles of brew to determine the right amount to use.

The Lady's Choice

Dear BYO,

I'm writing in response to "Why Don't More Women Brew?" (Last Call, February '96 BYO). I have often found myself in the same situations as the author.

I love beer, especially draft and homebrew. My husband and I have been brewing together for many years. In fact I opened a homebrew shop

about a year ago. Most of my customers are men who say "Gee, I wish you were my wife." Thanks for the compliment guys, but I'll stay where I am!

I have almost a dozen women brewers as customers (or at least that many who help their husbands brew). These women are very informed and tend to create recipes instead of relying on those in books.

One woman brews for her entire grown family, buying cases of malt extract at a time. My women customers do complain about brew shops that are run by men who tease them, but they've learned to brush it off.

We are out here, and I'm sure you'll here from more women brewers soon!

Kathy Booth
Seabrook, N.H.

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Fill It to the Rim with...Beer?

by Scott Russell

Remember a few summers ago, a big commercial brewery spent a fortune on radio commercials making fun of homebrewers? Remember their Pumpnickel Stout comments? Well let me tell you, I made it! (And before that bearded homebrew guru, the one from Colorado, I might add!) A mash of rye, corn, oats, wheat, and pale malt, some chocolate malt and molasses, and caraway seeds as a finishing hop.

Was it good? Yes, it was. You know the way a really good dark rye tastes, chewy and slightly sour, rich and really filling? All I was missing was some pastrami and Swiss...

Well, I'm not ready to share that recipe yet. I'm still savoring it and getting ready to brew it again. You'll have to wait a few months.

In the meantime, how about some Espresso Stout? Sure, don't mind if I do. I am, in addition to a beer lover, a coffee junkie. Even my wife's rela-

tives in Seattle are amazed at how much coffee I consume given the time and the opportunity. My love of coffee comes from living in France for a couple of years, where coffee is dark, thick, very strong, and flavorful. Maybe that's why I drink more in this country — it's only half as strong. I knew if I were going to brew a coffee-flavored beer (and the idea had an enormous appeal), it had to be something big. It had to be a dark beer, full-bodied to hold up to strong-flavored beans, and relatively sweet. In other words, a sweet stout.

When I opened the first bottle, I was transported to my favorite Montparnasse café, a copy of *Le Monde* in one hand, a small white porcelain cup in the other, the noise of Latin Quarter traffic all around me... But this was a beer! Truly, the best of both worlds.

Espresso Stout (5 gallons)

Ingredients:

- 2.5 gallons cold water
- 0.5 lb. roasted barley
- 0.5 lb. Belgian Special B malt
- 6.6 lbs. dark unhopped malt extract
- 1 oz. Northern Brewer hop pellets
- 0.5 lb. freshly crushed (not ground!) French roast or espresso roast coffee beans
- Pre-boiled chilled water
- Ale yeast (perhaps Wyeast 1084 Irish ale liquid culture)
- 1 cup amber or dark dry malt

Step by Step:

In 2.5 gallons of cold water, steep the roasted barley and Belgian Special B malt (or the darkest crystal

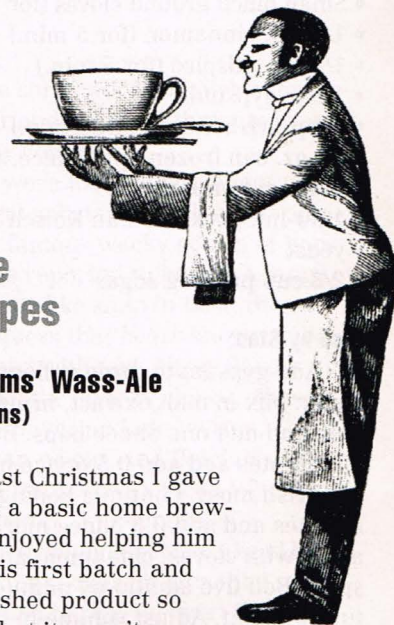
malt you can find, 120° Lovibond if possible) as you bring water to a boil. At 170° F or so, remove the grains from the water and sparge through a strainer. Add the malt extract to the kettle and bring back to a boil. Add 1/2 oz. of the hop pellets, boil 45 minutes. Add 1/2 oz. more pellets, boil 15 minutes. As the wort cools after kettle knock-out, steep the freshly crushed coffee beans (the best you can get!) for at least 15 minutes. Add to fermenter and top off to 5.25 gallons using pre-boiled, chilled water. At 75° F pitch the yeast, seal, and ferment at 65° to 70° F. Rack after four to five days, age in secondary six to eight days and bottle, priming with amber or dark dry malt. Bottle condition three to four weeks.

More Recipes

Ed Adams' Wass-Ale (5 gallons)

"Last Christmas I gave my son a basic home brewery. I enjoyed helping him brew his first batch and the finished product so much that it wasn't long before I had equipment of my own. Now I am an avid homebrewer.

"Last holiday season I decided to try a Christmas brew. I like wassail and I like beer, so I combined the two. I liked the outcome so much I decided to share the recipe."



Alternatives:

This is an easy recipe to adapt for partial mashing or all-grain brewing within standard sweet stout parameters. Be sure to keep the roasted barley to malt (Special B or crystal) proportions, because that's what gives this beer enough body to hold up to the coffee.

Coffee:

I've tried this with freshly brewed coffee (brewed double strength in an espresso machine) and did not like the results as much as when I made it with the just-crushed beans. I've been told that if you use some Kahlua or other coffee liqueur with your priming sugar you can get a pretty appreciable coffee flavor as well.

Ingredients:

- 6 lbs. American light extract
- 2 oz. Hallertau hops (1 oz. for 60 min., 0.5 oz. for 30 min., 0.5 oz. for 5 min.)
- Small pinch ground cloves (for 5 min.)
- 1/2 tsp. cinnamon (for 5 min.)
- 1/2 tsp. allspice (for 5 min.)
- 1 tsp. gypsum
- 1 tsp. Irish moss (for 30 min.)
- 12-oz. can frozen apple juice, thawed to room temperature.
- 1 50-ml. pack German Kölsch liquid yeast
- 2/3 cup priming sugar

Step by Step:

Add gypsum to three gallons of water. Mix in malt extract, bring to a boil, and add one ounce hops. Boil for 30 minutes and add 0.5 ounce hops and Irish moss. Continue boiling for 25 minutes and add 0.5 ounce more hops along with cloves, cinnamon, and allspice. Boil five additional minutes and turn off heat. Adjust volume to five gallons. Cool wort to room temperature, aerate, and add yeast.

Ferment at room temperature. Rack to secondary fermenter and add apple juice concentrate. Leave in secondary until fermentation is complete and yeast has settled. Add priming sugar and bottle.

Brian Buckowski's Cherry Ginger Honey Root Surprise
(5 gallons)

Ingredients:

- 8 lbs. pale malt extract
- 0.5 lb. crystal malt
- 0.25 lb. chocolate malt
- 0.25 lb. black patent malt
- 1 lb. honey
- 2 oz. Cascade hops (1 oz. for 60 min., 1 oz. for 2 min.)
- 1 oz. Hallertau hops (for 2 min.)
- 1 oz. shredded ginger root (for 15 min.)
- 1 1/4 tsp. root beer extract (1 tsp. at boil, 1/4 tsp. at bottling)
- 2 oz. cherry extract
- 1 tsp. Irish moss
- 1 package Liquid Wyeast 1056
- 3/4 cup dextrose

Step by Step:

Fill boiling pot with one gallon

water. Add crystal, chocolate, and black patent malt. Remove grains as soon as the water begins to boil. Sparge with one gallon 170° F water. Add pale malt extract and honey to water and bring to boil. When boil begins, add one ounce Cascade hops. At 45 minutes add shredded ginger root and Irish moss.

At 58 minutes add Hallertau hops and another ounce Cascade hops.

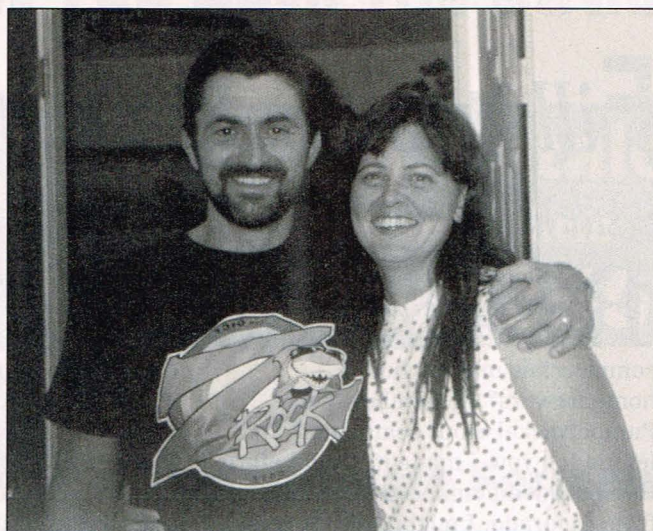
Remove from heat at 60 minutes. When cooled to 150° F, add root beer and cherry extracts. Add cool water to make five gallons. Pitch yeast. Leave beer in primary for four days at 70° F, in secondary for 10 days at 70° F. Prime with dextrose and bottle with root beer extract.

Bill Krostag's Easy Pumpkin Ale
(5 gallons)

"This beer matures very well. It's good after two weeks, but it's great after one month. I do the primary in plastic because I leave the pumpkin in for the first week of fermentation, then go to glass for the secondary."

Ingredients:

- 9 lbs. two-row American ale malt (crushed)
- 1 lb. crystal malt, 40° Lovibond (crushed)
- 2 29-oz. cans "Libby's" canned pumpkin
- 1.5 oz. Willamette pellet hops (4% alpha) for 60 min.
- 1.5 oz. Cascade hops (5.8% alpha) for 60 min.
- 1 oz. English Kent Goldings hops (5% alpha) for 15 min.
- 1 tsp. ground cinnamon
- 1/2 tsp. ground nutmeg
- 1/2 tsp. ground ginger
- 1/2 tsp. Irish moss
- Dry ale yeast (the starter is 5 tbs. dry malt extract and 1 cup water prepared 12 hours before pitching)
- 2.5 oz. corn sugar



Bill Krostag and his wife have found that it's worth being patient while their Easy Pumpkin Ale ages.

Step by Step:

In a preheated five-gallon cooler mash in using 10 quarts of 170° F water. This will stabilize at about 156° F. Mash for 75 minutes. Sparge using four gallons 175° F water. Boil as usual with one exception: Add pumpkin before adding hops and stir to prevent burning. Boil 60 minutes, adding Willamette and Cascade hops at the beginning. After 45 minutes add English Kent Goldings hops along with the spices and Irish moss to complete the 60-minute boil. Prime with corn sugar.

OG = 1.060

FG = 1.020 ■

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Waiting to Exhale



Mr. Wizard

I was recently flipping through the February BYO and happened upon the question submitted to you regarding the relationship between hops and marijuana. You mentioned that in the past you have partaken in brews that have incorporated the mystic weed. As both a scientist and a homebrewer, the concept fascinates me.

I just had to ask: If by chance someone were to go ahead and attempt this marriage of wort and weed, what kind of guidelines would they use? Understand that I realize marijuana is illegal, and I would never, ever attempt making such a brew, but I would very much like to know the ins and outs of such a procedure to satisfy my own curiosity.

Greg Young
South Plainfield, N.J.

Mr. Wizard

I hope this letter is one of the nice ones. What a can of worms you have opened. I'm sure you'll be flooded with neo-prohibitionist and anti-drug opinions from the uptight yuppie geeks your mag-

azine targets every month.

Let me come right out and say it: I'm pro-hemp. I believe hemp should be exploited to its fullest. Textiles, food, bio-fuel, and medicines, not to mention occasional recreational use. If God grows it, we should utilize it.

I'm proud of you for printing the question. Your answer was safe, cautious, and correct! In our efforts to get lawfully high, we have gone so far as to make Hop-Hashish from nothing but lupulins. It looked like hash, burned like hash, but it didn't have the same function as hash. At the risk of clobbering our lungs, we verified there are *no psychoactive effects* found in hops.

I understand the crap you and your magazine will go through in the next few months. When Nuco Gordo wrote an article called "The Noble Weed" in the *Southwest Brewing News* (November/December '94), the editors were inundated with hate mail. At one time I was an editor for a Texas homebrew club and voiced my views on the "M" word. I was crucified and left to dangle in the wind. So please accept my deepest sympathy and try to rise above it.

If your readers want more information on how to use hemp in beer, there is a great book on the subject written by Ed Rosenthal called *Marijuana Beer*, published and distributed by Quick-American Publishing, San Francisco, 1984.

Rev. Sean C. Markham
Houston

Dear Closet Potheads: I don't remember anything about this "Cannabinale" recipe. Really. I didn't even swallow it! I was in college and a friend gave the mystical potion to me. I put it in my mouth and after being told what the brew was all about, I immediately expectorated the vile liquid upon my friend's kitchen floor. The only recollection I have about the evening is grapefruit.

Now, being the Wizard that I am, I

do have some words of advice for the many friends of weed that apparently read my column.

If I were to speculate about using an illegal substance such as marijuana, the famous wacky cousin of hops that was reported to impart a tangy, grapefruit-like snap in beer, then I would guess that beers known to be garnished with tart, citrus flavors would be the style of choice. These include Bavarian hefe-weizen, American wheat, and Belgian wit beers. I think Wacky Weed Wit sounds pretty hemp...I mean hip.

This hypothetical beer would be made from a mash of unmalted wheat and malted barley, the wort flavored with coriander, Curaçao orange peel, hops, and a blend of aromatic herbs. After cooling the wort, the sweet and spicy potion would be pitched with a wit yeast strain and fermented as usual.

Regarding the amount and variety of herbal flavoring, the only advice I can offer is my vague recollection of my friend pouring a small amount of the stuff into his brew kettle. It looked like about three tablespoons of oregano, and he dumped it in the wort right after the boil was turned off. He let this additive (which incidentally is not on the Bureau of Alcohol, Tobacco and Firearms' list of approved beer ingredients) stay in contact with the hot wort for about five minutes before rapidly cooling the wort. Since I was shocked at what I was witnessing, I didn't inquire about the variety, quality, or quantity of herb used. Since this beer was brewed on the West Coast of our great land, the herb was probably grown somewhere exotic, like Humboldt, Calif. I'm sure *Marijuana Beer*, the book cited by Rev. Markham, has more recipe details.

By the way, exactly what church are you with, Reverend? It must be pretty darn progressive!

For those of you with inquiring minds, that's all I know about the

brewing of "Cannabinale." As the Wizard of Wort I must say that "Cannabinale" probably does not contain a whole lot of THC (tetrahydrocannabinol), the psychoactive drug found in marijuana. THC is a fat-soluble compound, essentially an oil, and is most likely not very soluble in wort. However, like hop oils, it may be brought into the wort in limited amounts. If you are really gung ho on the idea of THC in beer, then you may

want to extract the compound in alcohol and add the extract to the beer after fermentation.

That's all folks! No more pot talk in my column. I hope Rev. Markham is wrong about a 47-day flood of mail, all about hemp, pouring into the office two by two. If by chance he is correct, and he may be, you will not be seeing them here. So please save the wood-pulp and hemp-fiber paper on which your pens flow.

Yeast, that fabulous fungus! Much has been written about the care, feeding, and breeding of yeast. This leads to much confusion about many aspects of this tiny creature. One of the many confusing issues regarding yeast is the pitching rate.

Some say to pitch only the contents of your basic smack pack. Others say make a pint starter of about 1.020 gravity and pitch that. Still others say pitch a minimum of eight ounces of slurry. All of this advice to brew a five-gallon batch.

So what is the correct pitching rate? And how do you express this measurement (ounces/pound, ounces/gallon, ml/liter, or mg/kilogram)? All of this confusion leads me to the fridge for another homebrew that I am sure is either overpitched or underpitched.

Any words of wisdom regarding proper pitching rate will be greatly appreciated. And it will settle a mild argument.

*Warren Churchill
Santa Fe, N.M.*

Like most brewing arguments, yours cannot be settled with a single "ideal" number. I do have some very strong opinions on the subject, though.

I believe that those who use the contents of one smack pack are underpitching their wort. Yeast counts performed under a microscope support this opinion.

I like the idea of making a starter, but in my opinion 1.020 is a bit low for the gravity of the starter. I recommend using wort in the 1.040 to 1.048 range because that is the typical wort strength produced in most breweries, and the yeast culture should be acclimated to normal brewing conditions. If the only thing you ever brew is barleywine, a wort strength of 1.040 to 1.048 should still be used since high-gravity worts do strange things to yeast. If you're using dry yeast, making a starter is not necessary and pitching about 14 grams into five gallons does the trick.

Pitching at least eight ounces of slurry also sounds good. If the slurry is one that was harvested from a previous batch and is fairly thick (similar to pancake batter in consistency), then eight ounces per five-gallon batch is a

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very good rule of thumb.

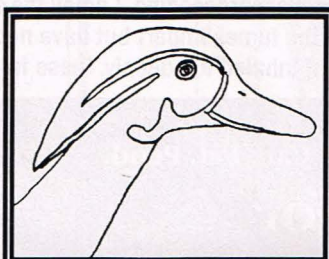
My opinions on this matter were not grabbed out of thin air; there are some guidelines regarding yeast concentration used by commercial brewers. Most brewers express yeast cell concentration in terms of millions of yeast cells per milliliter of wort, although some brewers pitch yeast by dry weight per wort volume (pounds/barrel or grams/liter). The rule of thumb quoted in many textbooks is to use one million yeast cells per milliliter per degree Plato (wort original gravity). If you have a 12° Plato wort (1.048), then you need about 12 million yeast cells per milliliter of wort. Most homebrewers do not have the tools required for yeast counts, so rules of thumb have been derived.

When I use yeast for the first time, I like to make a starter culture with a volume equal to 1/10th my batch size (for five gallons my starter is one half gallon). After the starter has completely fermented, I allow the yeast to flocculate (clump and sink — refrigeration of the starter helps this) and discard most of the clear liquid on top of the yeast, which is essentially unhopped beer. I then swirl up the yeast sediment at the bottom with the small amount of propagation beer and use this amount of slurry in my five-gallon batch. Based on numerous yeast cell counts, this method almost always gets me in the ballpark.

I like to re-pitch this yeast, if possible, since it is a pain in the can to propagate yeast every time I need it! When re-pitching yeast I use about eight ounces of slurry in a five gallon batch, and that always gives me just about the right amount.

That's the end of the straightforward rules. To complicate matters, yeast viability (living vs. dead) and vitality or vigor affect the quantity of slurry to pitch. For example, if 50 percent of the slurry is dead, then more must be used. Viability is relatively easy to determine using a stain called methylene blue. Vitality is similar to viability — if 50 percent of the slurry has so little vigor that it may as well be dead, then you must use more. It is like a scene in Monty Python's *The Life of Brian* when the poor old man is carried on the plague-victim wagon while kicking and screaming,

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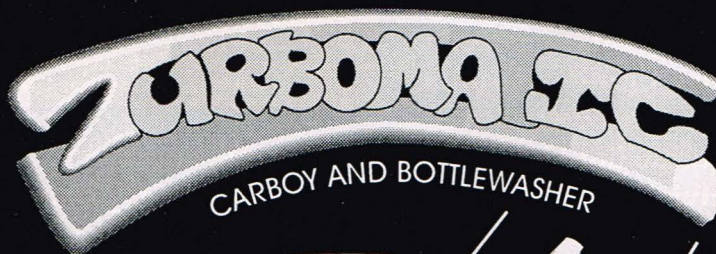
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"But I'm not dead yet," and the goon who is carrying the unfortunate soul says, "Yeah, but you will be soon."

Yeast vitality is more difficult to determine and is usually estimated by its history, taking into account how many times the culture has been repitched in the brewery (generations of use), what type of beer it was previously used in, how long the culture has been stored, and other considerations.

Hopefully I have helped you out. If

you're still a little confused, don't feel alone. Most commercial brewers have different ideas on this most fundamental of brewing concepts.

Mr. Wizard

While primary fermentation is vigorously proceeding, I enjoy the aroma that the fumes impart but have noticed that if inhaled too deeply, these fumes

cause dizziness. Is there any known hazard associated with this practice?

*Jim Quafimoto
Spokane, Wash.*

So Mr. Quafimoto (if that is your real name), you have been sniffing fumes? The only known hazards associated with this practice are dizziness, headaches, increased respiration rate and depth of respiration, respiratory failure and, eventually, death. You see, Mr. Quafimoto, you are quaffing carbon dioxide into your lungs.

In all seriousness, carbon dioxide is extremely dangerous. It occasionally claims the lives of commercial brewery and winery personnel. At home you can probably inhale the fumes off of your five gallons until you are dizzy, turn purple, and pass out without dying. This is because you will most likely pass out on the floor away from the airlock that is coughing carbon dioxide into your lungs. In a commercial setting you could pass out in a tank or you could open a tank full of carbon dioxide in an inadequately ventilated tank cellar, get dizzy, and fall to the carbon-dioxide-laden floor of the cellar and die. Carbon dioxide is no joke in such settings.

