Brew Your Own™

February 1996, Vol.2, No.2
Niche Publications Inc.

THE HOW-TO HOMEBREW BEER MAGAZINE

BREW REAL STEAM BEER!

George Washington's Homebrew Recipe

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CIRCLE 71 ON READER SERVICE CARD

Microbrewers should have nothing to hide from their customers.

That's why I believe all microbrewers should put a clear, easy-to-read freshness date in a prominent place on their labels. The Institute for Brewing Studies, a non-profit organization, also supports the education of the brewing community on consumer legible freshness dating.



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

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

Boston Beer Company, Atlanta Brewing, Broadway Brewing, Brooklyn Brewing, Bohannon Brewing, Casco Bay Brewing, Catamount Brewing, Chicago Brewing, Crested Butte Brewery, Frederick Brewing, Lowell Brewing, New Belgium Brewing, New England Brewing, Old Dominion Brewing, Old Marlboro Brewing, Otter Creek Brewing, Pavichevich Brewing, Potomac River Brewing, Redhook Brewing, Spring Street Brewing, Sudwerk Privatbrauerei Hubsch, Summit Brewing, Wynkoop Brewing.

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

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

I believe all microbreweries should join the Boston Beer Company and the other microbreweries listed here in insisting on freshness dating.

Anything less would be incomprehensible.

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James Koch

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Meet the Smiths.



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CIRCLE 44 ON READER SERVICE CARD

Contents

FEATURES

27 **Convert Your All-Grain Recipe to Extract** *Ashton Lewis*
Or go from extract to all-grain. Find a substitute for elusive hops or yeast. The do's and don'ts of recipe conversion.

30 **What Makes a Style** *Jeff Frane*
Style definitions affect what we drink and brew. But who decides whether your brew's a heavy porter or a light stout? And does it matter?

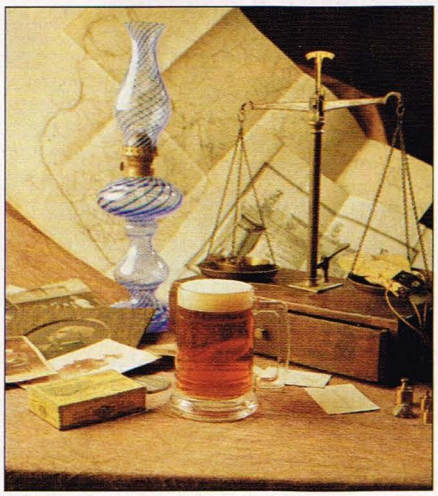
36 **Revolutionary Brewing** *Sal Emma*
George Washington's homebrew recipe, easy brew additions for the farmer's wife, and more.

42 **Steam Beer** *Martin Lodahl*
California's gold rush left an amber legacy that you can brew and enjoy.

51 **Keg Cleaning Made Easy** *Tom Fuller*
Build this simple user-friendly quick-connect system for less than $50.

57 **Calling Dr. Science** *Keith Wayne*
Go behind the scenes to peek in the microscopes and test the scientific tools of commercial brewers.

63 **A is for Amylase**
The first installment of our brewer's dictionary, *adjunct* through *crystal malt*.



p. 42

DEPARTMENTS

4 **Editor's Note**
Romance tips for Valentine's Day.

6 **Pot Shots**
Brewers with badges, having a real blast.

10 **Mail**
More on calculating color.

72 **Last Call**
Contrary to popular belief, women do brew!

64 **Homebrew Directory**

71 **Classifieds**

71 **Advertiser Index**

COLUMNS

9 **Recipe Exchange**
Can you brew a cookie? Check out this delicious, off-beat recipe.

12 **Help Me, Mr. Wizard**
The Kingpin of Kegging gives the straight dope on the hemp/hops connection and more.

19 **Tips From the Pros**
Give your beer a sense of smell with a lesson in aroma therapy.

23 **Style of the Month**
The troops go marching in with India pale ale.

67 **Microbreweries You've Never Heard Of**
Try a taste of Hair of the Dog.

A Special Anniversary

Among the many highlights of my wedding — and yes, I'm wording this carefully — was the wedding cake. It wasn't one of those three-feet-tall things with the pillars and flower petals and a statuette of a waltzing Barbie and Ken on top. It wasn't one of those "classics" that look like Southern architecture and taste like a blend of whipped cream and powdered sugar.

It was a simple cake with three layers, each succeedingly smaller, placed atop one another without the support of Doric columns. It looked rather ordinary (can I say that?), but the way it tasted! It was a wonderful chocolate cake with a delicate buttercream frosting. A perfect blend of sweetness and bitterness. Everybody raved about it. It was truly the best cake I've ever tasted.

And we observed the custom of saving the top layer and freezing it until our first anniversary. So we sampled this delicacy again a year later, and it was still great. It was one of the things (careful here) that made our first anniversary special.

A few years later my wife and I were reviewing the many, many highlights of our wedding when we came to the cake.

"Delicious," my wife noted.

"Great," I said.

That's when, being Mr. Romantic at heart, I came up with an idea. Let's brew a beer that tastes like our wedding cake, I suggested. We'll brew it together on Valentine's Day, then open it on our anniversary in June. That way we could enjoy a taste of our wedding, albeit in a somewhat altered form, just as we did on that first anniversary.

Of course, any normal person would have attempted to duplicate the cake by baking. Perhaps it says something about the strange affliction of being a homebrewer, but I admit we never considered that option.

We started by consulting every cookbook we owned for suggestions on cake spices. We made a list: cocoa, cinnamon, nutmeg, cloves, and a few other things.

Then we visited the homebrew store. We told them what we wanted — sweet, full, but not too heavy. They suggested a basic ale recipe, then gave us instructions on using spices. We brewed as scheduled, and everything seemed to go off without a hitch. When we bottled several weeks later, we were careful not to taste the beer, but it smelled great.

Finally, when our anniversary rolled around, we went out to dinner, then came home for "dessert." With much anticipation we opened a bottle, poured it out, and toasted our years together. Proud of our joint creativity, we each took a nice, healthy drink. And practically gagged. It tasted horrible.

We poured the remainder out. It was disappointing, even though it made for a memorable anniversary, and Valentine's Day, too. We marked the whole thing down to a failed experiment in culinary science and agreed to seek professional help if we ever tried again.

[A pause: Our publisher, during a recent "tasting" session, claimed no one reads this column. I'll send a free BYO t-shirt to the first 10 people who tell him he's dead wrong! Call (916) 758-4596.]

That's why this month we introduce a new column, Recipe Exchange (page 9). Each month author Scott Russell will present an off-beat recipe. In this issue he focuses on a minty, chocolatey concoction guaranteed to make you smile. Scott, manager of the Seven Barrel Brewery Homebrew Shop in West Lebanon, N.H., and co-author of the *Seven Barrel Brewery Book of Brewing*, is a master at developing recipes. If anyone could brew a wedding cake, he could. So check it out. You might want to start making Valentine's Day plans.

Craig Bystrynski

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Brew Your Own (ISSN 1081-826X) is published monthly for $44.95 per year by Niche Publications, 216 F St., Suite 160, Davis, CA 95616; tel. (916) 758-4596; fax (916) 758-7477. E-mail address: BYO@byo.com. Application to mail at second class rates is pending at Davis, CA and additional mailing offices. POSTMASTER: Send address changes to ***Brew Your Own***, P.O. Box 1504, Martinez, CA 94553-9932. Customer Service: For subscription orders call 1-800-900-7594. For subscription inquiries or address changes, write ***Brew Your Own***, P.O. Box 1504, Martinez, CA 94553-9932. Tel (510) 372-6002. Fax (510) 372-8582. Foreign and Canadian orders must be payable in U.S. dollars plus postage. The subscription rate to Canada and Mexico is $60.95; for all other countries the subscription rate is $80.95.

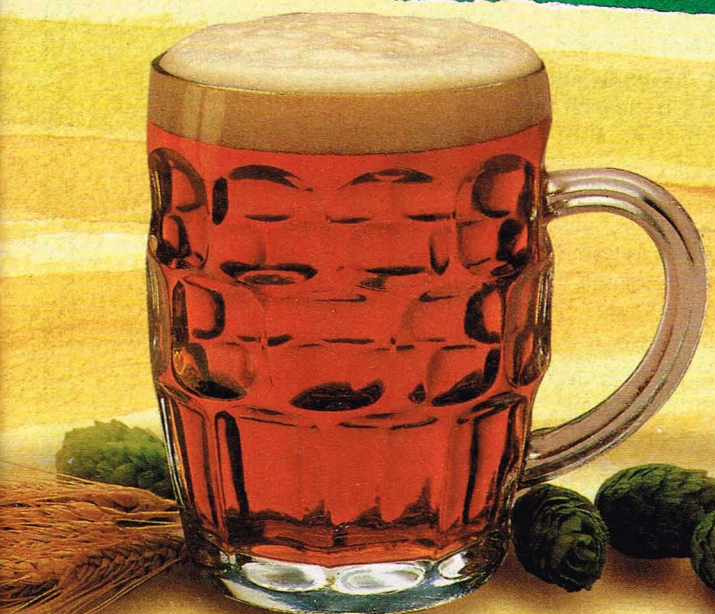
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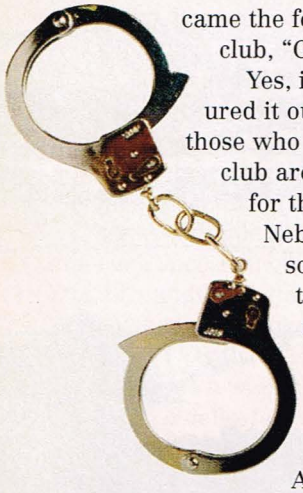
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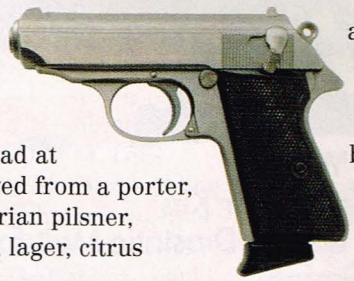
Brian Giles
Lincoln, Nebraska

I began brewing nearly a year ago, after being introduced to excellent homebrewed beer by a co-worker. Word spread quickly among my fellow employees, and soon there were enough homebrewers that we felt a club was necessary. Hence came the founding of our club, "Cops & Hops."

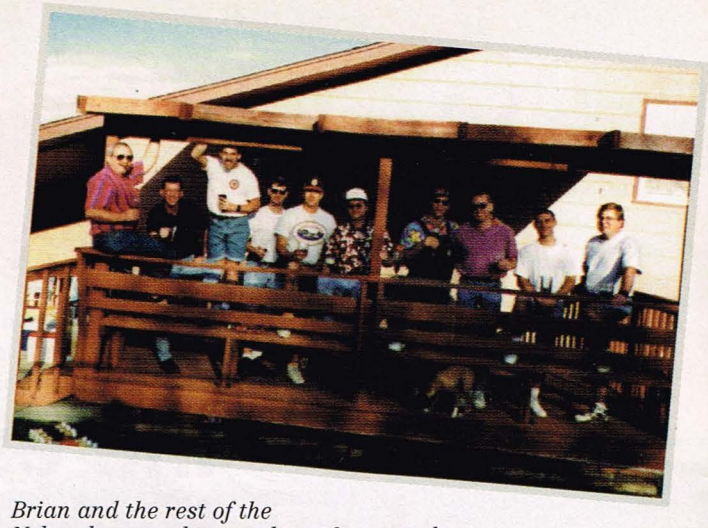


Yes, if you haven't figured it out by now, all those who belong to this club are police officers for the city of Lincoln, Neb. We have gone so far as to register our club name on the Internet, as well as with the American Homebrewers Association.

