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September 1995, Vol.1, No.3
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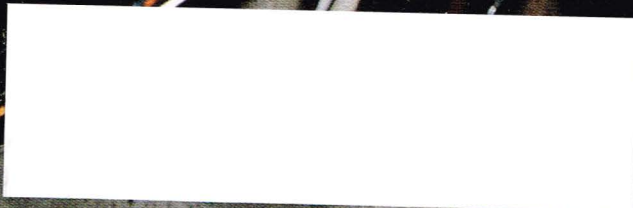
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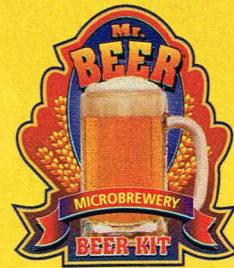
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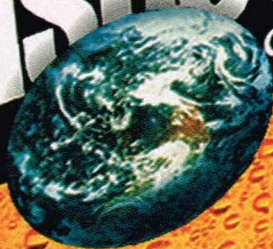
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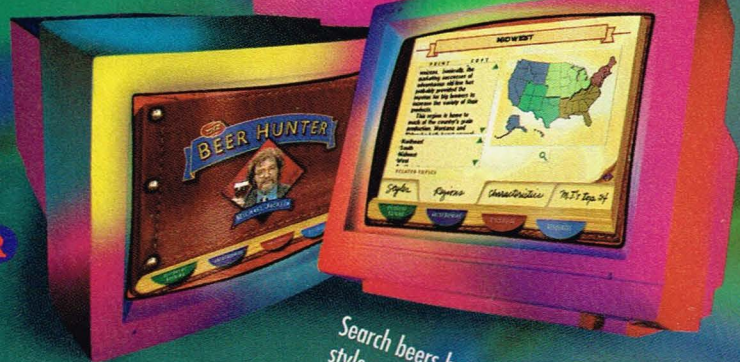
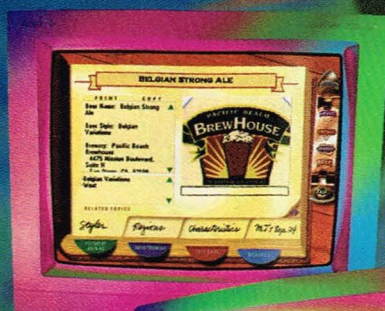
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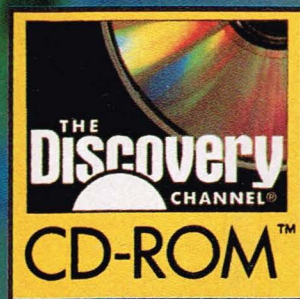
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FEATURES

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John McDermott built his brewery from used dairy equipment.

Beer Barter System

Liquid gold. It's the term swarthy Texas wildcatters used for that black, slimy stuff the rest of the world calls oil. Sure, it made a lot of enterprising cowboy types rich—but gold? For my money there's no comparison between the deep yellow sparkle of gold (hey, I've seen pictures) and stinking, gooey cars that, when refined, makes cars run and airplanes fly.

If you're going to call something liquid gold, it should be something attractive, something golden. Specifically, a nice, golden beer.

I recently brewed a pale ale from a recipe (provided by my homebrew retailer) called Sluice Box. It's named for a piece of equipment used by gold miners, and the name refers to the rich golden color of the beer.

Which got me to thinking: Why can't beer be like gold? I mean, it's pretty, there's a demand for it, and it has limited intrinsic worth. If gold is so valuable, why not beer? My plan: There should be a barter system based on homebrew. That way, instead of parting with hard-earned cash, you could spend some quality time brewing and pay for those little incidentals that always seem to add up. The secret would be to not spread too much around. It's homebrew, bud, you can't get this just anywhere...

I need some work done on my house; that seems like a good place to start. Let's see, a case of amber ale for the carpenter to work on the windows. A case of lager each for the two guys putting on the new roof (made of tar, liquid sludge). A case of porter for the painter (another case and a half if he'll hang the wallpaper in the kitchen—ugh!)

Four cases of brown ale for the contractor to rebuild the garage. (Hey, what the heck—I'm on a roll.) And I guess only Sluice Box—the original liquid gold—will do for the plumber. It's a dirty job; better put him down for four cases, too.

While we're at it, let's throw in a couple more six-packs of amber for someone to re-sod the weed garden that passes for a lawn.

Total bill: 14 cases of homebrew. One five-gallon batch makes about two cases, with a little left over for the brewmaster, so that's seven brewing sessions.

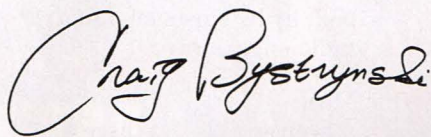
In return, a house and yard recapture a semblance of their original splendor, give or take a few years. Also, several hard-working contractors get paid with a product they can't get anywhere else—my homebrew (quality guaranteed).

Sounds like the start of something big.

The Real Thing

Meet some people who really have made brewing into gold. Steve Dresler, Teri Fahrendorf, Greg Noonan, and Bill Cherry were avid homebrewers who turned their hobby into a dream job: professional brewer. Learn how they did it, and what still excites them about brewing beer. Their stories begin on page 61.

Beer in space? Next month we focus on NASA, where the homebrewers are out of this world. Check it out.



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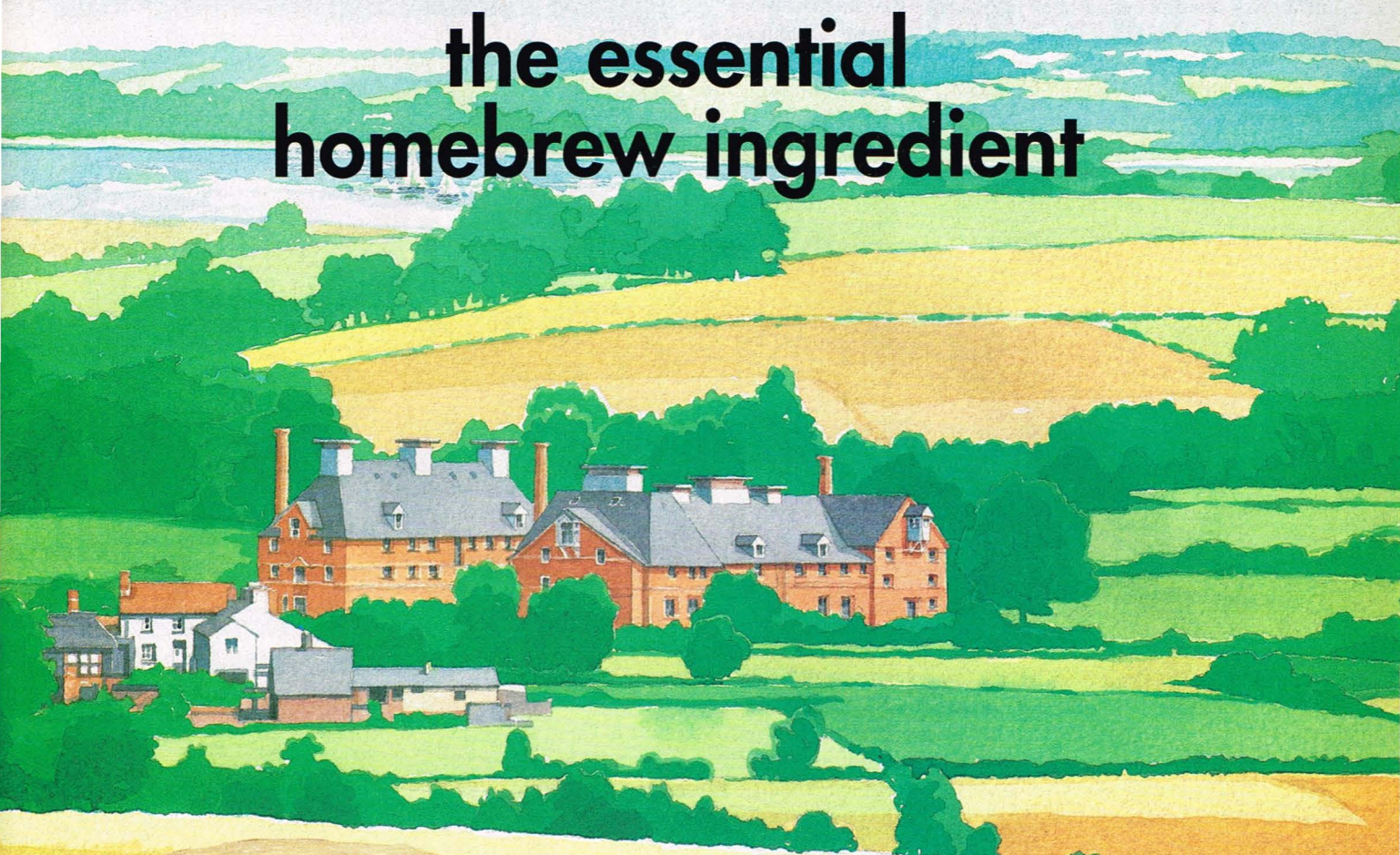
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Dave Sedeno Roseville, CA

What do you get when you cross two firemen, a radio engineer, and a desire to brew and consume great beer? The "Firehouse Brewing Company," that's what!

My friends Rick Edgar, Kevin Pratt, and I have been brewing beer together for more than two years. Rick and I are firemen for the city of Roseville, California (hence the name Firehouse), and Kevin is a sound engineer for a radio station in Sacramento.

The brew system is set up in Rick's garage. The full-mash, gravity-fed, two-barrel system includes two kegs used for hot liquor tanks. The water is heated by two 160,000-BTU burners.

Our mash tun was designed by Kevin using an ordinary 80-quart ice chest that was retrofitted with a copper pipe manifold for wort separation. We also fitted the mash tun with copper tubing to act as a sparge ring.

The boil pot is a 60-gallon, 304-grade stainless steel thing of beauty that I acquired from a friend who had it sitting around in his garage for years. Another 160,000 BTU burner is used to bring the wort to a full, rolling boil. A standard counterflow wort chiller cools the wort quickly to sub-70° F temperatures before adding the yeast.

Fermentation takes place in five-gallon glass carboys. We have to use 11 of these for one brew! We are also equipped with a bottle filler but since we brew large batches, most of our beer ends up in five-gallon Cornelius kegs.

Since it takes just as long to brew five gallons of beer as it does 60 gallons, we adhere to the old adage "the more the merrier!"

Kevin is by far the most accomplished homebrewer of the group. His talent as a homebrewer comes through in three distinct styles of beer that we have named "Fire Engine Red Ale," "Bucket Brigade Bitter," and "Hook and Ladder Stout." Kevin also brews

"Backdraft Barleywine" that will knock your socks off.

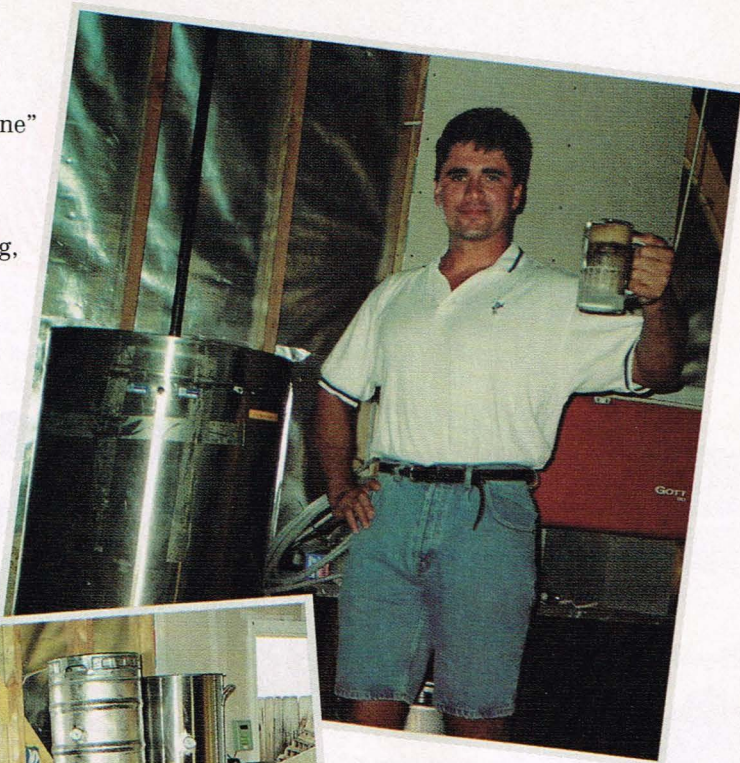
After brewing together for this long, we have decided to turn our favorite hobby into an exciting business venture. We feel we have a team with a lot of potential. The members of our Firehouse team have backgrounds in finance,

marketing, and

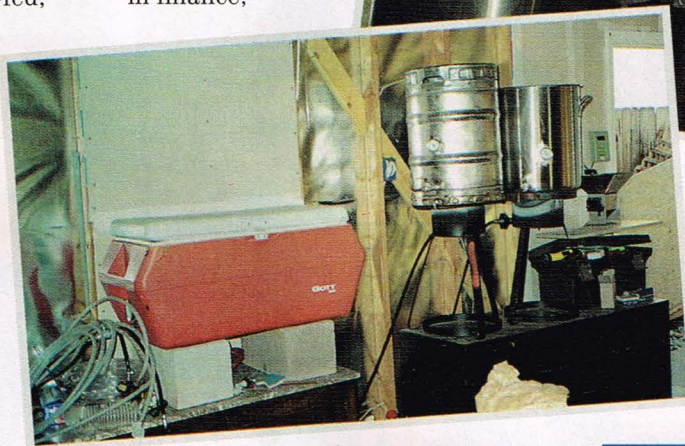
brewing. Currently, we are coordinating some contract brews and hope to be on draft in Roseville and Sacramento by September of this year. Hopefully these initial contract brews will spawn "The Firehouse Brew Pub" that will give Roseville its first micro.

CONFESS!

Share your darkest brewing secrets with your fellow homebrewers. Show off your homebrew set-up, and brag about it, too. Send your photo/story to Pot Shots, c/o Brew Your Own, 216 F Street, Suite 160, Davis, CA 95616. E-mail: edit@byo.com. Be sure to include your address and phone number.



A 60-gallon brewpot (above) is the centerpiece of the system. Two 160,000 BTU burners heat the water, while mashing is done in a converted cooler.



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Mercury Malt

I was a space-available brewer for a number of years until I stopped apartment hopping and bought a home in 1988. After reviving my brewing hobby to a more regular practice, I decided to pull out all stops and make the ultimate stout.

I crushed grain, boiled wort, carefully selected all the special ingredients to make this batch legendary. I was careful to cool the wort to a proper temperature before pitching the yeast. I used an extremely accurate photo thermometer I had from my darkroom days (carefully cleaned and sterilized).

When it came time to clean up, I had a sink full of sticky brewing tools. At the bottom of the sink was my thermometer—broken. A small price to pay for not scalding my yeast.

I waited impatiently for bottling day. Primed and ready, I bottled my best-ever stout, capped it, and put it aside. As I cleaned the muck out of the

bottom of the fermenter, I was alarmed to notice some fragments of my thermometer.

Knowing the entire batch was spoiled, I just couldn't bring myself to pop all those caps and pour it out. I let it condition the full time and gave it a couple of days for good measure. And, with a tear in my eye, I poured all five gallons down the drain, taking time to savor the smell but not risking even swishing a mouthful of stout around to know if it had attained its promise.

The brew became legendary, but not as my best stout. Rather, it is known as the Mercury Malt. I now use a metal cook's thermometer for all brewing activities.

Lessons are painful when your brew is involved.

*Perry A. Trunick
Cleveland, OH*

More Homebrew Humor

Brewers are a funny bunch. Here are a couple of items posted on-line.

Most major on-line services, such as America OnLine, CompuServe, and e-World have homebrew boards.

Horse of a Different Color

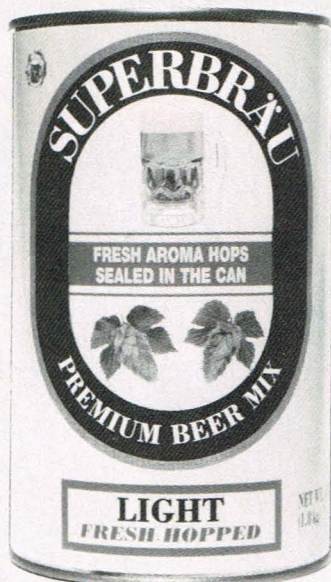
My grandfather made a batch of homebrew once as a youngster and before drinking it took it to the local pharmacist in a vial for analysis. (In those days the pharmacist served all kinds of purposes: well-water testing, veterinary services, etc.)

He left it with the assistant without much explanation, and when he came back for the results, the pharmacist took him aside and made him sit down. "I'm very sorry, young man, but I'm afraid your horse is diabetic..."

Anonymous

Limerick Lane

I was having a party one night,
When a fellow asked for "beer—light"
I said to my daughter,
"Go fetch him some water!"
And told him the difference was slight.



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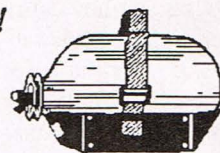
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A Hair Conspiracy?

Dear Brew Your Own:

After spending the past several years trying to convince myself that homebrewing was going to be the only way to get a decent-tasting beer in America without committing a variety of violations of import laws, I had finally decided to start.

Though I have not gone out and purchased the necessary equipment



The ultimate beard/brewer success story! See page 61

and supplies, I now realize an obviously important thing I had overlooked. While leafing through your first issue, I

noticed a rather disturbing trend. After counting all of the men in the photographs, I found there were 23 pictured and 11 of them sported some form of facial hair with a beard.

Now, I am not one to be accused of discriminating against those who do not shave. But being a male who seems to have been cursed with a thin beard, certain important questions have now been brought to light:

1. To be a successful homebrewer, must I have a full beard before making my first batch? If so, please let me know very soon as I will have to start growing one now so I can start my first batch before Easter of 1997.

2. If facial hair is merely a product of one's homebrew, which variety of beer should I brew first for a thicker beard rather than a longer one?

While certain professors of sociology will now be beating a path to your door for this incredible breakthrough just remember: If they offer you any money for this discovery, I want some of it too.

Alex St. Clair
Minot, ND

Brewing can be a hair-raising experience at times. There's no reliable data relating that effect to a particular type of beer, though. More likely it has to do

with trying new styles (or techniques) for the first time. Unfortunately, this can also make you pull your hair out, which may explain this editor's particular affliction.

Back to School

Dear BYO:

My friends and I are avid homebrewers and would like to learn more about brewing. We've seen ads for brewing courses, but they're in California and Chicago. Could you please tell us if there are any brewing courses in the New England area? We'd appreciate any information you could give us.

Keith Stokes
Dracut, MA

The first place to check for brewing courses is your local homebrew retail store. Most homebrew retailers are experienced brewers, and many offer both beginning and advanced courses. If you can wait awhile, the American Brewer's Guild is planning a series of courses in Boston in April 1996.

More on Liquid Yeast

Dear BYO:

I have been using liquid yeast and starter worts for several years, and my experience is consistent with the superior results claimed by Sal Emma in his article "Take the Plunge Into Liquid Yeast" (BYO Premier Issue). One advantage of the starter wort approach that Emma did not mention is the opportunity to eliminate the bad-tasting chemistry that the yeast generates during its early, rapid-growth phase.

To illustrate: I start the contents of an activated "smack pack" in a gallon of starter wort made with three cups of dry extract. The yeast multiplies rapidly and, after several days, settles to the bottom.

On brewing day I decant and discard the liquid portion (a vile-tasting brew) and pitch the residual, 1/2 cup of yeast slurry, into my keeper wort. That quantity of yeast gets my keeper wort up to a bubbling fermentation

within six to 12 hours—without the rapid growth phase and the off flavors it produces.