A tragic story that is part of brewery lore is that of a brewery worker who stuck his head into a carbon-dioxide-filled tank and passed out. The worker's buddy followed the downed man into the tank to rescue him, and the terrible outcome was two dead cellar workers. The sad part of this story is that it happens. In large breweries strict OSHA guidelines about entering empty tanks have all but eliminated this sort of accident. In microbreweries and brewpubs, which are not as tightly regulated by federal and state agencies, these tragedies can still occur if proper precautions around this deadly gas are not taken.

If I were you, I would quaff the fragrant aroma of the finished beer and not the dizzying fumes off of the fermenter.

Mr. Wizard

I've been told that the yeast at the bottom of a homebrew is high in

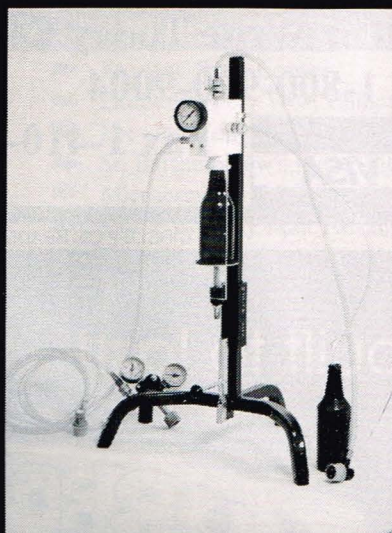
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Marmota Monax

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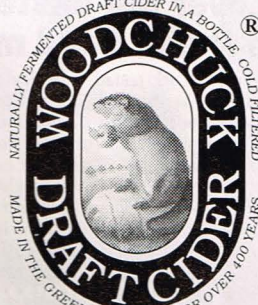
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vitamins. So although I stop pouring my homebrew before I get to the yeast, I often drink the yeast straight from the bottle. Recently at a holiday party I had "more than a few" brews and the accompanying yeast. Later that night I had a beastly bout of diarrhea. I did not go overboard on the food, and I didn't hear of anyone else getting sick. Was it too much of a good thing?

Deni Boyer
Fair Lawn, N.J.

Normally I would guess that the cause of diarrhea from a holiday party would be food related, but I think your passion for yeast is to blame. Live brewing yeast, although high in vitamins, especially B-vitamins, has a knack for wreaking havoc on the gastro-intestinal tract.

For starters living yeast, which can live in your intestines, actually remove more nutrients from your gut than they add — not exactly my idea of a dietary supplement. This is why health food stores sell *autolyzed* yeast extract (basically dead yeast) as a dietary supplement instead of the living stuff.

The other side effect of brewer's yeast in the body is really awful (sorry, folks) flatulence. My next door neighbor is the brewmaster at a brewery that makes a great hefe-weizen, but I steer clear of that place when I know that he has had a few hefes!

Combining these two effects could cause bad diarrhea. I know a few commercial beers that are infamous for their ability to induce diarrhea. Although not all of them are unfiltered, many are. I think you are right, your problem was simply from drinking "too much of a good thing!" ■

Mr. Wizard's Address

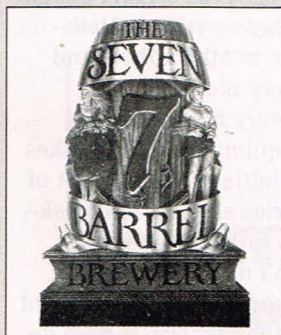
Do you have a question for Mr. Wizard? Write to him c/o Brew Your Own, 216 F St., #160, Davis, CA 95616. You can also reach him by e-mail at BYO@byo.com.

After smoking an unidentified plant during a ritual cry for rainfall, Mr. Wizard was transformed into an opinionated master and now dwells in the hills. On a clear night you can hear him howl.

Brewers with Temperature Control Issues

by Gailen Jacobs

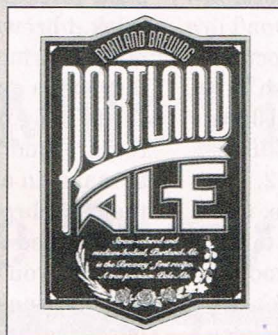
While they're not necessarily more difficult to brew than ales, lagers take a little more time, need a little more attention, and thrive with a little more equipment. And if you don't ferment the beer cold, it's not a lager. Three veteran lager brewers tell it like it is.



Vermont Pub and Brewery

Brewer: Greg Noonan

"The hallmark of a lager is that you taste the malt, hops, and water profile and you don't taste the yeast. Yeastiness, esteryness is the hallmark of ales, essentially."



Portland Brewing

Brewer: Alan Kornhauser

"One additional trick for homebrewers brewing lagers is to get the beer off the yeast as soon as possible after primary fermentation is over. Sitting on the yeast can give any beer off-flavors, but more so in lagers."



Tabernash Brewery

Brewer: Mark Lupa

"The yeast are probably the most important aspect of any brew, ale or lager. Make sure you have a good yeast culture and you pitch at the correct rate. Make sure that you use a lager yeast, of course."

Brewer: Greg Noonan

Brewery: Vermont Pub and Brewery, Burlington, Vt., and Seven Barrel Brewing, West Lebanon, N.H.

Years of experience: Eight

Education: On-the-job training

It's all in the temperature with lagers. For most homebrewers who are really into it and want to brew lagers, the first investment to make is a refrigerator. The second investment is a better temperature controller.

If a brewer does not have a refrigerator handy, here are two tricks: If you can't get your temperature below 60° F, use a relatively neutral ale

yeast. When fermenting colder than normal for the ale yeast (60° F rather than 68° to 72° F), esters will be subdued and sulfur components are more apparent, which is more typical of the lager style.

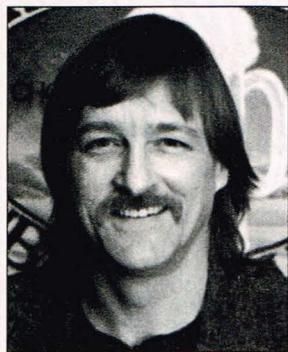
The second trick is to use evaporative cooling to chill your fermenter 5° to 10° F colder than the ambient (room) temperature. A swamp cooler will work. Put your fermenter into a pan of water. Take a bath towel, wet it, drape it over the fermenter so it trails into the pan of water. Fill the pan if it gets low. The evaporation through the towel will cool your

fermenter up to 10 degrees.

The hallmark of a lager is that you taste the malt, hops, and water profile and you don't taste the yeast. Yeastiness, esteryness is the hallmark of ales, essentially. Lagers you have to get past the fruity ale flavor. Use a lager yeast and ferment under 55° F, depending on the strain.

Use authentic European extracts or malts. That will give it a more authentic flavor.

Use a decoction mash. Decoction mashes are not as hard as they sound, and they are the only way you get the malty flavor that is character-



Greg Noonan

istic of the Munich-style lagers. You have to boil the wort or you don't get the malty flavors.

Don't decoction mash

British or

European malts unless their soluble nitrogen ratio (SNR) is under 42, preferably under 38. Otherwise, too many proteins will be reduced to amino acids. The beer will be too thin — no body. Ask your supplier for the SNR of the malts when you purchase them.

Let lagers age. Let them condition. Let them lager. Six weeks minimum, preferably eight to 10 weeks from the day you start fermentation. This lets the flavors mature and mellow.

Brewer: Alan Kornhauser

Brewery: Portland Brewing, Portland, Ore.

Years of experience: 20

Education: Short Courses at Siebel, North Dakota State University

I don't think brewing lagers is as big a mystery process as a lot of people think. I brewed lagers with G. Heileman Brewing Co. in Milwaukee, and they came out very nicely.

In a big brewery making lagers requires more equipment than it takes to make an ale. Initially I think a lot of the microbreweries started with cask-conditioned ales rather than lagers because you don't need to kraeusen, and you don't need to have the amount of refrigeration that is necessary to do lagers.

A lot of people who want to start microbreweries are on a tight budget and naturally gravitate to the more economically feasible. Still, for homebrewers and professionals, the process

(of brewing lagers and brewing ales) is roughly the same.

Normal brewhouse procedures are roughly the same for lagers and ales. Basically the keys to lager beer flavor are the variety of yeast you use (lager yeast), the temperature at which you ferment

(32° F), and the varieties of hops you use. I prefer to use Mt. Hood hops. They complement the German flavor and

are available here in the US. And, of course, the German hop varieties.

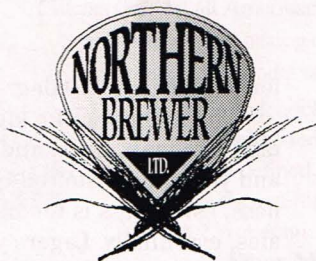
I think one of the basic things that homebrewers need to do is keep the fermentation temperatures low. Temperatures no higher than around 56° F



Alan Kornhauser

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The Tips

Greg Noonan

- Ferment at the correct temperature.
- If possible, invest in a refrigerator.
- For higher temperatures use a relatively neutral ale yeast.
- Use evaporative cooling to chill your fermenter 5° to 10° F colder than the room temperature.

Alan Kornhauser

- Don't be intimidated by lagers.
- Get the beer off the yeast as soon as possible after fermentation.
- Ferment at the correct temperature.

Mark Lupa

- Be extra fastidious during the entire brewing process.
- Make sure you pitch lager yeast at the correct rates.
- Ferment at the correct temperature.

are key to producing good lagers that are within the flavor profile.

One additional trick for homebrewers brewing lagers is to get the beer off the yeast as soon as possible after primary fermentation is over. Sitting on the yeast can give any beer off-flavors, but more so in lagers. With an ale it's not nearly as critical because as soon as the so-called aging period is started, you're pretty much getting ready to rack or bottle it. With the long aging time for the lagers, getting it off the yeast is critical. You should transfer the beer from the primary into another vessel.

Ideally, you would get rid of as much yeast as you can. As you cool the lager down to fermentation temperature, you get more yeast settling out. It's a good thing to try to pull that out as well. In most modern professional breweries you're dealing with cylindro-conical fermenters, so you have a valve at the bottom of the fermenter. As the yeast falls down to the bottom of the fermenter you are able to open the valve and extract the yeast portion. Once you reach the beer, you close the valve.

Brewer: Mark Lupa

Brewery: Tabernash Brewery, Denver

Years of experience: 2 1/2

Education: On-the-job training

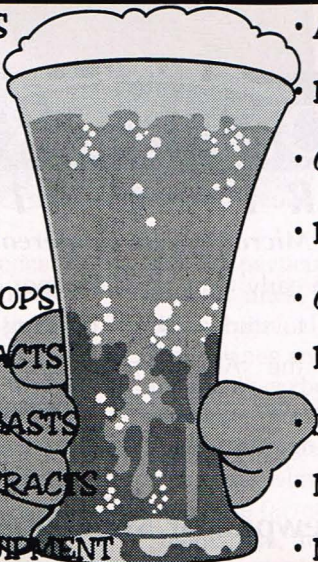
To brew good lagers you need to be extra fastidious during the entire brewing process. The lager flavors can be affected much more easily than ale because of the characteristics you

get from the lager yeast. A lager is a much drier beer with much more refined flavors, as opposed to the robust flavors of an ale.

Small changes like getting too much oxygen when you are transferring into the lauter tun, having too many husks pulling through into the kettle during the boil, or not getting a good cold break will affect the flavor of any beer but will be much more noticeable in

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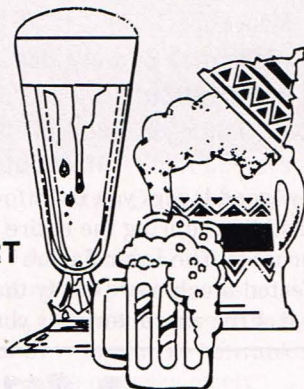
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Mark Lupa

lagers than in ales. That is the first thing.

The second thing is yeast. The yeast are probably the most important aspect of any brew, ale or lager. Make sure you have a good yeast culture and you pitch at the correct rate. Make sure that you use a lager yeast, of course.

The third thing is to ferment at the correct temperature. For a true lager you must get it down to a good 10° to 12° C (50° to 54° F). Otherwise, you will lose all the characteristics you want in the lager.

We have special equipment at the brewery to brew our lager. We brew a pale lager, which is a Dortmunder style, and a dunkel lager. Starting with the brewhouse, we use the four-vessel brewing process that Jim Koch has attempted to make famous. The fourth vessel is a floatation tank. The wort goes into this tank immediately after it's gone through the heat exchanger. We chill it, oxygenate it, and put it in the floatation tank. There the cold trub rises with the bubbles formed from oxygenation and aeration. You get a really good cold trub separation that way. Adding another vessel is more difficult for homebrewers. After four hours in the floatation tank, we put the lager into a fermenter.

Our fermenters are jacketed to keep them cool all the time. After the wort is about 80 percent attenuated (yeast is converted to sugar and alcohol, lowering the specific gravity), we transfer it into the lager cellar, which is kept right around freezing. There it's lagered anywhere from three to 10 weeks. For homebrewers four to five weeks is probably more than enough, as long as it's kept cold enough. ■

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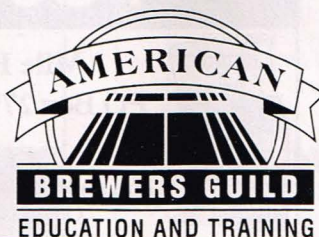
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The Link between Heaven and Earth

by Jeff Frane

Here in the US we have a long tradition of equating alcohol with evil. The anti-saloon movement that culminated in the Great Experiment of Prohibition was (and remains) inextricably linked to the fundamentalist belief that drinking is inherently wicked, and that there is no difference between a glass of beer at dinner and a bagged bottle of Mad Dog in an alley.

Our history must be what makes it difficult for Americans to understand how it is that men of God can dedicate themselves to brewing beer. Yet some of the world's finest ales are produced by the Trappist brothers in six monastery breweries. To drink these beers is to understand the link between heaven and earth; not only are they brewed reverently, but to contemplate a glass of Chimay or La Trappe is to savor the great Gift.

The Trappist brothers of five Belgian monasteries (Chimay, Rochefort, St. Sixtus, Orval, and Westmalle) and one Dutch (Schaapskooi) define an amazing array of beers — the only beers that can carry the Trappist appellation. Other breweries (primarily in Belgium) brew “abbey beers” in the style of the originals and are sometimes licensed by abbeys that have no breweries of their own, or whose breweries are now closed. Today, the beers provide a source of income for the monasteries and brother monasteries elsewhere. Traditionally, of course, monastery breweries and wineries provided sustenance for their residents and for travelers stopping by.

Trappist beers are typically Belgian, which is to say there's little “typical” about them. Belgium is the home of lost beers, the country where no beer style ever really dies but instead survives in some small corner of this small land. Idiosyncrasy is the norm.

In the most general terms, however, the Trappist beers (and most of their

imitators) follow a similar path: They are top fermented and bottle conditioned. They tend to be high-gravity beers with a fair to high alcohol content. They may be dry or sweet, but with the notable exception of Orval they tend not to be hoppy. If they have one truly universal facet, it is the intensely aromatic character derived from the yeast. Whether single-strain or multi-strain, abbey beers all have a special spicy, fruity character very different from British ales or Continental lagers. The aroma is earthy and spicy, rich, complex, and fascinating.

Each of the monasteries (once again, Orval is excepted) produces a range of beers of increasing strength and varying complexity. Usually, the only name given is a number. Rochefort uses the old Belgian degrees system, bottling a six, an eight, and a 10. More commonly, the abbey beers are labeled as dubbels and tripels, each with a distinct character.

Dubbels are usually dark, deep amber to brown, and relatively sweet. Moderately alcoholic (1.050-1.060 original gravity), they are likewise fairly rich beers of moderate body. Unlike the characteristic apple/pear fruitiness one might encounter in English ales, these beers often evoke plums or raisins. Roasted, burnt flavors are completely absent.

Tripels are among the most devious of beers — pale, almost the straw-color

of a pilsner, and fairly dry, yet with an intense alcoholic warmth (1.080-1.095). The Trappist brewery at Westmalle produces the defining beer, which is rarely available in the US.

Unlike the pilsner, tripels have a very low hop profile.

They are, in fact, surprisingly neutral in character, without much hoppiness or maltiness and with relatively little yeast character.

Other Trappist ales fail to fit these neat categories, ranging in color from orange-red to amber to deep copper, and with flavors that tax the vocabulary to define.

There are a few characteristics common to abbey beers. Although high in alcohol, they

lack the particular estery, winey taste (and the thick, satiating sweetness) of high-alcohol, all-malt beers such as barleywines and Imperial stouts. They are highly carbonated, particularly in contrast to British ales, with a distinctive mousse of a head, dense, rocky, and white.

These factors are not unrelated. The mousse, the lack of winey esters, and the refreshing body stem from a liberal use of sugar in the kettle. Sugar? Yes, the abbey beers are defining proof that sugar has an appropriate place in beer. The Belgians tend to use “candi” sugar, liquid or crystal, in a range of colors from white to dark brown. Belgian candi sugar is increasingly available to American homebrewers, but in many cases simple table sugar can be substituted.

Belgian brewers have more trade



secrets than anyone, and like seasoned politicians they are remarkably evasive at giving direct answers about ingredients or techniques. The term "Belgian waffle," I am convinced, was first coined to define this practice. But dogged persistence has allowed some hardy researchers to winnow out the occasional nugget.

Belgian brewers have an initial advantage: Their malts are among the finest in the world. The abbey beers are virtually all built on a base of pilsner malt. When the Belgian caramel malts appeared in the US market a couple of years ago, they were a revelation. Special B, a very dark caramel malt, has a distinctly raisin-like edge that provides just the right touch for dubbels — used cautiously, and in conjunction with other Belgian specialty malts, such as CaraVienne, CaraMunich, and Biscuit malts. Substitutions for Belgian malts should be limited to the very best lager malt or high-quality pale extracts.

Belgians also use adjuncts; flaked maize (corn) seems to be a favorite.

Abbey Hoffman (5 gallons, all-grain)

Ingredients:

- 9 lbs. Belgian pilsner malt
- 0.6 lbs. Belgian aromatic malt
- 0.4 lbs. Belgian CaraMunich malt
- 1 lb. flaked maize
- 1.5 candi sugar
- 5 g. Irish moss after 60 min.
- 1 oz. British Columbia Goldings hops (5% alpha) for 75 min.
- 1 oz. Mt. Hood hops (3.5% alpha) for 75 min.
- 0.25 oz. Saaz hops (3.5% alpha) for 30 min.
- Wyeast 3944 (in 2-liter starter)
- 4 g. gypsum (if necessary)
- 1 cup corn sugar

Step by Step:

Adjust soft water with gyp-

sum. Mash in all malts at 130° F for 30 minutes. Add maize and raise mash to 150° F. Hold until negative iodine test (about 60 minutes). Sparge to six gallons.

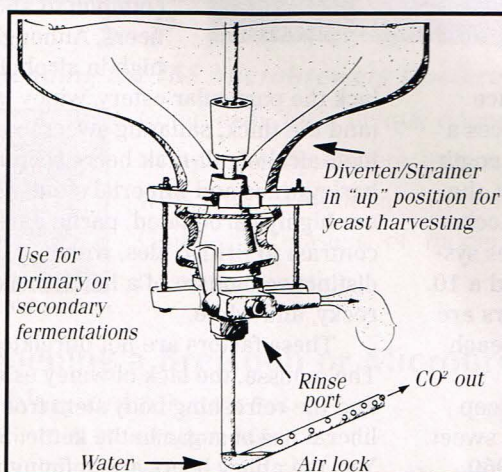
Boil for 15 minutes and add Goldings and Mt. Hood hops. After 15 minutes add candi sugar. Boil for 30 minutes and add Saaz hops. Boil 30 minutes. Whirlpool wort, then chill to 70° F. Aerate thoroughly and pitch yeast. Open ferment at 65° F for about 10 days, then rack to secondary until fermentation is complete. Bottle with corn sugar.

OG = 1.062

FG = 1.010

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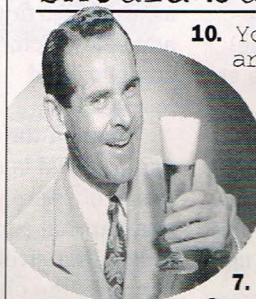
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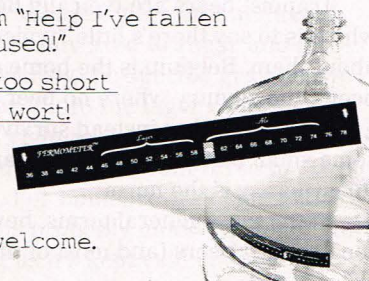


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Like sugar, it helps to brew a less-satiating beer, but unlike sugar it needs to be mashed.