Several of our members have been brewing for two years or more, and we currently have close to 20 members. We meet every three months, which allows each member plenty of time to handcraft a select new brew for the upcoming meeting. In the picture above, some of our members are celebrating "Oktoberfest" at our October meeting. We gather for great food, great beer, and some general stress relief.



The brews we had at this gala event ranged from a porter, English bitter, Bavarian pilsner, wheat, bock, steam, lager, citrus honey lager, raspberry wheat, two different brown ales, and a stout. As you can tell from the array of fine beers available, we are having no problems spreading the good word about homebrewing and recruiting new members. We have the luxury of having a homebrew supply store here in Lincoln (Kirk's Brew) and the owner is our official advisor and demigod.



Brian and the rest of the Nebraska peacekeepers know how to relax when they're off duty!

Future plans for our club include a monthly newsletter and, with luck, a trip to the Great American Beer Festival in Denver. *Brew Your Own* has been tremendous in providing understandable information for us, as we have all experienced every possible thing that could go wrong when you are homebrewing. Thanks to the article "20 Tips for Easier, Faster, Better Beer" (December BYO), I finally solved my never-ending problem of wort boilover. My wife is thankful for a clean stove!



We prepared well in advance for our Christmas gathering, and there were some truly outstanding seasonal brews. By the way, I brewed up a batch of pumpkin ale following the recipe in the November issue ("In Search of the Great Pumpkin), and it was simply outstanding. After it was such a huge hit at Thanksgiving with my family, I could hardly wait to share it with my fellow "Boys in Blue."

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She Huffed, and She Puffed...

Two weeks ago I was racking my "Mystic Mary's Stand Up Stout." I had a friend helping me. The siphon hose clogged up and all my blowing would not dislodge it. My friend took over and blew. All of a sudden there was a funny booming sound and I was covered with beer. The carboy had blown. It hadn't shattered — it was like the whole side gave way and then returned to the original position. After I got over the shock and then quit laughing, I examined the bottle. There was an upside down U-shaped crack in the side where all the beer had blown out. Everything else was intact. Except my kitchen. I'm still finding little hidden pockets of dried, sticky beer around!

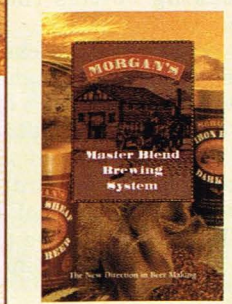
Happily, the stout that we did get was good. It is now known as "Blow-Out Beer."

Mary E. Sybrant
Wayzata, Minn.

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



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

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, spellbound.

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."

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 Dopplebock, both promptly received by simply dialing Liberty Malt's own toll free number, 1-800-990-MALT (6258).

Favorite brewing styles

"Lets 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

Off The Wall Brewing

by Scott Russell

If beer lovers only liked one kind of beer, there would be only one kind. And by extension, if there were only one kind of beer out there, chances are that some commercial brewery would have figured out how to make it perfectly by now.

Of course this is not the case. We love different beers at different times, with different foods, and in different seasons. In fact there are almost as many kinds of beer as there are homebrewers, because homebrewers are known for their creativity and experimentation.

That's what this column is going to be all about. There are many traditional recipes available for the 40-odd accepted styles of beer and all of their substyles. And at times it's wonderful to brew those standard classics, to revive and renew brewing traditions from around the world. But it can be more difficult to find the inspiration for those unusual, oddball, "off-the-wall" brews.



In the coming months you'll see recipes for spiced beers (like Gingersmoke Rauchbier), fruit beers (like Lemon Weizenbier), brews that use unusual grains and other ingredients (like Espresso Stout, Estonian Rye, and Juniper Brown Ale), and more. The recipes will be accompanied by a story or two about their creation, the brewing procedures that make them work, what to eat with them, and where to find the best ingredients.

Chocolate in a Glass

Now, picture if you will, a cookie. Your favorite cookie. (Well, my favorite cookie, anyway.) Chocolate, with a glossy brown coating and a strong minty aroma. That's right, a Girl Scout cookie. Now picture a Girl Scout cookie that comes in a bottle — dark brown with a thick, rich, foamy head. Minty fumes rise from this liquid cookie as you pour it gently into your favorite pint glass. Can you brew this cookie? Absolutely! Here's how to earn your badge in homebrewing...

Send your recipes for Recipe Exchange! We'll send you a stylish Brew Your Own T-shirt for FREE! Mail them to Recipe Exchange, 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.

Choco-mint Brown Ale
(5-gallon, partial-mash recipe)

Ingredients:

- 1 lb. two-row pale malt
- 1/2 lb. crystal malt, 90° to 120° Lovibond
- 1/2 lb. chocolate malt
- 4 lbs. amber dry malt extract (unhopped)
- 1 oz. Mt. Hood hop pellets (4% alpha) for 30 min.
- 1/2 cup ground semi-sweet cocoa powder (not instant hot cocoa mix!)
- 1 to 2 oz. dried fresh peppermint

Step by Step:

Crush pale, crystal, and chocolate malts. Mash in 3 1/2 quarts of water at 150° to 152°F and hold 75 minutes. Raise temperature to 165° F for five minutes. Lauter and sparge with 4 1/2 quarts of water at 170° F. Add enough water to make 2 1/2 gallons to run off in the kettle.

Add extract. Bring to a boil, add hop pellets. Boil 30 minutes. Add cocoa powder and boil 15 minutes more. Turn off heat and steep peppermint in a muslin hop bag for 10 minutes as wort cools.

Remove mint, cool, and top off wort to 5 1/4 gallons with cold preboiled water in fermenter. At 75° F, pitch 10 to 14 grains of a neutral dry ale yeast or a liquid culture (such as Wyeast London Ale 1028.) Follow normal fermentation procedures (four to five days in primary, four to seven more in secondary), prime with 2/3 cup of corn sugar, and bottle. Age two to three weeks and keep relatively cool (50° to 55° F).

Extract Option:

For all-extract brewers: Skip the mashing step and add an additional one pound dark, unhopped dry malt to the kettle. You should still at least steep some (1/2 pound or so) chocolate malt in the brewing water while it is heating to about 170° F.

About Chocolate:

Powders contain less oil than solid chocolate "bars" (such as baking-chocolate squares), so they are preferable. If you like a drier taste, use bitter or unsweetened cocoa in place of semi-sweet.

Can't find fresh mint? Try priming with white Creme de Menthe!

This is best described as a "dessert beer." It is not the one to down on a warm summer day. Serve at cellar temperature to emphasize the chocolate and mint aromas. It is a smooth complement to a fruit and cheese assortment, plain cake, pastry, or ice cream, but don't pair it with nachos or a Basque lamb dish.

Colorful Questions

Dear Brew Your Own,

Help! The December issue had a great article, "A Lighter Shade of Pale," detailing how to determine and plan the color of a brew. As I was reading it I thought about how to apply it, and all was well. Until I tried to set it up in my PC and realized that it was missing a key ingredient!

The article says, "Final color is directly proportional to the color rating of the malts being used and the wort's original gravity." Then the color rating index uses total pounds of grain to normalize (or determine the average), but nothing is said about what constant of proportionality should be used for the original gravity of the batch! The example says to use the formula for a "normal gravity wort (1.040 to 1.060)." This is a wide range. It sounded good when I read it, but when I tried to set it up it didn't work. There was no way to get a good estimate, only a wide range.

Another section of the article seems to normalize it as a five-gallon batch but does not state that this works for all cases.

I would really like to set this up, and I can probably fake it for now by normalizing to a five-gallon batch. Is this correct?

Tim McDonald
Media, Penn.

Since wort gravity affects color, it was stated in the December article that this method should only be used for "normal gravity" worts. However, you are correct that the range given for "normal gravity" is a bit broad. The range of normal gravity worts that the equation applied to should have been limited to 1.040 to 1.048.

Empirical data collected at the University of California, Davis Brewing Lab confirms that this calculation does indeed work for predicting finished beer color with worts in the normal gravity range. If you want to predict the color of higher-gravity worts, the correction factor to use is:
Target wort gravity ÷ 8.

The target gravity must be expressed in degrees Plato. If your target gravity is 1.064 or 16° Plato, the correction factor for gravity would become 16 ÷ 8 or 2, and the color calculated in the December article would by multiplied by the correction factor to account for wort gravity.

The reason this factor normalizes the wort strength to 8° Plato is because that is the approximate wort strength used in a brewing lab when assessing color ratings to malt. Whether the malt is 40° Lovibond crystal malt, 3° Lovibond pale malt, or 450° Lovibond chocolate malt, the colors were taken in 8° Plato wort, give or take a few tenths of a degree.

Dear BYO,

I was just reading "A Lighter Shade of Pale" (December BYO) and I have a question: Is there a similar formula for calculating color that uses malt extracts and whole grain malts? Or a conversion for dry extract weight to whole-grain malt?

B. Sanchez

Color calculations can be used with malt syrups if you know the color of the syrup. If this information is available on the brand of syrup you're using, then you can plug the data into any of the color calculations cited.

Your second question is answered in this month's article "Convert Your All-Grain Recipe to Extract" (page 27).

Mission Accomplished!

Dear BYO,

I bottled about 1.25 gallons tonight with my counterpressure filler, homemade from the plans in *Brew Your Own*. It worked like a charm. (Except when I inadvertently removed the filler before turning off the beer-supply valve.) Thanks so much for the article.

Finding all the parts was harder than anything else. Your assembly instructions were clear and concise. The pictures were worth lots of words. Building it took hardly any time at all. Using it turned out to be much simpler than I anticipated. I did have a slight problem when I connected the system, pressurized at about 10 psi, to a keg of beer being force-carbonated at about 30 psi. Luckily, no beer flowed into my regulator and no damage was done.

Doug Smith
Tuscaloosa, Okla.

A Clear Solution

Dear BYO,

Here's an idea for bottling: Bottle one of your homebrews in a clear bottle and store it in the dark. This way you can see how your beer is doing without opening it up.

Also, use whisky in your airlock. This will keep bacteria from forming.

Ed Tash
New Albany, Ind.

HOW TO REACH

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PO Box 1504
Martinez, CA 94553

Tel: 1-800-900-7594
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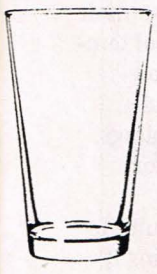
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You Can't Choose Your Family



Mr. Wizard

I've been brewing my own beer for about 10 years. When I started, a friend told me that marijuana and hops are related. This friend also told me that this is why hops add a hallucinogenic quality to beer. The dictionary's definition of hops is: "(1) a rough twining vine, *Humulus lupulus*, of the hemp family, having the female flowers born in small cones covered with bladdery bracts. (2) the dried ripe cones of the female flowers used for flavoring beer, ale, etc. and in medicine."

The dictionary mentions hemp, but I have never read in any beer publication about a connection between hops and marijuana.

Could you clarify this for me?

Donald Nowak
Portage, Mich.

Your friend is correct that hops and marijuana are related. In fact one of marijuana's claims to fame is that it is the only botanical relative to the hop plant (or is it the other way around?). Your friend is wrong on the assertion that hops give beer hallucinogenic properties. The only thing hops do to beer is to make it taste bitter, smell like hops, and resist spoilage from certain microorganisms.

I want to make this point loud and clear in case there are any neo-prohibitionists reading my column who want to spread the word that beer is a psychoactive drug as well as being intoxicating! That is *not true*. I've known many people who, after hearing this story (including the bit on no hallucinogenic properties), have gone right out and rolled up a big fat hop cigarette only to find themselves with a splitting headache and no buzz. This is due to the lack in hops of tetrahydrocannabinol (THC), the hallucinogenic compound found in marijuana.