Sam Johnson
Pleasanton, CA

Acid Test

Dear BYO:

In Mary Samuels' article on decoction mashing (BYO Premiere Issue), there was absolutely no mention of pH. In decoction mashing it is imperative that the pH of the decoctions be between 5.0 and 5.5. Otherwise the boiling of the grains will result in astringency in the finished beer.

Adjustment of the pH can be done via an acid rest, additions of organic or mineral acids (such as phosphoric, lactic, or hydrochloric), or additions of calcium salts (such as calcium chloride

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or gypsum—however be mindful of excessive sulfates with the latter).

*Al Korzonas
Countryside, IL*

More on Hops

Dear BYO:

In my recent article, "Get the Full Effect from Your Hops" (August 1995), I credit Jackie Rager with popularizing a method of estimating IBUs in beer using calculations based on the alpha acid content of the hops used and other factors.

What I've learned since is that Rager's formula owed a great deal to a formula published four years earlier by Byron Burch. That formula was in turn based on the work of Gary Bauer, who was improving upon commercial methods previously published by the American Society of Brewing Chemists. Mr. Rager mentioned the work of Mr. Burch in the article, but I'm sorry to say that I didn't pursue the reference.

It's been my observation that in brewing, as in most pursuits, progress is seldom a matter of an idea or technique springing up in its final form. More often it's a matter of progressive development by several people, each making important contributions.

Martin Lodahl

Free Ideas

Dear BYO:

Some things I'd be interested in reading about:

- What does it require to switch from bottling with corn sugar carbonation to CO₂? And how much should it cost? I'm not interested in kegging, just bottling.

- Beer recipes and information on CD-ROM. How about a review? Maybe just a listing of the ones that are out there.

*Don Kaufman
Antioch, CA*

Correction

A letter to the editor in the September BYO included a typographical error. The letter from Leigh Beadle of Specialty Products International,

maker of Superbrau malt extract, should have read:

"I use a small amount of a very special corn syrup in our three fresh-hopped mixes to make a better beer than 100 percent malt extract can produce and here's why:

"Everyone's 100 percent malt in a four-pound can will only produce a final gravity of 1.005 in the standard

recipe of six US gallons. You must have at least a final gravity of 1.007 to give beer enough flavor-carrying dextrins and body. We use a small amount of highly non-fermentable corn syrup (60 percent malto-dextrin) to raise that final gravity just above 1.007."

We regret the error.

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Beechwood Aging Works for Homebrews, Too



Mr. Wizard

Recently I went on a tour of a brewery in Columbus, Ohio where they make "the most popular beer in the world" (I won't mention it by name). I observed the use of beechwood chips in aging by spreading the chips in the bottom of the fermenter. I have become interested in pursuing this in my homebrew set up.

Jim Lynes
Northfield, Ohio

It's okay Jim, we can say Anheuser-Busch. So you're interested in brewing up some Jimweiser and want to know what's up with those damned chips?

Here's the deal. Beechwood chips are a carryover from a bygone era in brewing, like many of the traditions practiced by the big brewers. Contrary to the belief of many beer nuts, big breweries are not petroleum refineries. They are breweries that happen to be big. Very big. In fact some of the traditions practiced by big breweries would never be adopted by craft breweries because they're too expensive. Beechwood aging is an example.

Beechwood was used in the old days to aid in aging. At Anheuser-Busch, brewery workers line the bottom of kraeusening tanks with chips, jump out of the tank, close it up, and fill it full of beer. The beer going into the tank is about 90 percent fermented beer and about 10 percent krausen beer (see last month's issue of BYO for more details on kraeusening). Since the krausen beer is more dense than the fermented beer, it stays at the bottom of the chip tank where it entered.

They have a monster of a tank with wood chips and beer in it. Now what? As it turns out, the Anheuser-Busch yeast is very flocculent (it clumps together during fermentation) and sinks to the bottom of the chip tank. Fortunately, all of the chips give the yeast a large surface area to settle on. I say fortunately because the yeast is still needed. The large yeast surface area is effective in fermenting the krausen.

Without the chips, the dense layer of yeast at the bottom of the tank wouldn't be so handy. After about 21 days, the mature beer is transferred from the chip tank and goes on to another traditional process in which they add tannic acid to precipitate proteins and give their beer greater stability.

If you want to use beechwood at home, you need to recognize a few peculiarities about the process. The first one has to do with wood flavor; you don't really want any. At the golden eagle they cook the hell out of the beechwood chips by steaming them repeatedly to make sure they have absolutely no flavor. I always get a kick out of the beer drinker who can taste the beechwood in Bud—just like I can smell the hops in a Sierra Nevada.

As far as the size goes, their chips are about 15 inches long, 4 inches wide, and about 1/4 inch thick. That's a big "chip." At home you'll probably need a shorter chip to fit it in your tank.

Once you have your chips, make sure that they are layered to provide a

few inches of depth. In the monster chip tanks at Busch, I think they layer about two feet deep. If I felt really crazy and was going to attempt this at home, I would lay a soda keg on its side and layer the chips in the keg. Next, I would make sure the gas fitting was in the 12 o'clock position (remember, the keg is still on its side). Then I would fill it from the beer-in fitting, which is at six o'clock, and leave it alone for three weeks at 35° F.

Mr. Wizard

I was at my local homebrew store and a guy told me he no longer mashes his all-grain beers—he steeps them in a grain bag at mash temperature [about 152° F]. I went back to buy grains and the guy behind the counter told me you cannot steep all-grain brews.

Who is right?

Ken Hoffmann
Chicago, IL

I think the guy behind the counter is right. If all you had to do was dunk the grains around in water, brewers wouldn't take the time to lauter. Beer has basically been made the same way for a few thousand years, so I tend to believe that there is probably a good reason behind most common practices.

You need to lauter in order to separate the good from the bad. During mashing, wort is extracted from the malt along with a bunch of protein and some tannins. Most of the tannins and a lot of the protein coagulate in the mash. The goal of lautering is to produce a clear wort comprised of soluble carbohydrates and proteins and to leave the coagulated proteins and tannins, insoluble starch particles, and small husk fragments behind. If you use the grain bag method, much of these undesirable materials pass into the wort. The results range from hazy beer to grainy and astringent off-flavors.

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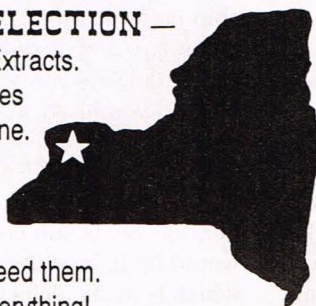
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Mr. Wizard

Mr. Wizard

I have recently acquired two hop vines (by gift) but do not know what the variety is. Since I just planted them this spring, I'm not even close to having a flower to guess. I was wondering where I can get information on buying different varieties for planting, as well as harvesting, procedures. If you can answer this question, I will be forever in your servitude!

Just Hoping,

Kirk Spell
Rapid City, SD

I appreciate your enthusiasm, but let's just call this one a debt of gratitude. This is a servitude-free zone.

If these hops were planted early this spring, you may not have a very good yield this year. Assuming the hops began sending out shoots (bines) in April or May, you should have started training two or three of the bines up a wire work.

During the growing season, hops need to be fertilized with a good nitrogen fertilizer. In the old days, manure was used. It seems like there should be some manure lying about somewhere in South Dakota. Be careful; if you over-fertilize, you will get excessive bine growth and the cone yield will suffer. If everything goes right, you should start seeing hop cones in August. Incidentally, hop cones are the fruit of the female plant. Only male plants flower and do not produce anything of value for the brewer (sorry guys).

It is important to pick the hops when they are ripe but not over-ripe. When hops are ripe, the cone will be tight and compact, will easily come off of the hop plant, and will have just changed from bright green to greenish-yellow. If the cones are too ripe, they will begin to loosen up and are easily damaged by the weather. Once picked, the hops must be dried before you use them. The best way to do this is to spread the cones a few layers deep on a cookie sheet and place the sheet in a 130° F oven.

Move those on the bottom to the top a few times and allow about 10 hours for drying. In commercial drying operations (oast houses) the hops are layered up to two feet deep and hot air is forced up through the bed. If you have a food dehydrator, you can emulate this practice.

To judge the hop's variety look at a cone, compare it to photos of cones from

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various types, and take a guess. Then brew with it, using an educated guess at its alpha acid content derived from your guess at its variety. I would estimate a percent or two less than the published values, since homegrown hops tend to have a lower alpha content than commercially grown hops.

Once you have a beer made with your hops, use your senses to evaluate your initial guess at the variety. At the end of it all you will have guessed a lot, made some beer, drunk it, and hopefully had a little fun in the process.

For information on hops, contact Hop Growers of America, (509) 248-7043. This organization promotes American hops. They should be able to put you in contact with a supply of hop rhizomes so you can play around with different varieties next season.

Mr. Wizard

I recently tasted and enjoyed the Raspberry Wheat Beer specified in "The Art of Non-Grain Brewing" in the premier issue of *Brew Your Own*. Could you suggest an appropriate amount of fresh raspberries to use for five gallons of wheat beer?

Thank You!

Dan Clevenger
Burke, VA

It's nice to get a letter from my neck of the woods! In fact Mr. Wizard's in-laws live right around the corner.

In general, about 1 to 1-1/2 pounds of raspberries per gallon is a good concentration. The trick is using them properly.

Some of the best fruit beers that I have made have fruit added after the primary fermentation. The brew retains more of the fruit aromas than if the fruit churned about in the primary fermenter. This is kind of risky, though.

To try it you must have high-quality raspberries that are clean and unbroken. This is required since you want to add the berries immediately after gently squashing them. The alcohol, low pH, and lack of nutrients in the beer should suppress the growth of wild yeast and bacteria. If you try this, you can either keep the brew warm, in which case the fruit sugars will be fer-

mented, or you can immediately throw the whole lot into a very cold refrigerator and let it stay cold for one to two weeks.

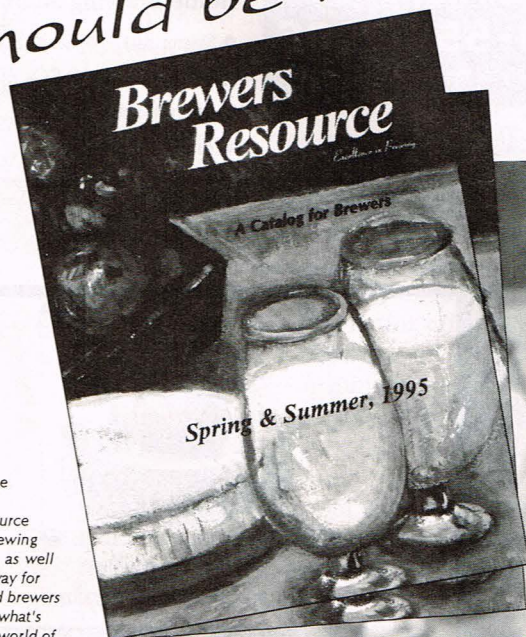
If you practice the latter procedure, you need a filter. After cold storage, filter out the yeast and artificially carbonate the beer in a soda keg. The beer will be very fruity and retain some of the sweetness from the fresh fruit. Don't practice the non-fermenting fruit method if you don't have a fil-

ter! Removal of the yeast is required to prevent a secondary fermentation in the bottle.

An alternative method is to squash the berries, heat the mush up to about 170° F, and hold for 15 minutes to kill any wild microflora. Quickly cool and then add it to the fermented beer.

Yet another way is to follow the suggestions in the premier issue for Blackberry Porter, in which the fruit is added to the wort initially. I'm partial

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to adding the fruit at the end, because the
finished beer is fruitier.

Okay Dan, now it's your job to go out
there and pick some of those tasty Virginia
raspberries and brew up some fruit beer.

Commotion over respiring yeast

In the premier issue I made the point
that yeast don't respire during any part of
a brewery fermentation, particularly in
the early stages. As expected, Mr. Wizard
received a few letters questioning that
statement. Since the idea of a respiratory
phase seems to permeate articles written
about fermentation, I must respond to
this. No, really, I have to do it!

I have checked this out through many
references (text books and experts in the
field) and have confirmed that brewing
yeast do not respire oxygen, even when it
is present. There are two reasons for this.
The first is the Crabtree Effect mentioned
in the column. The second reason has to
do with the fact that brewing yeast have
incompletely developed mitochondria, the
intercellular site of respiration.

Saccharomyces cerevisiae (brewers
yeast) *can* respire if they are grown up on
low concentrations of glucose in the pres-
ence of oxygen. These conditions will acti-
vate enzyme systems in the yeast cell,
which will give rise to offspring with fully
developed mitochondria. However, under
brewery conditions this never happens.

If there are other arguments related
to the issue, please send me more mail! ■

Mr. Wizard's Address

Do you have a question for Mr. Wizard?
Write to Mr. Wizard, c/o Brew Your Own,
216 F St., Suite 160, Davis, CA 95616. You
can also reach him by fax at (916) 758-
7477, or e-mail at wiz@byo.com. You can
visit Mr. Wizard on the World Wide Web
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*Bitten by a radioactive yeast strain the
day he turned 21, Mr. Wizard was
instilled with mystical brewing powers.
He's reportedly been spotted clinging to
the sides of breweries, and he shares his
knowledge with homebrewers worldwide.*

The Right Water for Your Beer

by Christian McIntosh

Water is the foundation of the brewing process and 95 percent of the finished product. What appears to be the simplest of a beer's ingredients is often the most overlooked.

The three pros surveyed for this month's column agree that it is important for brewers to research the content of their local water supply. The first step to curing bad water is locating the problems. Whether you need to add gypsum, extract unwanted chlorine, purchase bulk amounts of bottled water, or leave your water alone, you must first determine what exactly you're working with. Beyond this common ground, the pros offer a spectrum of suggestions and insights about the importance of water to your finished product.

Brewer: Paul McErlean

Brewery: Lowell Brewing Company, Lowell, MA

Years of professional experience: Two

Education: Master Brewer's Program, University of California, Davis.

Water is certainly important. You have to have clean, potable water to brew with; that's the first requirement. You don't want to have a lot of particulate (dissolved solids) in your water.

Basically, you want clean water to brew with. You're ultimately going to do other things with it than make beer. You're going to wash with it, you're going to rinse things off, clean your equipment, etc. It becomes imperative that you start out with a good water supply that doesn't have high levels of chlorine, because the boil can produce chlorinated flavor compounds that are very intensely flavored and the flavor is not good.

Every brewer does something different to ensure clean water. We use a carbon filter. Here in Lowell we have very soft water, which is far better than hard water for cleaning. Consequently, however, we have to add calcium sulfate (gypsum) to our water for brewing purposes. Basically, you want to do that to ensure your mash is acidified. Otherwise you extract things from the mash that you don't want, such

as tannins and silicates.

Homebrewers might want to invest in a water hardness testing kit or something of that nature. This might be especially worth the investment if you're brewing in an area where the water is changing a lot—for example, if your water comes from a river during one part of the year and from a well during another part of the year. If you're positive that your water is pretty much the same all year, then you can check it biannually with your local water company and go with that.

There are differences in your approach to water between extract brewing and all-grain brewing. You need sufficient levels of calcium in your water to have a nice acid mash so that you're not extracting things from it you don't want. If you're using a commercially prepared extract, then you don't really have to worry about that.

The bottom line is knowing what's in your water. There are certain areas of the country where there are a lot of things in the water that you definitely don't want in your beer. If your water supply has high levels of iron, for example, you might be better off buying bottled water. Iron is very bad. It catalyzes all sorts of nasty reactions in beer, a lot of haze-forming reactions.

Heavy metals are generally bad. Particularly in an area like Davis (California), where there's a lot of agriculture, you can get a lot of pesticides in the water. You should also be aware of nitrates that can come from fertilizers. In an agricultural area, you should check your water for things of this nature, and that might warrant a professional analysis.



Brewmaster Paul McErlean recommends getting periodic water test results from a local water company to protect your brew from water-borne chemicals.

Brewer: Carol Stoudt

Brewery: Stoudt Brewing Company,
Adamstown, PA

Years of professional experience:

Nine

Education: Courses with Siebel
Institute and University of California,
Davis; masters in education from Penn
State.

I think that water is extraordinarily important to the brewing process. Historically, small breweries became popular because of their water source and that's the reason for certain beer styles. Just look at the water profile in Germany, where you have the pilsners in the northern part and the malty, Munich-style beers in the south. Ninety-five percent of a beer is water and on that criteria alone, water is very important.

Much of the success enjoyed by the great breweries comes from their natural water source. Some people

might locate a brewpub in a metropolitan area as opposed to near a great water site because of the marketing benefits from the traffic and location. For a microbrewer, the water source should be a high priority. For many breweries, an affordable building often outweighs the proximity of quality water.

I don't know that if I were a homebrewer, I would necessarily adjust the water. It depends upon what style of beer you want to make. Most homebrewers probably don't want to copy a style but rather just brew quality, original beer.

We brew about 80 percent lagers at Stoudt Brewing, so we have excellent water for making southern German-style lagers. We do harden the water for the ales that we make, but again, we're doing 30 batches at a time. Our water is natural; it comes from deep artesian wells into the Susquehanna aquifer.

A lot of homebrewers primarily

make ales, in which case the hardness of the water is very important. The salt levels dramatically affect a brew's outcome, but you can remove or add salts to the water when necessary.

All homebrewers should certainly have their water tested to figure out which styles of beer would be best

**Most homebrewers
should just use their
natural water source
and use taste as the
litmus test.**

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sued to their local water supply. After testing the water and determining the best styles to make, they can then decide whether they want to alter their water or not. I would recommend starting by not altering the water, unless you're brewing in a major city that has a lot of chemicals in the municipal water supply. Better yet, if you're worried about your water, just go out and buy some pure water.

Information about your water is available to the public. As far as home treatment and filtration systems, I'd recommend calling Cloister Spring Water Company at 1-800-426-2665. They are international, and they were one of the first that started water treatment for the home as well as the industry. That would be an excellent source to contact. The local university would probably be more than happy to do an analysis. A lot of brewers use their local university to handle their yeast management and other stuff like that.

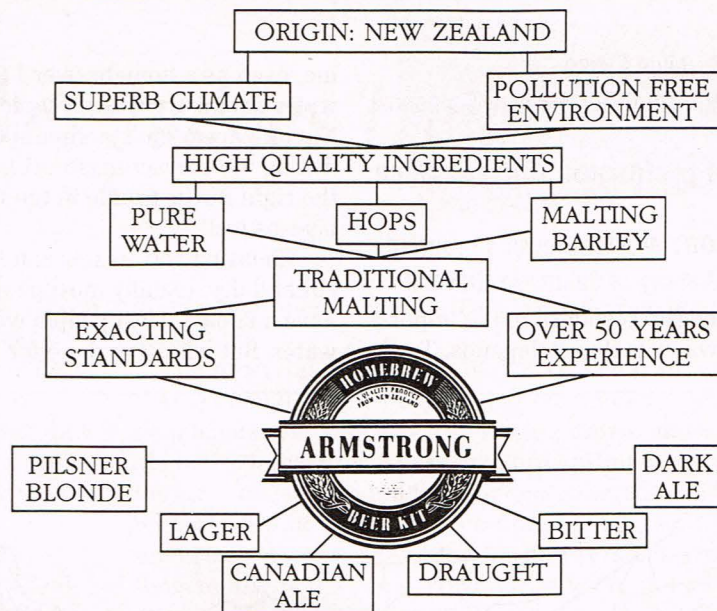
Most homebrewers should just use their natural water source and use taste as the litmus test. If the water tastes good to drink, then I would use that as my gut feeling. On the other hand, if the water is horrible and metallic, I would really consider buying water from a good source.

The whole process can become quite technical. As a microbrewer, you start by getting a detailed analysis of your natural water source, then brew a batch and evaluate it. Ultimately, you must decide if you want to alter your water based upon your initial evaluations and if so, how. The amount of time and money you want to spend altering the water is also a factor.