The abbey brewers enjoy a blend of the best British and Continental hops in careful additions: a little Hallertau or Saaz mixed with a little Goldings or Fuggles. Michael Jackson even hints at a touch of Cascade in Chimay — could it be? Hops are used to subtly spice the beer and do not dominate abbey beers at all — except Orval. Orval is the great exception and has a huge hop profile, dry-hopped as it is with British Goldings.

Before the use of hops became the

Dubbel (5 gallons, extract)

Ingredients:

- 6.6 lbs light liquid extract
- 2 lbs. light dry extract
- 1 cup lactose
- 0.5 lb. 40° L crystal
- A few pinches black patent malt
- 1.5 oz (5.6% alpha) Hallertau hops, for 60 min.
- 3.5 oz (3.5% alpha) Hallertau hops, for 20 min.
- Yeast culture Kit A16
- 1 cup corn sugar

Step by Step:

Soak the crystal and black malt in one gallon of water at 150° F for 60 minutes. Rinse to a kettle, add malt extract, and raise volume to 2.5 gallons. Bring wort to a boil and hold for 30 minutes. Add 5.6% alpha Hallertau hops. Boil for 40 minutes and add 3.5% alpha Hallertau hops. Boil for 20 minutes. Add to cold, pre-boiled water, bringing to five gallons. Aerate thoroughly and pitch yeast. After primary fermentation at 65° F has finished (kraeusen has fallen), rack to secondary and finish fermentation. Follow normal bottling procedures, using corn sugar to prime.

OG = 1.055

FG = 1.014

— Courtesy of Phil Seitz

norm, brewers used any number of herbs and spices to season and preserve their beer. In the Belgian land of the lost, the practice still survives and some abbey beers may be hiding secret additives; coriander is a particular favorite.

The greatest brewing scientist of the century was Jean de Clerq, a Belgian professor who left an indelible mark on the Trappist brewing practices. Not only did he help isolate critical yeast strains, but he insisted that the best brewing

results came from blending varieties of hops and malts rather than relying too heavily on a single strain.

Like many Belgian beers, the abbey beers are aggressively carbonated. The high CO₂ levels responsible for the impressive head also add to the perception of dryness and the fruity aromatics. For the homebrewer this means priming with about a cup of sugar — cane, corn, or invert — at bottling.

The proper yeast is absolutely

laret!

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essential to a good abbey beer, and today's homebrewer has access to an increasingly fine selection. The first to appear, Wyeast's 1214, had an unfortunate tendency to banana flavors, but plenty of other good yeasts are available: BrewTek CL-300, CL-340; Wyeast 3944, 1388, 3787; Yeast Lab A08, among others.

A very large starter and plenty of aeration at pitching time are absolutely critical for these high-gravity beers.

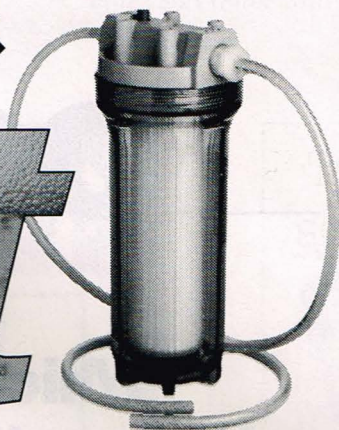
Fermentation temperatures should not be allowed to creep too high (not much above 68° F) or solvent-like fusels may be produced.

A second helping of yeast along with the priming sugar may be helpful at bottling, especially with the strongest of beers. Most of the abbey beers, like any high-alcohol beer, can use a long maturation time after bottling.

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Trippel

(6 gallons)

Ingredients:

- 14 lbs. gambrinus 2-row malt
- 2 lbs. flaked maize
- 3 lbs. candi sugar
- 20 g. coriander after 30 min.
- 5 g. Irish moss after 60 min.
- 1.5 oz. British Columbia Goldings hops (5% alpha) for 75 min.
- 0.25 oz. Mt. Hood hops (3.5% alpha) for 75 min.
- 0.5 oz. Saaz hops (3.5% alpha) for 30 min.
- Wyeast 3787 (in 2-liter starter)
- 20 g. gypsum (if necessary)
- 1 cup corn sugar

Step by Step:

Adjust soft water with gypsum. Mash in malt at 130° F for 30 minutes using five gallons of water. Add maize and raise mash to 150° F with about 3.5 gallons boiling water, and hold until negative iodine test (about 60 minutes). Sparge to six gallons and boil for 90 minutes, adding hops. Add candi sugar after 60 minutes. Whirlpool wort, then chill to 70° F, aerate thoroughly, and pitch yeast.

Open ferment at 65° F for about 10 days, then rack to secondary until fermentation was complete. Bottle with corn sugar.

OG = 1.090

FG = 1.012

tastings. Although any beer deserves the right glass for serving, abbey beers almost require it. The traditional glass is a fat goblet that allows the fragrant head to build without squeezing itself out of the glass. Whatever you do, treat these beers with reverence.

Brewers seriously interested in abbey beers and who have Internet access should get Belgian Beer Notes, an indispensable resource painstakingly developed by Phil Seitz. Web access is at <http://www.qdeck.com/~garyrich/beer/belg.html> ■

Bubble, Bubble, Boil and Trouble

Wort Boiling Techniques that Get Results

by Kirk Fleming

It's hard to believe any part of brewing beer could be easier than boiling the wort. But even as simple as boiling is, it has a real influence on the quality of your finished product.

For all-extract brewing, boiling (along with hop and yeast selections) is a big factor in the overall character of your beer. But maybe you've wondered, "Why boil at all? I use hopped extract kits!" Or maybe you know boiling is needed to kill bacteria in the wort but still wonder how long the boil should be, and why. Well, there are three main reasons to boil the wort:

The first is to make a physically stable

finished product that won't become hazy too quickly with age. The second is to get the goodness out of the hops and into the beer. The third is to evaporate undesirable substances called malt "volatiles." Dimethyl sulfide (DMS), which smells of cooked corn, is often the most critical to remove.

There's a fourth, albeit less critical reason: to fill your home or apartment with the delightful, captivating aroma of the brew kettle.

"Stabilizing" the wort means to alter its makeup, making it less prone to change over time. Three big causes of unwanted changes are bacteria, enzymes, and proteins.

Room-temperature wort containing bacteria from the air, your



THE AROMA FACTOR

water, or any other source will probably change over time as bacteria discover the nutritional value of your wort. If enough bacteria gather to change the wort's taste, smell, or appearance, then it becomes contaminated, ruining its flavor. Boiling "resets" the living bacteria count to zero. If you work quickly and with sanitary equipment after the boil, inevitable contamination will be kept in check until the yeast make beer. Beer can defend itself.

For all- or partial-mash brewing the enzyme activity that was desired in the mash would, if not halted through boiling, continue in the fermenter. Dextrins would continue to be converted to fermentable sugars,

and you'd likely end up with a thinner, more alcoholic beer than planned. This is an aging process, changing the beer from your intended design.

Finally, wort contains many kinds of proteins that slowly degrade and change the appearance and flavor of the beer. The more of this protein you can eliminate from the wort, the less likely you are to have unpredictable and unwanted changes in your product over time. Boiling for about 15 minutes completely halts enzyme and bacterial action, and longer, vigorous boils will cause much of the unstable proteins to drop out of the wort as "break" material.

Outfitting for the Boil

To begin you'll need a pot to serve as your brew kettle and a spoon you can use to reach to the bottom of the pot when it's full of boiling wort. Your pot should have a volume about one-

quarter to one-third greater than the volume you expect to boil. It's important to be able to do a full, vigorous boil, and it's important to keep the boiling, sugary wort inside the pot.

For a five-gallon extract recipe many instructions call for a wort volume of two gallons at the end of the boil. The wort is then added to three gallons of chilled water. With this method you should have at least a four-gallon pot. This allows you to start the boil with about three gallons of wort, to be reduced during the boil to about two gallons.

If you don't have a brewpot yet, you have at least two choices to make: how big and what material.

Your choices include enamelware, aluminum, and stainless steel. Whichever you choose, a good rule of thumb is to buy the heaviest pot you can afford. High-quality enamelware pots are hard to find,

unlike small, paper-thin aluminum and stainless pots, which are everywhere.

Prices range from about \$20 for 15-gallon enamelware to \$60 for six-gallon heavy aluminum to \$150 for a 10-gallon, aluminum-clad stainless unit. Thicker pots and those with aluminum-clad bottoms are better choices if you want to avoid scorching, a common problem in the boil that not only makes cleanup a big chore but also affects beer flavor.

Finally, a very real consideration is the Aroma Factor. Some non-brewers have a genetic flaw that makes the smell of the brew kettle intolerable. If you haven't brewed in the house yet, you may want to try it first with available or borrowed gear to determine if those who live

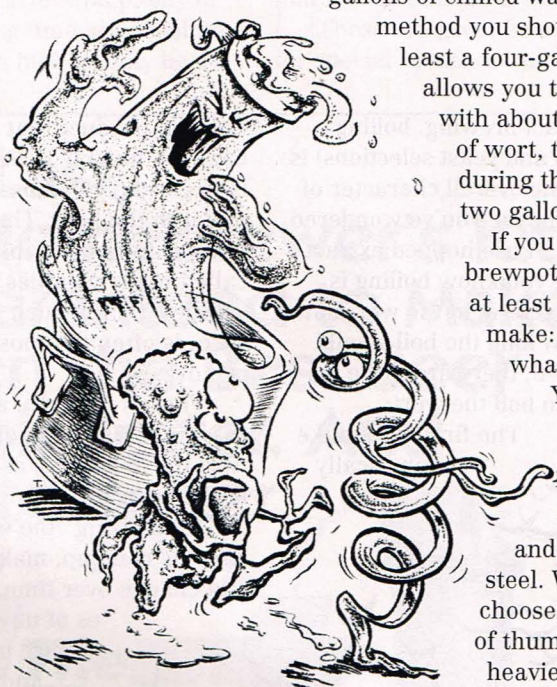
with you will ever permit it indoors again. Having to brew outside can add to your equipment requirements. This extra cost is called the Aroma Factor.

Turn Up the Heat

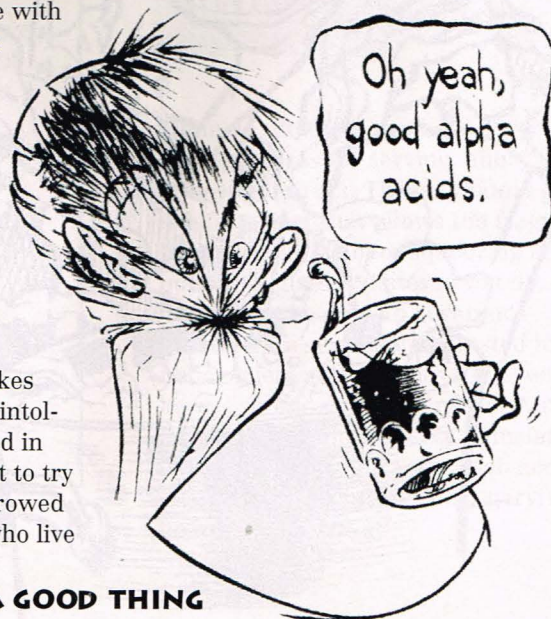
If you're brewing with extract, it's important to avoid scorching when adding the syrup to the water. When the water begins boiling, take the pot off the heat and stir in the extract. Continue stirring until the extract is completely dissolved, then return the pot to the heat. Any syrup or dry extract sitting on the pot bottom may stick to it before it dissolves, so keep stirring for a while. It's important to continuously watch the pot during this reheating — changes occur quickly as the wort begins to boil.

Just before the wort boils, you should see a thin, uniform layer of foam develop on the surface. Without your complete attention a boilover is possible within the next few minutes. Reduce the heat when you see this layer form. If you get surprised and are using an electric range, you'll need to remove the pot from the heat completely because the hotplate doesn't cool very fast after it's shut off. It's a good idea to have a pair of potholders handy and a nearby place to set the pot.

After a few minutes of very gentle boiling, the foaming problem will go away. At this point you still need to watch for boilovers, but the problem is much less severe. The goal is to maintain as vigorous a boil as possible, without the risk of boiling over.



BEER CAN DEFEND ITSELF



TOO MUCH OF A GOOD THING

The strong agitation of the wort and the bubbles moving to the surface both provide what's needed for a strong protein break and a stable, quality final product.

Bitter Truths

Until this point the wort is referred to as "sweet wort." Now it's time to change that by adding hops. Hops actually have three very important things to offer:

1. Resins add bitterness used to balance the malty sweetness all beers would otherwise have.

2. Tannins help to drop out those nasty proteins that cause unwanted haze in your beer.

3. Oils add aroma and flavor to the beer.

The one hop resin that's most important for bittering is called alpha acid. Look at the label on any package of hops at your supply store, and you'll see the alpha acid content given as a percentage by weight. The numbers on bittering hops range from four to 14

percent, and you may see labels such as "6.3% alpha acid" or "7.8% AA." The larger the number, the more bittering resin the hops contain.

The alpha acid content alone doesn't determine how much bitterness will be added to your wort, though. Alpha acid itself is not very soluble in wort. Boiling helps extract the resin from the rest of the hop and convert it to a soluble form. Only the percentage extracted and converted remains in the finished beer. The percentage of alpha acid extracted increases with a longer boil time and decreases with higher gravity wort. After an hour or so of boiling, nearly all the resins extracted from the hops will have been converted to soluble bittering material.

For wort having an original gravity between 1.050 and 1.060 and boiled for one hour, you can expect the percentage of total alpha acids extracted to be 20 to 30 percent. This extraction is called hop utilization and also depends on what form of hops you use (pellet, whole, or plug). In general pellet hops will provide the highest values, partly because they disintegrate into fine particles in the boil. Whole-leaf hops provide the lowest utilization.

It's generally accepted that it takes a vigorous, 60-minute boil to get conversion of the hop resins to a soluble form and to ensure enough violent activity in the kettle to get a good protein hot break. Most recipes will specify either

60-minute or 90-minute boils, with 90 minutes being common for all-grain worts, primarily due to the need to coagulate proteins.

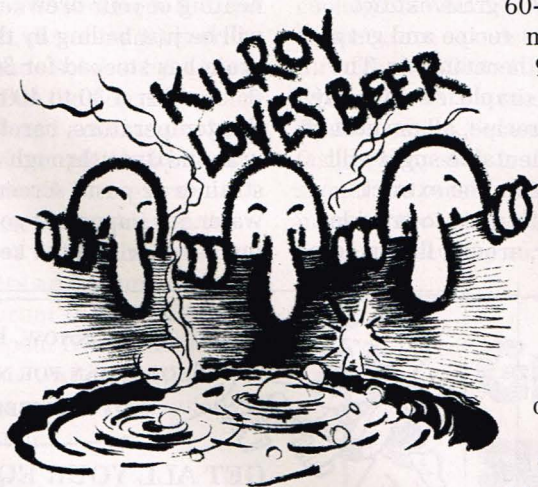
The bittering hops can be added at any time near the onset of boiling. But when doing 90-minute boils,

add the kettle hops about 15 minutes into the boil to avoid unpleasant bitterness from over-boiling the

hops. However, adding a few hop pellets before the wort begins to boil will help prevent boil-overs in the early stages of boiling. Later in the process things are a bit different; hop pellets can cause boil-overs when added to a vigorously boiling pot of wort. It's a good idea to add a little, wait for the foam to settle down, then add a little more, and so on.

Looks Like Rabbit Food

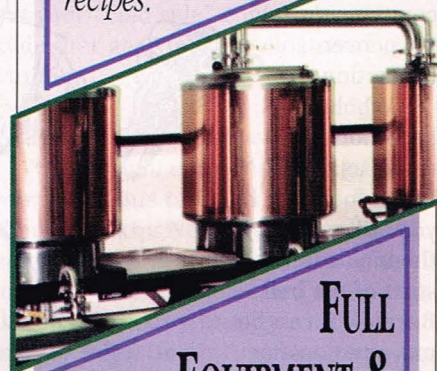
At first brewing with pellet hops may seem processed and unnatural. There's a practical problem with whole leaf hops though: They tend to plug things up. Your brewer's supply shop should have straining bags (hop bags) to solve this problem.



WATCHING THE KETTLE BOIL

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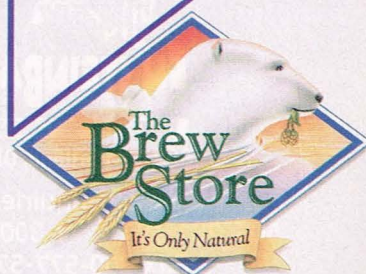


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Hop bags are available in both reusable, washable nylon or throw-away gauze. You fill a bag with the appropriate amount of hops and tie it shut with a drawstring. Just drop the full bag into the kettle and pull it out with tongs at the end of the boil, before chilling. When using hop bags some brewers like to increase the recommended hop weight by about 10 percent to compensate for poorer extraction.

Whole hops don't cause as much initial foaming, but you still need to add them carefully at the start of the boil. Because it can be more tedious to separate or weigh out whole leaf hop

additions, it's a good idea to have everything ready before you start the boil. It helps to weigh the hops into paper or plastic sandwich bags prior to the brew session. If you don't have a set of scales, then whole hop plugs are especially handy for getting good hop

weight estimates. The plugs can be readily split using a sharp knife.

In Grain We Trust

If you haven't used specialty grains yet, you need to! Find an exciting grain/extract recipe and get a thermometer. The idea is simple. As with any extract recipe, all or most of the fermentable sugar will come from the extract.

Grain is used to provide color, aroma, flavor, com-

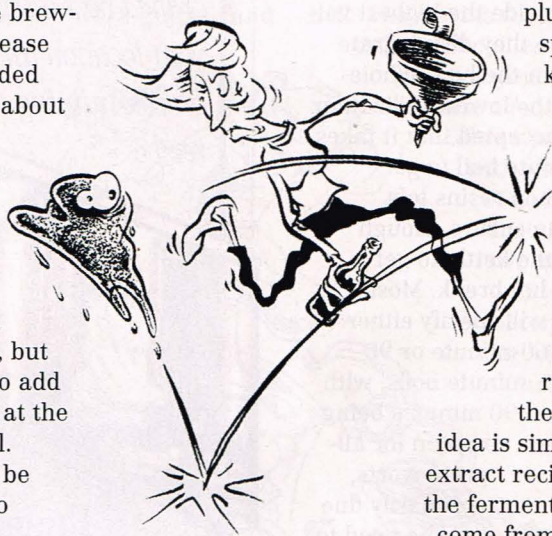
plexity, and fun. Any grain used mainly for these reasons is called a specialty grain. Some folks just call them "dark grains," even though they aren't all dark.

Several different techniques for using specialty grains work equally well. Here's an easy one:

1. Put all the grain into a pan large enough so the grain only fills it about halfway. Run your tap until the water is as hot as it gets (probably about 140° F), then cover the grain with enough water to get a very thin, easily stirred mixture.

2. Put the pan on very low heat. Temperature control isn't critical, but try to keep it around 150° F and definitely below 170° F. Time the heating of your brewkettle water so it will be just boiling by the time the grain has steeped for 30 to 40 minutes.

3. After a 30 to 40 minute steep at this temperature, carefully pour the grain mixture through a large kitchen strainer or pasta screen into the kettle water. An important goal is to get as much water into the kettle as possible,



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with no grain. Boil the water and add your extract as you normally would.

Another technique is to put all the grain in a grain (straining) bag (also at your supply shop), and drop the closed bag into the kettle as it's being heated. Remove the bag when the water temperature is about 170° F, and drain it into the kettle. This might be easier and less messy for you, but you'll get a little less from the grain. As with hop bags, you may want to increase the grain weight by about 10 percent when using a straining bag. Keep good records and find out for yourself.

Finishing with Flair

Recipes will almost always specify when all hop additions are to be made, usually in minutes from the end of the boil. Again, the hop resins are extracted and made soluble by a good 60-minute boil. But the hop oils, which contribute flavor and aroma, are driven off almost completely by such long times in the boil. Therefore aroma hops are usually added in the last 20 minutes or less of the boil. In fact some brewers add aroma hops only after the burner is shut off and the boil has stopped. If you add your finishing hops this way, cover the kettle completely and let it sit quietly for about 10 minutes.

Cooling Trend

One important but often misunderstood element of cooling wort is the difference between aeration and oxidation. After the boil is complete, the wort (now called the "hopped wort") should be cooled as quickly as possible then transferred to your fermenter. But before you decide how you'll do this, you should know what's good for the wort and what's not. When the liquid is above 140° F or so, any air mixed into the wort may oxidize it, and that's bad.

The chance for oxidation is greater with increased agitation of the wort at higher temperatures. Now, don't worry about a little sloshing around in the kettle. But avoid pouring hot wort from one container to another or allowing hot or warm siphon flow to drop and splash. This may damage the product permanently, degrading the beer's flavor and how well it ages.