On the other hand, I've also known of homebrewers who put marijuana in their beer. One memorable beer of this type that I've tasted, called "Cannabinale" by its creator, had a pronounced grapefruit flavor from the marijuana and a pleasant maltiness. The beer had both an alcoholic effect and a hallucinogenic effect that made for an interesting night. Since Cannabinale is illegal, I don't recommend trying to brew this one at home!

Mr. Wizard

I have been brewing for about a year now. I truly enjoy the labor as well as the final product. I ran across a few recipes that caught my eye recently. They all call for lager yeast used at ale (room) temperature. For a novice brewer words like "lightening fermentation" can scare the pants off of you! Can lager yeast be used at room temperature? Would you advise it?

Also, I recently moved to Rhineland, Wis. We have a well that has high concentrations of iron. I don't use it in brewing, but should I be concerned if I use it to rinse after sanitation?

Mark Strehlow
Rhineland, Wis.

Your first question calls for opinion more than hard fact, so I'll give you my opinion. I believe that lager yeast produces the best beers when the fermentation temperature is between 48° F and 55° F and the beer is given a long, cold maturation where flavor maturation, carbonation, and clarification all naturally occur. Those are the methods used in commercial breweries to produce fine lagers around the world.

Like everything else in brewing there are a few exceptions to this blanket statement. The most notable exception is with Anchor Brewing Co.'s famous Steam beer. This beer is made with lager yeast but the fermentation temperature is around 65° F, significantly warmer than the 48° F to 55° F window. At these temperatures lager yeast strains begin to produce fruity aromas more commonly found in ales. Also, they tend to produce more sulfur aromas at these higher temperatures that eventually blow out of the beer during aging.

At this point it's all semantics. Technically the beer could be considered a lager but it tastes more like an ale. My advice to a pragmatic homebrewer is to use ale yeast to make ales and lager yeast to make lagers.

Pragmatic professional brewers would choose a brewery's house lager strain and ferment at warm temperatures to make a fruity ale-like brew if the brewery usually makes lagers. Likewise, an ale brewery can use their house ale yeast fermented at cool temperatures to produce a very clean lager-like beer that lacks the fruity notes of its warm-fermented siblings. Kölsch is an example of a cool-fermented and cold-matured ale.

In commercial breweries multiple yeast strains can lead to problems if the strains become mixed. At home this is far less likely than other types of contamination. So you can really use whatever makes you happy.

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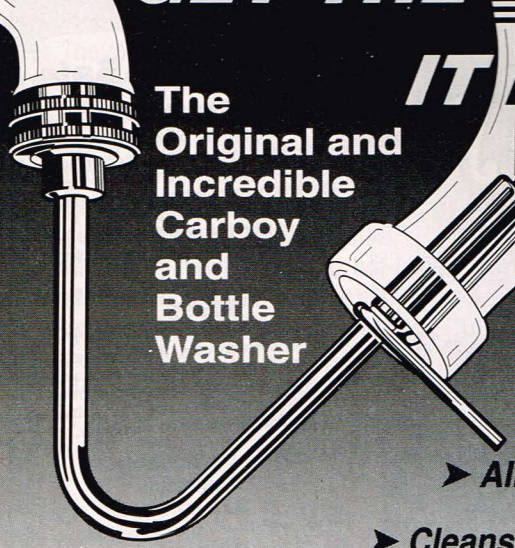
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Now as to your query about water. Well water high in iron can be problematic in brewing for two reasons. The first has to do with the iron itself. Iron gives nasty metallic and blood-like flavors to beer and also is a potent oxidant. Small quantities used for rinsing may not impart the bad flavors, but severe oxidation still may occur.

Another reason not to use well water for rinsing your sanitizing solution is bacteria. Most well water is not chlorinated and frequently contains bacteria, even if the well has been certified safe for human consumption. Since the bacteria that spoil beer are not harmful to humans, their presence would not raise the brows of a well-water inspector. If you want to rinse your sanitizer from your carboy, I would recommend using bottled water. Better yet, use a non-rinse concentration of iodophor sanitizer and don't rinse it at all.

Mr. Wizard

I'm pretty new to homebrewing. In fact I've just cooked up my first batch, and I'm a little concerned about the sanitation warnings I've been reading since I began this quest. I did what I think I was supposed to do. I washed everything per the instructions given to me by the homebrew store where I bought the kit and sprayed everything with an iodophor sanitizer. Then I cooked. Now the wort is sitting in the bucket with the airlock and I'm scared to touch it. How do I know if it's fermenting? Can I take the cover off to check the specific gravity? If I do that, will I be exposing the wort to all of the millions of potential bombs?

Jeff Mielke

Sanitation is one of the many things separating those who consistently make great beer from those who, let's just say, have difficulties. Since you're worried about it, you've got the right stuff to become a good brewer.

Sanitary practice in the brewery not only involves the act of cleaning and sanitizing but also involves risk assessment. The risk of contamination is greatest in the early stages of the beer-making process for two key reasons.

The first is that wort is much more prone to contamination than beer. This is due to the bacteria-friendly pH of wort and to the rich nutrient complement present in the wort. The transformation of wort to beer makes the beer more stable, because most of the wort nutrients are removed. Also, the by-products of fermentation, namely alcohol and organic acids, are a hostile environment for bacteria to live.

Recognizing this, it is important to provide a clean environment for wort. The other material that must be clean is the yeast. Yeast is usually dumped into the wort with little regard for its cleanliness. After all, it can't be soaked in bleach or iodine before use! As it turns out, yeast is an able vehicle for contaminants and so presents one of the biggest sanitation obstacles in brewing. The problem exists for all brewers, all the way from the five-gallon homebrewer to the most modern brewery in the world.

Commercial brewers deal with this problem by strict laboratory monitoring of their yeast. In the homebrewery the safest approach is to use high quality, proven yeast strains that are purchased fresh and re-pitched for only three to five generations, if at all.

On to the "is it fermenting and can I take a sample?" portion of the show. It's fermenting when the airlock starts to sing the "ka-dunk-ka-dunk" boogie. The best thing to do is to have a beer and forget about the brew for a couple of days. I used to be a one of those over-anxious brewers who would sample the brew daily to check its gravity. The only thing I ever accomplished with my over-attentiveness was to reduce my beer yield. Removing samples from your fermenter doesn't really present enormous problems as long as your sampling method is sanitary. Again, risk assessment and logic suggest that you sample after fermentation has begun, when the brew is more resistant to contaminants and when there is some data to collect.

I now only check the gravity at the end of fermentation. This is easy to spot, especially when using a glass carboy, because the yeast start to sink to the bottom (flocculate) and the beer clarifies from the top of the fermenter down to the bottom. If the gravity is higher than expected, then something may have gone wrong: insufficient yeast, insufficient wort aeration, premature cooling, or maybe the alcohol got high enough to send the yeast into toxic shock. Whatever the case, early sampling does not change the rate of fermentation or help out with stuck fermentations.

Mr. Wizard

How do you calculate IBUs? I used to know but for the life of me can't remember, and I can't find anyone who can tell me. That's why God gave us you!

Bill Boyle
Portland, Ore.

Ahhh, a straightforward question. As a refresher, an IBU or international bittering unit is defined as one part per million (ppm) of iso-alpha acids in beer; 1 ppm is the

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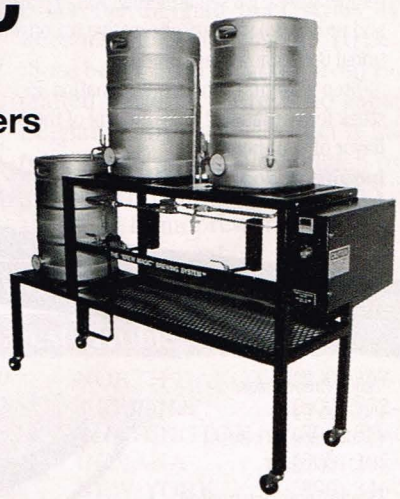
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same as one milligram per liter (1 mg/l). Most microbrewed beers contain between 20 and 40 IBUs.

To calculate IBUs it is easiest to use the metric system, since an IBU is defined in metric terms. To do the calculation you need to plug in the volume of wort being produced, the target bitterness, the percent alpha acids in the hops, and your system utilization. The equation used is:

$$\text{grams of hops} = \frac{(\text{liters of wort})(\text{desired IBU's})(0.001)}{(\%\ \text{utilization})(\%\ \text{alpha acids})}$$

If you wanted to brew five gallons (18.9 liters) of wort with 30 IBUs from 6 percent alpha hops and were going to boil them for 60 minutes and get about 25 percent utilization, the equation would look like this:

$$\text{grams hops} = \frac{(18.9)(30)(0.001)}{(0.25)(0.06)}$$

= 38 grams or 1 1/3 ounces.

Mr. Wizard

I've looked and looked, read and read, and I can't figure what's up with aeration and oxidation. Could you give me a what, when and why for one or the other? Maybe even a why not with the other. Explain it to me like I'm a 21 year old because, well, I am.

Jamie Jones

Okay dude, since you opened the door, I'm gonna give it my best attempt. But if I start geezin', gimme a break because, well, I am geezin'.

I'm gonna use an analogy to get started and will return to your question after my wild tangent.

So you're hangin' out in front of the tube watching 90210 and your bod is, like, covered with bacteria, you know, bugs, but you still smell okay. It's now nine o'clock on Wednesday night and Brandon's catchin' heat from his babe. You kill the tube and throw on the Pumpkins' new disk and get ready for roller hockey. Back home at 10:30 after an intense game and your woman won't get near you because, dude, you reek! Remember the bugs, they started turning your sweat into stench.

So now you're reeking and it's time to homebrew. Wort's done boiling and it's time to toss in the yeast after downin' that cold one. The book says to aerate but also says not to add air late because you'll trash the beer. Dilemma! You say to hell with it, aerate and get on with it. Two weeks later you're sipping on cold barley pops and they taste prime. So what happened to the oxidation stuff?

Well, beer flavor is like those bugs on your body that make you reek when you sweat. The difference is that beer flavor is oxidized or staled by oxygen (not by bugs), and like sweat turning to stench, only after the flavor has been produced. Yeast produce beer flavors but do not make them immediately. To produce flavor compounds the yeast must grow and ferment wort sugars.

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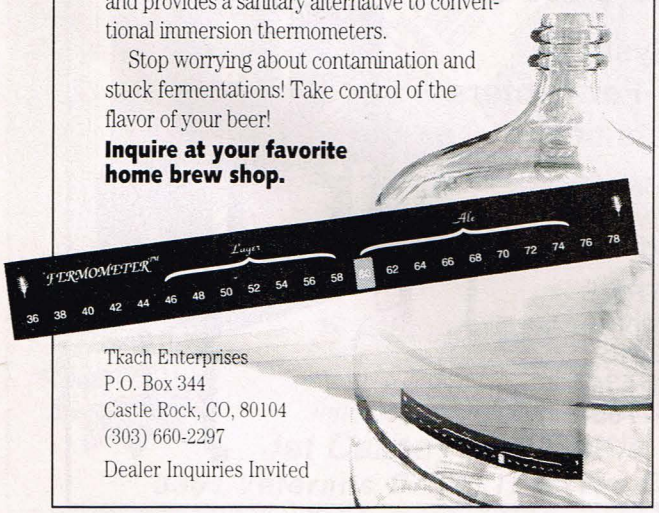
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Yeast need oxygen for growth and use up all that is available immediately after they begin to wake up from their state of dormancy (yeast are usually dormant when pitched).

The condition in the fermenter once fermentation begins is considered anaerobic, since there is no oxygen present. This means that flavor compounds are produced in the absence of oxygen. However, if you introduce oxygen into the beer during racking or bottle filling, then oxygen can come into contact with beer flavor compounds. If this happens, then the oxygen can chemically react with the flavor compounds. These chemical reactions, collectively known as oxidation, make beer taste stale.