Additives such as gypsum are fine with hard-core ales, but I wouldn't even consider adding gypsum when extract brewing, because many of the extracts could have some salts in them already.

If you are concerned about the quality of your water, I would recommend buying good water rather than trying to filter bad water. When you're buying in large quantities, water isn't that expensive. If you're going to invest the time and the labor into making your brew, don't start with something that you know to be bad.

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Brewer: David Evans

Brewery: Ybor City Brewing Company,
Tampa

Years of professional experience:
One

Education: Master brewer's program
at the University of California, Davis.

My favorite response to the importance of water is that it depends. To

me, even as a homebrewer I felt that water chemistry was pretty important. Not only from the standpoint of establishing the correct mash pH but getting the right flavor profile in the finished beer as well.

Choosing your water can be fairly cut and dry. Usually most people don't have a choice. Most people will use tap water. But what I've done for a long

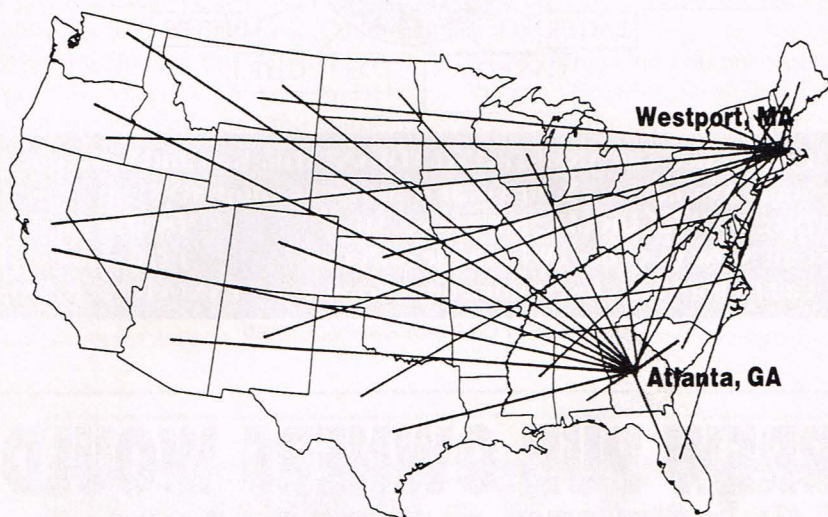
time as a homebrewer is to filter my water using an under-sink cartridge filter from Sears or wherever. Cartridge filters usually remove 99.9 percent of the chlorine and heavy metals and that sort of thing. Some filters will also include an activated carbon filter that will remove odors and turbidity (sediment).

It's usually not necessary for homebrewers to test their local water supplies themselves. Most municipalities will provide analyses to homebrewers free upon request. All you need to do is call your local water department. Some departments will actually have a lab, and the supervisors can give counts in parts per million of all the important ions (for example, calcium and bicarbonate, chloride, sulfate, and sodium).

Homebrewers should start by looking at the bicarbonate level in the water; they need to look at the hardness. Homebrewers then need to adjust their calcium content with respect to their bicarbonate level. Those figures will vary from location to location based on geography and seasonality of the water supply. For example when I lived in Colorado, we would get a lot of snow melt during the spring, which made for very soft water. During the summer and fall, water supply would switch over to reservoirs, and we'd get more of the earth salts (like sulfate) in the water.

Most people brewing with soft water will have to add some source of calcium. Usually that will take the form of gypsum. Here in Florida we actually have rather high sulfate levels in our city water, so we restrict the amount of gypsum we use and augment that with calcium chloride; in essence establishing a balance between our sulfate content and our chloride content.

Something else that I have noticed judging homebrew competitions in Florida is that a lot of homebrewers have added gypsum to their water even though the water is already fairly high in sulfate. It's pretty important to first establish what your water is and what is in it before you add any salts. I've tasted some beers where the brewer has gone way overboard with gypsum additives and the beer comes out with a very dry, salty, parching taste. ■



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The Beer that Makes Judges Tremble

by Jeff Frane

When I ran a homebrew competition, brown ale was the biggest hammer I had for keeping judges in line. "If you show up late this year, I'm putting you on brown ales." "Any more rude comments on the judging forms, and it's two rounds of brown ales for you." Very effective, too.

Ten years ago pale ale was a more effective threat, but pretty soon even the rawest new brewer had figured out that clean yeast and plenty of hops went a long way toward making a good pale ale.

Early on, though, judges hid out in the brown ales—there weren't many surprises, and you rarely got the feeling you'd just been poisoned by someone's blend of lighter fluid and bubble gum.

Most homebrew judges are involved because they love beer: good beer, for the most part. A judge with much experience at all has discovered that judging brown ales at a homebrew competition is like sitting through four hours of "Love Boat" re-runs—with no commercials.

All of which is a little odd, really. Brown ales have the potential to be very satisfying beers with an engaging complexity. A few good commercial examples are widely available in the US, so homebrewers have good benchmarks. And brown ales are not a technically difficult style; no special equipment (such as a lagering tank or decoction mash system) is required to brew one.

Brown ales are an early favorite for many new brewers. They seem pretty simple, and their rich color and flavor is a real departure from the sorts of anemic lagers that the homebrewer is trying to escape. But early brew attempts are rarely accompanied with a lot of skill (naturally), and by the time the adventurous brewer has begun to develop some real expertise, new and more interesting horizons beckon.

The early attempts invariably consist of six or seven pounds of amber malt extract, some corn sugar, and a negligible quantity of hops. This near-classic ends up with no malt, no hops, a soda pop head and,

with luck, an interesting bacterial contamination. Odds are it's cloyingly sweet, as well. This is homebrew judge hell, believe me.

Commercial brown ales, of course, are nothing like that. Although it's by no means as common as variations on pilsners and pale ales, interesting brown ales are available for comparison. There are three primary versions of the brown ale—two English and one American. (True, Scotland has its own interpretation, but it's really in a distinct class of its own. And the Belgian versions are, well, Belgian and that's one particular nut we're not going to crack today.)

The brown ales of southern and western England are closely linked to an early age in brewing. The beers are dark and rich, with very low hopping rates and generally a low alcohol content. The British often use sugar in brewing, and the dark color of these brews may owe as much (or more) to caramel sugar and dark invert sugar as to dark malts. Homebrewed versions could use lots of caramel malts (perhaps a blend of several different colors, leaning heavily toward those of 120° to 180° Lovibond), dark brown sugar, turbinado sugar, or molasses.

More commonly available in the US are the drier, although still malty, brown ales of the northeast, such as the classic Newcastle Brown Ale and Samuel Smith's Nut Brown Ale. Here the emphasis is less on the sweetness of caramel and more on the "nuttiness" of various toasted malts and the fruitiness of the yeast. Developed to some degree to compete with the pale ales brewed elsewhere in England, these beers are lighter and crisper than the older style. And the attempt has met with some success—Newcastle Brown ale is England's best-selling bottled beer.

According to Michael Jackson, Newcastle's brewers blend two very different beers to produce their brown ale. One portion is brewed to a very high gravity so that fermentation creates extremely estery (fruity) notes they cannot achieve at normal beer gravities. That beer is then blended with a low-gravity "amber" beer to produce their standard at an original gravity of 1.045.





Another commercial example of the style, Samuel Smith's Nut brown ale, is a bit richer, with a toffee-like character. The use of hops is very delicate, although there is a subtle contribution, certainly from very low additions of some of the finer British varieties: Goldings or Fuggles.

The third style of brown ale actually arose among American homebrewers. Whether through ignorance,

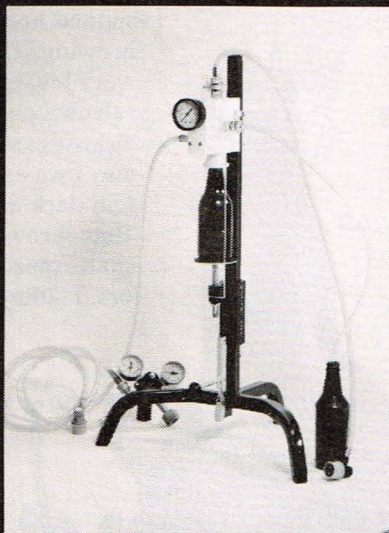
willfulness, or (more likely) sheer creativity, homebrewers added a foreign element to brown ales: hops! They cranked the bitterness way up, added lots of flavor and aroma hops, and even dry-hopped!

While judges may have been relieved at the appearance of some character in brown ales, the beers were regularly disqualified as being out of style. Eventually, however, orga-

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Rich Brown Ale (5 gallons)

Ingredients:

- 5 lbs. amber malt extract—preferably British
- 1 lb. British caramel malt
- 1/2 lb. amber malt (see notes in text)
- 1/4 lb. chocolate malt
- 1 lb. dark brown sugar (or turbinado)
- 1-1/2 oz. Northern Brewer hops (for 75 min.)
- 1 oz. Goldings (for 30 min.)
- Yeast: Wyeast 1968

Step-By-Step:

Crush caramel, amber, and chocolate malt and soak in one gallon of water at 150° F for 60 min. Rinse grains into kettle with one gallon more hot water (no more than 170° F). Add malt extract and bring to boil. Add sufficient water to keep volume at 2.5 gallons. Add the brown sugar for the last 30 minutes of boil. Total boil time is 90 minutes.

Cool by adding to 2.5 gallons of pre-boiled water; when temperature of wort falls below 80° F, pitch yeast. Aerate well! (Open fermentation works very well here.)

When primary fermentation is complete, rack to secondary and follow normal brewing procedures.

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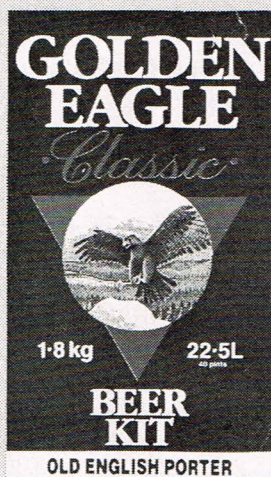
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nizers (could the Dixie Cup have been the first?) acknowledged the inevitable: a new style had been born.

American brown ales are quite different from their British counterparts. Apart from the much more generous hopping—and the general use of American hop varieties such as Cascade—the beers tend to avoid the warm, rounded maltiness typical of British caramel malts and, instead,

contain the sharp edges of American crystal malt and the roasted, burnt notes from the use of darker chocolate and black malts.

People's tastes vary. Some enjoy slipping into a freshly laundered, crisply starched dress shirt; others prefer an old soft-cotton pullover. (Me? Let's just say that flannel jammies and a dark ale before the fire is the best way to spend winter.)

Although the American micro-brewery explosion hasn't openly embraced the style, more and more brown ales seem to be appearing, and brewpubs often offer variations on the theme. A contract-brewed version, Pete's Wicked Ale, enjoys a

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Nuteena Brown Ale (5 gallons)

Ingredients:

- 7 lbs. British ale malt
- 1 lb. British caramel malt
- 1 lb. dextrine malt
- 1/2 lb. 80° Lovibond caramel malt
- 1/4 lb. amber malt
- 1/4 lb. chocolate malt
- 1/4 lb. flaked barley
- 3/4 oz. Eroica hops (for 75 min.)
- 1/2 oz. Goldings hops (for 30 min.)
- 1/2 oz. Willamette hops (for 30 min.)
- 3 grams calcium carbonate (chalk)
- 1.5 tsp. Irish moss in boil
- Wyeast 1968 ale yeast

Step-By-Step:

Single-step mash at 152° F for 90 minutes, or until iodine test is negative. Sparge to six gallons. Boil for 90 minutes.

Cool with wort chiller, aerate well, and pitch sufficient yeast. After three days, rack to secondary, then follow normal procedures when beer is complete.

CIRCLE 41 ON READER SERVICE CARD

large following. Michael Jackson has good words for Brooklyn's Brown. In the great Northwest Pyramid Ales offers a creditable version of the style. Full Sail's flowery brown ale will soon be bottled seasonally, in the autumn.

So given all that, here are some style guidelines.

Southern English brown ale: Very dark, but not black. Very sweet (which means, of course, with very low hopping rates as well). Low alcohol, with an original gravity around 1.035.

Northern English brown ale: When pressed, my artist wife; Elizabeth, offered "burnt umber" as its color. For those of us with less art training, she conceded to mahogany—reddish brown. Hopping rates are a bit higher, and the beer attenuated more (more sugars turned into alcohol and carbon dioxide), but bitterness is still subdued. A dry maltiness predominates. Original Gravity is about 1.045-1.050.

In both English versions, British malts (especially British caramel malts) are essential. Nuttiness can be enhanced by the use of "amber" malt, which can easily be created at home.

Spread 1/2 to one pound of pale malt on a cookie sheet and toast it in the oven at 275° F for 60 minutes, then 350° F for an additional 30 minutes.

The kitchen will take on the unmistakable aroma of Grape Nuts, and freshly crushed toasted malt adds a wonderful edge to the caramel malts without any unwanted roasted or burnt flavors.

Kettle sugars are entirely appropriate for both styles, with an emphasis on raw, brown sugars (such as turbinado or demerara). The truly adventurous brewer could try inverting brown sugar.

Good, fruity ale yeasts are essential. Commercial breweries can get away with bottom fermentation for these, but the homebrewer will find top fermentation better and simpler.

Cooper's Ale Yeast is a good choice among dry yeasts. For best results, good liquid yeasts include Wyeast 1098, Yeast Lab A04, or BrewTek CL-170. For buttery flavors, try BrewTek CL-160, Wyeast 1968, or

ABS001.

American brown ales offer a somewhat wider range but are usually of moderately high gravity (1.045-1.055). Color is somewhat darker than the Northern English versions and achieved with dark, roasted malts. The beers are almost certainly all-malt.

A wide array of hops are suitable, and high-alpha hops can be used for

bittering. The ubiquitous Cascade hops seems to be a favorite, but flowery, aromatic hops such as Mt Hood, Liberty, Willamette, or Goldings would be good choices.

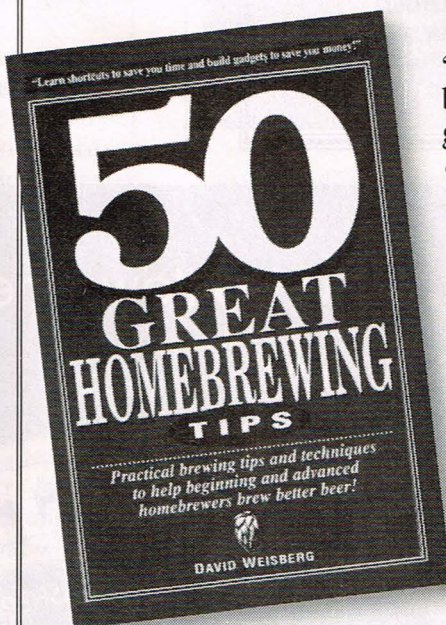
Any of the ales yeasts mentioned above would work well, as would very clean, crisp strains such as Wyeast 1056 or BrewTek CL-10.

Do it all right and maybe judging brown ales will become a plum. ■

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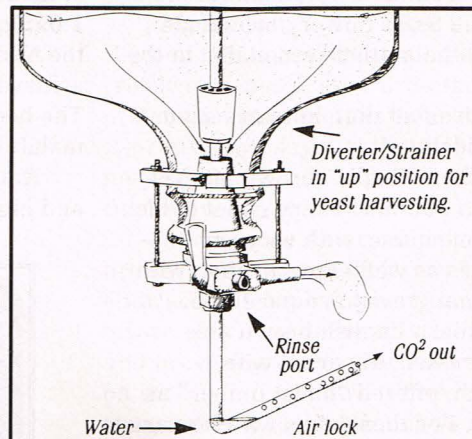
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Single Brewer Seeks Tall, Brown Bottle...

by Jen Hill

Like your favorite brew recipe, bottling is a matter of taste and imagination, and the subtle interaction between the two. One guy named Fred at the University of Michigan would, every January, bottle a batch of amber in those keg-shaped Red Stripe bottles, turn up the Bob Marley, barbecue some jerk chicken, and pretend he was in Jamaica instead of Michigan. It always worked until the police came and asked him to turn the music down.

True Facts

Myth: The shape of the bottle matters.

Reality: Traditional bottle shapes are dictated by the technologies of the countries and eras in which the brew developed.

Those soft-shouldered bottles that contain weiss beer or pils may or may not coddle the gentle carbonation as the purists claim, but they *were* readily available in Germany in the early part of this century. Here in the States there is a certain romance of the longneck that owes more to early mechanical bottling equipment than anything else. Just as you get used to buying flour in a five-pound sack, you get used to seeing a standard beer bottle. But when you're a homebrewer, you have options.

There are lots of bottles out there, from those fat little lambic vessels from Belgium to the broad-shouldered stout bottles of Britain.

Size Matters

Bottles come in lots of shapes, but sizes are fairly standard: 12-ounce and 22-ounce are the most common.

The advantage to buying 22-ouncers is that when filled, they'll have less head space over the batch, which means less oxidation. You'll also end up capping fewer bottles, so the process will go a bit more quickly. Adds Andy Grace of Northern Brewers, a homebrewing supply store in St. Paul, Minnesota, "Your friends are more likely to save them for you instead of tossing or recycling them."

The drawback of filling only 22-ounce bottles is that most homebrew is not meant for guzzling and, unless you're sharing, you might not want to drink 22 ounces of beer.

There's a woman who puts her brew in seven-ounce ponies because where she was raised women drink pony-sized beers while their manly mates drink out of standard bottles. But that's an outdated concept of thirst and gender.

On the other end of the size continuum is what goes by *le Méthode Champenoise*, a tongue-in-cheek name adapted from the label of French champagne bottles. "Tastes great,



less filling!" says Byron Williams, a homebrewer in Missoula, Montana, about using champagne bottles for homebrew. He's right: These 750 ml monsters will cut your bottling time by half. A champagne bottle also makes for nice presentation.

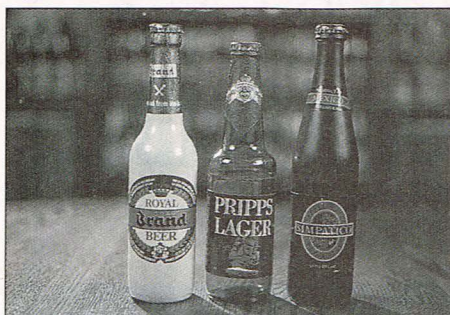
Bottle Hunting

Champagne bottles are more easily obtained than you might think. Steven Vandervere, also of Northern Brewers, advises would-be bottlers to seek out a place with a good champagne brunch—"Your local Marriott, say"—and ask them to save the bottles for you. He cautions, however, that European bottles require a 29-millimeter capacity from your capper. American brands match the 28 mm standard.

Vandervere's suggestion for asking local bars or restaurants to save bottles need not be limited to champagne bottles. Places that serve Grolsch are a good, cheap source for cage-cap bottles. Vandervere cautions, "If you do make a deal with a restaurant, make sure you pick the bottles up promptly, say thank you, and bring them a six-pack."

If you'll forget to pick up the bottles, you can always dumpster dive. Find a bar that serves a variety of microbrews and poach the empties before the trash gets picked up. Make sure they aren't returnables: You don't want to be charged with theft. If you live in a neighborhood with curbside recycling, you can make the rounds before the trucks do and scavenge your neighbors' old bottles. Better yet, get to know your neighbors and have them save bottles for you.

You can also improve your beer exposure while expand-



Romance in a bottle



For feminine thirsts?

ing your bottle collection. With the widespread popularity and availability of microbrews, more liquor stores are allowing "mix and match" six-packs. The cost breaks down to about 90 cents per bottle, depending on the beer.

If tradition is important to you and the look of 24 longnecks lined up in a cardboard box makes you think of summertime fun, not returning your returnables is a cheap, efficient way to get a good supply of bottles.