When the wort is at pitching temperatures, 75° F and below, air mixed into it simply dissolves, and that's good. The yeast will use all the dissolved oxygen they can get, and you can't dissolve too much with common methods. Those methods include pouring the cool wort back and forth from one bucket to another, agitating as much as possible (with your long spoon), and using an aquarium air pump with tubing and aerator.

It's very simple: If the wort is above 140° F or so, avoid any splashing. If it's 75° F or below, agitate and splash it as much as possible.

Cooling the Wort

You have three main goals in cooling the wort. First, lower the temperature as quickly as possible through the 80° to 100° F danger zone, where the wort is most vulnerable to contamination. Second, get a strong, fast, healthy start to the yeast. The sooner the yeast produce alcohol and increase the acidity of the wort, the sooner it becomes an unwelcome place

for bacteria. Third, produce a good cold break — that's when more of those unwanted proteins drop out of the wort.

Depending on your time and resources, you may choose to cool using the bucket-in-the-bathtub method, a copper coil chiller, or any other method suggested in books, by friends, or by your supply shop. Remember though, once you've finished the boil everything that comes into contact with the wort must be sanitized. The "hot side" of your brewery may be a grungy garage, but your "cold side" containers, tubing, and other gear must be clean and sanitary.

Your Work is Done

Even if you consider boiling the wort a tedious task, it's a step you shouldn't skip. Not only is there a lot happening in that kettle, but the boil provides many options for fine-tuning the brew. Making quality wort is the brewer's Job One. After that it's pretty much up to the yeast to make the beer. Give them the best raw material you can.

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Homebrew



Weddings

By Susan Walton

When homebrewers plan a celebration, for themselves or a loved one, it isn't complete without a beer from their own heart and hands. Here are some tales of love, marriage, and beer, all going hand in hand to the altar.



Chris and Jackie Werth toast with homebrew at their wedding.

An Autumn Ceremony



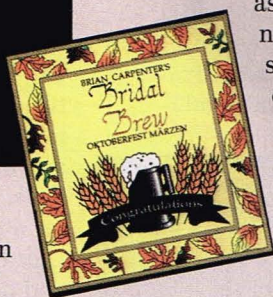
Karen, Autumn, Tevis, and Brian.

When Brian Carpenter's twin sister Autumn decided to marry Tevis Underwood, he and his wife Karen wanted to do something special. So they got together to make the "Bridal Brew."

Because the wedding was in October, Brian made a Märzen. The Carpenter "brewery" is in New York and the wedding was held in Tacoma, Wash., so they carefully packed 100

bottles in garbage bag-lined duffle bags for the plane trip west. "Amazingly," recalls Brian, "only two bottles were broken en route."

Since Brian started brewing late, Autumn and Tevis gave the beer out as favors. Brian announced that everyone should drink it at the couple's one-month anniversary. A guest called to tell them "We popped the bottle open (then), and it was smooth and great!"



Brian's Bridal Brew (10 gallons)

Ingredients:

- 6 lbs. light dried extract
- 3 lbs. pilsner malt
- 3 lbs. Munich malt
- 0.5 lbs. cara-pils malt

- 0.5 lbs. English crystal malt (60° Lovibond)
- 2 oz. chocolate malt
- 4 oz. Pearl hops (7.5% alpha)
- 2 oz. Tettnanger hops
- 2 oz. Hallertauer hops
- Lager yeast

Step by Step:

Soak the malts in four gallons of 150° F water for 45 minutes. Sparge and add the extract, six gallons of water, and the Pearl hops and bring to a boil. After 45 minutes add half the Hallertauer hops. For the final 10 minutes, add half of the Tettnanger hops and the rest of the Hallertauer hops. Turn off heat and add the remaining Tettnanger hops for three minutes. After cooling add the yeast and follow normal lagering procedures for fermentation, racking, and bottling.

OG = 1.057

FG = 1.026

Home-Grown Hops and a Brewer's Dozen

At Katherine Glazen and Andy Cutko's wedding in Glastonbury, Conn., many of the guests gave presents. Some gave something old or something new, but the most highly prized gifts were the cases of something brewed.

All the brewers in attendance brought a case of their own homebrewed wedding beer for the reception. The offerings included "Union Ale," "Paramour Alt," "Love Potions Number One and Two," and Steve Kreckman's contribution, "Kiss Me Kate" raspberry wheat. The guests toasted the happy

couple with the beer of their choice. "All in all," Steve says, "there were at least a dozen cases of homebrew."

Katherine also observed an age-old tradition of giving gifts to her guests in thanks for sharing her special event. The bride gave all the brewers bags of hops grown on her Connecticut farm! The ultimate party favor!

Kiss Me Kate Raspberry Wheat (3 gallons)

Ingredients:

- 1 tbsp. light dry malt extract
- 1 pint water (for starter)
- 3.3 lb. can Brewferm Framboise
- 1.4 lb. can Alexander's wheat "Kicker" syrup
- 1 tsp. Irish moss
- Wyeast 1056 American ale yeast (instead of the yeast provided with the Breferm kit)

- 3/4 cup priming sugar

Step by Step:

Make one pint of starter wort by boiling the malt extract in the water. Start yeast in the cooled starter wort one day prior to brewing. Boil extracts and Irish moss for 10 minutes (the Framboise is pre-hopped). Pitch yeast when cool. Rack to secondary after one to two weeks. Bottle with priming sugar after one week in secondary.

OG = 1.046

FG = 1.012



Katherine Glazen and Andy Cutko at their homebrew wedding, held outdoors on a beautiful Connecticut day.



Getting the Hall on Time

When Chuck Dutart got married, he knew what he wanted to serve at the reception: his dad's homebrew.

Tom Dutart, Chuck's dad, was looking forward to providing the beer for the event. Until just before the wedding date, arrangements seemed to be going well.

Then, the manager of the reception hall called to say he had double-booked. In spite of their carefully laid plans, Chuck and his bride, Faye, had to scramble at the last minute for a place to hold the celebration.

A new hall was found, but the manager insisted on providing all the drinks served at the wedding. In other words, no homebrew. Tom didn't want to disappoint his son, but he was in no position to argue.

"But homebrewers never quit," says Tom, so he bottled his trademark brew, chose a name that suited the special occasion, and gave it as a gift to the guests as they departed. He also gave some "Matrimoniale"

to the catering crew. "The husband of one of the cooks thought it was so good that he wanted to buy a case of it!" Tom didn't sell it, though. It was a brew to be enjoyed in honor of Chuck and Faye's marriage.

Matrimoniale (5 gallons)

Ingredients:

- 9 lbs. Alexander's pale malt
- 1/2 lb. crushed 60° Lovibond

- caramel malt
- 3.25 oz. Cascade hops
- Wyeast 1056
- 3/4 cup priming sugar

Step-by-Step:

Steep caramel malt in two gallons of 160° F water for 30 minutes in a grain bag. Remove grain bag from the water and rinse with two gallons of 160° F water. Add pale malt, adjust volume to 5.5 gallons, and bring wort to a boil. When it boils, add 1.5 oz. Cascade hops. Boil for 60 minutes and add .75 oz. Cascade. Boil for five more minutes and turn off heat.

Cool wort to 70° to 80° F and add yeast. Ferment at room temperature until complete, rack to a secondary fermenter, and dry hop with 1 oz. Cascade. Hold beer at room temperature for 24 to 30 hours. Transfer to a bottling bucket. Add priming sugar, bottle, hold for at least two weeks before refrigerating the finished beer.



Chuck and Faye Dutart at their December wedding in the Waterloo Hall.



Here Comes the Bride's Brew



Gail and Jamie Keating with the maid of honor, Lisa Walker.

The first time Gail Walker made beer, she served it at her wedding.

Gail and fiancé Jamie Keating, an avid homebrewer, were given a trip to a San Francisco brew-on-premise, Brew City, as an engagement gift. They invited two friends to come — Tighe, Jamie's brewing partner, and Gailen, like Gail a brewing novice.

"Jamie and Tighe considered themselves the 'real' homebrewers," says Gailen. "They humored us by taking us along."

The group chose a pale ale recipe, then began to measure ingredients. That's when the guys decided to go buy some beer to drink while they brewed (hey, it's important). Gail and Gailen continued mixing, measuring...while the guys consumed their beer, talked to the other brewers, and examined the equipment.

"They never did get around to helping with the brew," says Gailen. "Don't tell them this, but we didn't miss them."

Gail and Gailen (with a little help from the groom) bottled the brew in six ounces ("It took forever!") to give to the wedding guests as favors.

The wedding guests all enjoyed the beer (except for Tighe and Jamie, who grumbled about "beginners").

"When Gail told everyone that we had brewed all the beer, everyone laughed," says Gailen. Seems the guys were known far and wide as the brewmasters of the family, and no one believed that the "girls" had done the brewing.

Jamie and Gail's Wedding Veil Ale (14 gallons)

Ingredients:

- 2 lbs., 8 oz. wheat malt
- 2 lbs. crystal malt (20° Lovibond)
- 8 oz. crystal malt (60° Lovibond)
- 1 lb. Vienna malt
- 4 qts. pale malt syrup
- 2 qts. extra pale malt syrup
- 2 qts. amber malt syrup
- 6.5 oz. Cluster hops
- 8 oz. Cascade hops
- 0.3 oz. Irish moss
- Nottingham's ale yeast

Step-by-step:

Mash the grains at 158° F for 30 minutes. Add the malt syrups and boil for 15 minutes. Add 5.5 ounces Cluster and 5 ounces Cascade and boil for 40 minutes. Add 1.5 ounces Cascade and Irish moss and boil for five minutes. Dry hop with the rest of the Cascade and Cluster.



Vows to be Different



Now that they are married, Rich is teaching Heather to brew. Her first beer was a barleywine.

Rich Holmes is not what you would call a traditionalist. His credo (ironically, penned by Miss Manners) is "Not every tradition, however

entrenched, is attractive. Some should be closed down immediately." This includes serving champagne or the "store-bought" stuff at your own wedding.

For his own wedding Rich didn't just brew a beer — he made four of them! The guests raved about Old Dog Porter, New Tricks Brown Ale, Blue Blazes Red Ale, and Borrowed Bottle Gingered Golden Ale.

"The Gingered Ale was really bottled in borrowed bottles, since I didn't have eight cases of empties sitting around," he says.

Borrowed Bottle Gingered Golden Ale (5 gallons)

Ingredients:

- 3.5 lb. light dry malt extract
- 1 oz. East Kent Goldings hops
- 1.5 lb. orange blossom honey
- 1/2 tsp. Irish moss

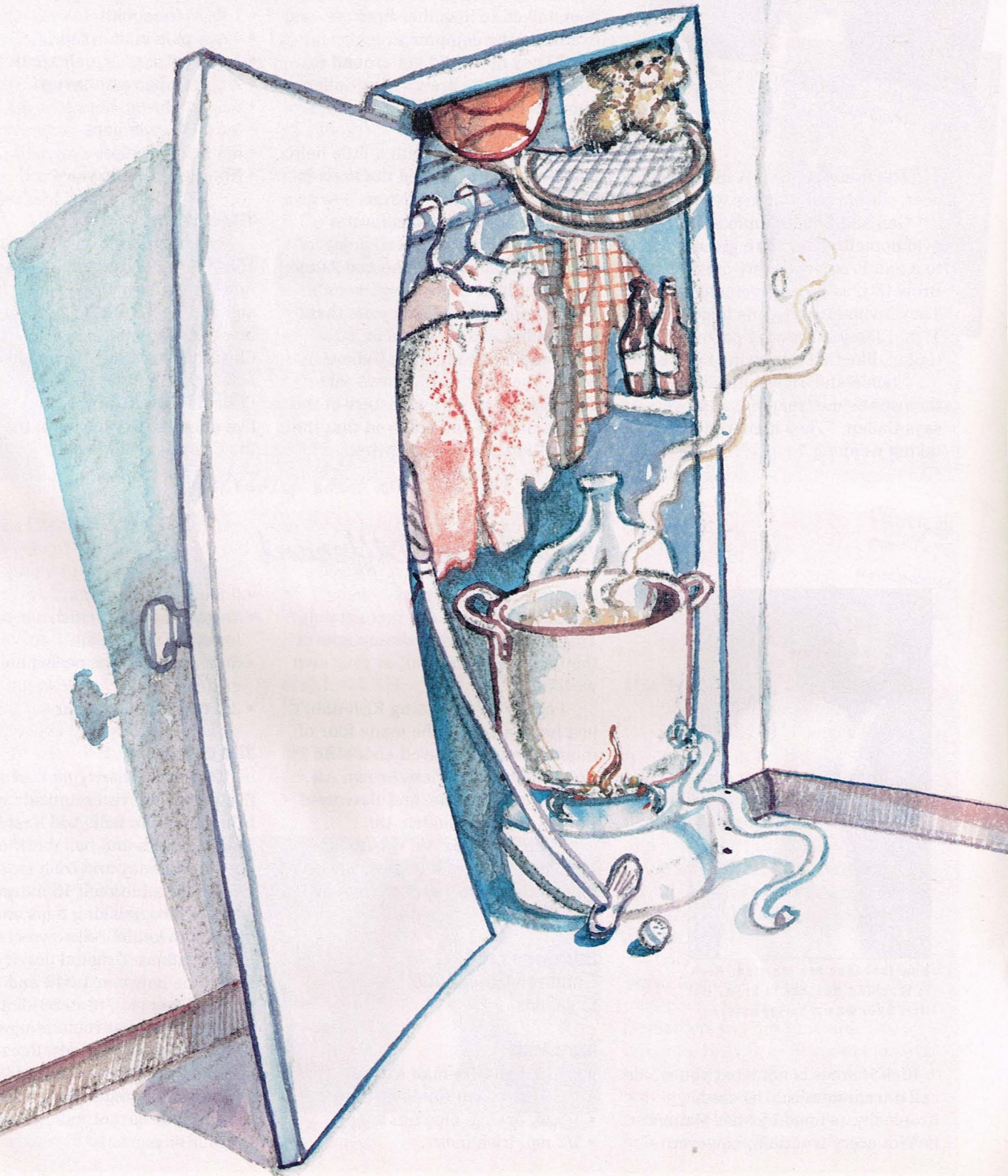
- 0.5 oz. Fuggles hops
- Yeast Labs A04 British ale yeast (or other ale yeast)
- 5 oz. fresh ginger, peeled and grated
- 2/3 cup priming sugar

Step by Step:

Dissolve light dry malt extract in five gallons of water and stir while bringing to the boil. Add East Kent Goldings hops and boil for 45 minutes. Add honey and Irish moss and boil for an additional 15 minutes. Add Fuggles finishing hops and turn off heat to kettle. Adjust wort volume to five gallons. Original gravity should be between 1.042 and 1.046.

Cool wort to 70° to 80° F and add yeast. Ferment at room temperature until fermentation stops. Rack beer to secondary fermenter and add the fresh, grated ginger. Bottle beer after leaving it in the secondary fermenter for four days.

OVERCOME YOUR



CLOSET ANXIETIES!

Even if your home is the size of a Brooklyn apartment, you can brew great beer without stress. Just follow this strategy for minimalist brewing with maximum success.

By **S**tefan **S**magula

There are two kinds of people in the world: pig lovers and pig haters. That's what anthropologist Bronislaw Malinowski might have said. What would Mr. Malinowski have said if he had been studying homebrewers instead of Trobriand Islanders? Perhaps he would have noticed that there are two kinds of homebrewers: apartment brewers and house brewers, minimalist brewers and

maximalist brewers.

Like pig loving and hating, the differences between minimalist and maximalist brewers are due as much to differing philosophies as to environmental requirements. Minimalist brewers know from experience that bigger is not always better. Sometimes small is sexy.

"Of course, living in a dorm inspires very simple brewing techniques," reports Eugene

Sonn of Oswego, N.Y. "First, I never used a chiller, always did a single-stage fermentation, and only laughed at the idea of brewing a lager." One of his beers, a strawberry-wheat beer, became so popular at Swarthmore College that friends and roommates commissioned a batch for a party.

Homebrewers like Sonn are minimalist by necessity; they live in studio apartments, dorm rooms, or condominiums. Other homebrewers are minimalist by nature; they simply prefer less to more. Whether you inhabit a dorm room or you are a minimalist in a mansion, space- and effort-efficient homebrewing can be satisfying and fun.

The apartment brewer may marvel at the ingenuity and inventiveness of a Recirculating Infusion Mash System (RIMS) controlled by a laptop computer, may admire the sheer power of a 165,000-BTU King Kong Kooker that boils five gallons in a few minutes, and may envy the house-brewer's ability to lager in the cellar. But in the end the apartment brewer can only laugh with Eugene Sonn while brewing another great-tasting batch.

Excuse Me, Can You Spare a Few Cubic Feet?

I learned to brew in a wee Brooklyn apartment. Unencumbered by the usual garage, cool basement, grassy lawn, brewing refrigerator, and spacious kitchen, I attempted to brew simply, with a minimum of gear and effort. "Reduce! Re-use! Relax!" was the mantra I chanted while brewing. By New York standards the apartment was spacious and sinfully inexpensive, which means by any other standards it was impossibly small and implausibly overpriced.

Once the refrigerator door opened, the kitchen was full. Like a puzzle with sliding tiles, moving one item here meant moving several other items over there. As I stuffed all my homebrewing gear under the only table, which blocked the closet, I realized either my brewing and I would adapt to this micro-environment, or one of us would perish.

During the earliest stages of adaptation, I cleared the bottom half of a closet. There I stacked most things

brewed and brewing related, but piling everything together meant emptying the closet every time I wanted to drink a beer, so I installed shelves in the closet. The lighter items went on shelves or hung on hooks. This freed up space around the heavy items on the floor: carboys, bottles, and grain.

The most voluminous item, a seven-gallon enameled pot, earned its keep by serving sequentially as grain storage bin, mash tun, boiling kettle, emergency blow-off reservoir, bottle sanitizer, bottling pot, and homebrew icer-downer. Reduce! Re-use! Relax!

All-Grain Brewing for the Minimalist

When not brewing, I stored the grain bag in the seven-gallon pot. This had the advantage of keeping my friends, the rats and mice, out of the grain. I mashed in the pot by heating the water in it and then adding the grain. The mashed grain went into a homemade Zapap (double bucket) lautering system, and then the run-off went back into the same pot. To do this you need to have more than one large pot, but with a combination of the right techniques you can create five gallons of sparge water using only a "spaghetti pot." Sounds impossible, but it's true.

To sparge a typical batch, about 10 pounds of grain, you need about five gallons of 170° F water. This doesn't mean you need an extra five-gallon pot or that all five gallons of water must be hot at the same time. After all, to avoid the dreaded stuck run-off and achieve full extrac-

tion you should sparge rather slowly.

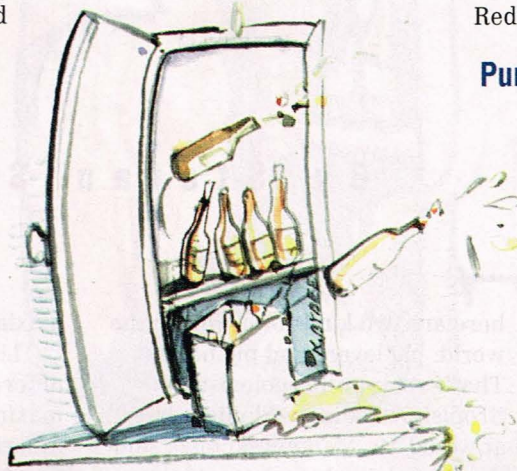
The minimalist can use a trick I'll call Just-In-Time Sparging. I learned this method the hard way after discovering in the middle of a mash that a friend had borrowed a large pot and never returned it. Just-In-Time Sparging means boiling a smaller quantity of water and then adding hot tap water as needed to bring the temperature down to the 170° F range.

The minimalist may use as many or as few pots as she or he may have. By combining the boil-and-add-hot-tap-water technique with the heat-as-you-sparge technique, you can make five gallons of 170° F sparge water using only a few household-size pots, thereby rendering superfluous the purchase and storage (perish the thought!) of an extra five-gallon pot. Reduce! Re-use! Relax!

Punishing Experiences

I must confess, sometimes in the middle of reducing and re-using I did not succeed in relaxing sufficiently. Pots overflowed, boiled over, ran out. But the least relaxing moment came one 100° F summer day when exploding bottles in the closet threatened to reach critical mass and flood my downstairs neighbor with a wit-beer meltdown.

My downstairs neighbor, Julie, a part-time dominatrix, would not have appreciated my uninvited wit. Realizing the potential for an un-neighborly disaster, I donned ski goggles, ski mask, sweater, jacket, and heavy leather gloves for protection and transferred bottles, one by one, to the fridge, averting a meltdown and a certain-to-be-



punishing visit from Julie.

Depending on your neighbors, brewing in an apartment does not have to be so punishing. "Actually, I found it easier to brew in a tight, cramped apartment kitchen," writes Alex Flinsch, a systems consultant living in Hamilton, N.J. "Everything seemed to be within easy reach."