Any time air, which contains oxygen, is added to wort, beer, water, or any other liquid, you are aerating the liquid, be it good or bad. If the oxygen goes on to chemically react with components of the liquid, oxidation is occurring. Technically, oxidation is any chemical reaction in which the compound doing the oxidizing gains electrons and the compound being oxidized gives up electrons; these are commonly written as redox (reduction-oxidation) reactions. Since yeast take up oxygen and use it for good purposes early in fermentation, brewers call this aeration; aeration is a good word when it happens to wort. To differentiate this good aeration from bad aeration, aeration late in the process becomes synonymous with an oxidation risk.

Mr. Wizard

I brewed up a Christmas beer this year. However, instead of stopping at the target finishing gravity of 1.030, the beer kept on fermenting until it hit 1.010!

I still want that sweet taste for my Christmas beer, so I figure I need to add a non-fermentable sugar, lactose. So I get out my books to see how to go about adding the proper amount to recover the sweetness I've lost. All any of the books say is "add lactose to sweeten the beer."

So Mr. Wizard, how do I determine the proper amount of lactose to add to my beer to recover the sweetness lost by an over-enthusiastic fermentation? How does the sweetness of lactose compare to the sweetness of corn sugar?

Robert Coleman
Germantown, Md.

The old "lactose-is-sweet" myth rears its ugly head! That old chestnut has been confusing homebrewers for too long!

Your second question on how the sweetness of lactose compares to the sweetness of corn sugar is the best place to begin. Lactose, or milk sugar, doesn't hold a candle to the sweetness of corn sugar (glucose) or fructose (fruit sugar). In fact lactose is barely sweet when tasted pure. If lactose were sweet, then milk (which contains about 10 percent lactose) would be very sweet, and according to my palate it is not. This is why sweetened condensed milk is sweetened with other sugars, such as fructose.

Conventional wisdom, however, seems to suggest that lactose does

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something special to beers, since it is included in milk stouts and milk stouts are pretty darn sweet. This is where the confusion arises. Lactose was historically added to stout (turning it into a milk stout) to make the stout more nutrient rich. Milk stouts were prescribed (by the country docs of the day) to nursing mothers, sick kids, and those who needed a little fattening up. Not a bad way to be fattened up! Lactose, however, was not added to sweeten those beers.

Many milk stouts available on the market today are syrupy sweet because of the addition of sweet sugars such as sucrose and fructose. Examples of such beers include Mackeson and Tennent's milk stouts, neither of which is domestically available due to their names. The good old BATF (Bureau of Alcohol, Tobacco and Firearms) prohibits the name of any alcoholic beverage to have any health implications, such as using the word "milk" to modify stout. The Tennent's milk stout label actually has a cow on the label with the quote "Nourishing and Invigorating; An Ideal Tonic" printed below Bessie — Janet Reno's boys surely wouldn't buy that one! But I digress.

Anyhow, adding fermentable sweeteners to beer requires that no yeast are present, since their presence would guarantee exploding bottles. Sweet stouts, like sweet ciders, are usually filtered, sweetened, and pasteurized. This ensures a sweet product with no explosive tendencies.

You could sweeten up your beer by adding a sweet, unfermentable compound. I'm trying hard not write the word, but you know the stuff I mean — it gives rats cancer in enormous doses, comes in a pink packet. Those compounds can be used to sweeten beer if you are really desperate. If you want to add lactose and see what happens, then about 1 3/4 pounds per five gallons of beer will increase the beer gravity by 0.008 and will get your beer up to 1.018. You can add more if you want a higher gravity.

Another, somewhat unconventional, method would be to put some honey, molasses, or corn syrup in your mug before filling it with your dry Christmas beer. This would accomplish your desire to sweeten the beer without having to worry about exploding bottles or giving any rats cancer. Don't try this with granule sugar, since granule sugar will cause severe foaming of your beer. ■

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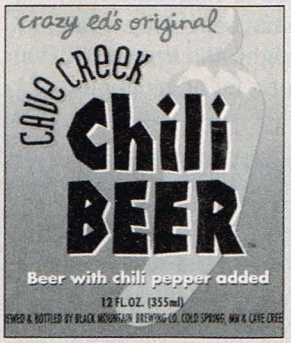
Do you have a question for Mr. Wizard? Write to Mr. Wizard, c/o Brew Your Own, 216 F St., Suite 160, Davis, CA 95616. You can also reach him by e-mail at BYO@byo.com.

Inadvertently trapped in a molecular transfer machine with a slurry of London ale yeast during an illicit brew lab experiment, Mr. Wizard was infused with a yeast cell's firsthand understanding of the brewing process — and a craving for sugary foods.

Give Your Beer a Perfect Nose

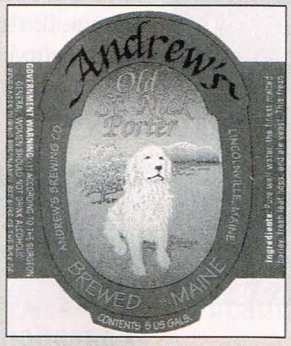
by Gailen Jacobs

Flavor is the complete sensory experience. It is comprised of texture, sight, taste, and smell. Often things you think you taste, you actually smell. Therefore, your beer's aroma could be its most important quality.



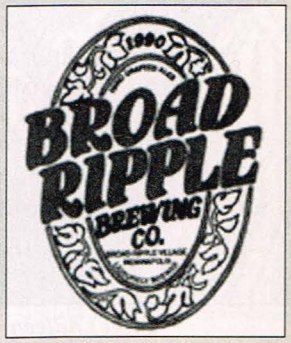
Crazy Ed's Black Mountain Brewing Co.
Brewer: Scott Chilleen

"We use Saaz hops for aroma hops...It's a real expensive hop, but it's well worth it. Using high-quality products is one of the most important things to brewing good beer."



Andrew's Brewing Co.
Brewer: Andrew Hazen

"We brew a high-gravity beer, so it smells nice and malty. A nice, malty nose is fairly important...Play around with different malts and hops to find aromas you like."



Broad Ripple Brewpub
Brewer: Kevin Matalucci

"You can identify plenty of styles by their aroma...The right balance between the hops and malt for the style is what you want to achieve in your aroma."

Brewer: Scott Chilleen
Brewery: Crazy Ed's Black Mountain Brewing Co., Cave Creek, Ariz.
Years of experience: Five
Education: On-the-job training

Aroma is extremely important to beer. You taste with your nose before you taste with your mouth. When you get the head on the beer and the bubbles are actually popping, that's putting off a lot of aroma, and not just hop aroma. It's a malt aroma also.

We use a double decoction system that gives us a very malty flavor. It also gives us a very malty beer smell. We use Saaz hops for aroma hops. Czechoslovakian Saaz are one of the best aroma hops out there as far as I'm concerned.

We use a minimum boil on the Saaz — we try not to boil any of the aroma off, and that's about it. It's a real expensive hop, but it's well worth it. Using high-quality products is one of the most important things to brewing good beer.

Instead of using bittering hops, I use my aroma hops for bittering units also. So I do get a little extra aroma out of them. You can do this with any beer style.

What I tell every homebrewer in the world is get away from extracts and start doing some all-malts because you will get a lot better malt flavor, a lot better control over your beer, and a lot better aroma.

If you do use extract, throw in some high-quality aroma hops at the end. Don't skimp on price because it effects 100 percent of how your beer is going to taste. It's better to spend a little extra money on your hops and get the aroma that you're looking for rather than to skimp on price and settle for what you'll get.

You can also use dry hops. That's done two ways, either with a hop emulsion or you can actually dry hop the wort. To dry hop, you let hops soak in the wort during fermentation and strain them out before you go to your secondary fermentation or your transfer into kegs or bottles. That will give you a really high aroma.

I use Saaz hop emulsion a lot. I get it from Morris Hanbury. Emulsion



Scott Chilleen

Brewer: Andrew Hazen
Brewery: Andrew's Brewing Co., Lincolnville, Maine
Years of experience: Four
Education: No formal training, homebrewer for 10 years

manufacturers cook the hops and turn it into hop oil. Emulsions give you a chance to change your beer later in the game. Rather than having to add all your aroma at the time of the boil, you can literally add emulsion right to the beer to give yourself more aroma and more bitterness. We add it in a mixing tank, after fermentation, before we bottle and keg.

There is a lot more to aroma than just the hops. There's the aroma you get from the malt also. Different kinds of malts give different kinds of aroma.

One last thing to consider is that anything you add to your beer will change the aroma, especially if the beer is served right. We brew chili beer, and we get a lot of aroma out of the chili.

When people pick up a beer, they do two things: They look at it, and they smell it. So aroma is pretty important.

We put our hops in the boil in two additions. We do a full hour-and-a-half boil. We have a hopback unit made out of a 20-gallon stainless steel pot with two pieces of screen that sandwich the hops between them. It has a false bottom, where you place the hops. Then, 10 inches up, it has another screen that fits over the top of the hops. The inlet runs over the top of the top screen.

We circulate the just-boiled wort through the hops and then back into the boil vessel for 15 to 20 minutes. At that time we also cut the fans off in the boil vessel, so we're not sucking any of these juices up.

We circulate the wort for about 20 minutes, right after the boil, and then hook everything up to the heat exchanger and start pumping. As the beer runs out of the boil vessel, it continues to run through this hop-back unit.

Anyone can build a hop-back unit. They can be made out of a canning jar. Using a hop back is much more effective than just boiling the hops.

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CIRCLE 56 ON READER SERVICE CARD

Ruby's Golden Pale Ale, which is just what it says it is — a golden pale ale. It's a lighter beer, although all my beers have a tendency to be very full bodied. We do English ales, that's all, and they are all pretty high gravity. Even the pale ale is 1.052. The porter is 1.056.

With Ruby's we wanted to do a beer that is lighter. Lighter in body, lighter in color. It demands a more delicate aroma. You don't want something overpowering. We're experimenting with a few hops now, such as Tettnanger. Even though they are German hops, I think they'll fit in with our English ales someplace.

We are dry hopping Ruby's as an experiment. I've used dry hops on one batch, and I can tell the difference between the aromas of the one that had been dry hopped and the one that hadn't.

If you go right from your primary to your bottles, then you can't dry hop. You need some kind of conditioning tank, although I have heard of some brewers dry hopping in the primary fermenter.

One easy thing any homebrewer can do is at the end of the boil throw in some hops and let the wort steep for 15 minutes to half an hour, covered. That should help create aroma.

We brew a high-gravity beer, so it smells nice and malty. A nice, malty nose is fairly important. The nice thing about homebrewing is that you can experiment. Play around with different malts and hops to find aromas you like.

The Tips

Scott Chilleen

- Use high-quality products.
- Use aroma hops for bittering units.
- Experiment with hop emulsions.

Andrew Hazen

- Try to build a hop back unit.
- Don't forget the finishing hops.
- Experiment with different malts and hops to find aromas you like.

Kevin Matalucci

- Experiment with hop powders.
- Try for the right balance between the hops and malt for the style.
- The more aroma hops you add, the better the hop nose will be.

Brewer: Kevin Matalucci
Brewery: Broad Ripple Brewpub, Indianapolis, Ind.
Years of experience: Two
Education: Siebel short course

Aroma is everything in beer. Well, not everything but just as important as any of the beer's other characteristics such as taste and more so than appearance.

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CIRCLE 31 ON READER SERVICE CARD

most part, so we like to use lots of hops. We do a lot of English pale ales, we have an extra special bitter and India pale ale. As far as aroma goes, we use Kent Goldings and Fuggles for finishing hops. We use them in the last three minutes before knock out. That's it for the most part. We use different hops for bittering, mostly because of price. Your finishing hops are the noble hops. Their alpha acids tend to be lower than your bittering hops, and they are much more costly to use.