Modern Conveniences

The advantage to buying bottles new is time and slime. Chances are you need to bottle your brew before it gets to tasting yeasty and you've procrastinated—errr, been too busy—so you don't have the energy or organization to clean and sterilize the smelly load of bottles you've got sitting in your garage.

While you don't have to spend hours over the sink with new bottles, you can't ignore the sterilization process. You should crank up the temperature of your water heater and run them through a long rinse cycle on the

lower rack of your dishwasher.

The drawback of new bottles is that your selection is limited by what's available at your local supply store. Most likely, they will have 12-ounce and 22-ounce traditional brown bottles, as well as larger cage-cap bottles.



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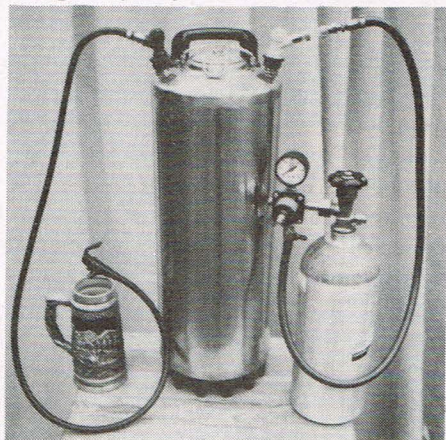
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(and bad), but also for hours of wrestling with slippery bottles in your basement. The cage cap, which Grolsch uses, is an older, easier method of capping.

The difference between the two is one of ease and cost. It's a lot easier to use the plug and gasket of the cage-cap bottle than it is to crimp a lot of crowns. But unless you have years of Grolsch bottles saved, the cost difference is significant: New cage-cap bottles are \$1.50 each, while standard bottles are about \$11 a case when purchased new.

Another downside to cage-cap bottles is their lack of longevity. The new

bottles manufactured in the U.S. have plastic plugs instead of the traditional ceramic ones. These tend to deteriorate. Not only do you have to replace a more expensive bottle more often, but you run the risk of losing your brew when the seal fails unexpectedly.

Which brings us to screw caps. In a word: avoid. While some homebrewers may swear by them, the risks of the seal failing are higher than acceptable.

The Allure of Green

Beer is a volatile substance. Light will affect the taste. One culprit to beer's volatility is the hop oil, which interacts with light. Brown glass is the only color that effectively screens out the fluorescent spectrum and therefore limits light damage.

Green bottles do nothing to stop light damage. They owe their popularity to Heineken, which introduced the bottle as a distinctive marketing device. It was picked up by other European breweries and became the mark of distinctive "Export" brews.

Advice: Avoid both green and clear



Coddling carbonation

bottles unless you store your brew in the dark or drink it very quickly.

Crockery Comes Back

There are advantages in tradition. Some crockery bottles made in the 1860s in Milwaukee advertised that they could keep beer air and light tight for 10 years. If you have antiques hounds or bottle collectors as friends, you're in luck. But be careful: Some glazes are unstable and can leech into stored liquids. Many state agricultural extensions have testing services for ceramics that will test your stoneware for reactivity. ■



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S PICE UP

by Scott Russell

Berliner weissbiers, even to this day) and yarrow, nettle, thyme, nutmeg, basil, and rosemary (in English and Irish country ales). The list is probably as long and as varied as the history of brewing itself.

Today ingredients such as licorice, anise, chili peppers, and orange peel have found their way into commercially produced specialty beers, particularly as the American craft-brewing industry has followed homebrewers' lead into more daring and innovative brewing.

The Philadelphia area has its anise-laced mild brown ale known as Swankey. Mexican and Western US brewers make spicy chili beers. Many micros have a special holiday brew with orange, cinnamon, ginger, or nutmeg. And then there are the attempts at pumpkin pie beers and chocolate or coffee stouts.

Well, if you're a homebrewer, chances are that somewhere in the back of your mind is an idea, a *different* brew that you're going to try to make that no one else has ever made. Go for it! Basically anything you can eat can go into beer. Be cautious of oily spices or foods, though. They can alter the beer's foam. And make sure that you do indeed like the taste of the special ingredient you plan to use. One home-

Homebrewers are resurrecting many elements of brewing's long and glorious history, elements that were partially erased by Prohibition, then shrouded in the mists of marketing spewed from the factories of commercial conglomerate breweries.

One of the most interesting aspects uncovered is the comparatively late arrival of hops on the brewing scene. True, Bavarian law has stipulated that hops be one of the only allowed ingredients since 1516, but that's Bavaria. Everywhere else brewers used many other spices and flavoring agents along with their grains and other fermentables until the 19th century.

Some of the traditional spices used long ago include heather and gorse (in the highlands of Scotland); spruce needles (in England and the American colonies); juniper (in Northern Europe, particularly along the Baltic Sea); coriander and cumin seed (Belgium); woodruff (in



YOUR BREW



brewer came up with a recipe for a beer using ginseng and other Asian spices. A few weeks later he discovered that he really didn't like ginseng all that much. He had two cases of an undrinkable (and expensive) brew to try to get rid of.

There are essentially five different ways to add flavorings to your brew. Each gives different effects with different spices.

1. Add the spice to the mash, if you're brewing with grain. This method provides a deep spice flavor but probably no aroma whatsoever. Simply put the spice in with the grist, or perhaps as a later addition to the mash as is often done with darker specialty grains.

Somewhere in the back of your mind is an idea, a different brew that you're going to try to make that no one else has ever made. Go for it.

2. Add the spice to the kettle, whether you're boiling malt extracts or boiling down your mash runoff. This will give you some aroma along with the flavors extracted, but the longer the flavoring is in the boil, the less of its aromatics will remain. In this regard, spice and hop techniques are very much the same.

3. Spices can be added as "dry hops." Depending on your style, this means adding the spice in the last two minutes of the boil, at kettle knockout (when you turn off the heat to stop the boil), or in the fermenter (primary or secondary). This will not add as much flavor as the first two uses, but the aromatic qualities of the spice will be better preserved.

A word of caution here: Large pieces of spices or fruits can and will clog airlocks or blowoff tubing. The vast majority of spices used for brewing purposes can (and probably should) be crushed or ground or broken up, no matter at what point you plan to add them. You'll always get more flavor from freshly ground spices than from either whole or commercially pre-ground spices.

4. Much attention has recently been given to the idea of potions or teas when using spices.

For delicate spices, those whose flavor and aroma are both desirable, this is a great method. It does require some forethought. A good potion needs to be prepared a few weeks, if not a few months, ahead of time.

One popular method is to crush, shred, or grind the spice and soak it in about four ounces of cheap vodka (other neutral grain spirits will work as well). The spirits extract all the flavor and aroma, and sanitize and pre-

serve the mixture until you're ready to use it. Add this potion (after straining out the debris) to your brew along with the priming sugar at bottling. Keggers can get the same effect by simply adding it to the keg.

As for teas, some spices work better if extraction is done with hot water. Teas to try include chamomile, spruce, lemongrass, and peppermint. This type of "potion" can be prepared right before bottling.

5. Another option, although limited by availability and price, is the use of liqueurs and syrups in lieu of priming sugar. This is more applicable with fruit flavorings, but there are a few herbed liqueurs or syrups that make for an interesting kick. Just imagine Blue Curaçao in a witbier, Jägermeister in a pilsner, or Extra Special Angostura Bitter.

If you choose this path, be cautious. You will need to figure out just how much sugar is in the liqueur (by its specific gravity, more or less). It will also add slightly to the alcohol content of your beer.

Typically, a 12- to 15-ounce bottle of liqueur will need about 1/4 cup more priming sugar to adequately prime five gallons of beer and may well crank up your alcohol content (by volume) 1 or 1.5 percent.

Now that you have a rough idea of the possibilities, it's time to put your imagination—and your brew pot—to work.

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Spicy Food for Thought

To get your imagination revving here
are some other possibilities for
spiced brews.

- Caraway Stout—sort of like good dark rye bread. Use malted rye in the mash if you can find it.
- Rosemary Weizenbier—it's different.
- Sassafras Red Ale—grown-up root beer.
- Espresso Märzen—or use Vienna Roast coffee beans.
- Garlic & Oregano "Mild" Ale—goes great with pizza.
- Peppermint Pale Ale—a winter warmer.
- Spruce & Licorice Porter—actually an old New England classic.
- Gingerbread Brown Ale—molasses, cinnamon, and ginger.
- Tropical Bitter—with coconut sugar and grains of paradise.

CIRCLE 33 ON READER SERVICE CARD

"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."



THE LIBERTY MALT CATALOG

How I learned to brew without a teacher.

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.

A Complete Catalog!

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?"

To order or for a free catalog:

1-800-990-MALT

CIRCLE 38 ON READER SERVICE CARD

Winter Solstice Red Ale

The blend of vanilla and cardamom with the fairly high hoppiness gives this brew a crisp, full-bodied spiciness like a good Christmas cookie.

Ingredients:

- 1/4 lb. 50° Lovibond crystal malt
- 1/8 lb. roasted barley
- 1/8 lb. malted wheat
- 4 lbs. amber unhoppled malt extract
- 2 lbs. amber unhoppled dry malt extract (DME)
- Northern Brewer hop pellets (8 alpha acid units)
- Willamette hop pellets (4 alpha acid units)
- 10-14 grams fruity ale yeast (or a liquid culture such as Wyeast 1084 Irish Ale yeast)
- 1 vanilla bean
- 12 whole cardamom seeds
- 4 oz. cheap vodka or pure grain alcohol

Step-by-Step:

Two weeks before brewing, chop vanilla bean into several pieces and coarsely grind the cardamom seeds, then put them in a jar with the vodka. Soak in a dark place until ready to use.

Steep the grains in two gallons of water as it begins to heat up. Remove them at 170° F. Add extracts (put aside 1 cup of the dry malt extract for priming), boil a total of 45 minutes. Add the Northern Brewer at onset of boil, the Willamette 15 minutes later. Proceed with your normal fermentation. At bottling time, prime with the cup of DME you set aside and add in the potion you made a few weeks earlier (straining out the chunks, of course). Age three to four weeks.

Orange Lager

This brew is light in color and in body, but the spices and the orange flavor are not overpowering, even when the beer is young. This brew can be made bolder by using two cups of orange-blossom honey in the boil as well.

Ingredients:

- 1 lb. dextrine malt
- 5 lbs. extra-light unhoppled DME
- Hallertau pellets (4 alpha acid units)
- Saaz pellets (4 alpha acid units)
- 2 oz. shredded orange peel (prefer-

ably organic)

- 1/8 tsp. each: ground nutmeg, clove, and allspice
- 10-14 grams of a clean lager yeast (or a liquid culture such as Wyeast 2007 Pilsen lager)
- 3/4 cup corn sugar

Step-by-Step:

Crack and steep the grain in two gallons of water, remove at 170° F. Add DME and Hallertau pellets, boil 30 minutes. Add Saaz pellets, boil 10 minutes. Add orange peel and spices, boil five minutes and turn off heat. Pour through strainer into your fermenter and proceed with normal fermentation, lagering, and bottling. Age three to four weeks. The orange and spice flavors will be stronger at first but will fade into the background after a month or two.

Old Smoky Scots Ale

This is not a brew for the faint of heart. The combination of smoke flavor (especially if peat-smoked malt is used) and pepperiness is very enjoyable and provides a great counterpoint for the richness of the Scots ale style.

Carbonation is low to further emphasize the body. This is a slow fireside sipping beer.

Ingredients:

- 1/2 lb. dark crystal malt
- 1/4 lb. smoked (peat-smoked, if available) malt
- 1/4 lb. roasted barley
- 7 lbs. light unhoppled malt extract
- Fuggles hop pellets (5 alpha acid units)
- 10-14 grams ale yeast (a liquid culture such as Wyeast 1728 Scottish Ale really emphasizes the smokiness and spiciness of this brew)
- 1 tsp. whole cumin seed
- 1 tsp. whole black pepper
- 2/3 cup brown sugar

Step-by-Step:

Crack and steep the grains, remove at 170° F. Add extract and Fuggles pellets, boil 60 minutes. Crush the cumin and pepper together. Turn heat down to simmer and add spice blend; don't stir in, but let it settle on the surface. Simmer 15 minutes, then remove from heat. Fermentation should be done at 60° F, with a secondary cellaring at 50° F, then bottled as normal (use brown sugar). Age six weeks for best blending of flavors and mellowing of the smokiness.



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BRING HOME THE GOLD

Germ

By John Naleszkiewicz

It's probably best not to think about it too often, but it's an inescapable fact: germs are everywhere. And all germs aren't the same. Like Charlie the Tuna, some have taste. They even like beer—your beer—as much as you do. Specifically, they go for the sugars in your unfermented wort.

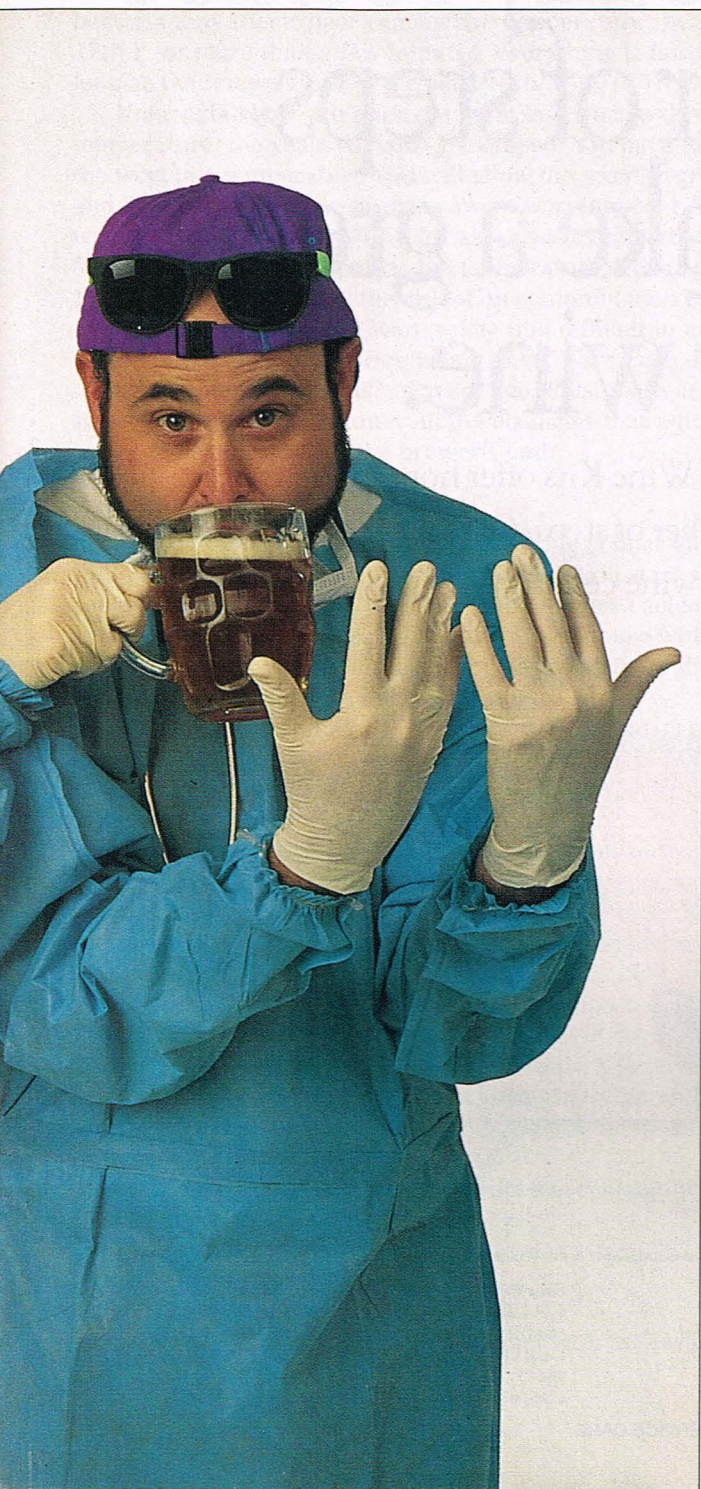
That mixture of malt sugars, hops, and water makes a wonderful home for yeast to grow but is also an inviting place for other microorganisms. These other organisms are waiting to devour those sugars before your yeast has had its chance to convert the mixture into beer. That wouldn't be so bad if these uninvited guests just had a little of the wort and then went on their way. But they also give off rotten smells and bad tastes.

So how can you prevent these pesky germs from getting at your beer and spoiling it before you have a chance to drink it? The trick is to keep as many of them out of your wort as



Warfare!

Don't Let Good Beer Turn Bād!



you can, and to make it as unfriendly a place as possible for those few that do happen to sneak in.

The Enemy

Germs fall into three categories: bacteria, viruses, and fungi. Forget about viruses; they don't attack beer. That leaves bacteria and fungi.

There are all sorts of bacteria. Some thrive with oxygen (called aerobic bacteria) while others thrive without oxygen (anaerobic). Some bacteria like to consume sugars such as the sugar in your beer wort; others may consume more complex compounds such as starches. Most bacteria are active only in a specific temperature range. This range could include room temperature, or even temperatures up to 120° F. In general the lower the temperature, the less active the bacteria will be.

Fungi includes molds, mildews, and wild yeasts. Most molds and mildews will give your brew a basement smell. This is never a desirable quality.

Yeast also falls into the fungus category, but you are using a specific strain of yeast to ferment your beer—one that will give your beer the desired aroma and taste. Some wild yeasts may have desirable characteristics for beer making, but don't count on it. It is more likely that they will ferment too much of what you have, give off strange esters and aldehyds (weird aromas and headache-inducing alcohols), and then refuse to settle out of the wort, leaving it as murky as a stagnant pond.

The Battle Plan

To fight back against the enemy, you need to know where these undesirables come from.

Bacteria and wild yeasts can be found on virtually any exposed surface. This includes you, your hands, all over the outside of your body, and even on the inside. So anything you touch will potentially get contaminated.

Another way bacteria get around and can get into your beer is through the air. Bacteria and wild yeasts are most commonly transmitted on dust particles, so the longer something is exposed to the open air, the greater the likelihood that it will get contaminated. Of course, there is no need to get paranoid about all these bacteria floating around you. Over the millennia people have developed a natural resistance to the common germs



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around us.

Unfortunately, the same is not true for your wort; you need to take some simple precautions to prevent contaminations.

Beer can be spoiled by any bacteria or fungus that consumes sugars to survive.

The most common way to get rid of a contamination in your wort is to boil the wort for more than 10 minutes.

Over the centuries, boiling has

become an integral part of the brewing process. Virtually no bacteria that affects beer can survive temperatures over 170° F for more than a few minutes. Everything is fine as long as the temperature of the wort is above 170° F.

Unfortunately, if you pitch the yeast into wort at this temperature, the yeast will also get zapped. You have to cool the wort to a temperature that will allow the yeast to grow and do its work of converting the sweet wort into beer. This would be approximately 70° F for ale yeast and about 60° F for lager yeast. But as soon as the temperature drops below 170° F, you start running the risk of an contamination again.

Don't be alarmed. If it were really that difficult to make a good batch of beer, brewing would never have been discovered all those thousands of years ago. Plus, there are some simple tricks to counter all the obstacles that nature seems to have thrown in the brewer's path.

Battlefield Tactics

There is no need for you to start wearing rubber gloves while brewing. Just wash your hands before you start and don't touch the wort with your hands once it has cooled. You also don't have to scrub down the whole house with disinfectant. But you should disinfect all the surfaces that will come in contact with the cooled wort.

Brewing Trick Number 1: You don't need to have everything sterile all the time. There are times when it is very important to keep sanitation at a high level, and there are other times when it is not as critical.

The most important time to keep things sanitized is while the wort is cooling and before the yeast begins actively fermenting the wort. Another critical time—but not quite as critical as the first—is when you prime the fermented wort before bottling. In fact any time you transfer the beer, such as from primary to secondary fermenter, is important.