Even Flinsch admits that apartment brewing poses some unique hazards. Once while he was on vacation, a bottle of beer exploded, cracking a full carboy. The contents of the carboy leaked downstairs, dripping beer on the landlord's Friday night seder. "Needless to say I moved a few months later," reports Flinsch before adding that he was already planning to buy a house.

The lesson to the brewer who must co-habitate with fermenting beer and neighbors: First, minimize wild yeast and bacteria in your brew, and second, protect yourself and your neighbors from the rare accident. Line the floor of your storage space with plastic bags under a half-inch of newspaper. The paper will soak up most unforeseen spills and overflows. If you have concrete floors (as many storage rooms in apartments have) the paper also pads the carboy.

During the first few days of fermentation, when the risk of blowoff is high, place your fermenter inside a large pot, or at least on top of a plastic lid, cookie tray, or something large enough to collect possible overflow. To avoid a case of Alex Flinsch's chain-reaction carboy failure, contain bottles in boxes, away from any fragile items. Charging a mere taste of your latest, your local beer distributor will

probably be more than happy to let you have a couple sturdy, partitioned, reusable boxes.

Boiling in the Great Indoors

Even if lack of space is not a question, lack of access to the outside world can pose problems to apartment dwellers, especially when it comes to large-volume boils. "My apartment starts on the second floor," says Laura Conrad, an apartment-bound, all-grain homebrewer from Chelmsford, Mass., "so I can't just step outside and use a propane burner."

Instead she boils the seven or eight gallons of wort in two pots. "This means that I am using three burners on my gas stove, which may not be as powerful as a propane burner but certainly beats one burner on an electric stove." She adds that she ferments six-gallon batches in two three-gallon carboys because the three-gallon carboys fit on her kitchen counter better than five-gallon ones.

"The best advice to give beginners with space problems," offers Conrad, "is to get several smaller pots that nest rather than one large pot that will be a storage problem (and which holds more hot liquid than you really want to lift, anyway)."

Essential Gear

As you probably know, the truly essential gear for brewing five gallons consists of about a dozen things:

A seven gallon plastic fermentation bucket with lid, airlock, rubber stopper, hydrometer, siphon tube, racking tube, bottle filler, bottling bucket, bottles, bottle capper, caps, bottle brush, and a pot erstwhile known as the spaghetti pot. This is how many fine brewers start.

Homebrew supply stores will sell this gear (not including the pot) together with an instructional book for about \$40. The space needed to store your

new gear is no larger than the seven-gallon bucket. Everything else basically fits inside. Even the smallest studio apartments and dorm rooms can accommodate a couple of extra cubic feet.

If you are interested in more advanced brewing, add a five-gallon glass carboy as your secondary fermenter. For all-grain

brewing add a large spoon, a thermometer, a seven- or eight-gallon enameled (\$30) or stainless steel (\$120) pot, a lautering device of some sort. If you are feeling expansive, you could buy or devise a wort chiller. For cleaner brews use a seven-gallon carboy instead of the plastic bucket. Whether you brew from extract or

all-grain, all your equipment, supplies, and the delectable final product should fit in the lower half of a regular closet.

Minimalist Gear

While not essential to brewing, there are a few devices that still qualify for minimalist status because they either save space and effort or improve the quality of beer sufficiently to offset the space they occupy. One candidate for minimalist status is a five-liter mini-keg system (\$95 for tap, 10 carbon dioxide cartridges, and four mini-kegs), which makes cleaning, sanitizing, filling, and storing 60 bottles unnecessary. The mini-kegs are lightweight and of a size that will fit any kitchen cabinet or refrigerator.

The main disadvantage is that bottles are free while mini-kegs aren't. "We actually discourage people from [the mini-kegs] a bit," says Darren White of Austin (Texas) Homebrew Supply. White says that the initial expense combined with the need to use about four CO₂ cartridges per five-gallon batch makes mini-kegging almost as expensive as a "real" kegging system. But for the



Once the refrigerator door opened, the kitchen was full.

If you are brewing from extract, you really don't need anything more than a bathtub, a fire escape, or a block of ice.

space-conscious brewer who can't or won't use a "real" kegging system, who also dislikes the hassles of bottling, the value of mini-kegging may be somewhat higher.

Chilling the Wort

The most space- and effort-efficient wort chiller is your sink or bathtub. "Hell, in the wintertime I just stick the carboy out on the fire escape," says Chris MacDonnell, an engineer in Brooklyn, N.Y. If you are brewing from extract, "you really don't need anything more than a bathtub, a fire escape, or a block of ice," says MacDonnell. Just fill your kitchen sink or bathtub with ice and water and place your covered pot of wort in the ice bath.

One tale popular among urban brewers is that you can fill two-liter plastic bottles with water, freeze them, and throw them in your pot with the boiling hot wort. This method would work even with full-volume boils, since it would add no water to the wort. But for the extract brewer, "the easiest way is to make three gallons (of wort) and add it to cold water," says MacDonnell.

Because they must conduct full-volume boils, all-grain brewers will probably, though not necessarily, want a chilling device of some sort. There are two types of chiller: immersion and counterflow. Larger, heavier, harder to clean, and more expensive, the garden-hose variety of counterflow chiller, which consists of 30 feet to 50 feet of garden hose with copper tubing on the inside, is not a candidate for minimalist status.

Even the heaviest immersion chiller weighs only a few pounds, can be made to fit any pot, and requires no special

tools or knowledge to make. The immersion chiller consists of 30 to 50 feet of copper tubing bent in concentric circles and attached to your faucet with some plastic tubing. This chiller also has the advantage of allowing you to siphon the wort away from the tub and hops in the bottom of the pot.

Lighter and smaller than both the garden-hose chiller and the immersion chiller is another type of counterflow chiller made from a wide-diameter plastic pipe that encloses a coil of copper tubing. Cold water flows through the pipe, hot wort through the copper tubing. The drawback to this chiller is that it is more difficult to construct than the immersion chiller and also more expensive to purchase pre-made.

Neighbors, Roommates, Landlords, and Lovers

"I've been brewing in a small one-bedroom for a few months now," writes Matthew Wilson, a financial analyst living in Takoma Park, Md. "The only real concern that I have is that when I brew, the aroma that I find so pleasant can smell up the hallway and possibly neighboring apartments." Apparently, not everyone loves the smell of boiling malt and hops.

"For that reason, recently I have been brewing at night when I feel most everybody is home and sleeping. It works out all right because I will pitch the yeast sometime after midnight and by the time I wake the next morning, visible fermentation has begun without any worry of a failed fermentation." Other strategies are to boil on days when roommates will be out, to use the ventilation hood over the stove if

possible, and to close doors to contain the steam.

When landlords and roommates first find out about your homebrewing hobby they may imagine strange smells, a still in the bathtub, and a visit from friendly Bureau of Alcohol, Tobacco and Firearms investigators. What your roommates and landlord don't know about homebrewing may work against you, so why not inform them?

Lagering the Natural Way

"I'm dying to try doing a lager but live in a tiny apartment with a tiny fridge that my spouse insists we use for such incidentals as food," complains Michael Kerns in a recent Homebrew Digest, an electronic forum. "I was wondering if I could put the fermenter on my balcony, as the temperature here has been in the 40° F to 60° F range."

Believe it or not, it is possible to lager in an apartment, and you don't need to buy a brewing refrigerator. If your apartment has a fire escape, balcony, or sturdy plant box outside your window, you can let Mother Nature lager your beer — as long as Mother Nature is in the 35° to 60° F range.

Derrick Pohl of Vancouver, British Columbia, advises Kerns and other apartment-bound lager aspirants to "wrap up and insulate the carboy as best you can, to prevent light penetration and to minimize temperature fluctuation...Also, pitch the yeast inside at room temperature and don't move (the carboy) outside until fermentation gets going." Pohl and a friend have "both brewed several lagers in this fashion with good results."

Make the Least of It

When it comes to apartment brewing, and minimalist brewing in general, the joy comes not only from sipping your own Balcony Lager, Farnham Hall Strawberry-Wheat Brew, or Just-In-Time-Sparged Ale but from devising the techniques and equipment that will work most efficiently in your environment. Stripped of all superfluous gear and armed with space- and time-saving techniques, the minimalist brewer says less is more with each new batch. Reduce! Re-use! Relax!

The contents of the carboy leaked downstairs, dripping on his landlord's Friday night Seder. "Needless to say, I moved a few months later."

The Queen of Beers

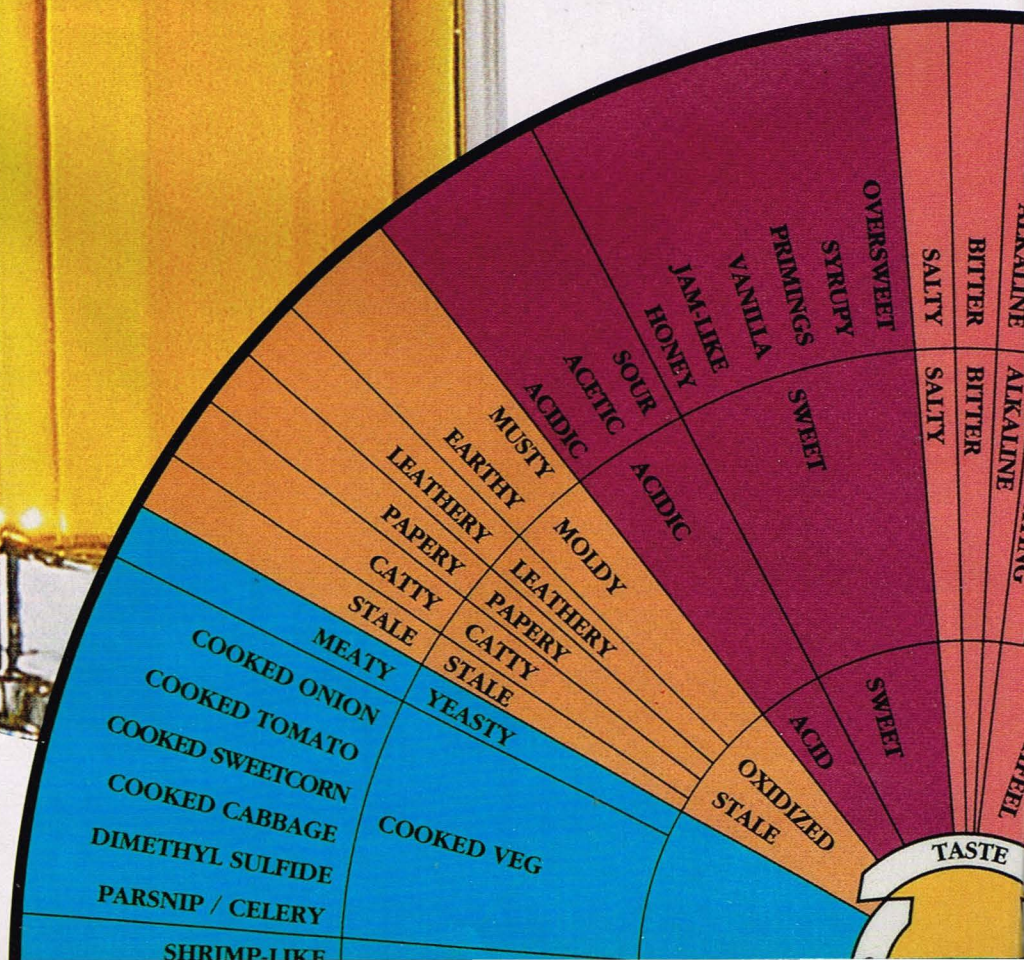
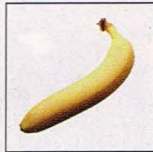


*K*ings get all the credit. First there was the Bohemian brewery that called its lager the "*Beer of Kings*." Now the biggest brewer claims its lager, which has a similar name, is the "*King of beers*." Both brewers would have been wise to study their history. They would find that there is a good woman behind every great beer. Women, not men, have brewed beer throughout most of recorded history. Beer queens have reigned from the Egyptian era, when they were served only the finest beers through golden straws, to medieval England and Elizabeth I, who established a connoisseurship for beer that her subjects quickly followed, to Catherine the Great, Queen of all the Russias. For shipping to Russia, brewers had to make their beer powerful, with lots of malt and hops. So great was Catherine's taste for the majestic stout that Imperial Russia became England's biggest export customer. The beer was titled, Imperial Stout.

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Use Your



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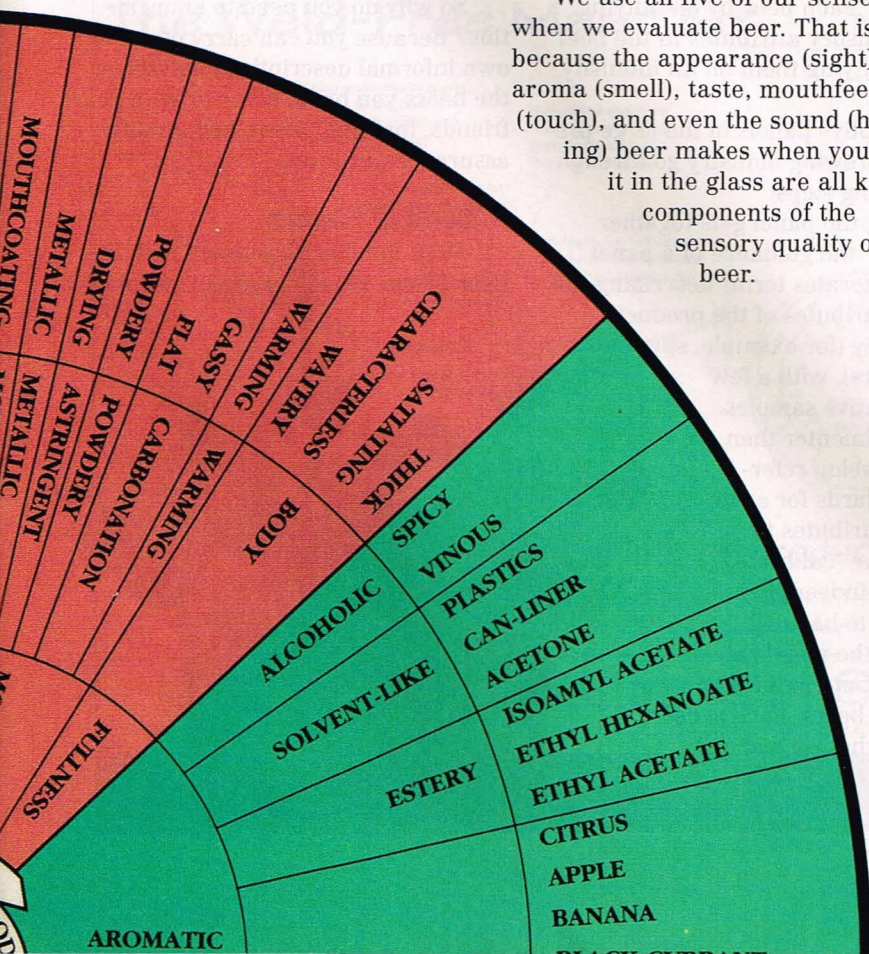
No matter how tight your brewing budget, there's one high-end tool that you can afford. Used properly, it will greatly improve the quality of your beer. It's a sophisticated, versatile device that can help you accurately evaluate your beer. That tool is you. By using your senses and acting as your own objective taster, you can improve your homebrewing skills.

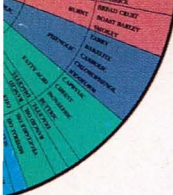
There's a sixth sense, too. Sometimes called the "common chemical sense," the trigeminal nerve (found in the mouth) responds to irritants. It is also stimulated by components in beer such as carbon dioxide and astringent phenols.

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In general, human sensitivities to chemical stimuli — the compounds in beer with a taste or smell or the ones that act as irritants — are normally distributed. That means most of us have more or less the same sensitivity to the bitter taste of isohumulones or the floral smell of Chinook hops.

A few people have particularly low or high sensitivities. And there





psychology play tricks on you. As a homebrewer, you might be your own worst enemy because you tend to lose your objectivity when you taste your own beers. So much effort goes into brewing your own that it will taste good to you — regardless.

Train yourself to become an objective taster, and don't be afraid to get a second opinion every once in a while. The comments and suggestions of others can help make you a better (more objective) taster.

Personal Trainer

There is a simple way to train yourself to use your senses for quality assurance (or damage control) purposes. The technique is called descriptive analysis or flavor profiling. It produces a sensory ID for each beer by identifying

the key sensory attributes in the beer and quantifying them on an intensity scale.

Descriptive panels in the large professional brewing industry go through the following steps:

- First, the panel gets together and, under the guidance of a panel leader, generates terms describing the sensory attributes of the product under study (for example, specialty lagers), with a few representative samples. The experimenter then tries to develop reference standards for each of these attributes to “anchor” or “calibrate” the panel. Indeed, it is important to have all judges on the panel rate a given attribute in the same way across the beers. Each sensory concept, whether diacetyl, skunky, dry hop, or bitterness, must be clear to all the judges on



the panel.

- Once the scorecard (list of attributes) is finalized, judges are trained to rate the intensity of these attributes with representative samples for the category. This can take weeks, because the panel evaluation must be consistent and reproducible before the judges carry out the actual descriptive analysis.

- When they are ready, judges evaluate the beers in the category for all the attributes, usually in duplicate or triplicate. The data is analyzed using complex statistics such as analysis of variance or multivariate statistics.

So why do you need to know all this? Because you can carry out your own informal descriptive analysis on the beers you brew, alone or with your friends, for comparison and quality assurance purposes.

A World of Flavors

First, familiarize yourself with the Beer Flavor Wheel (page 46), developed



are compounds for which some individuals may be anosmic (can't smell them) or agueusic (can't taste them), in the same way as some individuals are color blind. But these compounds are relatively few and are not typically found in beer. So relax, because on average when it comes to tasting or smelling most of the compounds found in beer, we all pretty much play with the same (sensory) deck of cards.

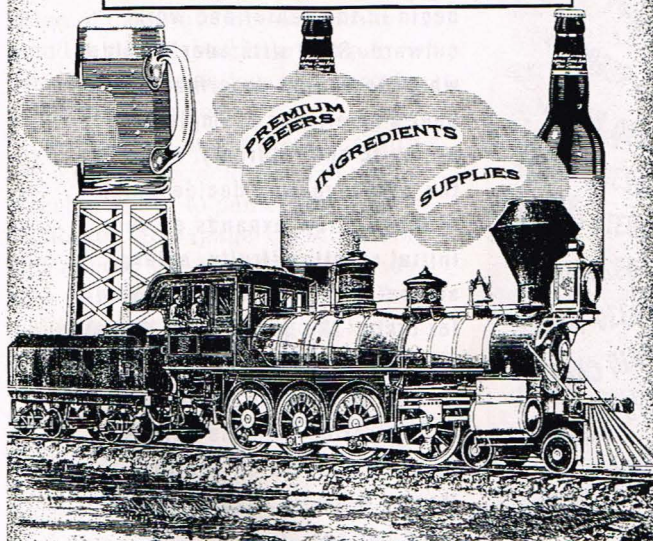
Know Your Own Mind

What makes a person a good taster is experience — the size of the sensory database accumulated in memory. In other words, how many beers did that person “taste” — not “drink” — over the years? Once you have tasted several beers with diacetyl, it becomes easy to pick out the buttery smell associated with it in your own beers. The same goes for most off-flavors such as the skunky character of lightstruck beers or the apple/cardboard smell of oxidized beers.