We tried dry hopping. A couple of times it worked out, once it didn't. I found that using a hop powder works wonderfully for dry hopping. Hop powders work the same way as hop oils (or emulsions), although they may be harder for homebrewers to find at their homebrew retailer. As opposed to dry hopping, when using the powder you don't need to worry if you're filtering or anything like that because there is no sediment.

With the English-style ales, hops are where you do get most of your aroma. We are more interested in hop aroma than malt aroma. Although you do have plenty of your specialty malts that can give you beautiful malt aroma, that's more important with other styles.

You can identify plenty of styles by their aroma. We make a sweet porter that has that really roasty, chocolatey smell. We do a Wee Heavy Scotch Ale in the winter. It has more of a malt aroma than anything. The right balance between the hops and malt for the style is what you want to achieve in your aroma. For the Wee Heavy Scotch Ale we use plenty of crystal, cara-pils, DeWolf-Cosyns Belgian grain and special B malts.

My final tip is the more hops the better. I like a big nose. You really need to experiment with everything when it comes to aroma: malts, hops, times. My experience has been the more hops at the finish, the more aroma. It is very hard to be consistent with your hop aroma because it is so volatile. Hope for the best and treat your beer carefully. Things like a high fermentation temperature — vigorous fermentation — will cause the hop aroma to come out of solution and blow off with your carbon dioxide. ■

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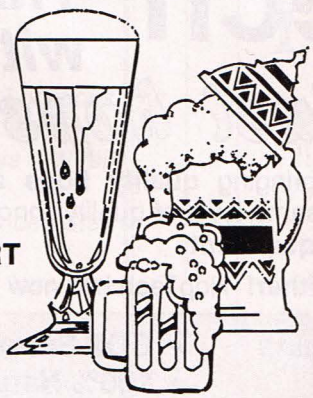
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CIRCLE 66 ON READER SERVICE CARD

A Beer to Buck Up the Troops

by Jeff Frane

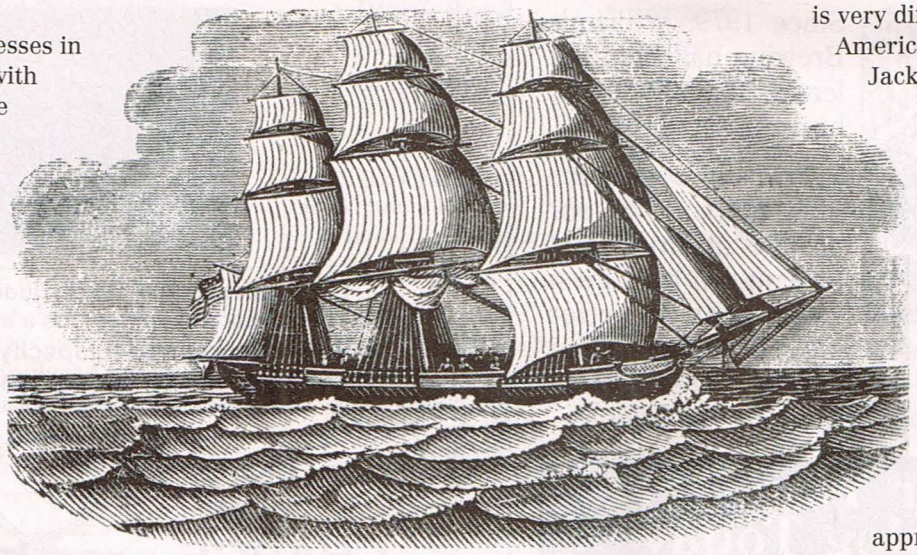
Offhand, I can think of no beer quite so layered in mysticism and questionable information as India pale ale. I think it stems in part from the name — so evocative, so romantic. Stories about IPA are all wrapped up in the need to supply British troops in India (mostly the "other ranks," since the officers had their gin and whiskey) with their daily pints of ale. A pity the British couldn't have built their empire in more convenient locations, but after all, most of Europe was already taken...

The British troops must have had a hard time of it (although not as hard as the Indians being occupied, of course). There wasn't any barley or hops to work from, and the subcontinent made a generally poor place for brewing anyway — at least without modern refrigeration. Beer from home had to come by sailing ship, and the voyage from England took months through tropical and temperate waters.

The earliest successes in reaching the troops with decent ale were made by Hodgson, a now-extinct London brewery, in the late 1700s. The greatest and best-known was, of course, the India pale ale brewed by Bass in 1828. The beers that succeeded in making it intact to India were among the first of the true pale ales, protected during the long sea voyage by high starting gravities (at least 1.060 and generally about 1.070) and very high hopping rates. Without refrigeration, hops were the brewer's best bet of avoiding spoilage, particularly in dealing with souring lactobacillus. The beers all seem to have been dry hopped, although over the months the aroma would not have been as great as the hop flavor.

The Bass beers were aided by an apparently vigorous strain of yeast, which was "fluffy" — that is, it stayed in suspension for a long period of time. The resulting beers were very dry and (more significantly) had a very high alcohol content. The water in Burton, where Bass ales were brewed, allowed for extraordinarily high hopping rates, far greater than those that could be used in London breweries or in most areas with softer waters. The water also meant that the beer was brighter and paler than those brewed elsewhere, which seems to have been a selling point for many.

Modern IPA fans tend to go overboard in their analysis of the effects of the beer's voyage. Homebrewing writers often assure us that all the sloshing around in the ship's hold actually "improved" the beer. I have yet to see a homebrew recipe that requires rocking the beer for months in a bathtub, but I'm sure it's out there somewhere.



None of this accounts for the beer's success in the home market, where the beer would have come directly from the brewery without the supposed benefit of ocean voyage. It's possible that Bass built a special keg-sloshing room on their 200-acre site in Burton, but if so, no records survive.

Modern enthusiasts also insist that since the beers were shipped in oak casks, no true IPA could be produced without oak. For years homebrew IPA recipes have called for oak chips, and much effort has been invested in determining the best chips, the best method of sanitizing the chips (boiling, steaming, microwaving), and when the chips should be added (in the boil, in the primary, in the bottles).

I suppose this has been good for the people who sell oak chips, but the reality is somewhat different. It may, in fact, be true that beer served "in the wood" is different from beer served from stainless steel, but European oak is very different from American oak. Michael Jackson notes that the traditional source for the great British casks was Lithuania — perhaps homebrewers could be a market for the new republic? American oak is very tannic, as a number of homebrewers can attest, and "oak" is a character more appropriate to chardonnays than to pale ales.

Other than for the no-doubt-grateful British troops, India pale ales seem to have been just another ale to the brewers. Judging from an 1880 price list, they weren't even the brewery's best or the consumers' favorite. At

Bass at any rate, the prime beer was Bass No. 1, priced at several shillings more than the IPA for a home cask (18 gallons — lucky folk!), and the IPA was more in line with Bass No. 3.

Rather than defining India pale ale as a distinct style, in fact, it might be better to think of it as one portion of a wide spectrum of pale ales and bitters. For the most part it served, and survived, as a marketing term for a particularly hoppy, effervescent version of a particularly hoppy, pale, top-fermented beer.

At one time the US was home to a particularly fine beer, labeled convincingly as an IPA. The Ballantine brewery produced a true, top-fermented ale well into the recent past, with an original gravity of 1.076, aged in wood (Lithuanian?) for a year, and heavily hopped (with a bitterness around 60 IBU) primarily with Brewer's Gold. When the brewery changed hands and production moved to the Midwest, the proud ale became a shadow of its former greatness, with the OG dropping to about 1.050 and

Hop Field IPA
(5 gallons)

Ingredients:

- 8.5 lbs. Hugh Baird two-row ale malt
- 2 lbs. 80° Lovibond crystal malt
- 1 lb. Munich malt
- .5 lb. 135° L crystal malt
- 4.5 oz. East Kent Goldings Hops (4% alpha)
- 3.5 oz. Cascade hops (5% alpha)
- 1 tsp. Irish moss
- Ale yeast

Step by Step:

Mash in at 150° F with 3.5 gallons Burtonized (hardened) water. Rest for one hour, then sparge with 170° F water, collecting 5.5 gallons in kettle. Bring to boil. The boil time is one hour, 15 minutes.

At 10 minutes add 2 oz. East Kent Golding, giving 23 mg/liter. At 30 minutes add 2 oz. Cascade, giving 29 mg/l for a total of 52 mg/l or 52 IBU. At one hour add Irish moss. After boil-off add 1.5 oz. East Kent Golding and 1.5 oz. Cascade. Rest for 30 minutes, then cool into your fermenter. Aerate your wort well!

Yeast: Pitch with a good, healthy starter of your favorite ale yeast. Due to the higher original gravity, make sure you have enough yeast. Once fermentation is complete, transfer into aging tank with 1 oz. East Kent Golding hops. Age cold (40° F) for two weeks. Bottle or keg and enjoy.

Courtesy of John Harris

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CIRCLE 26 ON READER SERVICE CARD

Adelaide Pale Ale
(5 gallons)

Ingredients:

- 7 lbs. light malt extract
- 1 lb. amber dried extract
- 1 lb. British caramel malt
- 2 oz. flaked barley
- 2 oz. Centennial hop pellets (10% alpha) for 75 min.
- 1 oz. Willamette hops at end-boil
- 1 oz. Willamette hops, in secondary fermenter for two weeks
- Cooper's Australian ale yeast

Step-By-Step:

Soak the crushed caramel malt and flaked barley in one gallon of 150° F water for 45 minutes. Sparge into the kettle, add the extract and enough water to bring volume to about 2.5 gallons. Boil for 90 minutes with hop additions as noted, then add to 2.5 gallons cold water in an open fermenter. When temperature reaches 70° F, pitch yeast and follow normal procedures for fermentation, racking, and bottling.

OG = 1.060
TG = 1.015

the bitterness to 35 IBU. Perhaps it is memories of this once-fine ale that add a romantic luster to Americans' view of India pale ales.

Microbreweries have jumped on the bandwagon and produced a number of beers labeled India pale ale, to the extent that they have emerged as something like a distinct style. These beers seem very different from the "traditional" version, sharing only a tendency toward very high bitterness levels. Using primarily American two-row malts, they tend to be very pale, appropriately dry, and mouth-puckeringly bitter. Many are dry hopped, although with American hops (quite different from the traditional Goldings). And of course, these went through no ocean voyages and probably no long-term storage. Like most microbrewed beers, with storage tanks in short supply, they are consumed within a few weeks of being brewed.

Although some ales with original gravities of 1.040 to 1.050 are sold as IPAs, the gravity should really be pushed at least to 1.060 to remain truer to the original. Microbrewers are too pure, of course, to add any sugar to their beer, but caramel malts and dextrine malt would be important additions to enhance color and maltiness. Unconfined by tradition, the style can use the biggest of the super-alpha hops. Chinook, Centennial, and the new Columbus (at 15 percent alpha!) are excellent possibilities. Finishing hops, likewise, are American, particularly the ever-present (perhaps we should say, over-present) Cascade. No

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CIRCLE 36 ON READER SERVICE CARD

one would complain, however, if a British hop was used as well.

A more "traditional" beer would be brewed from British pale ale malts, possibly all-malt, but more likely with a percentage of sugar. No caramel malts, with the beer's color derived from the pale malt and the long boil. Bittering can be accomplished with massive quantities of low alpha acid hops, but given that low-alpha hops were the only kind available, it's doubtful that "traditional" brewers would have limited themselves given the option. The original beer would have been very bright and more carbonated than much of the standard ales of the time, enhancing the hop nose. The best bet is that the beer would have been very fruity, with the mineral-rich background of Burton's water — but today gypsum is essential in water treatment. However the finishing hops are added (late in the boil and dry hopped, most likely), they should be only the finest of British ale hops: Goldings or Fuggles, although the modern versions, including Challenger, Brambling Cross, and Progress, are hard to resist.