Priming is when you add some fermentable sugars to the beer to naturally condition and carbonate it in the bottles (this also applies to kegs, if that's where you condition your beer). Among the equipment that may come in contact with cooled wort are:

- Stirring paddles (if used after wort has cooled)
- Funnels, tubes, and hoses
- Wort chillers, hop backs
- Strainers, filters
- Primary fermenter

If this equipment is to come in contact with the cooled

wort, it needs to be sanitized. There are many ways to sanitize brewing equipment, including boiling it or even using various disinfectants and cleansers.

When don't you have to worry about the sanitation as much? Any time before the wort is boiled is not considered critical. This includes the mashing and sparging of the grains. Please, don't misunderstand: It is still important to keep the equipment clean. You don't want to have any bad flavors introduced because of dirt and grime, but sanitation is not as critical. This is because the time frame for mashing is so short (usually less than two hours) that any bacteria in the mash will not have enough time to do anything before they are destroyed in the boil.

Brewing Trick Number 2: Pitch actively fermenting yeast as soon as the wort has cooled to the proper temperature. This is one of the most important tricks you can perform to help prevent bacteria from over-infesting your brew.

It is very important to cool the wort quickly once the boil is completed. This allows you to pitch the yeast so fermentation can begin. You could leave the wort in the covered boiling vessel until it is cool enough to pitch the yeast. This could take eight hours or longer. As the wort cools, any airborne bacteria that got into the wort can begin their work before the yeast does. This could lead to a spoiled brew. Using a wort chiller can bring the hot wort down to yeast pitching temperature in 15 to 25 minutes.

Yeast is a living organism, and it needs oxygen to develop properly during the initial stages of its lifecycle. Oxygen-starved yeast can result in a lengthened growth stage of fermentation, increasing the chance that bacteria may become more dominant in the wort. Another problem with under-aeration is that in an oxygen-starved wort, yeast cell growth will be abnormal, and undesirable esters will be produced. These esters cause off-flavors in the beer.

The rapid boiling that took place before the wort was cooled drove off all the oxygen from the wort. The aeration of the cooled wort will dissolve oxygen back into the wort.

It is very important to remember that cool wort should be aerated, not hot wort. Wort is considered hot if its temperature is over 100° F (38° C). At the higher temperatures

Infesting Organism	Symptoms
Acetic acid bacteria	Smells like vinegar
<i>Clostridium butyricum</i>	Smells like vomit
Coliform bacteria	Cooked vegetable smell
<i>Hafnia protea</i>	Sour, smells like celery
Lactic acid bacteria	Sour, buttery, or sometimes butterscotch taste, DMS (dimethyl sulfide)
Wild yeast	Ropiness or oiliness on surface, wort remains cloudy once fermentation is complete, medicinal smell

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there can be oxidation of the wort that adversely affects the flavor of the beer. The easiest way to aerate your cooled wort is to allow it to splash when pouring it into the primary fermenter.

There are several reasons most other microorganisms tend to be overpowered once the yeast begins actively fermenting. Once the yeast is pitched into the aerated wort, the yeast multiplies quickly and consumes all the available oxygen in the wort. This means that any bacteria that need oxygen to reproduce will only be active during the short time that oxygen is available. Yeast growth also reduces the beer's pH, further suppressing bacterial growth.

Also, as the yeast reproduces and ferments the wort, it produces alcohol. As the alcohol content increases, it will inhibit bacterial growth. In fact if the alcohol content gets too high, it will even inhibit yeast growth (this doesn't happen with beer yeast until around 8 percent).

There are other factors that control the growth of unwanted bacteria in the fermenting wort. The bittering acids that are contained in the hops are a natural inhibitor of lactic acid bacteria. Lactic acid bacteria can give your beer a sour or even a butterscotch taste. At

one time, beers that were to be stored for long periods or transported over long distances were brewed with more hops as a preservative. A good example of the preservative qualities of hops is demonstrated by India Pale Ales (IPAs), which were originally brewed extra bitter to help them survive the long trip from England to India.

Brewing Trick Number 3: Ferment the wort in a closed primary fermenter. Primary fermentation can be done in either an open or a closed container. An open primary fermenter should still have some sort of cover over it to prevent larger particles from dropping into the fermenter. However, using a closed fermenter (with a fermentation lock) prevents any airborne bacteria from floating into the brew.

This is especially important if you don't have a place that is free from open drafts for brewing your beer. This is not to say that you should never experiment with open fermentation. On the contrary, beer has been brewed in open containers for centuries. The foam (called the krausen) that is formed on the surface of the beer acts as a natural insulation between the germs floating in the air and the fermenting

Cleaning Agent

Uses

Ammonia

Can be used to wash bottles and containers but is difficult to work with because of the strong odor. You can use about 1 cup in 5 gallons for washing. **DO NOT combine ammonia with any chlorine cleaners. This will cause the release of poisonous chlorine gas!**

B-Bright

A cleaner that is made especially for cleaning surfaces that come in contact with beer. Follow the directions on the container.

Chlorine Bleach

This is an excellent sanitizing agent. You can use about 2 ounces of bleach in 5 gallons of water. You should rinse the items thoroughly after soaking or rinsing with a bleach solution.

Detergents

Any good detergent can be used to wash the surfaces of glass and plastic containers.

Sodium Metabisulfite or Potassium Metabisulfite

Both of these are available as a powder or as tablets (Camden tablets). They are widely used in wine making but neither of these is suitable for beer brewing because they depend on the acid content of the solution to be effective.

Washing Soda

Can also be used to wash glass and plastic containers. It is especially good for removing labels from bottles. Use 1/4 to 1/2 cup in 5 gallons of water.

wort. However, since the goal is to minimize possible contamination, a closed primary fermenter will provide that extra bit of security.

Since you cannot protect your wort from all bacteria, strive to make it rough for those bacteria that do happen to get in. Using all the tricks that have been passed down over the centuries:

- Boiling the wort
- Using hops as a natural preservative and bacteria inhibitor
- Sanitary brewing conditions
- Cooling the wort to yeast pitching temperature quickly
- Aerating the cooled wort
- Using a closed primary fermenter

Losing the Battle

In most cases bacteria attack the fermenting wort, and the spoilage is readily detectable. It is characterized by off smells during or after fermentation, scum that floats on the surface of the fermented wort, or yeast that fails to settle after fermentation has completed. Note that some strains of beer

yeast give off a sulfury or rotten-egg smell during fermentation. This is normal, and the resulting beer is very good; the sulfury smells escape through the fermentation lock.

Other germs (usually wild yeasts) can attack the beer once it has been bottled. These will be characterized by over-carbonation of the beer. Over-carbonated beers may cause the beer to erupt into a fountain when opened or, in rare occurrences, cause the bottle to explode. This is because wild yeasts will ferment compounds that are not normally fermented by beer yeasts, resulting in the production of more carbon dioxide in the bottle than expected.

Usually there is nothing that can be done once a batch has been contaminated by some unwanted germ. If the contamination is caught early enough during the primary fermentation stage, lowering the fermentation temperature may allow you to salvage the batch from the effects of the bacteria. Often, however, you won't notice the problem until you are getting ready to bottle the

beer. If the off smells or tastes aren't too bad, just bottle and drink the beer anyway (none of the bacteria that live in beer are harmful to people).

If the smells or tastes are more than you can handle, then you have no other course of action than to dump the batch. If a batch does go bad, make an effort to identify what type of contamination occurred and how it can be prevented in future batches. You don't want to make the same mistakes over and over again.

Winning the War

If despite your best efforts your batch goes bad, remember: Even the big commercial breweries get an occasional contaminated batch. When that happens, they have to dump thousands of gallons of spoiled beer. So don't get discouraged, try to figure out what went wrong, and try again. Most important, remember to have fun with your hobby. If a batch does go bad, it will make a good story to tell while your friends are drinking one of your good batches.



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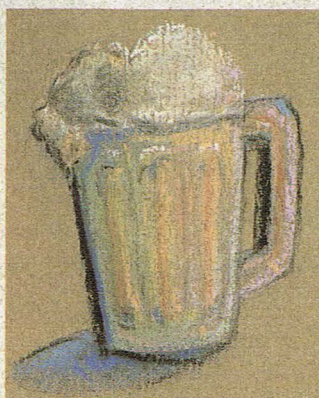
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■
By Sam Wammack

The most fun in brewing comes from designing recipes and choosing ingredients. There is just no end to it. A homebrewer, no matter how young, could make a different beer every day of his or her life. By the time he reached a ripe old age of 90 or so, he wouldn't have scratched the surface of the possible recipes he could have chosen.

Of course if he drinks all that beer, he may never see 90, but that's a whole different subject.

Just for fun, think about all the

possible beers you could make. There are about 150 varieties of malt extract, 15 specialty grains, 25 hops, and 32 yeast varieties easily available to a homebrewer today. If you were to design beers only around those ingredients, using two specialty grains and three hop additions in each recipe, you could make an awful lot of different beers. In fact, if you change only one major component in each batch, more than 16 billion different brews are possible!

The remarkable thing about this mental exercise is that all the beers

would be different. They would run the entire range from light to dark, hoppy to mild, and from mediocre to good to great. A major component would be different in each beer, and no two of them would be exactly the same. That's what makes this hobby so much fun.

Some of the most important beer ingredients available are the specialty grains, also called specialty malts. A specialty grain is any brewing grain other than plain malted barley.

Plain malted barley is the basis of beer. Barley from the field is made "brewable" by putting it through the

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BREWING GRAINS

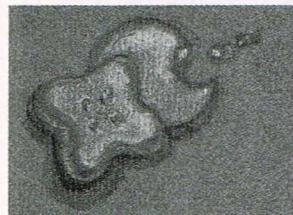
GRAIN VARIETY	NEEDS TO BE MASHED?	COLOR	USED IN BEER STYLES	QUALITIES	AMOUNT USED IN 5 GAL.
Malted Barley U.S. and foreign	yes	very light	all	fermentables, body, flavor	7 to 20 lbs.
Lager Malt Pale Ale Mild Ale	yes	light amber to dark amber	named for beer styles	fermentables, body, flavor, color	7 to 12 lbs.
Cara-Pils	yes	light amber	various	fermentables, sweetness, body	1 to 2 lbs.
Vienna and Munich Malts	yes	amber to dark amber	German lagers	fermentables, sweetness, color	1 to 10 lbs.
Malted Wheat*	yes	light	wheat beers	fermentables, clove flavor, head retention	1 to 12 lbs.
Light Crystal	no	light amber	many, esp. British ales	body, flavor, color, sweetness, head retention	2 oz. to 1 lb.
Medium Crystal	no	amber	same	same	same
Dark Crystal	no	dark amber	same	same	same
Roasted Barley	no	dark brown	stout	sharp roasted flavor, color	2 to 8 oz.
Biscuit (Victory) Malt	no	light amber	many	toasted flavor, body	2 to 8 oz.
Special Roast	no	red	various	medium crystal with red tint	2 to 8 oz.
Black Patent	no	black	porter, dark beers	sharp burnt flavor, color	2 to 4 oz.
Black Barley	no	very black	porter, all dark beers	rich burnt flavor, color	2 to 4 oz.
Chocolate Malt	no	dark brown	all dark beers	pleasant roast flavor	2 to 8 oz.

*Note: Malted Wheat doesn't have enzymes and must be mashed along with a grain that does.



malting process.

In malting, barley is soaked in water until the seed sprouts, then it is gently heated and dried to kill the live seed and preserve it. In starting to sprout, the barley seed produces



starches and enzymes for the purpose of growing a new barley plant. If you look at a diagram of a barley grain, or seed, it's a lot like an egg. A small part of the grain is actually alive, but most of it is a food reservoir for the new plant to draw on.

Gentle heating and drying at the malting company makes malted barley a stable product that can be shipped and stored. When the malt is crushed, mixed with water, and kept within a narrow temperature range (about 135° to 160° F), the enzymes that were inside the grain break down the

starches into fermentable sugars. These fermentable sugars can then be consumed by yeast cells and changed into carbon dioxide gas and ethyl alcohol—in other words, beer!

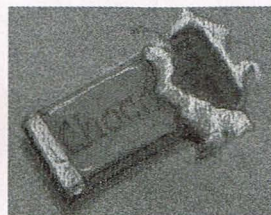
How Extract is Made

It doesn't matter whether you are talking about homebrewed beer made from malt extract or from all grain, the process is the same. In a brewery, malted barley is taken through the mashing process to break the starches into fermentable sugars. This reaction is called "conversion"; it converts the starches into sugars. The spent grains are rinsed and removed in a process called "sparging," which leaves unfermented beer known as "wort." At this point, a brewery moves the liquid wort into a kettle, brings it to a boil, adds hops, and goes ahead with the brewing process just like a homebrewer does on his or her kitchen stove.

A malt extract manufacturer does the same thing. If an unhopped extract is being made, hops are not added, of

course. When a brewery reaches the end of the boil, the wort is cooled, transferred to a fermenter, and yeast is introduced. At the end of the boil, a malt extract manufacturer transfers the wort to a vacuum chamber and evaporates the water. Most of the water is removed to make malt extract syrup. All the water is removed to make dry malt extract.

Without specialty grains, only a few beer styles can be made. Malted barley is very light in color, as great care has been taken not to scorch it during the drying process. It usually has a color of four or less on the



Lovibond scale (a color scale that ranges from zero, clear, to 120, very dark), and by itself it will

make American Lager, European Lager, and a few other beer styles that are light in color. If you use a lot of



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malted barley, either in the form of grain or malt extract, it will make a heavy-bodied, malty beer that is still pretty light in color and flavor, such as an Oktoberfest or Hellesbock.

To make other beer styles, specialty grains are used. Commercial brewers and all-grain homebrewers enjoy an advantage here, because they usually just add whatever specialty grains they are using to the mixture of grains in their mash. To a commercial or all-grain brewer, all the grains are mixed. Whatever converts is welcome to do so, and whatever doesn't still adds the desired color and flavor to their beer! Some specialty grains need to go through this mashing process. Malt extract brewers cannot use these grains or if they do, they need to do a partial mash to add to their malt extract.

Grains that need to be mashed are those that are convertible. That is, they contain starches that can be broken down by enzymes into fermentable sugars, just like plain malted barley. Many of these grains are considered specialty grains by American homebrewers, but they really aren't. Often, they are just malted barley from somewhere else.

For authenticity, many all-grain brewers like to make their pale ales from English malt, Oktoberfests from German malt, Belgian Ales from Belgian malt, etc. That's perfectly reasonable. Every country has its own growing conditions, barley varieties, and methods of malting grain. To be authentic, it may make a lot of sense to use the ingredients those beers are brewed from in their home countries. That doesn't mean those are specialty grains, though; they are malted barley. That is, they need to go through the mashing process.

The specialty grains that can be easily used by malt extract brewers and all-grainers alike are those that have been processed in such a way that they will not convert through mashing. This includes most of the specialty grains, so almost all beer styles are possible by brewing with malt extract.

Specialty grains that can be used in this way are usually barley, malted or unmalted, that has been treated dif-

ferently at the malting company. Crystal malt is one of the specialty grains. It is available in a whole range of colors, from 20 to 120 Lovibond.

Crystal malt is malted barley that is heated while wet. This is done under controlled conditions, and the starches are converted and caramelized within the grain. That's why crystal malt is sometimes called caramel malt. Crystal malt is the most common specialty grain used by homebrewers, and

it's a great ingredient. It enhances the sweet character of the beer, increases the body, and it aids in head retention. It can be used to control the color of the finished beer, from gold to quite dark depending on what the brewer wants.

Some other specialty grains that are easy for everyone to use are roasted barley, biscuit malt, special roast, black patent malt, black barley, and chocolate malt. Each of these was

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Ozarks Brown Ale

[Named for the White River in the Ozark Mountains after the spring rains.]

Ingredients:

- 6.6 lbs. unhoppled light malt extract syrup
- 4 oz. crystal malt (20° Lovibond), crushed
- 4 oz. black patent malt, crushed
- 2 oz. chocolate malt, crushed
- 1 1/2 oz. Willamette hop pellets (about 5.0% alpha) bittering
- 3/4 oz. Cascade hop pellets (about 4.5% alpha) flavoring
- 1/2 oz. Cascade hop pellets (about 4.5% alpha) finishing
- 1/2 tsp. Irish moss clarifier
- 2 packs dry ale yeast, or 1 liquid ale yeast starter
- 3/4 cup corn sugar (priming)

Step-by-Step:

Crush the specialty grains and tie them in a cheesecloth bag. Add five gallons of water to the brewpot, and put it on the stove to heat. While heating, add the grain bag. Stir it around and watch the temperature. Remove the grain at 170° F. Continue heating until a boil is reached. Kill the heat and

stir in the malt extract syrup and the Willamette bittering hops.

Turn the heat back on, and stir periodically until a rolling boil is reached. Note the time it starts boiling. Thirty minutes after the start of the boil, add the Cascade hops for flavoring and stir them in. At 45 minutes after the start of the boil, add the Irish moss clarifier. At 60 minutes after the start of the boil, add the Cascade hops for finishing and stir them in. Cover the brewpot and let it sit for about 5 minutes.

Cool the wort as quickly as possible, preferably with a wort chiller. Toward the end of the cooling period, quit stirring the wort and let it settle. When the temperature is down to 75° F, carefully siphon from the top of the brewpot into a sanitized fermenter.

A 6 1/2 gallon glass carboy makes a good primary fermenter, but a plastic primary fermenter will work. During this transfer, keep the pick-up end of your siphon just under the surface of the wort in the brewpot, and let the wort splash into the fermenter.

This introduces oxygen that is needed for early yeast development.

As the liquid level drops, keep the siphon just under the surface. As you get to the bottom, you will see all the protein trub and hop particles you are leaving behind. If you siphon off all the clear wort and leave this trub behind, you will prevent a lot of problems with protein chill haze in the finished beer. Pitch two packs of dry ale yeast right into the stream going into the fermenter.

Close the fermenter with an airlock and stopper. After the active primary fermentation is done, siphon the beer into a five-gallon glass carboy for a secondary fermenter. This time, don't splash it. When all activity has stopped, prime the batch with 3/4 cup corn sugar and bottle.

Starting Gravity = 1.048

Final Gravity = 1.013

This beer is a little heavy for a brown ale, but it tastes great.

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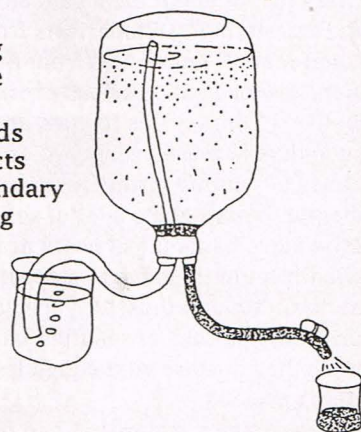
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made in a different way, and each will add different qualities to the beer you are making.

Using these grains is very simple. To make an all-grain beer, just crush all the grains together, specialty grains as well as brewing grains. The whole grist goes through the mashing process, and the spent grains are sparged out before the wort is heated over 170° F.

When making beer from malt extract, the specialty grains are the first thing to add. Start by putting a brewpot full of water on the stove to heat. Use hot water out of the tap, which gives you a starting temperature near 104° F. When the water is starting to heat, put the specialty grains in a small cheesecloth bag, tie a knot in the top, and add the bag to the water. While the water is heating, the grain bag bobs around like a tea bag and you can see the color coming out of the grains into the water.

As the water heats, keep a thermometer in it. Remember, you are trying to use specialty grains as if they

had been in the original mash when the malt extract was made. That original mash stopped at 160° F, and the grains were probably rinsed (sparged) near 170° F. When the temperature approaches 170° F, dunk the bag of specialty grain around in the water to get all the goodness out of the grain. Then take the bag out.