Also important are the ability of the person to concentrate and the person's motivation. Don't let human



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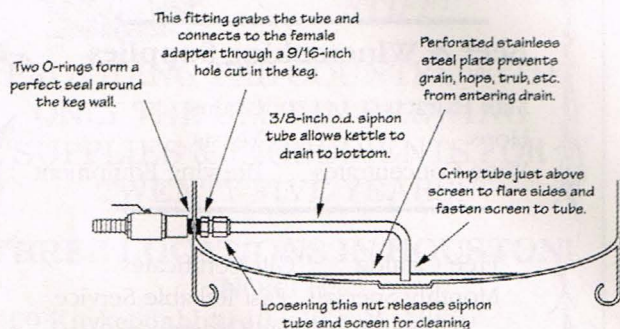
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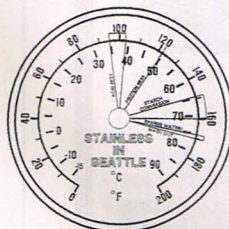


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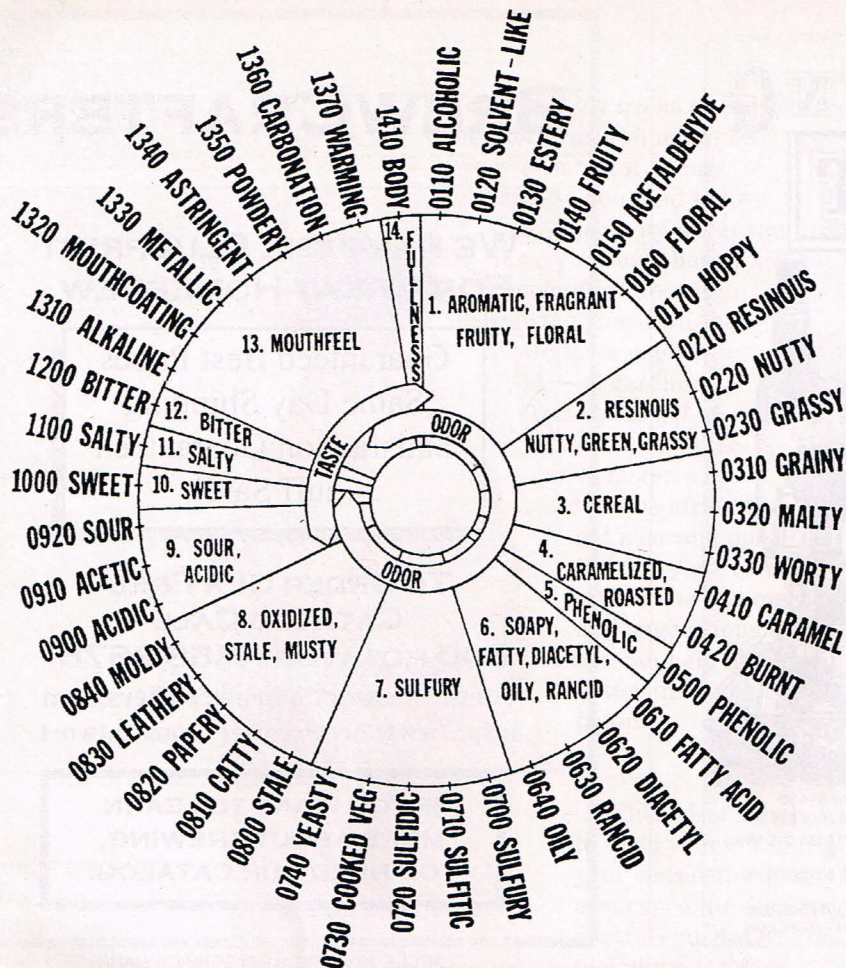
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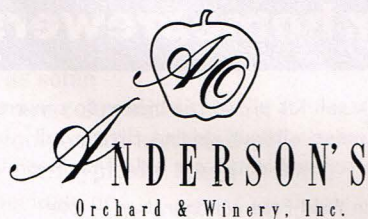
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To use the Beer Flavor Wheel, begin in the center and work outward. Start with odor. Decide which term best describes the beer's smell (for example, aromatic and fragrant). Move to the next level and decide which of these terms expands on your initial reaction (fruity, estery, solvent-like). Then do the same for taste. The Beer Flavor Wheel was developed by the American Society of Brewing Chemists in collaboration with the European Brewery Convention and the Master Brewers Association of the Americas.



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jointly by British and American brewing scientists in the late '70s. The Flavor Wheel (the mother of all wheels, don't let those wine people tell you otherwise) is a fairly good compilation of flavor attributes typically found in beer. It will help you put words to the sensations you perceive when you taste beer.

Now, if you are not familiar with some of the characteristics in the wheel, no need to panic. The Beer Attributes table (page 49) is a list of typical beer sensory attributes and their definitions. The Beers Standards table (at right and on page 48) tells how to prepare reference standards for them. Most standards can be prepared by spiking a base beer with the item representative of the attribute (e.g., butter extract for the diacetyl/buttery character).

Buy a case of neutral, clean domestic lager beer to serve as the base beer, and add the items shown in the Beer Standards table. When you taste these standards, you conceptualize the attributes they demonstrate by

Beer Standards

Flavor

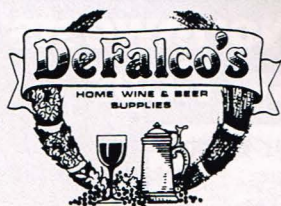
ALCOHOL
ARTIFICIAL FRUIT
ASTRINGENCY*
BANANA
BITTERNESS*
BOILED HOP
CHEESY
CITRUS

DIACETYL/BUTTERY
DMS
DRY HOP
DRY vs. SWEET*
FLORAL
FULL MOUTHFEEL*
FUSEL OIL
GRAINY
GRASSY
GREEN APPLE
HAY/STRAW
HONEY

* Standard is to be tasted, all other standards are to be smelled.

Example

12 oz.. Coors Cutter (NA) + 11 g. ethanol
12 Froot Loops + 1/2 piece bubble gum
12 oz. Coors + 1/2 tsp. tannic acid
12 oz. Coors + 14 drops banana extract
12 oz. Coors + 2 drops Hop extract (isohumulones)
fresh hops + water, boiled 20 min.
12 oz. Coors + 2 tsp. feta cheese juice
12 oz. Coors + 2 1/2 tsp. fresh orange juice, 2 1/2 tsp. fresh lemon juice, 2 tsp. fresh lime juice, 1/2 tsp. peel
12 oz. Coors + 10 drops butter extract
Rolling Rock beer
12 oz. Coors + fresh hops
Asahi beer (dry); 12 oz. Coors + 1 tsp. sucrose (sweet)
fresh flower petals
barleywine
12 oz. Coors + 10 drops of fusel oils
unmalted barley
fresh cut grass
12 oz. Coors + 5 tsp. fresh crushed green apple + peel
fresh hay/straw
12 oz. Coors + 4 tsp. honey



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Beer Standards

Flavor

Example

MALTY	malted barley
METALLIC*	12 oz. Coors + 2 crystals of ferrous ammonium sulfate
MOLASSES	12 oz. Coors + 20 drops molasses
MOUTHCATING*	same as full mouthfeel standard
OXIDIZED/STALE	Coors, exposed to air at room temperature for 24 hrs.
PHENOLIC/MEDICINAL	Spaten Weisse beer
PUMPKIN/SQUASH	12 oz. Coors + 1 tsp. canned pumpkin
RESIN/PINE/CEDAR	pine bark
ROASTED GRAIN	12 oz. Coors + 1/2 tsp. chocolate malt
SHERRY	12 oz. Coors + 3 tsp. sherry
SKUNKY/LIGHTSTRUCK	Corona beer, exposed to light for 24 hrs.
SOAPY	12 oz. Coors + 1/4 tsp. powdered ivory
SODA WATER/SALTY	seltzer water
SOLVENT	12 oz. Coors + 1 drop ethyl acetate + 1 drop acetone
SOURNESS*	12 oz. Coors + 1/2 tsp citric acid
SPICY	12 oz. Coors + 1/32 tsp. allspice, clove, black pepper
SULFURY	12 oz. Coors + 1 burnt match
VANILLA/CARAMEL	12 oz. Coors + 8 drops vanilla extract + 2 tsp. caramel
WORTY	fresh wort extract
YEASTY	12 oz. Coors + 1 tsp. active dry yeast

* Standard is to be tasted, all other standards are to be smelled.

"abstraction" and/or "generalization."

This exercise is called "concept formation" in psychology. If you taste a standard consisting of the base beer spiked with a particular compound or item (e.g., butter extract for the diacetyl flavor note), you develop the diacetyl concept in your mind by "generalization." In some instances, however, it is difficult to find an item or substance that will adequately illustrate the sensory attribute. You must then find a commercial beer with the attribute. The commercial beer is contrasted with the base beer, which should be devoid of the attribute. By tasting both beers you then form the concept in your mind by "abstraction."

You are now ready to do some serious descriptive work. To practice, take commercial (preferably micro-brewed) beers apart and identify and quantify their sensory attributes. Train yourself to recognize all the key sensory attributes of beer by tasting as many beers as possible (not at the same sitting!).

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Beer Attributes

ALCOHOL: the sensation produced in the nasal cavity by ethanol.

ARTIFICIAL/TROPICAL FRUIT/BUBBLE GUM: Trix cereal, Froot Loops cereal, Juicy Fruit chewing gum, bubble gum.

ASTRINGENCY: mouth drying, mouth puckering, rough tongue sensation.

BANANA: like banana, isoamyl acetate.

BITTERNESS: like caffeine in water, isohumulone in beer; taste on the back of the tongue.

BOILED HOP: aroma/flavor due to the boiling of hops; cooked flavor, tea-like aroma.

CARAMEL/VANILLA: sweet, buttery aroma; brown sugar, vanillin.

CHEESY: rancid, sweaty, stale cheese aroma; due to old hops.

CITRUS: like lemon, orange, tangerine juice/peel.

DIACETYL/BUTTERY: like butterscotch, buttermilk.

DMS: like creamed canned corn.

DMS/VEGGIE: like canned vegetables.

DRY HOP: aroma due to late addition of fresh hops; resinous, floral, citrusy, spicy aroma; frequently found in ales.

DRY vs. SWEET: dryness as absence of sweetness, sweetness as presence of simple sugars such as sucrose.

FLORAL: like the fragrant aromas of fresh-cut garden flowers.

FULL MOUTHFEEL: thick, viscous, syrupy sensation before swallowing.

FUSEL OIL: like the aroma of cheap, dark rum.

GRAINY: like Grapenuts, fresh wheat or barley.

GRASSY: like fresh-cut grass.

GREEN APPLE/ACETALDEHYDE: like fresh-cut green apple.

HAY/STRAW: like dried grass.

HONEY: sweet, like honey.

HOPPY: aroma character of boiled and/or dry hops.

MALTY: like malted meal.

METALLIC: like chewing on aluminum foil, licking a penny or a battery.

MOLASSES: like molasses, black treacle.

MOUTHCOATING: lingering sensation that persists after swallowing.

OXIDIZED/CARDBOARD/STALE: old beer, cardboard/papery, stale bread.

PHENOLIC/MEDICINAL: like Band Aids, phenols, medicinal.

PUMPKIN/SQUASH: like fresh-cut pumpkin, cooked squash.

RESIN/PINE/CEDAR: like fresh resin, pinewood.

ROASTED GRAIN: like coffee, burned bread, chocolate malt.

SHERRY: like sherry wine.

SKUNKY/LIGHTSTUCK: like skunk.

SOAPY: like Dove, non-perfumed soaps.

SODA WATER/SALTY: like seltzer water, club soda, mineral water, salt.

SOLVENT: sharp smell, like rubbing alcohol,

acetone, ethanol.

SOURNESS: taste sensation on the sides of the tongue; acidic, tart.

SPICY: like allspice, cloves, black pepper.

SULFURY: like burnt match, rubber, burned tire rubber, rotten eggs.

WORTY: malt extract, fresh wort.

YEASTY: like rising bread, active dry yeast.

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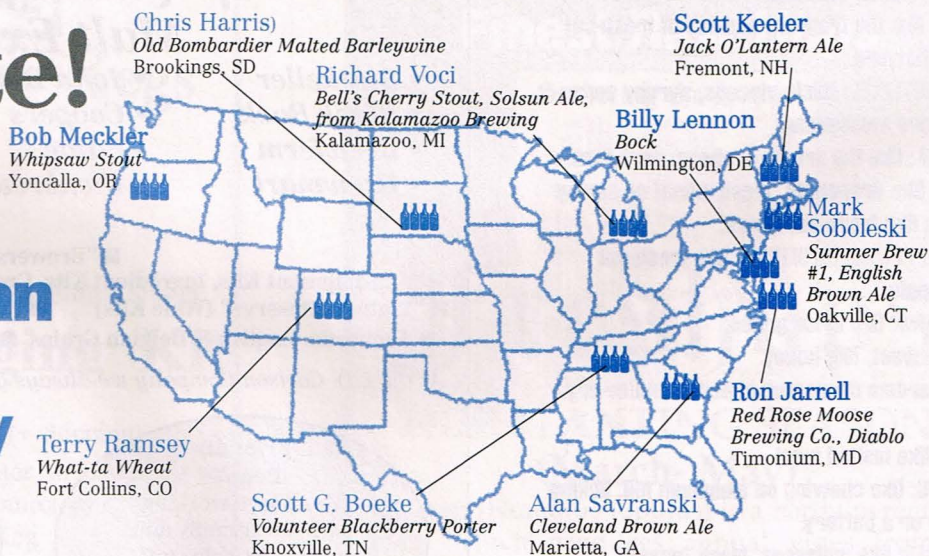
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A Simple Tasting Method

By the way, how should you "taste" beer? I recommend doing it at a "typical" serving temperature (warmer for ales than for lagers), in a wine glass (the concave shape retains volatiles better), four to six beers at a time, with water and crackers close by to cleanse your palate, and with rest between samples.

1. Observe the beer first. Check its color, clarity, and foam structure and stability.

2. Smell the beer. Take brief sniffs (the CO₂ can hit you rather hard, so avoid big, long whiffs) and concentrate! This is the step when most of the sensory information is collected. That's because the most important (and telling) characteristics of beer are olfactory notes.

3. You can now taste the beer. Take a large enough sip. No need to swirl and swish the stuff around. Yes, you should swallow the beer. The taste buds (properly called taste papillae) at the back of your tongue are sensitive to bitterness, so you won't get the full bitterness in a beer unless you swallow it (and flush those papillae in the process). Also, trying to expectorate beer can be embarrassing (it gushes). And with a third of the alcohol of wine, beer does not get to you as quickly as wine does. But in time it will, so consume limited amounts when you taste and do a lot of sniffing.

What It Means

How are you going to use the information you collect when you taste your beers? Well, you must be able to relate sensory properties to brewing ingredients and processes. That's why knowledge and understanding of the brewing process is a condition to success.

For example, turbidity usually indicates some microbial presence. In some cases the microorganisms are meant to be there (some microbrewed beers with culture yeast sedimented at the bottom of the bottle, for instance), but most often turbidity means the beer is contaminated. And if you can see the contamination, the beer is long gone. Indeed, you can

usually smell a problem before you can see it.

More examples:

- A phenolic (medicinal) smell in your beer means your yeast contains so-called wild (undesirable) yeast. Any of that yeast in your homebrewery should be discarded and replaced (unless you want to make German-style wheat beer).

- A sour taste or a lactic flavor typically warns of a contamination by lac-

tic acid bacteria. If that happens, your yeast and/or your brewing process need some serious sanitation.

- An oxidized flavor signals problems with the bottling process (too much air was let in). Leave some yeast and sugar in the beer when you bottle (for a second fermentation) and the yeast will act as an oxygen scavenger.

The bitterness of your brews depends not only on how much hops

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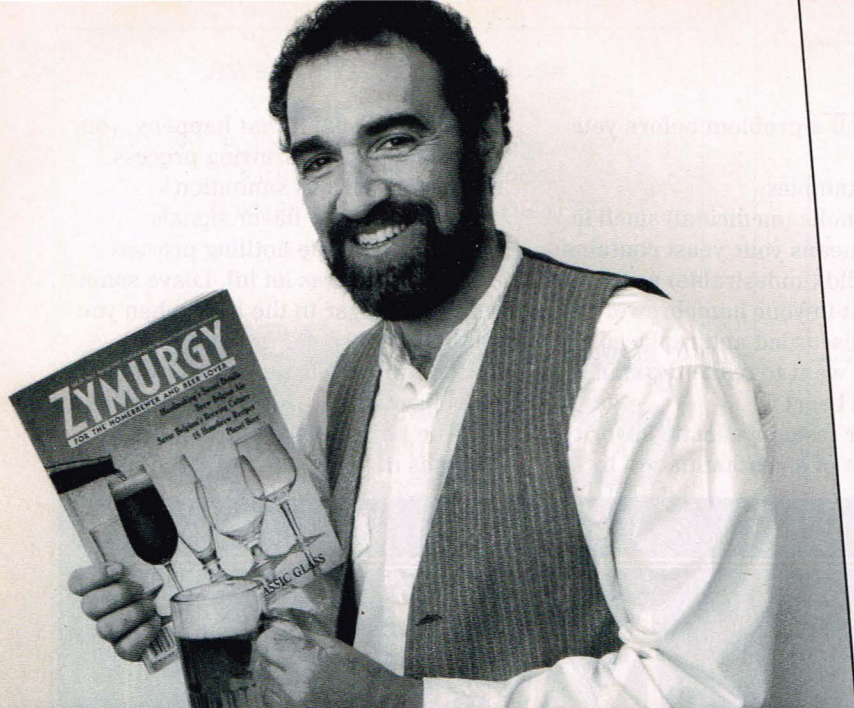
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you add to the boiling wort, but also which varieties of hops and how old they are. With time, hops get oxidized and lose some of their bittering power.

The head of foam on your beer is a function of the mashing process. Proteins from the grain's endosperm (the white center) and phenols from the grain's husk, which are extracted during mashing, are involved in foam formation and head retention.

And the list goes on... You can expand it by reading about brewing science and learning the biochemistry and microbiology of the brewing process. Three good books to try are *Brewing* by Michael J. Lewis (Chapman and Hall), *Evaluating Beer* (Brewers Publications), and *Malting and Brewing Science, Volumes I and II* by Briggs, Hough, Stevens, and Young (Chapman and Hall). The key is to be able to relate as many sensory attributes as possible to the ingredients and processes used to brew your beers. You want to reach the point where all you need for quality control purposes are your eyes, nose, and taste buds.

Now remember that beer does not age well. Microbial contaminants and oxygen are the two worst enemies of the brewer, especially the homebrewer who has few resources when it comes to controlling these two factors. (Don't take it personally, that's what makes homebrewing a real challenge.) Both contaminants and oxygen result in off-flavors in beer. The longer you wait to drink a contaminated or oxidized beer, the worse the off-flavors get! So don't take chances, and drink it while you can.

Jean-Xavier Guinard is an assistant professor in the Department of Food Science and Technology at the University of California, Davis. He is a sensory scientist with a strong interest in beer and brewing. He is the author of Lambic (Classic Beer Styles Series, Brewers Publications).

The Key to Better Lager: Cornelius Kegs!

by Tom Fuller

Build this simple set-up to gain control over fermentation temperature and improve the taste of your lager.

Porter, stout, pale, stout, weiss, pale, stout, porter. Is that what you see when you peruse the pages of your brewlog? Wouldn't you like to also see pilsner, bock, Märzen, doppelbock, and other bottom-fermenting beers in that log as well?

Making lagers can be a challenge for any homebrewer. If yours taste fine but lack that refreshing quality and the smoothness generally associated with a

lager, you are not alone.

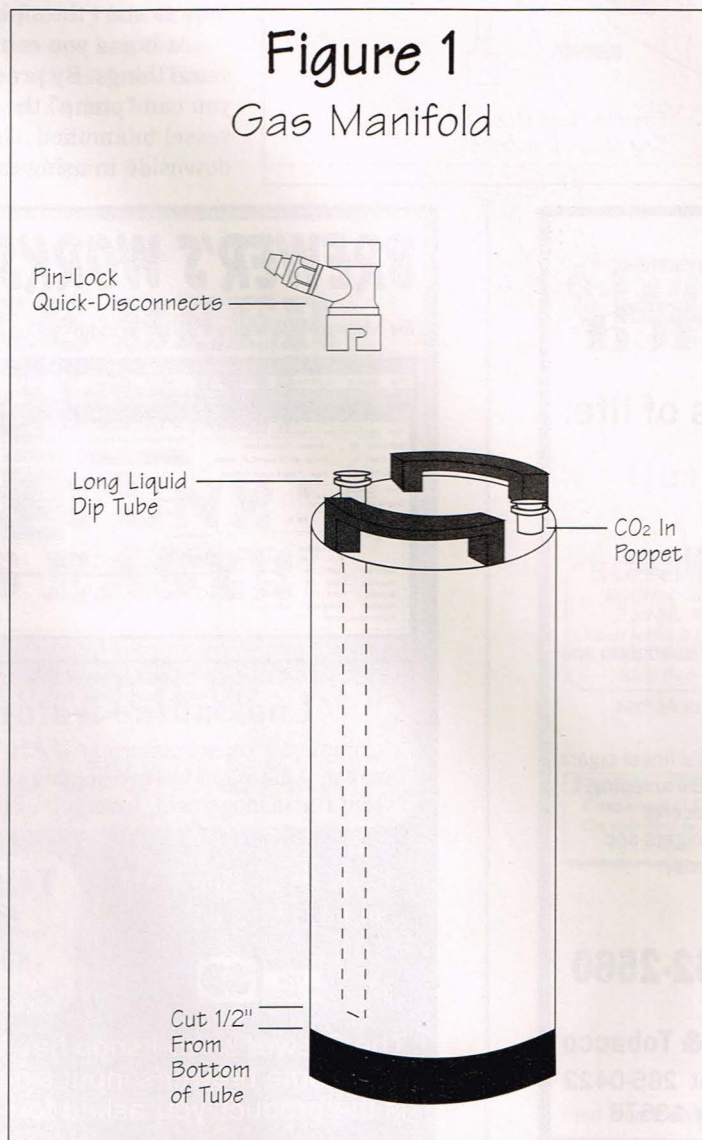
One of the real challenges for the homebrewer is temperature control. Ales can be fermented at a great range of temperatures while maintaining a desirable balance of flavors. Lager yeast is much more temperature reliant, and controlling the fermentation temperature is the most common problem in producing lagers and some colder-fermenting ales.