In either case (modern or traditional) the water should be adjusted so that it mimics that of Burton: very high in sulfates and calcium. The same yeast can be used in both instances, preferably something very fruity. Highly flocculent strains (those that clump easily, aiding clarity), while helpful for many other beers, could cause problems, especially in the traditional version. It would be better to use a fluffy strain that will attenuate the beer (change sugars to alcohol) completely, and rely on time for achieving clarity.

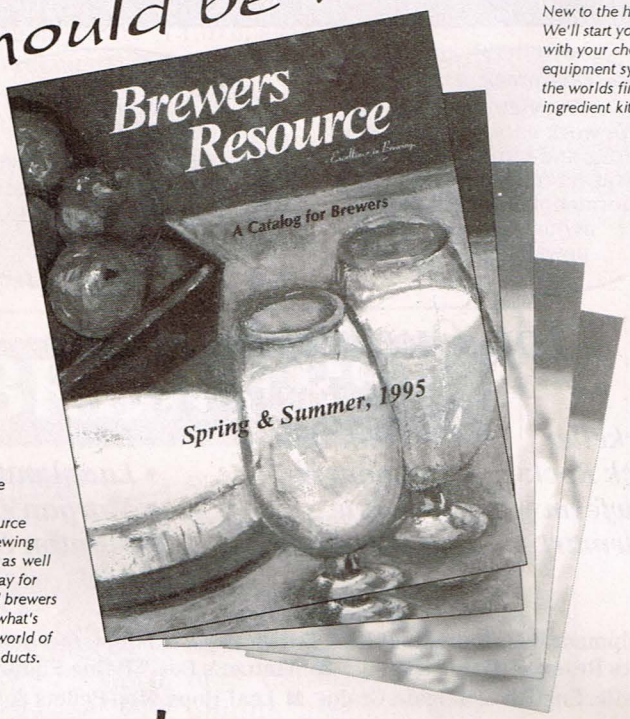
Neither of the accompanying recipes is a purist's version. My own recipe (page 25) was brewed as an experiment for a beginning brewers' class and succeeds mostly by a high original gravity, high bitterness, and a very fruity character. The fruitiness comes from the use of Cooper's yeast strain, which can be found dried or in a liquid culture from a number of sources. The beer is much too rich and dark for a purist, but I make a poor purist.

The second recipe (page 24) is by professional John Harris, who brewed tremendous beers during his tenure at the Deschutes Brewery in Bend, Ore., and has continued to make some of Oregon's best after moving into Portland, where he runs the Full Sail annex brewery.

John writes, "It is a hybrid version, mixing traditional with new age. By using both the traditional East Kent Goldings and American Cascade, the beer should have an interesting grassy, citrus-like flavor and aroma." He also notes that "the hop calculations are based on mg/liter. See George Fix's *Oktoberfest Vienna Märzen* (published by Brewers Publications) for the formula."



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CIRCLE 14 ON READER SERVICE CARD

Convert Your All-Grain Recipe to Extract

by Ashton Lewis

Or go from extract to all-grain. Find a substitute for elusive hops or yeast. The do's and don'ts of recipe conversions.

In the modern world of American cooking, the word "substitution" conjures up images of diet food. Saccharine in place of sugar; skim milk substituted for the whole stuff; ice milk replacing ice cream; tofu burgers instead of Big Macs. The list goes on.

Oh, sure, a scoop of ice milk drizzled with carob syrup sounds delicious, but there are no modern substitutes for malt, hops, yeast, and water. In the world of brewing, today's ingredients are more or less universal.

Brewers do, however, have a wide range of these basic ingredients to choose from and have used this range to create thousands of recipes. The problem for many homebrewers is that the ingredients specified in many homebrew recipes are not locally available. Another common problem: You have an all-grain recipe and want to brew with extract. Or vice versa.

When this happens, substitutions must be made. Following are some simple solutions to the ingredient substitution issue. But here's one disclaimer: If you prefer exacting calculations, the following suggestions may seem over-simplified. But they do present good, general guidelines.

	Hop Varieties	
Bittering Varieties	**European Aroma Varieties**	**American/British Aroma Varieties**
Brewer's	Spalt	Cascade*
Bullion	Styrian Goldings	Fuggles
Cascade	Olympic	Goldings*
Chinook	Hallertauer	Willamette
Cluster	Tettnanger	Cluster
Columbus	Liberty	
Eroica	Hersbrucker	
Galena	Perle	
Northern Brewer	Saaz*	
Nugget	Hallertauer Mittelfrüh	
Perle	Mt. Hood	
Super Styrian	Talisman	

** These varieties have no substitutes due to their unique aroma qualities.*

Malt

Malt substitutions are required when switching between all-grain and extract-based recipes. The key ingredient to focus on is the pale malt or its extract equivalent. This ingredient provides the bulk of fermentable sugars to the wort and also provides the background malt flavor to beer. An all-grain recipe will call for pale malt, lager malt, two-row malt, six-row malt, or some other similar material. Light dry malt extract (DME) or light, unhopped malt extract (syrup) is an adequate substitute for each of these.

Along with pale malts, most all-grain recipes call for a range of specialty malts. Unfortunately, there is no easy substitute for specialty malts, because a wide selection of them are not available in extract and syrup form.

The best way to create an extract-based recipe requiring special malts is to do a partial grain mash. In this method you simply steep the crushed special grains in hot water before adding the pale DME or syrup. Many recipes specify the special malt company along with the type, for example DeWolf-Cosyns crystal malt. Although special malts do vary between malt houses, using crystal, chocolate, or Munich malt from different suppliers will get you in the ball park of the original recipe. Be careful, however, when a recipe calls for an unusual malt such as Briess cara-pils or DeWolf-Cosyns special B, since these are special malts made only by these maltsters; there are no substitutes.

If you're an all-grain brewer wanting to create an all-malt brew from an extract recipe, the task becomes a little tougher. This is due to the wide range of blended extracts available in the homebrew supply market. An amber extract, for example, may contain several crystal malts as well as Munich malt and pale malt. Since extract producers don't provide an ingredient list, it becomes difficult to substitute grain for blended extracts.

This problem is extended when the recipe calls for a hopped extract. You know neither the bitterness level nor the hop varieties used, or even if aroma hops have been used at all. In these situations it is best to use the extract recipe as printed or to use a different recipe all together; there is insufficient information to make educated substitutions. However, if a recipe simply calls for pale DME or light extract, then you can use any of a number of pale malts as the substitute.

The table below lists substitutes to typical malts called for in a recipe.

Hops

It is not always possible to find the exact hop specified in homebrew recipes, so hop substitutions are common. If a recipe calls for 6 percent alpha-acid Cascade and your local homebrew store has 5 percent alpha-acid Cascade, then a substitute is necessary. Likewise, if Nugget hops are needed but you can't find Nuggets, then you must choose a different variety.

Hops give beer both bitterness and aroma, depending on the time of addition and the variety. It is best to add the hops at the time specified by the recipe, but the variety can be changed. The table on page 27 groups hop varieties by type: bittering, European aroma, and American/British aroma. Some varieties appear in more than one type, because some hop varieties are used for more than one reason. Although all hop varieties have unique properties, substituting one variety for another within these categories provides similar properties.

Another variable with hops is the alpha-acid content. This affects the bitterness contributed to the beer. Most recipes specify variety and the alpha-acid content of the variety. The table on page 29 equates hops with differing alpha-acid contents by weight. For example, 5 percent alpha hops are 1.67 times stronger than 3 percent alpha hops; this means if the recipe calls for 5 percent alpha hops and you have 3 percent alpha hops then you must use 1.67 times the weight specified by the recipe.

Water

All water is not created equal, but most waters will do fine when translating recipes.

If you are going from all-grain to extract, water is not that critical. Water's largest role in brewing occurs during mashing, a step that is skipped in extract brewing. Just be sure to use enough of it so that you produce five gallons of wort after boiling. If you're going from extract to all-grain, you need to determine the amount of water to use in mashing as well as the type. A good rule for mash thickness is to use between one and 1 1/2 quarts of mash water per pound of malt. After mashing, use enough sparge water to collect 5 1/2 to six gallons of wort before boiling for a five-gallon recipe. You may want to add salts to the water depending upon the type of beer you are brewing.

Yeast

The last ingredient you'll need is yeast. Due to the enormous selection of yeast available to homebrewers, it is often hard to get the exact strain called for in many recipes. To keep things simple, you may lump yeast into four major types: ale, lager, weizen, and Belgian. Use your favorite ale strain for ordinary ales such as pale ale, amber, porter, stout, etc. A good lager strain works

Substitutes to Typical Malts

Recipe Calls for	Syrup Substitute	DME Substitute	Malt Substitute
1 lb. 2-row pale malt	13 oz. light syrup	11 oz. pale DME	N/A
1 lb. 6-row pale malt	13 oz. light syrup	11 oz. pale DME	N/A
1 lb. lager malt	13 oz. light syrup	11 oz. pale DME	N/A
1 lb. ale malt	13 oz. light syrup	11 oz. pale DME	N/A
1 lb. Munich malt	13 oz. Munich malt syrup	11 oz. Munich malt DME	N/A
1 lb. wheat malt	15 oz. wheat malt syrup	13 oz. wheat DME	N/A
1 lb. flaked rice	19 oz. rice syrup	N/A	N/A
1 lb. light malt syrup	N/A	13 oz. pale DME	20 oz. pale malt
1 lb. pale DME	19 oz. light syrup	N/A	23 oz. pale malt
1 lb. Munich malt syrup	N/A	13 oz. Munich malt DME	20 oz. Munich malt
1 lb. wheat malt syrup	N/A	13 oz. pale DME	20 oz. pale malt

well for any lager, such as a pilsner, helles, bock, or Märzen.

Weizen yeast, although an ale strain, should only be used for Bavarian weizens, dunkel weizens, and weizen bocks. The last category, Belgian, is really a catch-all for the many peculiar yeast strains in Belgians. For these brews the yeast really contribute some special flavors, so try to get the particular strain specified by the recipe. Most yeast strains do indeed produce unique flavor profiles.

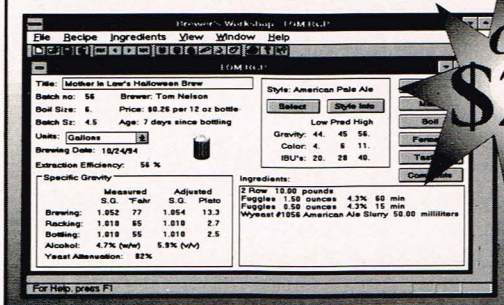
To Wrap Things Up....

Beer recipes, like recipes from a cookbook, are not set in stone. The key to switching ingredients in beer recipes is to focus on the four primary ingredients: malt, hops, water, and yeast. If only one ingredient needs to be substituted, keep everything else constant. Even if it's necessary to change the entire recipe, it doesn't mean that the spirit of the recipe has to be lost!