Some old recipes tell homebrewers to boil grains. Never do that. The grain husks that are normally unused are full of starches that become soluble with temperature and will make your beer cloudy. Also, the husks contain tannin that will be extracted into your beer at higher temperatures. Have you ever bitten into a grape seed? That sharp, astringent taste is tannin. Astringency is often encountered as a beer defect. It usually means that a grain brewer sparged too long or got his sparge water too hot. In an extract beer, it means the brewer overheated his specialty grain.

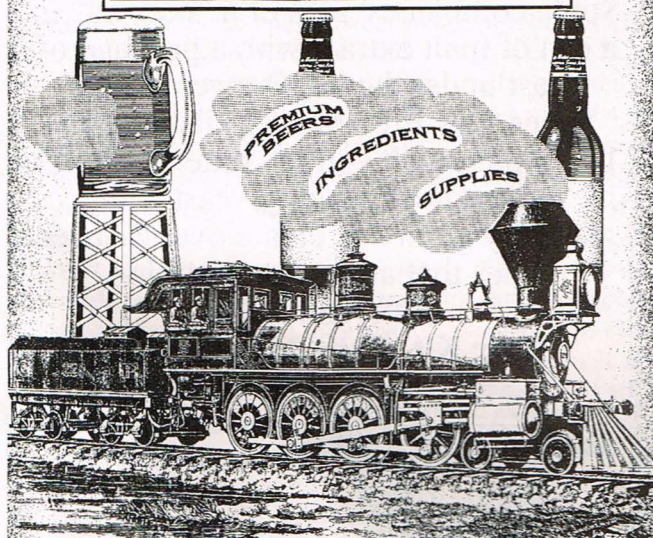
After removing the specialty grain and the grain bag, just go ahead with the brewing process. The pot contin-

ues to heat. When the liquid begins to boil, add malt extract and hops and go from there.

Some brewers put loose specialty grains directly into the brewpot. There is nothing wrong with this as far as the beer is concerned, but it's a lot of trouble to strain them all out. The cheesecloth bag works best for this. A small bag will hold about a pound of grain, and that is usually enough. Occasionally, in some barley wine or other extremely heavy beer, you may have to use two bags.

As far as the types and amounts of specialty grains to use, there are a lot of published recipes to go by. In time experience will give you an instinct for the flavor and color characteristics you can get from each grain, and you will know how much of it to use to get the effects you want. In the meantime, you can get a lot of good information from the "Guidelines for Brewing 5 Gallons of Traditional Beer" on pages 166 through 173 of *The New Complete Joy of Home Brewing* by Charlie Papazian. It is a chart with general guidelines for

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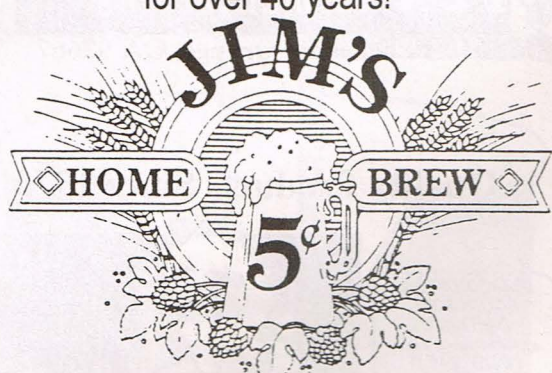
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most beer styles. It suggests weights and types of specialty grain for almost any beer you want to make.

Preparing the Grains

Specialty grains used in homebrewing are usually crushed, but not always. Crushing allows much more extraction of both flavor and color. You can actually make a dark beer, about the color of root beer, with light malt extract and a half-pound of crushed medium crystal malt. In a few beers it's okay to leave the specialty grains whole. By doing that you still get some flavor characteristics into the beer, but you limit color extraction and keep the color light.

For example, try two ounces of uncrushed chocolate malt in a light beer such as American lager. You probably won't find any published recipes like that, but a small amount of chocolate malt in such a delicate beer style will add a good nut-like aftertaste to the malt character.

If you do crush specialty grains, don't grind them into flour. Just crush

them so each grain husk is broken. If you are all-grain brewing a British pale ale, you might use eight pounds of malted barley, four ounces of 20° Lovibond crystal malt, and two ounces of chocolate malt. Simply weigh those whole grains by pouring them into a grocery bag, then run the mixture through a grain mill.

Crush the two specialty grains together and put them in a cheesecloth bag. If you don't have a grain mill, a rolling pin works fine on most specialty grains. Unlike malted barley, they are brittle and the grains break easily. To make the same beer with malt extract, use light, unhopped extract.

A big underlying principle here is that all beer styles are made from light, unhopped malt extract. That is true whether the malt extract comes from a can or box used by a homebrewer, or whether the malt extract is being made directly from grain by a commercial brewer or all-grain homebrewer. Light, unhopped malt extract, wherever it comes from, is like a blank

page to write on. Specialty grain, hops, other ingredients, and brewing procedure can change that beer into any of those billions of possible beers. That part of homebrewing is fascinating.

As you explore this great homebrewing hobby, don't be afraid to experiment. If homebrewers have a fault, it is that they are too conservative. An indication of this is how long it takes new ingredients to catch on. Three great new specialty grains, biscuit malt, special roast, and black barley, have been available for several years now. Unfortunately, very few brewers are using them, because they don't appear in the homebrewing books that were published 10 or 12 years ago.

Many professional homebrew people have been brewing for a long time. But just because they publish a recipe, it doesn't mean that you shouldn't change it or try something entirely different. There are billions of possible beers waiting to be made, and we should all be having fun trying to find the best ones.



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Two Easy-to-Build Wort Chillers

Fight Contamination With Your Own Immersion or Counterflow Model

by Tom Fuller

It's the end of a hard work week and, as usual, you can't wait to get home to do some brewing. With the time it all takes, nothing could be worse than losing a batch by contaminating it with unwanted wild yeast or bacteria.

Often contamination starts in the transition period between the boil and the pitching of yeast. Why? Within the boil all is safe, but once the wort gets below 170° F, all hell can break loose. There is a whole truckload of nasty stuff just waiting to get into your wort. The quicker you can pitch the yeast, the better.

For optimal activity, yeast should be pitched within 30 to 40 minutes after the end of the boil (for five-gallon batches). Preferably, the wort should begin active fermentation within 12 hours of the end of the boil. With proper chilling temperature and adequate starter volume, you could see fermentation in two or three hours. Because it is inevitable that you will have some amount of unwanted bacteria in your wort, the sooner fermentation commences the quicker the undesirables can be fought off. Therefore, it is advantageous to cool your wort as soon as possible.

Wort cooled too slowly, especially in periods over one hour, may not only become contaminated but may also develop a sweet, cooked corn-type aroma and flavor known as dimethyl sulfide (DMS). This is especially a problem with lighter kilned malts such as lager and pils.

The largest concern after boil should be to reduce the wort to pitching temperature in as little time as possible while maintaining sanitation. If you do not bother to cool your wort, you might as well not bother to sanitize your fermenter or hoses either.

A lot of brewers simply let their fermenter sit in cool water for hours on end or even overnight before pitching. Considering the average homebrewer's pitching rate of about one to two ounces of yeast solution, your wort may sit an additional 24 hours before actual fermentation begins. That's a long time to expose your brew to bacteria and other unwanted elements. You really should chill.

Chilling the brew is accomplished through a heat exchanger. Heat is energy, and energy has to go somewhere. With a heat exchanger you are simply transferring heat to another substance and carrying it away. In this case the other substance is water.

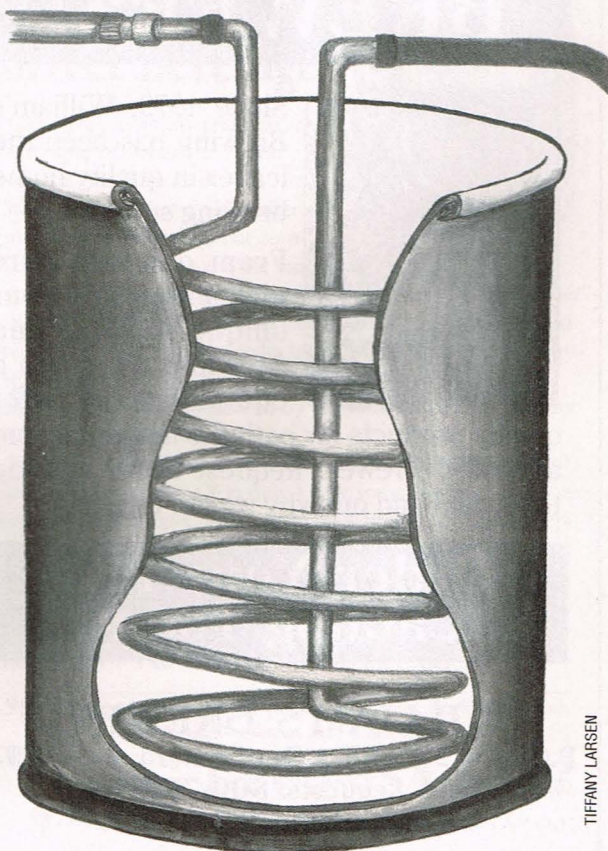
An ice cube provides a good example of heat exchange. If you sat an ice cube on your counter with your hand a few inches above it, you would feel the coolness. Notice that's "coolness." The ice cube is frozen, yet you do not feel the temperature at that degree. The reason is that the heat in the room is taking that frozen cube and carrying its temperature away. The cool air almost feels like it is blowing at your fingers.

There are many ways to cool your wort: the carboy in the bathtub trick, the carboy in the snow bank. But there are two types of cooling devices—counterflow and immersion—that make these unnecessary. Unlike the

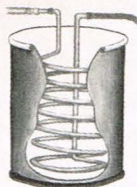
snow bank, you can use these all year. Also, you avoid the risk of shattering your glass carboy by putting hot wort into it—a full-fledged and dangerous disaster.

Immersion chilling is the act of immersing a cooling unit into hot wort, in this case a copper coil. Cold water flows through the copper then exits, carrying away the heat of the wort. This provides a fairly efficient method of cooling and is inexpensive to construct. Immersion chilling does have its downsides; it can be quite slow, taking as long as 30 minutes. It also requires you to stir the wort at regular intervals of two or three minutes.

A counterflow chiller carries the



TIFFANY LARSEN



wort within a copper tubing while cold water flows around the copper within a jacket in the opposite direction. The wort flows with the help of gravity, in one end and out the other, directly into the fermenter. The downfall is it requires much more attention to sanitation.

Most commercial breweries use a plate heat exchanger that is somewhat similar to the counterflow chiller. The hot wort flows into a vertical plate with worm-like trenches. Behind this plate is another plate that is almost identical yet contains the chilled water. These plates are sandwiched back to back throughout the unit. Each unit is generally expandable to accommodate more plates. Some units contain hundreds of plates.

Immersion Chiller

The simplest chiller for the homebrewer to construct is the immersion chiller; it equals much more than the sum of its parts.

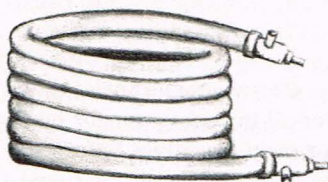
You can build an immersion chiller and use it for years. Furthermore, if you later decide to change, it can become the inside coil of your counterflow chiller.

The Parts:

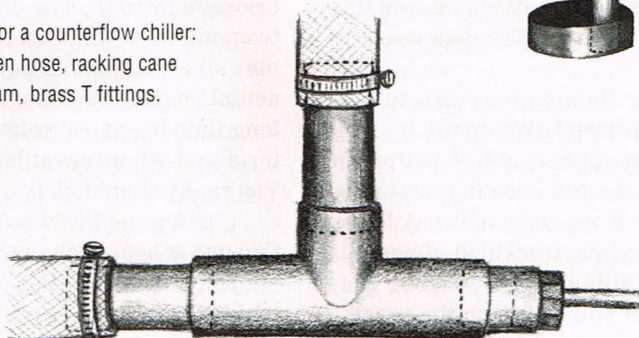
- 15 to 25 feet of 3/8-inch

(outer diameter) soft copper tubing

- 10 feet of 3/8-inch (inner diameter) heavy-grade beverage-type plastic tubing (available at hardware or homebrew stores)
- 2 small hose clamps
- 1 female hose fitting (for faucet)



Essentials for a counterflow chiller: coiled garden hose, racking cane with trub dam, brass T fittings.



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The copper tubing can be found at most home improvement or plumbing stores in coils of 25 to 50 feet. A reputable store can cut the length you need. This must be rolled into about 10-inch-diameter coils (or just less than the inside diameter of your kettle or fermenter). The copper can easily be bent around a paint can or plastic bucket. Leave at least a foot at the end and bend it to go up through the center of the coil for your outlet. Be very careful when making this bend. Without a tubing bender, it is very easy to crease the tubing at a 90-degree angle.

Attach half of the plastic tubing to one end and half to the other. On one end attach the female hose fitting for the input. Insert a six-inch length of 3/8-inch copper into the output end to act as a weight to keep this end in your drain.

(Note: You may want to substitute a brass fitting instead of the hose clamp to avoid any risk that the hose could soften and come off during the transfer of hot liquid.)

Putting It to Work

Using the immersion chiller is as easy as stirring your wort. Blow or rinse the dust off the coils and toss it into your boil during the last 10 minutes or so to sanitize it. Connect the input to your faucet, place the output into your sink, and you are ready to chill.

To achieve maximum effect, bounce the chiller while stirring it around within the wort. This will avoid hot or cold spots and cut down chilling time. This also will help aerate the wort—nothing like killing two beers with one stone.

Chilling may be done in the kettle or plastic fermenter. Chilling in the fermenter is advantageous considering you can transfer wort at 170° to 200° F, when it is much less vulnerable, and you really don't need to sanitize your racking cane or tubing. However, you should never put hot wort into a glass fermenter.

A nice modification to the immersion chiller is to add a five- to 10-foot coil to the in-flow tube before the kettle. This additional coil can be submerged into a small bucket of ice to further chill the water before it enters the main chilling coil. This modification will reduce chilling time considerably.

Counterflow Chiller

The counterflow chiller is more efficient than the immersion chiller. However,

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Marmota Monax

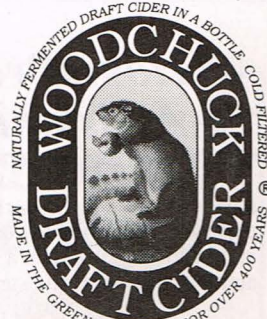
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Cider played an integral part in the history of America. In the early 1600's, Samuel de Champlain enjoyed a cider after a grueling day exploring, but complained that he had to cut the cidre with an axe during the intense winters. Hence the term "hard cider" was born. Early Colonists fermented fresh cider as a way to preserve it. Farmers quaffed a quart or two before a day busting their pick in the rocky soil. Often a village's worth was measured by the number of kegs of cider cellared for the winter.

President John Adams calmed his flatulence with a "jill" of cider each morning. (You may know someone who could use this tip.) The "Log-Cabin-and-Hard-Cider" campaign swept President William Henry Harrison into office in a landslide and elevated cider to the first politically correct beverage.

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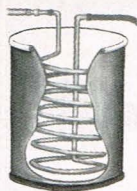
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it does require much more skill and effort to construct and sanitize. The construction requires proficiency at sweating copper joints.

The Parts:

- 20 to 30 feet of 3/8-inch (outer diameter) soft copper tubing (or more for 10-gallon batches or larger)
- 2 feet of 1/2-inch brass pipe
- 2 female brass T's, 1/2-inch (sweat type)
- 2 compression fittings, 3/8-inch with 1/2-inch female ends (sweat type)
- 4 medium hose clamps
- 20 to 30 feet of 5/8-inch garden hose
- 5 feet of 3/8-inch (inner diameter) plastic tubing
- Lead-free solder
- Lead-free solder flux

The beauty of this chiller design is its fittings. They are like those commercially available yet can be constructed at home for a quarter of the cost.

The first thing you need to do is to

insert the copper tubing into the garden hose. Cut equal amounts off both ends of the hose to achieve a hose length of 12 inches less than that of the copper tubing. Save the severed hose ends, as they will become your chilling water input and output.

Using an immersion chiller is as easy as stirring your wort. Connect the input to your faucet, place the output into your sink, and you're ready to chill.

Carefully uncoil the copper tubing—be careful not to kink it—while inserting it into the hose. Continue insertion until equal amounts protrude from both ends. You may wish to do this outside unless you have a very long room in your house.

Next you want to coil the hose into roughly the same diameter it came in (about 12 to 15 inches), leaving about eight inches at the top and bottom uncoiled. To make it easy, do this around a five-gallon bucket.

Now make the fittings. With a hacksaw or pipe cutter, cut the copper pipe into four 2.5-inch lengths and two 1.5-inch lengths. The 2.5-inch lengths are used for the cold water input and output and the 1.5-inch lengths for the compression fitting connectors. Wire brush or sand with a plumbers cloth the inside of the brass T and the ends of the pipe lengths. Apply flux to the brushed or sanded parts and insert a 2.5-inch length to the T to form an L shape.

The 1.5-inch length goes onto the other end of the T to receive the compression fitting. Next, sweat one of the



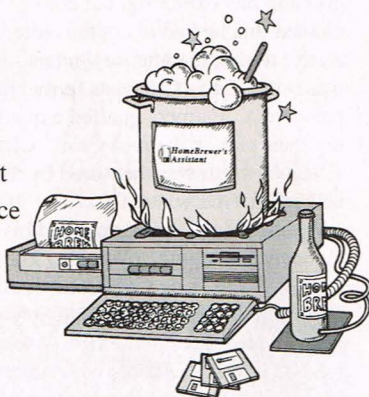
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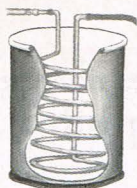
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compression fittings on the 1.5-inch length. Repeat these steps for the other fitting.

The fittings are then slid over the copper tubing with one of the 2.5-inch lengths receiving the garden hose and secured with a hose clamp. The compression fitting is tightened around the brass tubing. This is done on both ends of the coil.

You now have one 2.5-inch length of each T open. The bottom of the coil is the output and the top the input. Insert the bottom remaining copper connection into the severed end of hose with the female hose connector that you earlier cut off. The other severed end with the male fitting goes to the fitting on the top of the coil. You now have a counterflow heat exchanger.

To use the counterflow chiller you will need a brass racking cane, since you will be siphoning boiling or near-boiling wort. One can be made simply with 3/8-inch (outer diameter) copper tubing bent into a cane shape at a

height just taller than your brew kettle. Solder a 1/2-inch to 3/4-inch brass pipe cap to within 1/4-inch of the end of the cane for a trub dam.

Putting It to Work

Sanitizing the counterflow is a bit-time consuming, but it can be accomplished. First, make up a typical sanitizing solution such as bleach or iodophore. You can siphon three to five gallons through the copper, then flush out with the same amount of hot tap water. While this will effectively sanitize a clean unit, it will not sanitize a dirty one. If you let the wort dry on after use, cleaning becomes very difficult and may even require pumping the cleaning solution through it.

To chill your wort attach 3/8-inch (inner diameter) plastic tubing to the racking cane with the other end attached to the input of the chiller. Attach another length to the output and into the fermenter. Attach the female hose connector to the faucet and place the male output into the sink.

Turn on the water and start the siphon of wort into and through the chiller.

You will need some method of restricting the flow of wort into the chiller to set the heat exchange to the desired temperature. Clothespins work well as flow restrictors. The slower the wort travels through the copper, the cooler it will exit. Take its temperature as it exits and adjust the flow accordingly. Total chilling time should be approximately 20 minutes for five gallons.

After use, run boiling or very hot tap water throughout the copper followed by a light bleach or iodophore solution to clean.

Choose Your Method

Which chiller is for you? The immersion chiller works fine, even for batches as large as 10 gallons. But if you feel comfortable with the extra sanitizing efforts required and do occasional large batches, the counterflow may be just what you want.