Pale ale, for instance, often suffers from too much diacetyl (a buttery flavor). This is generally a result of fermenting at a temperature not appropriate for the particular yeast strain.

A common conclusion for those who live in an area that gets hot and/or humid during the summer (in other words, almost everyone who lives in the US) is that lagers and some ales can only be made in the winter-time. Summer stalwarts, meanwhile, search their homes with thermometer in hand, looking for the most suitable resting spot for their carboy filled with lager, then pray that the temperature will hold steady. The irony of all of this is that these spots are generally in front of a drafty door or window that really should be fixed but not at the loss of a good lager.

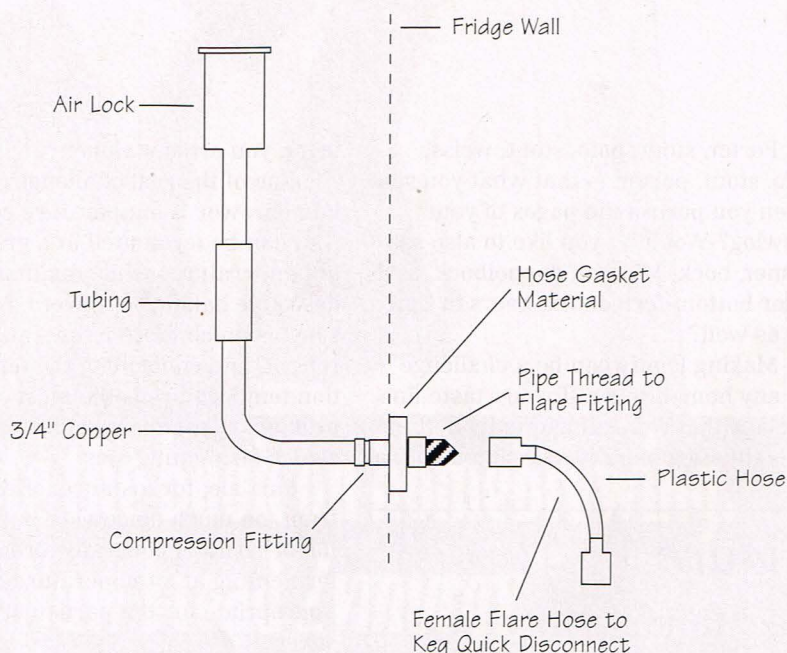
The sensible choice is to have a controlled fermentation room that

Figure 1
Gas Manifold



Controlling the fermentation temperature is the most common problem in producing lagers and some colder-fermenting ales.

Figure 2
Air Lock Assembly



holds a few fermenting vessels and can be monitored, the temperature adjusted if necessary. This is both possible and practical thanks to that wonderful invention, the refrigerator.

A typical fridge, though, does have its drawbacks. For one, it is not always easy to fit a couple of carboys in a refrigerator. That's why on the eighth day (brew day), God created the cornelius keg.

Fermenting in Kegs

What better vessel could you find for fermentation than the cornelius keg? Just think about it: What do breweries ferment in? Stainless steel, right? Corny kegs are made of stainless! How do breweries move beer? They pump it. (Wait, don't they have huge racking canes with some guy sitting at the end sucking on a tube to start the siphon? ...Nah.)

At home you can do much the same things. By pressurizing the keg, you can "pump" the beer from one vessel to another. The only real downside to using the cornelius keg as

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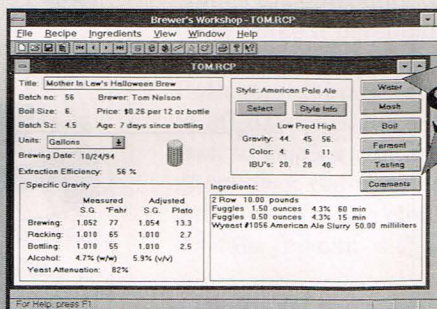
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a fermenter is its size. But if you are making five-gallon batches, there is no problem.

These kegs are very common and often inexpensive. The hardest part can be finding a source for them, but once you find one you will most likely end up with more kegs than you could ever use.

Very little modification (if any) is needed to ferment in a cornelius keg. First you must decide if you are going to rack the beer from the primary into the secondary under pressure or use a racking cane. If you choose to rack under pressure, you will want to shorten the dip tube in the keg. The dip tube goes to a small bowl-like indentation at the bottom of the keg, thus allowing you to serve every last drop of beer.

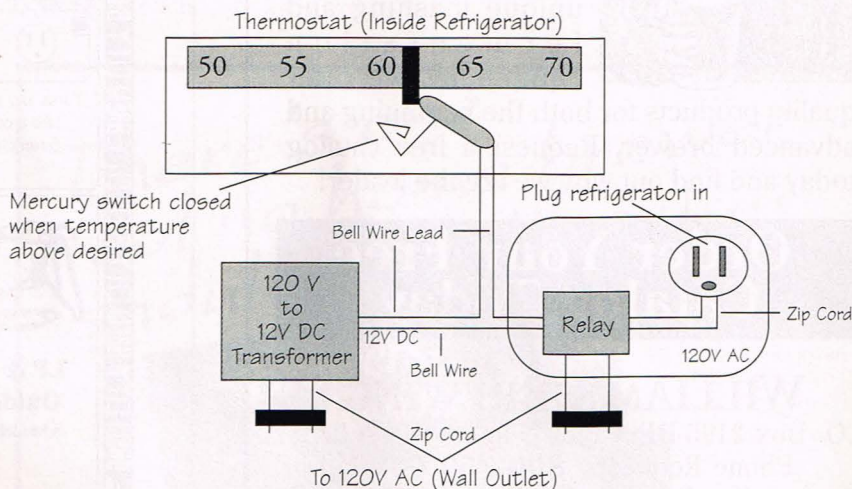
Leaving the tube at its full length will cause you to rack every last drop of yeast and trub from one keg to the next, rendering the rack useless. The dip tube should be cut so that its length is about 1/2 inch from the bottom of the keg (see Figure 1).

Kegs and Oxygen

Using kegs as fermenters works

basically the same as using carboys except for one advantage. Kegs make it much easier to avoid oxidation.

Figure 3
Thermostat



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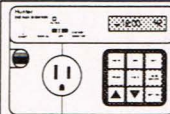
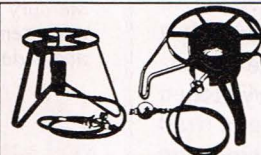
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For proper oxygenation of wort prior to fermentation (and after cooling), fill the keg with O₂ or air and allow the wort to splash into the keg when racking. After filling the keg with wort, open the check valve at the center of the cover and shake the keg a few times. Close the valve and attach the airlock.

Airlock

When fermenting in the fridge you need a special airlock. It is pretty simple to make. Some of the parts were described in the article "Keg Cleaning Made Easy" (BYO, February '96). The idea behind the airlock is to vent the CO₂ produced during fermentation to the outside air rather than just into the refrigerator.

The biggest reason for this is to prevent the build-up of dangerous CO₂ in your fridge. If too much CO₂ accumulates, it can cause unpleasantness and even injury when you open the door. An outside airlock also keeps your refrigerator from smelling like a closet where someone came to hide after eating too many burritos.

Airlock parts

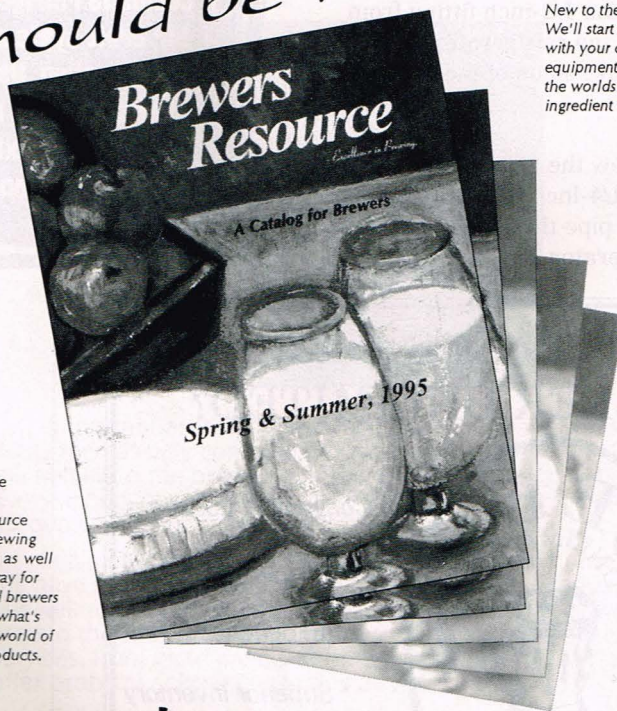
- 2 1/4-inch flare nuts.
- 1 Length of 1/4-inch plastic tubing.
- 1 1/4-inch male flare to 1/2-inch female pipe thread.
- 1 1/2-inch female pipe thread to 3/4-inch compression fitting.
- 1 Length of 3/4-inch inner diameter (I.D.) plastic tubing.
- 1 Length of 3/4-inch copper tubing.
- 1 Airlock.
- 1 Piece of hose gasket material.

The first step is to make flare fittings (described in more detail in the February '96 article). Take the 1/4-inch tubing and cut it into two lengths of two inches each. Using a flaring tool, flare one end of the tubing. Slide on the flare nut. This is your flare connector. You can also buy the flares already made from hardware stores and some homebrew supply stores for \$1.99 to \$3.99 each.

Assembly (see Figure 2)

1. Bend the 3/4-inch copper tubing to form a 90-degree angle and then cut each side to about four inches in length.
2. Insert airlock into 3/4-inch plastic tubing.

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3. From the outside of the refrigerator, drill a 1/2-inch hole through the side of your refrigerator about two to four inches above the height of your kegs.

4. From the inside of the fridge, drill a one-inch hole at the same location through only the interior plastic.

5. Insert the 1/2-inch male pipe thread into the hole with the 3/4-inch compression fitting on the outside of the refrigerator.

6. Cut a piece of hose gasket material about one inch by one inch with a 1/2-inch hole in the center. Slide this around the 1/2-inch fitting from the inside of the refrigerator (you will have to remove some of the insulation material).

7. Screw the 1/2-inch pipe thread and 1/4-inch flare fitting onto the 1/2-inch pipe thread on the inside of the refrigerator. You may have to

use a few layers of gasket material to achieve a snug fit.

8. Insert the 3/4-inch copper tubing (previously bent) into the compression fitting.

9. Affix plastic tubing and airlock onto the copper tubing.

10. Make a small hose with 1/4-inch flare fitting on both ends to attach between the airlock fitting and the keg

quick disconnect. The shorter the better. This will be attached to the keg's CO₂-in poppet (not the beverage-out dip tube side).

That's it for the air lock. Of course if you choose to use the airlock within the refrigerator, assemble the airlock to fit your needs.

Temperature Control

This is where the refrigerator or chest freezer comes in (yes, you can also do this in a chest freezer). It makes good sense to have a separate refrigerator for fermentation, but space can be a problem. Money should not be a concern when it comes to refrigerators for draft systems or fermenting. Used refrigerators can be had for next to nothing and often free.

If you have a draft system, you can also use that refrigerator for fermentation as long as you don't mind drinking your draft beer at temperatures between 50° and 65° F. If you make traditional-styled ales, 50° to 60° F is a very nice serving temperature to expe-

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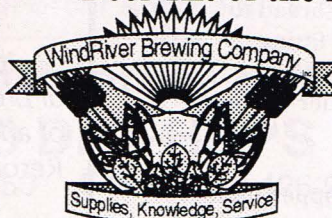
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perience the aromas and flavors of your current masterpiece. Still, most Americans drink their beer rather colder. So do what you must.

Building your own thermostat is very simple and inexpensive. You need a regular household thermostat, the kind with a thermometer reading on the bottom and a temperature setting on the top (or vice-versa). If you have upgraded your old home thermostat to a computerized setback type and kept that old one, you're in luck. If you still use the old type, this is really good excuse to upgrade; what's good for your beer is good for your house.

The thermostat is the key to the whole system. It works by shutting down your refrigerator or freezer at a specific temperature. (If you don't want to go to the effort of building one, a refrigerator thermostat can be purchased for \$40 to \$60 at good hardware stores and some homebrew supply stores.)

Thermostat Parts

- 1 Thermostat control (household type).
- 1 120-volt-to-12-volt transformer.
- 1 Relay switch.
- 1 Outlet.
- 1 Length of two-core bell wire.
- 1 Length of electrical zip cord wire.
- 2 Male plugs.

Assembly (see Figure 3)

1. Attach bell wire leads to thermostat.
2. Attach one wire to the transformer and the other to the relay.
3. Run a wire from the open lead on the transformer to the open lead on the relay.
4. Attach the relay out to the outlet with the zip cord.
5. Attach the transformer to another length of zip cord and attach

a male plug.

6. Attach a length of zip cord to the relay and attach a male plug.

The thermostat goes inside your refrigerator (or freezer). Both thermostat plugs and fridge plug should be plugged into an outlet. Turn your refrigerator (or freezer) to its maximum setting and set your new

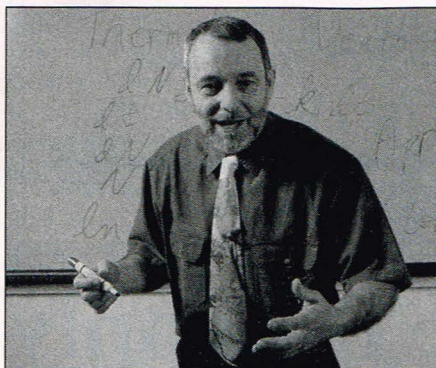
controller to the desired temperature.

Always be careful when dealing with 120-volt circuitry and follow local and state building codes. If you have questions, an electrician or someone at your local electronics store should be able to help.

You should now be able to perfect your beers with a constant and exact fermentation temperature.



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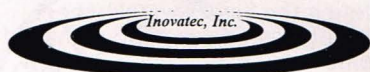
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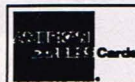
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L is for Lupomaniac

The third installment of a continuing series on beer and brewing terms.

H

head - the foam at the top of a poured beer. *I was elected the "head" homebrewer at my club because my beer had such a creamy head.*

heat exchanger - equipment used to heat or cool the wort rapidly.

high gravity - an original wort gravity of 1.060 or more. *My beer may have a high gravity, but when you drink it you feel like you're floating.*

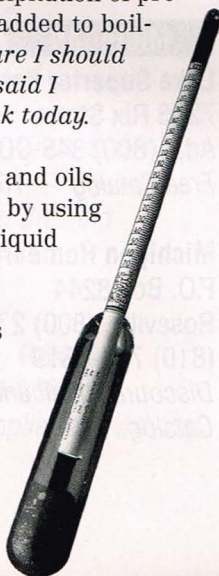
homebrewers bittering unit - a formula used to estimate the bitterness value of hopped wort. Determined by multiplying the number of ounces of hops by the alpha acid percent of the hops used.

hops - the flowers or cones of the female hop plant used in brewing to impart flavor and bitterness.

hop break - the precipitation of protein when hops are added to boiling wort. *I wasn't sure I should brew, but my sister said I deserved a hop break today.*

hop extract - resins and oils extracted from hops by using organic solvents or liquid carbon dioxide.

hydrometer - a glass instrument used to measure the specific gravity of beer by



comparing it to that of water. *Without my hydrometer I'd have to be unspecific about gravity.*

I

IBU (or International Bitterness Unit) - unit of measurement used to express a beer's bitterness as milligrams of iso-alpha-acid (a compound created when alpha acids are boiled) per liter of beer.

immersion heater - a heating device used to maintain a constant temperature in the mash tun.

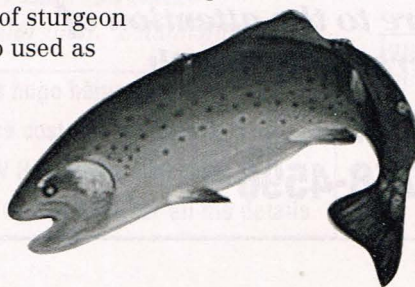
infusion mashing - the traditional British method of mashing, primarily used in ale brewing. It occurs at a single temperature and is carried out in a combination mash-lauter vessel called an infusion mash tun.

invert sugar - a mixture of fructose and glucose produced by chemically breaking down sucrose; used for priming.

Irish moss - a red seaweed added at the end of the boiling process as a fining agent. *I tried using grass from the hills outside Dublin to clear my beer, but it was the wrong kind of Irish moss.*

iron - an ion that causes haze and oxidation and hinders yeast. *Superman told me that even the man of steel doesn't want iron in his beer.*

isinglass - a gelatinous substance derived from the swimming bladder of sturgeon fish, also used as a fining agent.



J

Jacob's ladder - a conveyor used to transport ale casks from the cellar to the brewery or pub.

jetting machine - an automatic machine used to wash bottles. *I am the only jetting machine at my home brewery.*



K

kegging - drawing beer from the fermenter to the keg.

kettle - a large vessel used to heat wort. *We have two kettles at my house, but we call one a lobster pot.*



krausen (pronounced "kroy-zen") - the fluffy head of foam that forms on the surface of wort during the first few days of fermentation. At its peak it is called "high krausen." *It may look like poison, but it's only krausen.*

krausening - adding a small amount of wort at high krausen to fully fermented lager to create a secondary fermentation and natural carbonation.

L

lactic acid - an acid produced by bacteria during mashing or (more frequently) during fermentation

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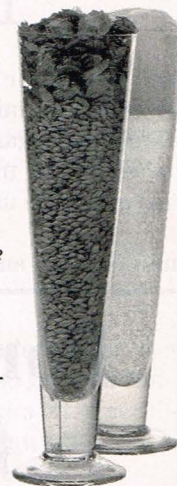
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and aging via contamination.

lager - (n.) any beer produced by bottom fermentation. (v.) The process of aging beer at cold-storage temperatures. *Jim said his lager was bottom fermented, but I think it came from the bottom of the barrel.*



lambic - a Belgian wheat beer traditionally brewed in winter that uses wild airborne yeast and bacteria to ferment the wort. *I tried to brew a lambic, but I added too much airborne bacteria before the yeast.*

lauter - to separate the wort produced during mashing from the spent grains (husks and coagulated protein).

lauter tun - a large, perforated, false-bottomed vessel used to strain the sweet wort from the spent grains after mashing. Sometimes the mash tun is used for both mashing and lautering.

lion - in France, a beer glass that holds 0.4 liters (about 13.5 ounces). *I drink from a lion because I like my beer to roar.*

Lovibond - the scale often used to evaluate malt, wort, and beer color.

lupomaniac - one who likes a heavily hopped beer, or feels that a beer can never be "too hoppy." *I have been diagnosed a lupomaniac, so now I add hops to my morning tea.*

lupulin gland - a yellow, powdery substance at the base of the hop cone containing the resins that contribute bitterness and aroma to beer.

lupulones - the bitter resins found in the lupulin glands of hops. Also known as alpha acids. There are three forms of lupulone: co-humulone, humulone, and adhumulone.

M

malt - barley or other grain steeped in water and germinated to convert the starch into sugars, break down barley cell walls and, most important, create enzymes to be used in mashing.

maltase - the enzyme that precipitates

the change from maltose into dextrose.

malt extract - sweet wort concentrated into a syrup or powder by removing all or most of the water. Packaged in cans for use in homebrewing.

malting - the process of converting barley into malt.

maltster (or maltman, maltmaster) - one who makes malt.

mash - (n.) a mixture of milled malted barley (or other grains) and hot water used to produce the sweet wort needed in brewing. (v.) Mixing ground malt with hot water in the mash tun to extract the malt starch and convert it to grain starches and fermentable sugars. *For beer, you're better off mashing barley than potatoes.*

mash kettle - the kettle used to boil part of the mash in decoction brewing.

mash tun - a vessel used to hold the mash in infusion brewing. Fitted with a perforated false bottom to remove the sweet wort produced during mashing from spent grains. *You can mash on the stovetop, but if you're going to use a ton of grain, you'd better use a tun for mashing.*

mead - a beverage produced by fermenting a mixture of honey and water, sometimes flavored with spices. *Mead makes a great gift for your honey.*

milk of amnesia - a term for old ale, a strong, dark draft beer with a high original gravity served in Britain. *After a meal I like to settle my stomach with milk of amnesia.*



milling - grinding the malt into grist before extracting sugars during mashing.

modification - the net physical changes that occur within the barley kernel as it is converted from barley to malt.

mother-in-law - a mixed drink consisting of one part stout and one part bitter-ale. *I always brace for a visit from my spouse's parents with a mother-in-law or two.* ■

For more information about brewing terms, check out the Dictionary of Beer and Brewing, published by Brewers Publications, Boulder, Colo. It was used as a reference for this article.