Alpha Acid Conversions

Recipe Hops, Alpha Acid % \ Your Hops, Alpha Acid %	3	4	5	6	7	8	9	10	11	12	13
3	1.0	0.75	0.6	0.5	0.43	0.38	0.33	0.3	0.27	0.25	0.23
4	1.33	1.0	0.8	0.67	0.57	0.5	0.44	0.4	0.36	0.33	0.31
5	1.67	1.25	1.0	0.83	0.71	0.63	0.56	0.5	0.45	0.42	0.38
6	2.0	1.5	1.2	1.0	0.86	0.75	0.67	0.6	0.55	0.5	0.46
7	2.33	1.75	1.4	1.17	1.0	0.88	0.78	0.7	0.64	0.58	0.54
8	2.67	2.0	1.6	1.33	1.14	1.0	0.89	0.8	0.73	0.67	0.62
9	3.0	2.25	1.8	1.5	1.29	1.13	1.0	0.9	0.82	0.75	0.69
10	3.33	2.5	2.0	1.67	1.43	1.25	1.11	1.0	0.91	0.83	0.77
11	3.67	2.75	2.2	1.83	1.57	1.38	1.22	1.1	1.0	0.92	0.85
12	4.0	3.0	2.4	2.0	1.71	1.5	1.33	1.2	1.09	1.0	0.92
13	4.33	3.25	2.6	2.17	1.86	1.63	1.44	1.3	1.18	1.08	1.0

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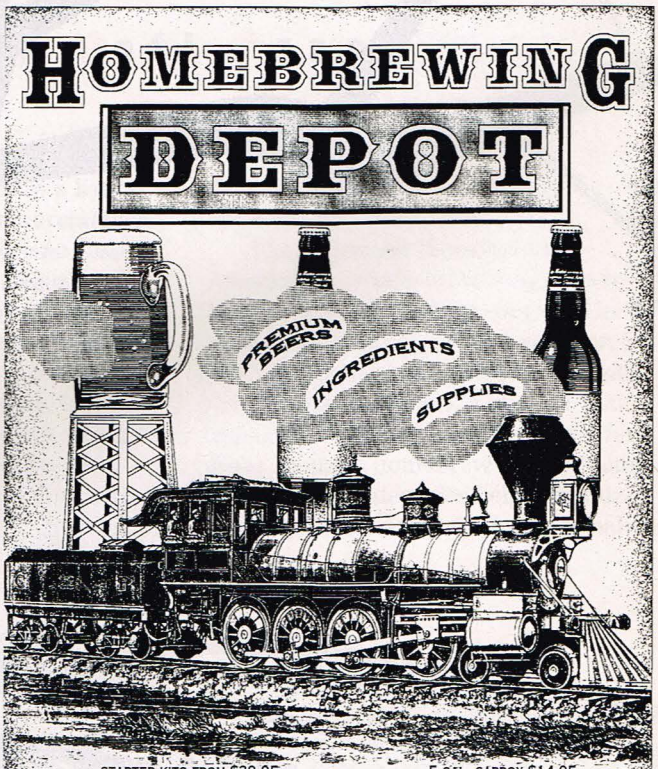
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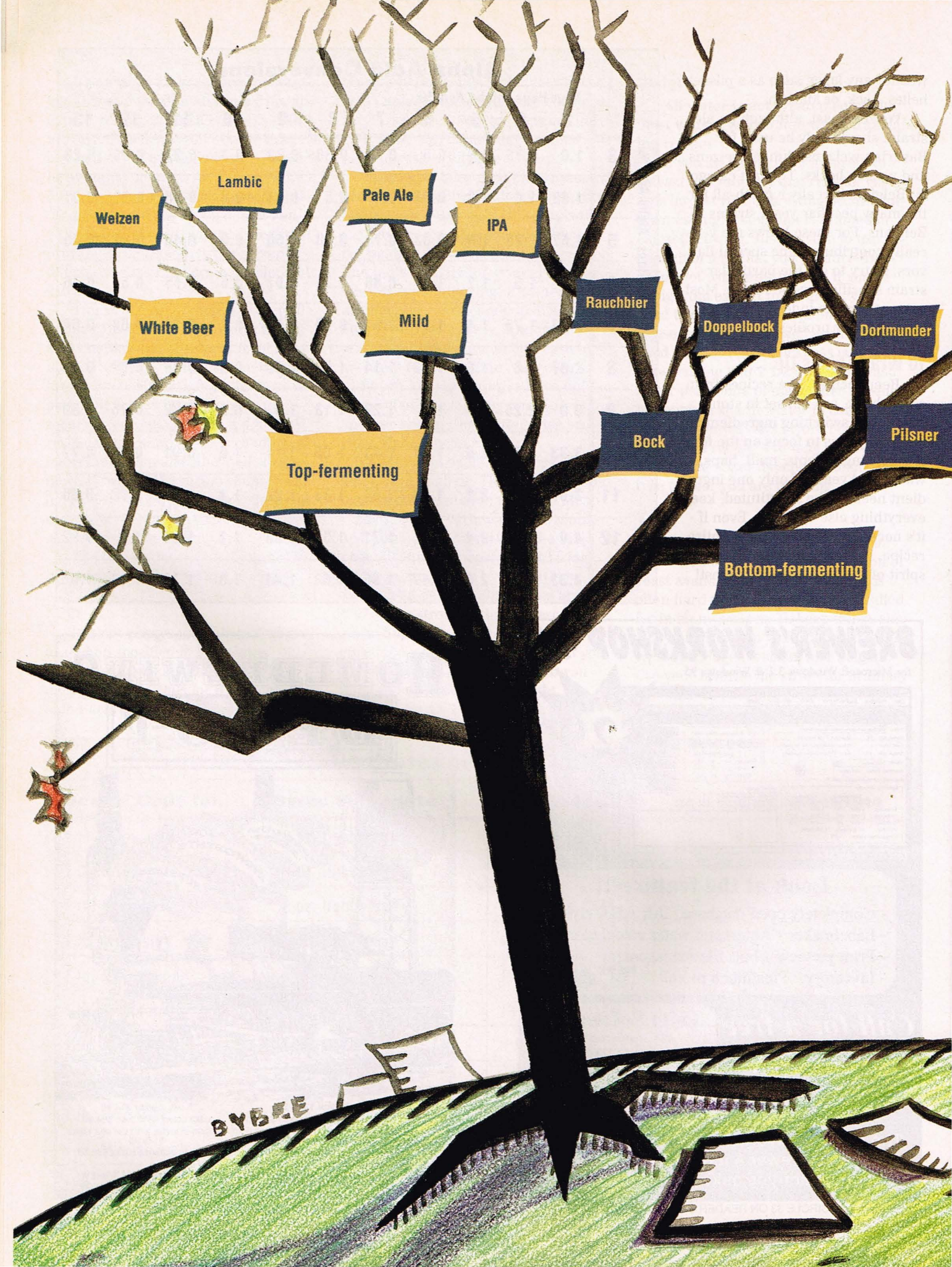
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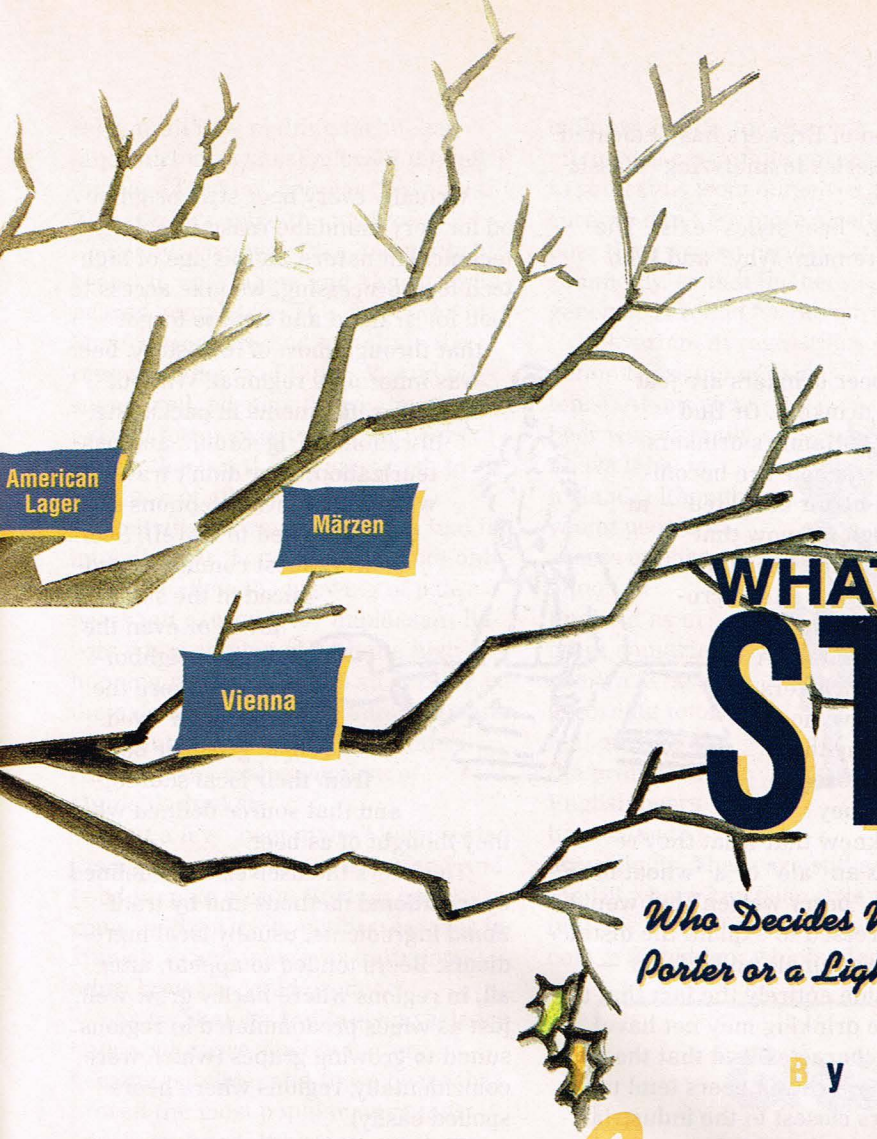


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Weizen
Lambic
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IPA
White Beer
Mild
Rauchbier
Doppelbock
Dortmunder
Top-fermenting
Bock
Pilsner
Bottom-fermenting



WHAT MAKES A STYLE

Who Decides Whether Your Brew's a Heavy Porter or a Light Stout? And Does It Matter?

By Jeff Frane

In front of me I have a list of the winning commercial beers from the 14th Great American Beer Festival. There are 26 categories, which is to say that there are theoretically 26 different beer styles represented. Now, admittedly, the GABF does some real nitpicking in order to encourage entries (American Lager, American Light Lager, American Premium Lager, American Specialty Lager, and American Malt Liquor), but the proliferation of "beer styles" is widespread.

The American Homebrewers Association, which sanctions competitions all over the country and runs its own national competition every year, has a similar number of styles but with 60-odd sub-categories, a number that has risen dramatically over the last few years. In large homebrew competitions, breaking out categories helps organizers keep some categories (such as pale

ales) down to manageable sizes, but every year there are proposals for more and more specific categories. And every year there are arguments, some of them very spirited, some of them remarkably stupid, about exactly how each of those categories is to be defined.

For a category to exist, it has to be defined in terms of original gravity, color, alcohol content, carbonation level, bitterness level, color, fermentation characteristics, and more. And to be realistic there has to be a range for each of these, because each category receives its justification on the basis of *commercial* beers. Hopefully, these are commercial beers that are readily available so that judges from all over the continent can use them as reference points.

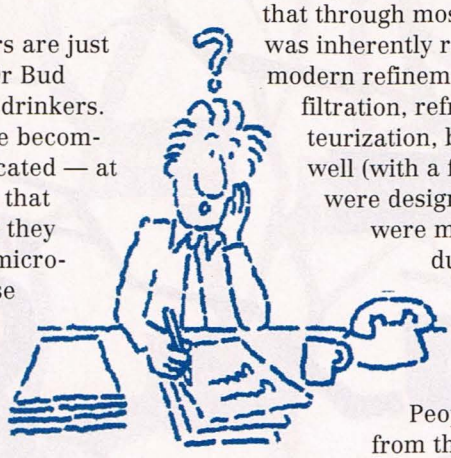
There are hundreds of homebrew judges who have qualified for the job through the Beer Judge Certification Program, and I bet you couldn't find two of them who could agree on more than one or two category guidelines.

Fred Eckhardt has an excellent book, *The Essentials of Beer Style* (long overdue for an update). Michael Jackson has written a variety of books guiding beer drinkers in an exploration of beer styles (perhaps the best of which is the *Beer Companion*). The Association of Brewers has dedicated an entire series to analyzing "classic beer styles."