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Kilning Unlocks Malt Flavor

by Tom Flores

Part two of a three-part series. Next month's topic: yeast.

Every time you order a beer, you have certain expectations. Picture yourself perusing the beer menu at a new brewpub. Stout, porter, amber ale, pale ale, weizen, lager. Each of those names creates an image in your mind. That's what beer styles are all about: creating a standard that tells the consumer—you—what to expect (within a certain range) when you place an order.

An important component of a style is the beer's flavor. Flavor is a perception that arises from color, aroma, taste, texture, and previous experience. A good beer balances each of these attributes.

Malt-derived flavors find their way into beer when they are extracted during mashing or steeping. Many of the flavors in malt originate during the kilning step of the malting process.

There are **four** major flavor attributes provided by brewer's malt:

• **Aroma:** Dimethyl sulfide (cooked corn aroma) and Maillard Reaction products (toasty, caramel, and roasted aromas)

• **Taste:** Maillard Reaction products (toasty, roasted, acidic, and burnt tastes)

• **Color:** Maillard Reaction products (light amber to black colors)

• **Texture:** Astringency from tannins in the husk (palate-drying and puckering sensations)

In the Beginning

Malt is made by first soaking the barley to get it to sprout. The wet barley is then germinated under controlled conditions, which

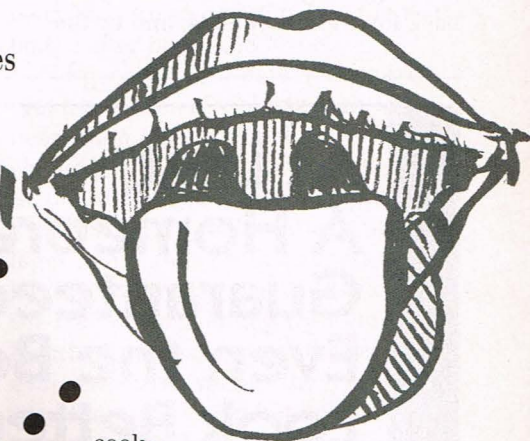
degrades some of the starch and protein into sugar and amino acids.

Kilning dries and partially cooks (browns) the malt. The early stages of browning form colorless compounds that affect the flavor. Color changes occur during the second phase of the browning process. This second phase is also where all of the aroma compounds arise.

Maillard Reaction

When you cook foods in a certain way, they often pick up similar

flavor attributes. That's true even if the basic tastes of the foods are completely different; the flavor comes from the way they are prepared. Cooking on a barbecue, for instance, gives food a certain smoky flavor—whether you're



cooking corn or hamburgers.

Maillard Reaction refers to just such a phenomenon. Maillard Reactions occur when you brown foods, such as toasting bread or grilling steak. The process gets its name from a French chemist who in 1911 defined the reactions between amino acids and sugars when they are heated. When brewer's malt is kilned (this is done by the malthouse before you buy it), this reaction takes place.

The trick for the maltster is to brown each type of malt to the perfect point to bring



mm mm mm mm

out the desired flavors. Think about cooking toast in a toaster oven. It starts out light and becomes progressively darker. If you take the toast out of the oven during the "light" phase, it will have a different flavor than if you remove it when it's well browned.

Also, there's a point at which the toast goes from brown to charred, and it happens quickly. One minute it's toasting along nicely. You turn your back for a few moments, and by the

time you smell the aroma and make it over to the toaster, your toast is black as Guinness!

Since browning begins with different combinations of amino acids and sugars, the process yields many different flavors. In fact, most of the flavors found in malt come from this browning process. They range from slightly toasty and biscuity through toffee and caramel, all the way to roast and burnt. More than 400 browning reaction

products have been identified, though they don't all have unique flavors.

Specialty malts are difficult to make because of the complexity of browning; if the temperature is a little too high or held hot a little too long, then the malt has the wrong color, aroma, and taste. It is tricky to hold something at the edge of burning without actually burning it.

Browning Flavors

Lightly colored malts:

Pale, Munich, Amber, Aromatic

These malts are lightly kilned to preserve enzyme activity. Some of these malts are known as "high kilned" because they are heated to slightly higher temperatures than pale malts. Lightly kilned malts contain products from the early stages of browning that lend biscuity and toasty aromas plus a slight color.

Caramel malts:

Carastan, Caramel, Crystal

Caramel malts are made using a "saccharification rest" after germination and prior to kilning. The moist malt coming out of germination is held near 158° F during the saccharification rest, allowing for mashing to occur in each individual malt kernel. This yields many sugars that can react in the browning process.

The result is an increase in the variety of flavors produced during kilning. Typical aromas are caramel, burnt sugar, rock candy, toffee, and slight coffee. Also, crystallization of the simple sugars produced during saccharification lends added complexity to these malts.

Roasted barley or malt:

Roast Barley, Black Patent, Chocolate

Roasted malts are made by heating the grain at high temperatures for long periods. This is very similar to the roasting of coffee beans. Roasting creates compounds at the far end of browning that lend very dark colors; burnt aromas; bitter, burnt, and acidic tastes; and even acrid astringency. At first glance these don't sound tempting, but they are the key malt attributes found in stouts, porters, and other dark beers.

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Dimethyl Sulfide

Beside browning, malt flavor can arise from two other compounds: dimethyl sulfide, commonly referred to as DMS, and tannins.

Dimethyl sulfide is a volatile oil. In a relatively low concentration, below 100 parts per billion, it contributes a desirable aroma and taste to lager beer. Above this concentration it becomes offensive, and terms such as "cooked corn," "tomato ketchup," and "parsnip-like" are used to describe its aroma.

The consensus in the brewing science literature is that all the DMS in beer arises from a precursor in malt produced during germination and the early, low-temperature part of kilning. This precursor, S-methyl methionine (SMM), is directly converted to DMS when it is heated during kilning. Since DMS is volatile, it becomes a gas and is driven off during kilning. If sufficient heat is added, the DMS will convert even further to a non-volatile compound called dimethyl sulfoxide (DMSO).

The level of SMM in malt can vary due to environment factors and the va-

rietal of barley used. Six-row varieties tend to have higher SMM than two-row varieties. Lots of nitrogen in the soil increases levels of SMM, and high germination temperature increases it as well.

Production of DMS does not occur only at the malt house; much of the precursor is converted to DMS in the brewhouse. The high temperatures of mashing, lautering, and especially boiling all can convert SMM into volatile DMS.

Boiling drives off most of the DMS. However, there are two ways in which DMS can arrive in the fermenter. The first is by formation in the fermenter: a portion of the DMS turns into DMSO during the boil, which is not volatile like DMS (it doesn't become a gas and disappear into the atmosphere), and so it is carried into the fermenter. There, yeast will convert it back to DMS.

The second way is by being carried directly into the fermenter. If the wort is held hot for an extended period of time after the boil, DMS production will continue due to the heat, but it

will not be driven out of solution as rapidly as during the boil. Therefore, it gradually builds up in the wort. This is especially true if the hot wort is in a closed container. During fermentation, carbon dioxide production will carry away a good portion of the DMS.

As a homebrewer, you can't control the amount of the precursor SMM in malt. However, you can choose malts that will yield varying levels of DMS in beer. You can also manipulate the wort boil to alter beer DMS levels.

In general, very pale malts have a greater chance of yielding high-DMS beers than higher kilned malts. The classic comparison is between lager malt and ale malt. Since ale malts are kilned at higher temperatures than lager malts, they produce beers with less DMS than lager malts. Regarding the boil, experimenting with the length of the boil and the degree of evaporation, as well as the length of time the wort is held hot during trub settling (wort clarification) will allow a degree of manipulation of the DMS levels in the final product.

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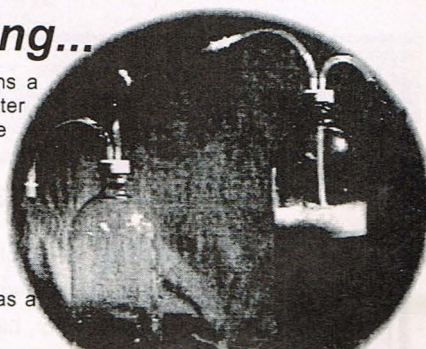
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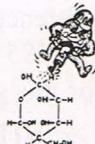
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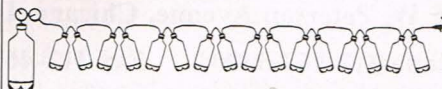
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Tannins

Tannin is a general term historically used for the dark, astringent extract of vegetable matter used in the tanning process. Maltsters and brewers refer to certain materials of the malt husk as tannins. The major flavor contribution from tannins is astringency. When extracted in very hot water, husk tannins can lend astringency to beer. The same extraction process occurs when you steep tea leaves in hot water.

Typically, astringency is not a problem as long as sparge water temperatures are not excessive. Most brewers prefer sparge water between 165° F and 170° F, though some brewers approach 180° F to increase runoff rate. Another potential contribution of tannins is on visual impact; they can cause haze (polyphenol-protein complexes). Since most homebrewers do not filter their beer, this is not a major problem.

Smoked Malt

Smoked malts used in the brewing of beer use woods such as beech, apple, alder, and ash to fire the kiln. The smoked malts are not kilned to the point where the kernels themselves begin to smoke; all good smoked malts look hardly distinguishable from Munich malt (until you smell them).

Some brewers also use peat to fire the kiln. Traditionally, peat malt is used in Scotch whiskey. In general, peated malts produce very assertive flavors in beer; the medicinal flavors they contribute are too strong for many beer drinkers, even in small additions.

The smoked malts made using beechwood or the like can make fine beers, even when the grist bill is 100 percent smoked malt. However, with any such malt care must be taken to balance the smoked flavor so that the beer does not taste as if you just swallowed a pint of liquid smoke.

The best way to learn about malt flavors and their effect on your beer is to experiment and observe carefully. If you have an adventurous spirit you will build, over time, a familiarity with specialty malts that can only make tasting and discussing beer more enjoyable. This familiarity with the various malts is a powerful tool in unlocking creativity in the brewing process.

Homebrewers Who Turned Pro

by Christian McIntosh

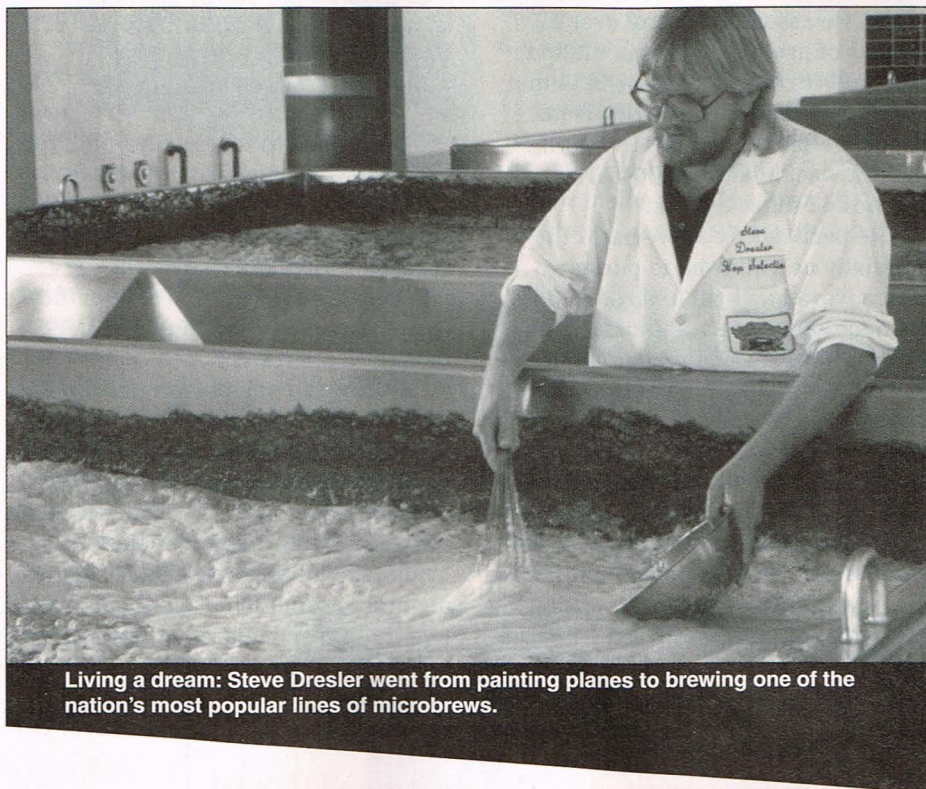
A new brewery opens its doors, on average, once a week in the US. That's at least one opportunity a week for a homebrewer to land the job of a lifetime. Today there's actually a shortage of qualified brewers. These are the stories of four homebrewers who made the leap to successful professional careers.

Steve Dresler, Brewmaster Sierra Nevada Brewing Co.

A few months ago Steve Dresler bought some Crystal hops, a type that he had never used before. He liked it and wanted to make something from it, but he wasn't sure what.

So he concocted and brewed several different recipes. He finally settled on an unfiltered crystal wheat beer, which was served this past summer at

"Most of us who have been here for any real length of time started as homebrewers, and those people's passions for beer...as an art form are as great as they've ever been."



Living a dream: Steve Dresler went from painting planes to brewing one of the nation's most popular lines of microbrews.

a brewpub owned by Sierra Nevada, the company where Dresler has been chief brewmaster for the last 10 years.

"I'm in a nice position here where not only am I responsible for what I feel is one of the best product lines in the country, but I can do some very creative in-house batches of beer," he says.

He freely admits that he enjoys the best of both worlds: He has much of the freedom and creativity that make homebrewing fun, while he also earns a generous salary for overseeing the beer product line. He can showcase many of his more innovative endeavors at the brewery's local pub. He can do 50- or 60-barrel batches periodically and distribute locally. If a particular brew becomes extremely popular in Chico, Dresler and the Sierra brain-trust might introduce it nationally.

When Dresler graduated from college with a double major in biology and

chemistry, he went to work painting airplanes at the local airport in Chico, California. He also started homebrewing out of sheer financial need.

"I didn't really care for any of the beers that I could afford to purchase at the time," he says.

The painting job didn't last long, so he found a job based on his homebrewing background. He landed a retail position at Ken Grossman's Homebrew Shop, a store that Grossman actually no longer owned. He had sold it to help launch Sierra Nevada Brewery.

"I was selling homebrew products and still making my own beer at home when I heard through the grapevine that Sierra Nevada was looking for some part-time help on the bottling lines," explains Dresler.

Once he got his foot in the door, he began performing as many tasks as possible: bottling, warehousing, janitor-

ial work, building boxes and dividers by hand—anything to get more hours at the brewery. Sierra Nevada soon began to expand, adding a couple of cellar and fermentation shifts, and Dresler used his microbiology background to win shifts in the lab and do actual brewing.

Roughly 10 years ago Dresler ascended to the top of Sierra's brewing ranks. He assumed control over all aspects of production, fermentation, and quality control. "I've been in that position as the brewery grew from doing five-barrel batches five or six times a week to doing 100-barrel batches 42 times a week."

He particularly appreciates the creativity he's allowed to pursue at Sierra Nevada. "I get to do some fun formulations," he says. In addition he has access to excellent equipment at the brewery. The only negative, he notes, is that managing a large staff is often burdensome.

Dresler says his passion for brewing is even stronger since joining Sierra Nevada's commercial ranks in the early '80s. "I'm more in love with brewing now than I was when I was doing it to supply my own beer habit," he says. "Most of us who have been here for any length of time started as homebrewers and those people's passions for beer as

an entity, as a product, and as an art form are as great as they've ever been.

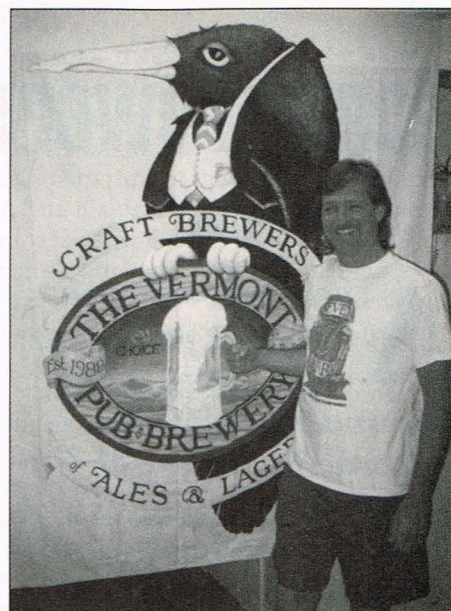
"It's worth a lot of money to get up in the morning and look forward to going to work, and it's also a great thing when you get done with your day to sit down and have a beer."

Greg Noonan, Brewmaster Vermont Pub & Brewery The Seven Barrel Brewery

Greg Noonan, like many of his veteran brewing counterparts, doesn't have a single unit of formal brewing education under his belt. Raised in rural New England, Noonan is the founder and brewmaster of both the Seven Barrel Brewery and The Vermont Pub & Brewery.

He began homebrewing during the early '70s while living in New Hampshire. Noonan gained most of his technical experience by associating with regional homebrewers. "There was not a wealth of information about the availability of services related to brewing and information itself about brewing—nothing compared to what is out there today," he says.

As the '70s wore on, he became more and more serious about brewing



beer. Through his research at the local library, he learned about all-grain brewing. A homebrew shop finally opened in western New England, and Noonan immediately made the pilgrimage to buy supplies and raw materials. "I went to buy grain and hops and such, and the proprietor asked if I knew what I was doing. He said, 'Let me show you malt extract. This is how you should do it.'"

Noonan didn't care for the shop-

11 Tips to Land a Pro Job

1. Establish a balance between creative brewing and consistent batching.

2. "Keep in mind that beer is a food and that cleanliness is godliness."

3. Learn your craft inside and out. Try to pick up a little experience in microbiological fields, pick up some chemistry, and try to get a few classes in fermentation science.

4. Make yourself available and build on-the-job experience. "Try to do some internships, perhaps in a brewery. Some small pubs will try and pick up volunteer labor."

— Steve Dresler, Sierra Nevada Brewing Co.

5. Start small. "Brew homebrew quantity, promote yourself, and build your business the hard way. There are drawbacks

to securing outside money by way of investors, primarily a lack of control."

6. Enter your work in homebrew competitions. "Homebrewers who want to brew on a commercial level are best advised to learn many different beer styles as homebrewers and enter them into competitions."

7. Read books. "Learn *Malting and Brewing Science* cover to cover. George Fix's *Brewing Science* is a good book covering the major biochemical reactions in brewing. Michael Lewis just published *Brewing*, an excellent new textbook."

— Greg Noonan, Vermont Pub & Brewery

8. Write a resume that is brewing specific. Even if you only have experience as homebrewer, write that down. Include competitions entered, awards won, even if you've given a speech to your local home-

brew club. Consider your homebrewing history as professional experience.

9. Make yourself known. Hit the breweries you want to work for, get to know the brewers, become a familiar face. "Have a beer with them on your time off, but don't be a lush. They'll wonder if you only want to work there because you want free beer."

10. Ask the opinions of those inside the industry. Even if a brewery isn't hiring at the moment, ask the brewers for advice and encourage them to pass on your resume when they hear of something.

— Teri Fahrendorf, Steelhead Brewery & Cafe

11. Secure references from within the industry whenever possible. If prospective brewers have objective verification of your ability, you'll have an advantage.

— Bill Cherry, Boulevard Brewery

keeper's malt-extract advice. He bought 10 pounds of grain, which cost roughly \$12 at the time, and returned home determined to brew an all-grain beer. "It was pretty expensive brew, and it all went down the drain. I didn't have clue what I was doing."

Fortunately for Noonan, Dave Line published his seminal homebrew guide, the *Big Book Of Brewing*, shortly thereafter. (The few other books on brewing science that were available at the time focused on extract brewing, not grain brewing.) Noonan began brewing all-grain beer around the clock while visiting New England breweries during his spare time. He became consumed with the idea of operating an independent brewery and sustaining a living by making beer.