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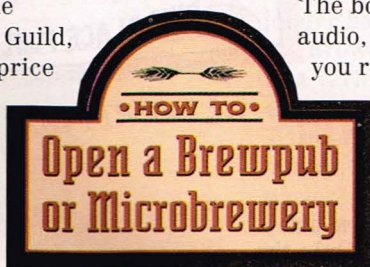
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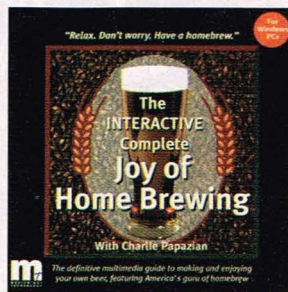
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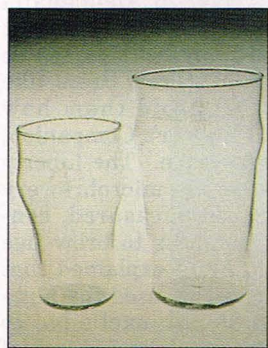
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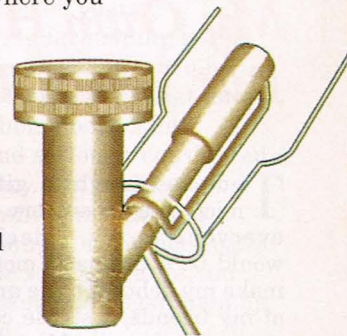
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"Can it really be any good?" a young woman whispered. "Heavens no," Thomas exclaimed. "He's never brewed a drop in his life."



They Laughed When I Told Them I Was Serving My Own Home Brewed Beer, But When They Tasted My Pale Ale! —

Thomas brought a gift of his latest micro-brew discovery that he wanted everyone to try. I decided that this would be a dramatic moment for me to make my debut. To the amazement of all of my friends, I strode confidently over to my Alephenalia Micro Brewery-Home Brew Kit and began to pull out the professional looking bottles that I had placed there.

"Chuck is up to his old tricks," somebody chuckled. The crowd laughed. They were all certain that I couldn't brew any more than I could make potatoes au gratin.

"Can he really brew?" I heard Thomas' partner whisper. "Heavens, no!" Thomas exclaimed. "He's never brewed a drop in his life. But just you watch him. This is going to be good."

I decided to make the most of the situation. Holding up the wing capper, I explained that I had bottled it just for this occasion. With mock dignity, I drew out a bottle and cradled it in my arms like a great wine. "Is this another of those disappearing ink trips," called a voice from the rear. The crowd rocked with laughter.

Then I began to pour.

Instantly a tense silence fell on the guests. The laughter died on their lips as if by magic. I poured a glass for everyone, even those who exclaimed "I don't like beer." I heard a gasp of amazement. My friends sat breathless, spell-bound.

I sampled it myself and for a brief moment I forgot the people around me. I forgot the hour, the place, my fellow imbibers. The little world I lived in

seemed to fade—seemed to grow dim—unreal. Only the ale was real. Only the ale and the visions it brought me. Visions as beautiful and as changing as an autumn sunset, with its amber hues, just like my homebrew.

A real Triumph!

As everyone finished tasting, the room resounded with accolades. I found myself surrounded by excited faces. How my friends carried on! Men shook my hand—wildly congratulating me—pounding me on the back in their enthusiasm! Everybody was exclaiming with delight, plying me with rapid questions. Chuck! Why didn't you tell us you could brew like that? Where did you learn? How long have you been brewing?

"I simply followed the complete instructions included with the Alephenalia Homebrew kit," I replied. "And just a short while ago, I didn't know hops from malt."

"Quit your kidding," laughed Thomas, a real beer enthusiast. "You've been brewing for years. I can tell."

"Only since Rosie gave me an Alephenalia Microbrewery for my birthday, less than three weeks ago. I decided to keep it a secret so that I could surprise all you folks." Then I told them the whole story. "Ever heard of Liberty Malt Supply Company?" A few of my friends nodded. "That's a home brew shop and mail order catalog!" One of the oldest in the entire country!

"Exactly," I replied. "They have a great program for learning how to brew beers like a professional, the Liberty Way."



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And then I explained how for years I had longed to brew my own beer. I shared that dream with Rosie and when she saw the Alephenalia Microbrewery in the Liberty catalog, she knew it was the perfect gift for me.

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Pointing to the colorful Alephenalia Micro-brewery carton, I explained, "It contains brewing equipment that can be used over and over to brew beers like the professionals." I told them how pleased I was with Brewer's Companion, a real home brewers bible. The Liberty Pack included with the microbrewery contained enough pre-measured, concisely labeled ingredients to brew five gallons of the Pale Ale. I explained that each of the Liberty packs used the highest quality ingredients, exclusive to Liberty Malt and that packs for each of the classic brewing styles are available.

I proudly told them that I have already begun brewing Weekend Weiss, a Bavarian style wheat beer and Liberator Doppelbock, both promptly received by simply dialing Liberty Malt's own toll free number, 1-800-990-MALT (6258).

Favorite brewing styles

"Let's order Liberty's Pals Pils Pack!" Thomas pleaded after seeing the Liberty catalog. He took another sip and said, "Which weekend is that Weiss going to be ready?"

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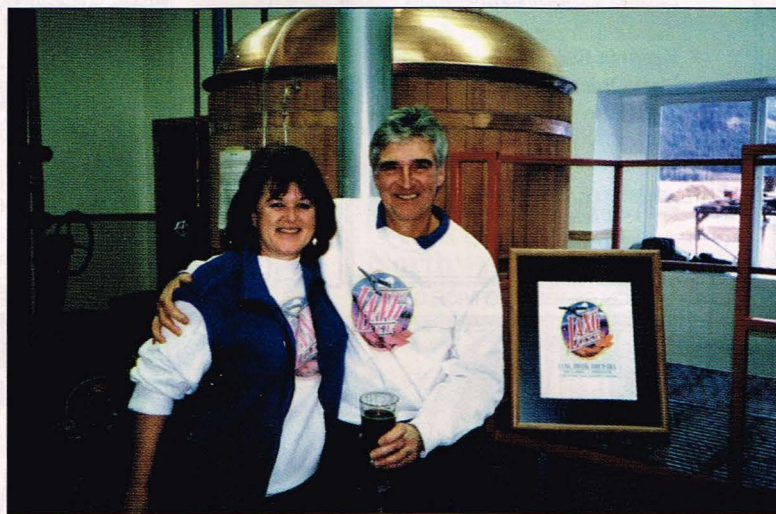
Brewing in an Airplane Hangar

by Steve Johnson

John Campbell leaves his airplane waiting near the door of his Thompson River Valley, Mont., microbrewery.

Not that Campbell is living life on the fly. Those days are over, he says. Now, he's dedicating his time to running his company, Lang Creek Brewery. The plane just sits there most of the time, unused. In fact he no longer has a good place to put it.

Breweries have been constructed in a variety of buildings, including old railway stations, gas stations, fire stations, electrical substations, post offices, garages, Elks lodges, funeral parlors, trolley barns, opera houses, and car dealerships. But Lang Creek Brewery is the only one that occupies an airplane hangar. Specifically, the former home of John Campbell's Cessna.



Sandy and John Campbell (just hanging out?) show off the copper brew kettle at Lang Creek Brewery. The boil begins right on the spot where they used to climb into the cockpit of their Cessna.

Flying, Campbell's passion since 1988, has had to make room for his newest love, brewing. He's a man who enjoys trying new things, and his resume includes farming, contracting, ranching, logging, aerial photography, and now brewing. He tends to throw himself into each new endeavor with gusto, then eventually move on. Don't call it an itch, says John, but he admits, "I have never done anything for more than seven years."

His interest in fermenting goes back more than 25 years, when he lived in rural Maryland. At that time he dabbled in home beer- and winemaking and seriously considered opening a winery. But his life took a different turn when he moved to Montana and bought a 160-acre cattle ranch. Later, he sold the cattle and half of his acreage and began hauling logs for a living.

Several years ago Campbell reintroduced himself to homebrewing, first with a malt extract system and then with an all-grain pilot brewery. "I like all-grain brewing because you can make any beer you want," he says.

At the time he was homebrewing, John was also looking for a new career opportunity. He says, "It just kind of dawned on me: Hey, maybe I could do this here at home. My wife and I drove up the West Coast on US 101. We visited microbreweries and brewpubs along the way and Red Tail Ale (made at Mendocino Brewing Co. in Hopland, Calif.) stuck out as a really good (microbrewed beer). Then we reached Newport, Ore., where we visited the Rogue brewery and I was able to talk to their brewmaster, John Maier. I really liked the Rogue ales."

When Campbell returned to Montana, he began doing research into opening a commercial brewery and used his Cessna to fly to different breweries in the West. He quickly identified the beers he thought were outstanding or, as he put it, "beers with high character."

Besides Rogue, he admired the

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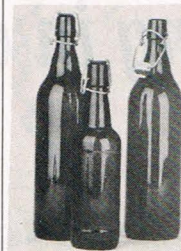
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beers made at the Leavenworth Brewery in Leavenworth, Wash., and those made at the Diamond Knot Brewery in Mukilteo, Wash.

Once he started getting serious about opening a microbrewery, he received a phone call from a beer distributor in Montana. With that kind of interest being expressed in his "brewery," he made the decision in January of '93 to jump into the business. Construction started in April, the first batch was brewed in December, and the first keg sold in January of '94.

He used a brewery consultant from Seattle to get his equipment. The 13-barrel mash tun, brew kettle, and a couple of open fermenters came from T.W. Fisher's Brewpub in Coeur D'Alene, Idaho, which was expanding. The grist mill came from Rogue Ales, and the fork lift from Hart Brewing in Kalama, Wash.

The decision to use the airplane hangar was based purely on economics. It provided a roof over their heads but little else. "We used it merely as a shell," says Campbell. "The interior had to be completely remodeled. We added insulation, sloped concrete floors and drains, plumbing, and electrical hookups."

Since the hangar measured only 44 feet by 32 feet, it was too small for the whole production. An addition was built to make room for milling, grain storage, and the propane burners to heat the brew kettle. A new building is being constructed this spring to house a bottling line.

Lang Creek beers are big and assertive, the kind you will never forget. "The Lang Creek Brewery is dedicated to the abolishment of the mundane, tasteless swill you've been programmed to know as beer," says Campbell.

The lineup includes Windsock Pale Ale, Tri-Motor Amber, Scud Runner

Dark, and Taildragger Honey Wheat — all named with the airplane theme in mind. Recently, Lang Creek released two new products: Good Medicine Brown Ale and a winter ale called Glacier Palette.

Lang Creek beers are made with imported British malts from Hugh Baird Malting and American pellet hops. Cascade hops are used in each brew, in combination with Mt. Hood, Centennial, Willamette, and Perle, depending on the beer.

The Tri-Motor and Windsock are fined and filtered. The beer is run through leaf filters made of Harborlite. John says that although most breweries use diatomaceous earth filters, Harborlite, a newer product used in the wine industry, is more user friendly.

Windsock and Tri-Motor are also available as Windsock XX and Tri-Motor XX — unfiltered, cask-conditioned versions with extra hops added

for bittering, then dry hopped in the fermenter.

When the gravity falls to about 1° Plato, the beer is kegged off into half barrels. It conditions for 10 days at about 70° F and is then stored in the cooler. It is kegged in quarter barrels for distribution.

The beers are tapped with hand pumps through Hoff Stevens

taps. Many bars use a cask breather, which protects the beer with a blanket of carbon dioxide.

After only two years the brewery has four full-time and two part-time employees. The head brewer is Carl Liebig, a neighbor from five miles down the road. Liebig has been with the brewery since day one and even helped build the original airplane hangar.

Joe and Pam Barbaris also work for the brewery. Soon after Lang Creek opened, the couple visited the hangar. They were doing research with the intent of opening their own brewery.



Joe stayed to help brew a couple of batches and was later hired on as assistant brewer.

Sandy Campbell, John's wife, is the chief financial officer. Sandy does all the book work, pays the bills, does the paperwork required by the Bureau of Alcohol, Tobacco and Firearms, orders supplies and equipment, and handles sales.

Doug Wilkie is general manager and handles sales with Sandy. Lang Creek isn't a company with a strict division of duties. "With a small company like this, we all kind of do everything," says John.

Production reached 574 barrels in the first year and increased to 750 barrels during '95. Lang Creek beers are now distributed in four states: Montana, Idaho, Washington, and Oregon. Instead of one distributor, they now have 15.

Is it complicated having that many distributors? John just laughs and offers an observation he picked up from a brewer in Oregon: "Every brewer has three headaches. One is bad yeast, two is bacteria, and three is distributors."

Perhaps the challenge of managing

wider distribution is one of the those problems that comes with success. John says, "We kind of learned as we went. We financed growth with cash flow and felt our way."

The investment at the time they opened was about \$200,000. Anticipating the next major investment, the acquisition of a bottling line, Lang Creek has gone public.

The first stock offering came out in

February '95. It broke escrow and met the minimum in October. The offering ended in February of '96, but it can be renewed under certain conditions. It is available to Montana residents and residents of some other states, depending on local laws.

The offering raised enough capital for the Lang Creek gang to begin construction on a new building in March. They expect to have the bottling operation up and running by June.

The Lang Creek Brewery is located in a beautiful valley in northwestern Montana. You'll find it next to the Campbell's home, two miles off the nearest road. Marion, 22 miles away, is the nearest post office, and Kalispell, the nearest town of any size and the location of the main airport, is 42 miles away. Tours can be arranged by calling (406) 858-2200. Directions are a must. ■

Steve Johnson lives in Clemson, South Carolina, and is author of three brewery guidebooks: On Tap: a Field Guide to North American Brewpubs and Craft Breweries, On Tap New England, and On Tap Northern California.

The Lang Creek Brewery is located in a beautiful valley in northwestern Montana. You'll find it next to the Campbell's home, two miles off the nearest road.

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The Weather Outside Was Frightful

by John Cole

More than 30 inches of snow fell in the Washington, D.C., area during the blizzard of '96. It was the second worst storm in history for a place that rarely gets more than one or two inches at a time. The authorities asked that we not leave our homes except in emergencies. Businesses shut down for days, roads closed, and four million people, at least the smart ones, stayed inside.

The snow forced me to close down my three-month-old brewshop. I had mixed feelings about that. On one hand I had been averaging 65 hours a week since it opened. Here was some real time off. On the other hand all my brewing supplies were at the shop, 20 miles away! In my mind this was an emergency. After all, quality brewtime doesn't present itself often.

So I did as any good brewer would and bundled up, put my Jeep into four-wheel drive, and ventured out. The roads were treacherous (as the weatherman had warned), but I thought of the wonderful fruits of my journey.

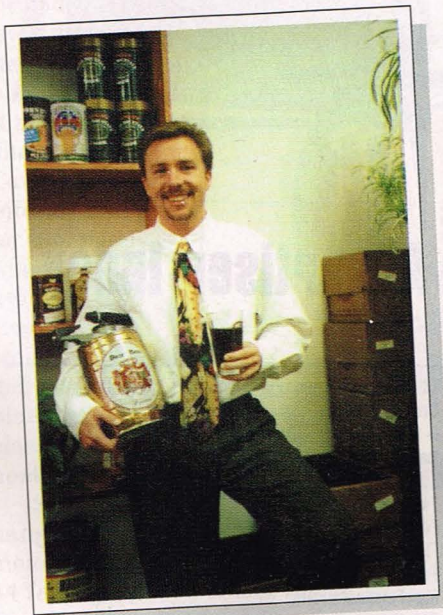
I pondered the style of brew I would make. Owning a brewshop has its advantages, and I have accumulated a plethora of recipes and books since we opened. Visions of "One-Eyed Jack Oak Cask India Pale Ale," "President Washington's Spruce Amber Ale," and "The Dog that Bit Me Lager" flashed in and out of my mind as I tried to see through the falling snow. By the time I pulled into the parking lot, there was a foot and a half of snow on the ground.

Eager to get where it was warm, I bounded out of the jeep too quickly and immediately began to pitch forward. I put my arms out to brace myself, but they just sank into the snow as I did a face plant. I felt like a new skier who just crossed his skis and got a frosty lesson.

After struggling up I made it to the door — at least where the door should

have been if it weren't for the huge drift blocking it. The next 10 minutes were spent digging with my hands, because I hadn't thought to bring a shovel.

Once inside I unbuttoned and dried off. Outside, the Jeep had already begun to accumulate snow, so I began to furiously thumb through recipes. Three extra fermenters were sitting cozily back at the house, and I intended to use them all. I decided on a hefe-weizen that a customer had brought in, a simple Irish stout recipe, and a more complex ordinary bitter from my computer files.



John Cole owns The Barley House in Woodbridge, Va. Stop by if you'd like the recipe for his Blizzard Stout!

I took three live yeast strains and activated them, hoping that they would be ready to use by the afternoon.

The yeast wouldn't start rising until it was warm enough, so I placed the packets in a plastic shopping bag and taped it over the heating duct on

the Jeep's floor. Then I started the engine and hit the road. That is, I made my way out to where I thought the roadway should be and drove over something with a loud thud. I stopped and checked out the jeep and the ferocious curb I had humbled. Since neither were damaged, I plowed on (so to speak). The roads had gotten worse in the hour I'd spent inside.

The trip home was an adventure, including a stop to help push a car out of a snowbank. When I finally arrived home, I took the ingredients inside, put the yeast by the heater duct, unwrapped myself, and placed the other ingredients in three bundles according to which recipe they went into.

Now, at last, it was time to start brewing. Any lag time between bringing water to a boil or cooling off the wort was spent bundling up, shoveling the driveway, and unbundling.

Somewhere between the hefe-weizen and the Irish stout I finished clearing the driveway for the first time. While the stout cooled, I started the boil for the bitter. Cooling the bitter was the last step. Well, that and shoveling off the driveway again.

It was by far the hardest I'd ever worked at brewing beer. Even with boiling one brew while cooling another, I spent more than 10 hours, including drive time, lost somewhere in the brewing realm. I'm sure that I will enjoy the fruits of my labor — as long as we get another blizzard in three weeks to give me time to bottle each of the brews.

We were closed again the following day due to snow. I sat in front of bad TV shows, trying to keep myself entertained. I checked on the brew a dozen times throughout the day. It felt good to be brewing again. ■

Do you have a story for Last Call? Write to Last Call, c/o Brew Your Own, 216 F St., #160, Davis, CA 95616.

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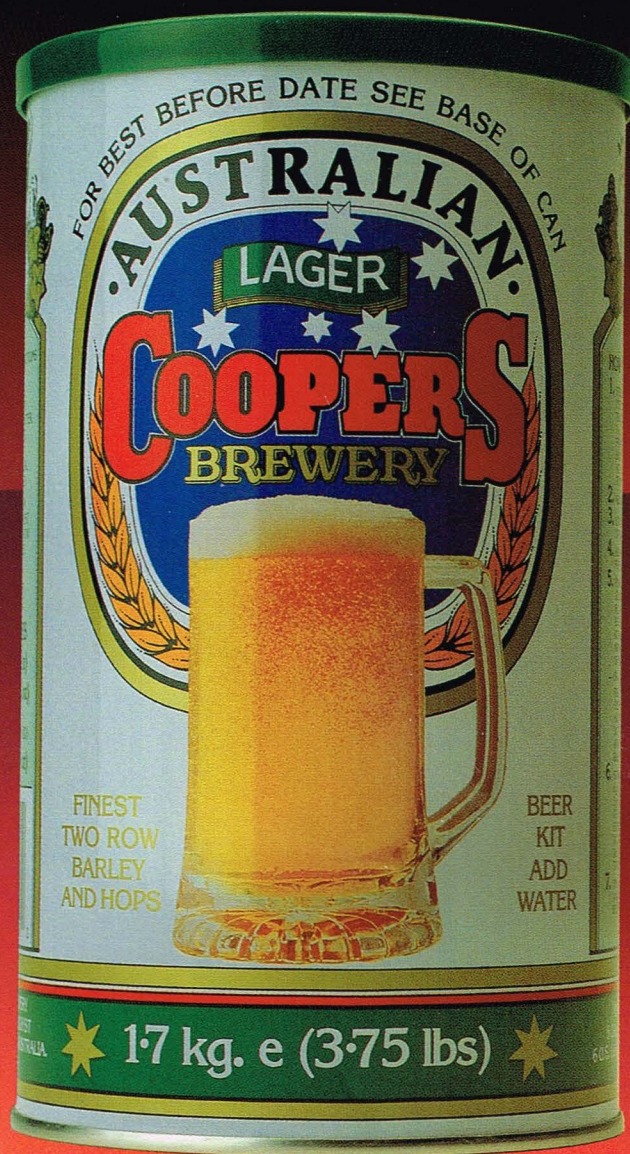
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