He also wanted to lend a helping hand to other prospective all-grain brewers. He compiled allgrain brewing information that was not readily available, and in 1985 he published *Brewing Lager Beer*, essentially a companion piece to Line's book, which dealt with ales.

Homebrewing still wasn't paying the bills, however. Professionally, Noonan had a background in restaurant management, but he was working as a manager for a manufacturing company. Together, he says, the fields provided him with the entrepreneurial experience to open his own brewery.

To this day Noonan remains a religious all-grain brewer. He's only brewed with extracts twice, and in each instance he used them as adjuncts mixed with grain brews. "I just got into grain brewing from the start and never saw a reason to go back, although I was envious of other homebrewers who were using extracts," he says. "They were done with three-hour brews where I'd be eight or nine hours every time I brewed."

When asked to compare homebrewing to commercial brewing, Noonan likes to quote homebrew author Dave Miller: "I had this perfectly great hobby, and I went and ruined it by making a job out of it." Noonan feels there is a lot of truth to Miller's statement but, on the other hand, he

appreciates the levels of control commercial brewing environments afford.

"We've got controls for everything; temperature controls, timer controls, microscopes to count the yeast we've pitched. It's not like you hit a warm spell in your house and the cellar goes up 10 degrees. You don't get called away in the middle of a kettle boil because one of the kids has fallen off the swing."

Noonan has access to more controls without the burden of an increased workload. "It kind of seems silly that brewing seven to 14 barrels of beer isn't a lot more work than brewing a homebrew, but it isn't."

Teri Fahrendorf, Brewmaster Steelhead Brewery & Cafe

As the brewmaster at a successful brewpub, Teri Fahrendorf says she makes a decent living brewing beer without compromising the creative process. "At our brewpub, we always

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have at least one specialty beer that changes weekly, three standard beers, and then a dark beer that changes about every three weeks," she says.

Fahrendorf traces her brewing roots to early childhood, when she started making bread at age 10. "It involves using yeast. To me the connection is quite apparent." During her sophomore year in college, a classmate in Fahrendorf's speech class gave a talk on homemade wine. Fahrendorf started experimenting with jug wine soon thereafter.

In 1984, when she moved to California, she no longer saw a need to make wine. "There's just no practical reason to make homemade wine in California. You can get really good stuff cheap," she says. The next logical step was homebrewing. She homebrewed extract beers for three years, and ultimately wound up at a homebrewer's conference in Denver where she met John Myers and Don Outerson. They told Fahrendorf about the brewing classes they had taken at Siebel, and she was intrigued by the idea.

Then at the Great American Beer Festival she met Melly Pullman from Wasatch Ales in Park City, who won a few medals. "I thought, 'Wow, if she can do the physical work, I can do the physical work. She's about my size,'" Fahrendorf recalls. Upon her return from these two events, Fahrendorf was committed to pursuing a career in professional brewing.

After completing the 11-week diploma course at Siebel Institute, she landed an unpaid three-week position with Stevens River North Brewpub in Chicago. Next, with a degree and some experience, she went to look for work in Portland, Oregon, dropping off resumes and encouraging brewers to pass them on.

Within a month's time, she was working for the second incarnation of the Golden Gate Brewing Co. Two months into her stay, however, the brewery went out of business for the second time. Fahrendorf pressed on, working as the head brewer for Triple Rock brewpub in Berkeley, California. She had found the perfect job, she says,



with one exception: It wasn't in Oregon.

Just over a year into her tenure with Triple Rock, she finally matched the ideal location with her dream job. The owner of Steelhead presented her with an opportunity to start a brewpub in Eugene. "They needed an experienced person, I wanted to move to Oregon. Boom, we made a deal.

"In hindsight people say 'Of course that was going to be successful.' But

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they weren't looking at an empty building with a concrete floor imagining what it could be," says Fahrendorf. "All I knew for certain at the time was that I was leaving all my friends and a fantastic job for an unknown."

Golden Gate's failure weighed heavily on Fahrendorf and her decision to move to Steelhead. "I didn't want to go through that again...I weighed the risks, and I felt that Steelhead would make it. Fortunately I was right, but it was never a sure bet."

Steelhead has plans to expand in California, building new brewpubs in Redwood City and Irvine. Fahrendorf is responsible for hiring and training the new brewers. While she is Steelhead's top brewer, everyone at the pub takes part in all brewing decisions. This sense of collective creativity appeals to Fahrendorf, who prefers working in a brewpub as opposed to what she calls the "beer factory" environment of a microbrewery.

Fahrendorf couldn't have scripted a more ideal career for herself. "I ne-

ver allowed myself to even dream about becoming a professional brewer. For one, I didn't think anyone would hire me because I'm a woman and I'm small; and two, I thought if I did do it I wouldn't make any money. Financially and physically I didn't think I'd ever have that chance, so I never let myself dream it."

Bill Cherry, Brewmaster Boulevard Brewery

While Teri Fahrendorf swears by her loose brewpub workstyle, Bill Cherry travels brewing's scientific path. The head brewer for Boulevard Brewery in Kansas City, Cherry has a bachelors degree in microbiology and a natural interest in the scientific processes of making beer.

"Beer is probably one of the most fascinating of the fermentation processes because of the two-fold interest: you are both encouraging

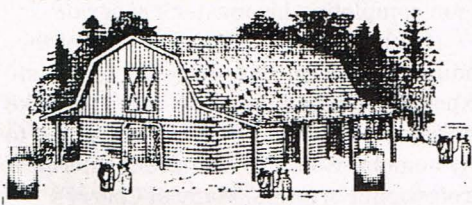
microbial growth with your yeast, and you are discouraging microbial growth of bacteria."

When a close friend observed that he could probably make a living brewing beer at the nearby Anheuser-Busch plant, Cherry had an awakening. "The light kind of dinged in my head. I said, 'Life making beer, this is it.'"

Cherry graduated from college in 1986 and at the time, there were no small breweries in the Midwest. The only other option was the big breweries, and Cherry couldn't get his foot in the door. Instead of giving up, he put his dream of brewing professionally on the back burner and started working for Oscar Meyer during the interim. It was during that time Cherry honed his homebrewing skills.

"I never actually bought a kit," he admits. "I pieced stuff together. I preferred to do it that way because I had my own ideas of what I wanted to do." Cherry started by adding a couple cans of sugar to a can of malt syrup and "then just letting it go. I made a real

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basic, boring beer. But I was excited."

Limited by his space and equipment, he never had a large enough facility for all-grain brewing. He began brewing his beers with an extract base and augmenting them with specialty malts to make different varieties.

During his homebrew evolution, something surprising happened: Cherry began advancing in the meat industry with Oscar Meyer. He hadn't expected any promotions, which explains his reaction to management's request that he go back to school. "I figured if I'm going to go back to college, I'm not going to learn how to make better ham or better bologna, I'm going to learn how to make beer."

Cherry held true to his word, and he wound up studying brewing science at the University of California, Davis. While at Davis, he stopped one kind of homebrewing in favor of another. "Of course, the lab brewing really was homebrewing. Even though we were doing experiments, they were essentially better homebrewing experiments; we had better equipment and better control, but we were still making five-gallon batches of everything we did."

While at Davis he completed a 12-week student internship with Anheuser-Busch, then went directly to Boulevard Brewing upon completing his master's program.

Homebrewers head Cherry's list of the industry's cutting edge. They are the most experimental, and they tend to never make the same beer twice, he says. That is not to say homebrewers are technically inferior to professional brewers. Many of Cherry's friends have homebrew systems that are every bit as sophisticated: "Custom, tiled rooms off the garage that the spouse is not allowed to enter. These guys are doing incredible things that are pretty fascinating."

After homebrewing the next step into the business is brewpubs, which have relatively small production and usually a few tap handles they can experiment with, according to Cherry. Seasonals and specialty brews provide the pubs with an expanded creative license. "They always have something in the pot," he says.

"And then you get to Boulevard, which is going to do over 20,000 barrels of beer this year and, strictly through distribution, I've got to worry about how many different products we can put on a shelf. In that way, I become restricted. We've got a set amount of products that we're trying to perfect and improve just a little bit every time. As a scientist, I love that."

He Learned to Milk the Equipment

by Steve Johnson

No two breweries are alike, and at every one you visit, the brewer will have his or her own story to tell. So listen carefully—the messages come from practical, hands-on experience. You can take courses, you can study books, but the lesson learned best is the one learned from the school of life.

John McDermott, partner and brewmaster at the Highland Brewing Co., has the kind of experience you can't get from a textbook. McDermott worked at several breweries before he and partner Oscar Wong started their own in Asheville, North Carolina. Everything he learned before pales in comparison to the knowledge he gained from building his own brewery from used dairy equipment. McDermott is now sharing his valuable knowledge through a brewery consulting service.

The long journey toward owning and operating his own brewery began modestly in southern California in the 1980s. There, he brewed his first batch of beer from a homebrew kit. After that, he was hooked.

Next came a trip to the San Francisco Bay Area, where he discovered Triple Rock Brewing in Berkeley. McDermott, like so many other homebrewers, said, "Hey, I can do this." He began to research commercial brewing and decided the first thing he needed was practical experience.

So he pulled up stakes and headed to Vermont, where he worked for six months at Catamount Brewing. His plan was to start a brewpub in Boston. While looking for investors and a location, McDermott spent much time reading books and taking courses on starting a small business.

When he couldn't pull the Boston project together, McDermott moved to Baton Rouge, Louisiana, where he became the assistant brewer at the Mill, part of a chain of brewpubs. From there he headed to Charlotte,

North Carolina, working as brewmaster at the Mill location there. He also brewed at a nearby brewpub, Dillworth Brewing Co.

While working in Charlotte, McDermott continued to explore the possibilities of opening his own brewery. Because his budget was very tight, he looked into purchasing second-hand equipment.

That's when he found an ad for used dairy equipment in a state agricultural periodical. On the positive side, the equipment was very inexpensive; on the negative, it would have to be re-engineered. With a background in mechanical engineering, McDermott thought he could modify the equipment to his own purposes. Truth was, he admits, it was just too expensive to pass up.

At the same time a friendship formed between McDermott and Wong, a civil engineer who enjoyed craft beers and was looking for a good business investment. The pair decided to join forces and start their own brewery. Thus, the Highland Brewing

Co. was born.

At that time Charlotte already had two brewpubs and one microbrewery (it now has three brewpubs and two microbreweries). The pair decided Asheville would be a better market.

Asheville is located in the western end of the state, in the Appalachian Mountains. It is a prosperous city, attracting many tourists during the summer, and it had no breweries at the time. One advantage they discovered later was that the tap water in Asheville was 10 to 20 degrees colder than in Charlotte, depending on the season. This meant it would take less electrical power to chill their water. Little things like this can make a difference.

They found a location in the basement of an old building in downtown Asheville. The rent was low, but the basement, with stone walls, needed extensive refurbishing and refitting. Also, re-engineering the dairy equipment proved to be a task that required a lot of ingenuity and patience. Every day seemed to bring a new crop of



Partners in Brewing John McDermott and Oscar Wong found a niche in the Appalachian Mountains, where the water is naturally chilled.

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unpleasant surprises and problems.

The mash tun was made from a 35-barrel Sealtest pasteurizer for ice cream. In a unique design change not only did they make a false bottom, but the screen extends part way up the side to allow for horizontal run-off.

A base of six-row pale malt was originally used, but they have since switched to two-row in order to reduce the height of the mash bed. McDermott says he uses a multiple-step infusion mash, and it works very efficiently. He can mash in 1,800 pounds of grain in 15 minutes.

The brew kettle is roughly the same size as the mash tun but is relatively shallow. Large pipes run horizontally through the kettle. During the brew, the pipes are filled with superheated gasses to heat the wort.

The fermenters are made from dairy tanks with a 2,000-gallon capacity—approximately twice the size of the brewhouse. On brew day, two batches are made to fill up a fermenter. For the first brew, the fermenter doubles as a hot liquor tank. Until recently, the beer has

been cold-conditioned for clarity rather than filtered. Now that demand has picked up, tankage is at a premium. Instead of purchasing more tanks, they decided to begin filtering the beer. They had two reasons for filtering: A filter is cheaper than another tank, and Southerners like their beer clear.

Looking back, McDermott says they did things the hard way in order to save money. "When you put it all together, we didn't save that much; there were costs we never anticipated," he says.

He found an ad for used dairy equipment...truth was, he admits, it was just too inexpensive to pass up.

By December 1994 Wong and McDermott released their first beer, Celtic Ale. The well-received effort is an American amber style, with plenty of hop bitterness. They have since released an Oatmeal Porter—a chewy, almost black beer with a very tasty, bitter-sweet palate. Because of the great expense of acquiring a bottling line, Wong and McDermott opted to package their beer in kegs, even though the American beer market, and especially the South, is bottle oriented. They released their first 22-oz. (hand-bottled) bottles this summer.

Highland Brewing is producing two very good beers, and they now have a system that functions very well. McDermott and Wong look forward to a bright future for their brewery in the mountains of North Carolina. ■

Steve Johnson, a resident of Clemson, South Carolina, is author of two brewery guidebooks: On Tap: a Field Guide to North American Brewpubs and Craft Breweries, and On Tap New England.

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Kegging With Old Faithful

by Sal Emma

For some months I had toyed with the idea of building a keg system. It's not that I hate bottling. In fact, I kind of like bottling. Bottling gives me a chance to spend an hour doing a completely mindless task, shutting off the world for a while.

I guess it was more of a Flash Gordon instinct for gadgetry that inspired me to keg. The idea of dealing with high-pressure gas, cool regulators, gauges, tubes, and plumbing fittings is attractive to the average suburban male. I don't spend much time puttering around the yard or installing turbochargers on my Briggs and Stratton lawnmower engine. I guess I needed some technical whizbang in my life.

I was putting it off, mainly because I am a cheapskate and could not stomach the idea of shelling out \$150 or \$200 for keg parts.

Then I remembered the old soda fountain.

For pin money, my brother and I ran a fast-food business when I was in college. After a few years, we gave it up to pursue "real" jobs. We gave the business to our dad, who runs it to supplement his pension.

A post-mix soda fountain was part of the package. But Dad had no interest in dealing with it, so it had been sitting in my brother's basement since Dad took over the business. I retrieved the machine, which we sold for scrap value, and I salvaged the regulator and gas lines.

A call to my local soda distributor completed the package. I bought some used soda tanks and new o-rings for cheap and set up a lease on a CO₂ cylinder. I bought the beer lines and taps from my homebrew store.

I appropriated the spare fridge in the laundry room. "It's full of your beer anyway. You might as well put your kegs in there," my wife said at the time. I brewed a batch of Special Bitter and counted the days to kegging.

I read and reread Papazian's and Miller's step-by-step, checked the carbonation chart, asked a bunch of dumb questions to anyone who would listen. I was set.

Two weeks later, I racked to the sanitized keg from the secondary fermenter and put it in the fridge to chill. The next evening I checked the temperature and rechecked the carbonation chart. My target pressure was 16 psi.

I connected the gas and turned the valve. The pressure went to the moon with the tiniest clockwise turn of the regulator screw. I panicked. "Turn the pressure down," I thought. So I started cranking the regulator screw counter-clockwise.

I was turning, but the pressure was not dropping. Suddenly the screw popped out of the regulator housing, followed immediately by a stream of cold, flat beer. It shot across the laundry room, dousing the dirty laundry on the floor.

I turned off the gas and disconnected the fitting, which popped loose in a cloud of aerosol beer. I was wet, laughing out loud, and standing in a puddle of English ale.

Wheels turned in my feeble brain. "Well, that was not exactly the way Miller said it would go. Maybe I should try another approach," I thought.

I replaced the regulator screw, reconnected the fitting, and turned on the gas. The CO₂ pushed the beer out of the line and into the tank. But the pressure went even higher. "It's gonna blow," I thought in a panic. So I turned off the gas at the tank valve. Now the beer was flowing up the gas line again. Before I could say "help!" it started squirting from the pressure relief hole in the regulator housing. The pressure was higher, and the stream made greater distance. This time beer reached the washing machine.

It was sort of like an episode of the

Three Stooges.

I disconnected the gas and scratched my beer-soaked head. "You moron," I thought. "Of course the beer came up the gas line. You pressurized the keg to 50 psi. When you shut off the gas, the beer had to go somewhere as the pressure equalized. And there's not enough head space in the keg!"

I had to start from scratch, zero pressure. I tapped some beer to make more room for CO₂ and to drop the level below the gas-in tube. I made another beer cloud, this time by pushing on the keg's gas valve with a screwdriver. Now keg pressure was back to zero.

I backed the regulator screw out as much as possible without it falling out, turned on the gas, *then* connected the fitting.

I tuned the screw slowly. The pressure climbed to 16 psi. It was stable. I disconnected the gas fitting, *then* turned off the tank valve. No beer counterflow. Using soap solution, I checked the keg for gas leaks. No bubbles, no troubles.

Time to clean up. I loaded the washing machine, mopped the floor, rinsed the keg, and sanitized the gas line.

I had to act fast to save the regulator. I disassembled it, cleaned it, reassembled it, and put it on top of the warm oven to dry. Then I washed myself.

Armed with new knowledge of pressure dynamics, I made a second attempt to carbonate the following evening. It went without a hitch. The regulator survived the ordeal.

It was worth it. Keg beer really is better than bottle beer. No sediment, amazing creamy head, great head.

Try it. But buy yourself a check-valve to keep the beer out of your regulator.

And plan your first keg session for a day your significant other is out of town! ■

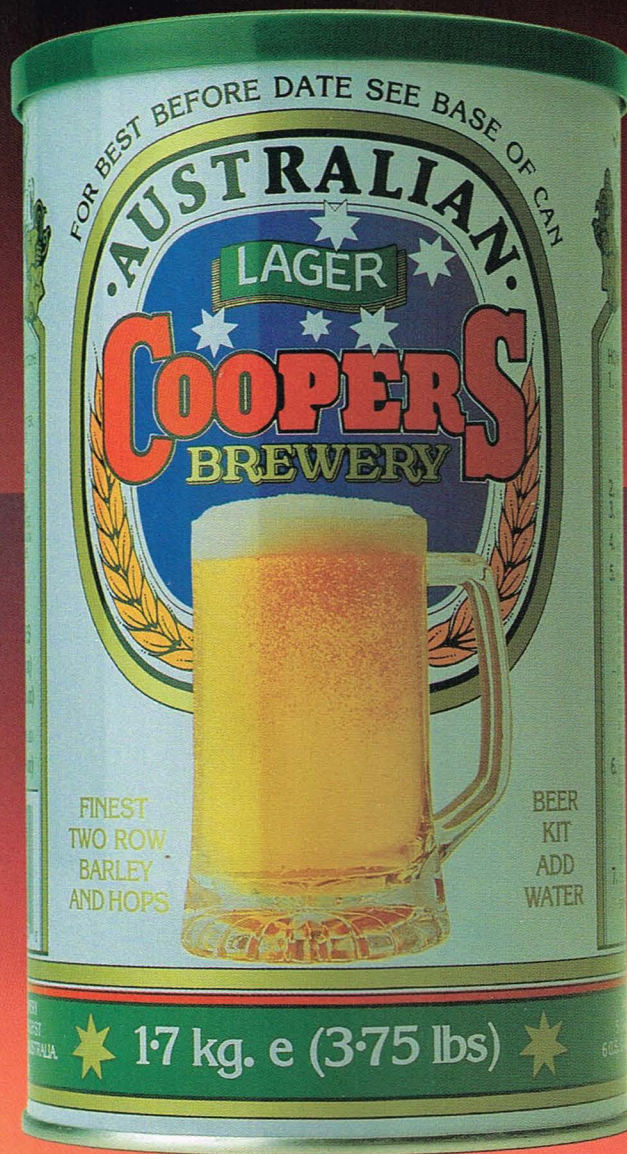
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