Clearly, "beer styles" exist. The questions remain: Why? and Who cares?

A Beer is a Beer

Most beer drinkers are just that: beer drinkers. Or Bud drinkers. Or Hamm's drinkers. These days people are becoming a little better educated — at least enough to know that when they drink beer they are *supposed* to like microbrewed beers, because these are "better." A good many drinkers, however, have no notion of why the beer is supposed to be better. They probably know that what they're drinking is an "ale" or a "wheat beer" or (gak!) a "berry weizen" but would be hard pressed to explain the distinction between an ale and a lager — leaving aside entirely the fact that the ale they're drinking may not have much ale character, and that the best-selling microbrewed beers tend to be those beers closest to the industrial beers they used to drink.



It Didn't Start as a Style

Virtually every beer style originated for very mundane reasons, chiefly technical in nature. In this age of high-tech food processing, we take access to food for granted and tend to forget that through most of its history, beer was inherently regional. Without modern refinements in packaging, filtration, refrigeration, and pasteurization, beer didn't travel well (with a few exceptions that were designed to travel). Beers were most commonly produced in the same town, or even the same neighborhood where the consumer lived. People got their beer from their local source, and that source defined what they thought of as beer.

The beers themselves were defined by traditional methods and by traditional ingredients, usually local ingredients. Beers tended to appear, after all, in regions where barley grew well, just as wines predominated in regions suited to growing grapes (which were, coincidentally, regions where beers spoiled easily).

The most local of ingredients, and quite possibly also the most significant, is water. The nature of the water controls the nature of the beer every time. Whether it's the soft water of Plzen, the carbonate-rich water of Munich, the hard waters of Dortmund and Burton-on-Trent, or the deep-bore well water of London, each of the great beer styles emerged originally as a product of the brewer's water supply.

Which was a knock in the eye to another big factor in the development of beer styles: imitation. Commercial brewers, alas, are profit driven. Even the most dedicated preservationist of "lost" beers knows that unless the beer sells, you don't get to brew it any more. Brewers noted the success of other beers and made their own versions in the hope of getting a chunk of the market. Beers emerge essentially by individual effort, but they become "styles" as a beer is brewed by more and more brewers.

In England porters were once the

The Belgian Paradox

Belgians, apparently, have never grasped the need for imitation, at least in regard to their beers.

While elsewhere in the world people were getting into line brewing their "pilsners" and "pale ales," an astonishing number of Belgian brewers persisted in making beers unlike anything else in town — or in the world. (Not that the country doesn't have its own boring pils, but even the pale ale is weird.)

This sort of selfishness creates nightmares for homebrew judges, who manage to lick their lips and roll their eyes at the same time when offered Belgian styles to judge.



Belgian cafes offer drinkers an actual choice of beers (perhaps a wit, a saison, a "Scottish" ale, a Trappiste, and a kriekbier). Bizarre. And cruel, for those of us who never get to Belgium.

There must be *some* facet of the Belgian character, however, that understands the need for regimentation. How else to explain a system that rigidly defines whether a beer is Class III, Class II, Class I, or Class S?

Difficult to imagine ordering that way, though: "Oh, I think I'll have that nice Class S I had yesterday." The bartender would look at you like you were wearing a duck on your head.

rage, until new malting technology (and Burton's water) allowed the introduction of lighter, hoppier "pale ales." Wheat beers, once the toast of Germany, gave way (like many other beers) to pale lagers and almost disappeared completely. The rich bocks of Munich were created to imitate the renowned beers of Einbeck. And pilsners, well, pilsners (in whatever twisted form) swept all other beers before them in the greatest rush to imitation of all.

Initially, however, imitation had its impediments. London's water not only wouldn't allow the brewing of pale beers but caused truly unpleasant flavors when combined with the high hopping rates that found such favor in the pale ales. Likewise, Munich's water ruled out pilsners, and Dortmund's ruled out the malty wonders of Munich's dunkels.

But a few "beer styles" have sorted themselves out: porters in Ireland and London, pale ales in Burton, hoppy gems in Plzen, rich, malty treasures in Munich — and whatever imitations other brewers could produce.

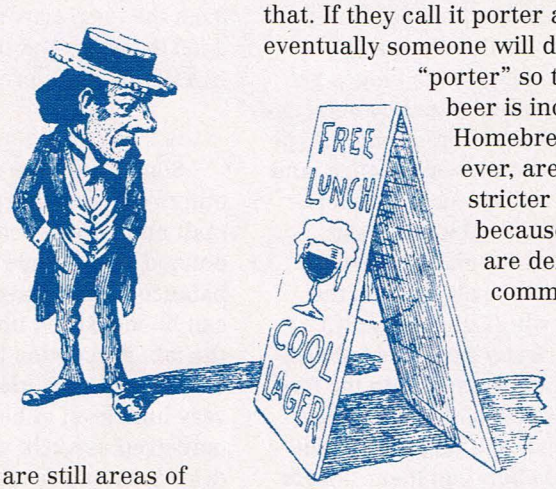
As technology and brewing science improved, more sincere flattery became possible, and those beers that proved the most popular were most widely imitated. It became more common for a brewery to produce a "range" of beers. A German brewer could produce a helles, a dunkel, a pils, and perhaps a seasonal bock. A British brewery might offer a bitter (or three), a mild, and a porter.

And then, naturally, the marketing guys got into the act. If one beer was a bitter, what was the second one? "Oh, that's our best bitter." Or "our special bitter." And if the lads up the street have a Special Bitter, you can bet that we're going to need an Extra Special Bitter — never thinking or caring that in a few generations, American homebrew judges would virtually come to blows defining these terms, one from the other.

Styles by Decree

Governments, which are particularly good at defining other people's needs, likewise got into the act. In some cases it's the government being helpful and consumer oriented — German laws defining a bock, for example. But most often it's a case of the government out to protect us from ourselves, making sure we don't get more alcohol in our beer than we can handle. Or more commonly, so that the beer can better generate revenue for the government.

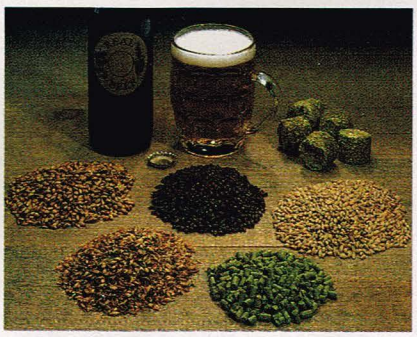
Government regulations can simply define beers out of existence. At one time, beer was virtually unavailable in Iceland, although young people had access to hard liquor. In England as in other countries, beers are taxed according to original gravity, and the profiles of English beers have changed accordingly. There are still areas of the US where any beer style that involves alcohol content over 3.2 percent is forbidden, which effectively eliminates a *lot* of beers.



Paradoxically, though, commercial brewers can have more freedom than homebrewers (outside Utah, anyway). As Fred Eckhardt notes: "If a beer is called 'porter' we agree, but the fact remains that some 'porters' (i.e. Anchor Porter) would be better judged as stout." Commercial brewers can do that. If they call it porter and it sells, eventually someone will define "porter" so that their beer is included. Homebrewers, however, are held to stricter standards because their beers are defined by commercial beers.

At a small homebrew competition years ago, I sat across from another judge who was adamant that we had to withhold honors from the only decent beer

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on the table because "a stout shouldn't have such a hoppy finish." Never mind that if BridgePort had brewed the beer, he would have praised their originality. The homebrewed stout could only be judged as it related to Guinness' stout. An extreme? Well, yes and no. I've run across plenty of similar instances over the years. At times it seems that the more careful competition organizers are to precisely define their style guidelines, the pickier the judges get.

Beer styles are defined by objective standards such as color, strength, type of ferment, and malt/hop balance, and by subjective criteria such as intent.

Color is measured in two basic scales: Standard Research Measure (SRM, also called Lovibond) and the European Brewing Congress (EBC). Much as Americans have avoided metric systems, they've stuck with the former scale. The rest of the world uses the EBC method, and there is no reliable conversion between them. Just to confuse things further, Fred Eckhardt proposed his own system (from one to 10), which is a little more intuitive but used primarily by Eckhardt. Without lab equipment to analyze beer color, it's usually sufficient to be more vague. Pilsners are "straw-colored" or "golden," pale ales are "coppery," brown ales are, well, "brown." Vague as they are, the terms are well suited to describing the range within a beer style.

References to alcohol strength can be more specific, either because the brewer has provided the actual alcohol content (by weight in the US and by volume in the rest of the world) or the beer's original gravity. US law now allows brewers to list the alcohol content on the label. Elsewhere in the world, this has always been more common. Occasionally, the information is given in a form that confuses the drinker (such as the wandering American reading 12° Plato on a pilsner bottle and believing the beer has 12 percent alcohol), or is in some wacky local scale like (surprise!) the Belgians. The British use the specific gravity scale familiar to homebrewers, and I was heartened to note that it was a range of about three degrees — made me feel better about my own inability to hit the same original gravity exactly every time.

The type of ferment (top-fermented, bottom-fermented, or spontaneous) is usually easy to determine by the finished beer's flavor. The influence of a quick ale fermentation is very different from the long, slow mellowing of a good lagering, and the bizarre mingling in a lambic is different from either.

Distinctive Character

Some beers are rich and sweet, others dry and sharp. The balance of malt and hops is critical to a well-defined style. While the perception of balance is subjective, the bitterness can be measured (in bittering units) in the lab. Perception is the key, however, because a heavy, rich beer can have a very high level of bitterness and not be perceived as such, while a lighter, drier beer can seem very bitter with a lower hopping rate.

Besides bitterness, of course, hops provide their distinctive flavor and aroma to beer — where appropriate. Some beer styles are virtually defined by an abundance of hop in the mouth and nose. Others would be strange if they had anything but a subtle hop character.

Without ESP, the brewer's *intent* is hard to measure (especially for long-dead brewers), but we can find clues. If a beer is called "porter," we can assume that it was the brewer's intent to produce a porter. Likewise, a pils, a bock, or a weizenbier. And we can judge the brewer's success by how closely the beer fits the known profile while expressing the same individuality and, most important, yumminess.

At times, of course, we are stymied, like when marketing consultants flood us with "red" beers, "amber ales," and "lambics" that have never seen the microflora of Belgium. Personally, I like to pretend these beers don't really exist or that they aren't really beers at all. With luck, they disappear in short order.

Examining beer styles opens a wonderful world of possibilities, of new flavors and new approaches to brewing — as long as we don't allow ossification to set in and definitions to become so rigid that creativity is stifled. Just keep that Spiced Raspberry Dunkel Pils away from me, please!

Longtime homebrewer and author Jeff Frane is BYO's Style of the Month columnist. Among his credits, he was editor of the book The Essentials of Beer Style *by Fred Eckhardt.*

Second Time Around

One important standard in beer judging has been sadly ignored in the literature. Although scholars dwell at tedious length on carbonation levels and conditioning, charting temperatures against pounds per square inch, no one ever refers to the *effect* of all that gas in beer.

Beer has *gas* — it's what makes beer beer. And, inevitably, what goes down comes back up. People who drink beer burp; whether discreetly or seismically, they burp. Yet no one (to my knowledge) has acknowledged, much less analyzed, the burp as a flavor element in beer.

Fortunately, there are two researchers hard at work on this vital study. My wife, Elizabeth, and I have come (after some struggle) to define this quality as "burpness." Burpness is nothing so crude as a consideration of volume (although this has been tested), but rather an understanding that sometimes we get to taste our beer twice, and that some beers do better on the second round than others. Data is still being analyzed, but tentative results to date seem to indicate best results occur with high additions of very floral hops (such as Cascades). Results will continue to be noted as they arise.

— *Jeff Frane*

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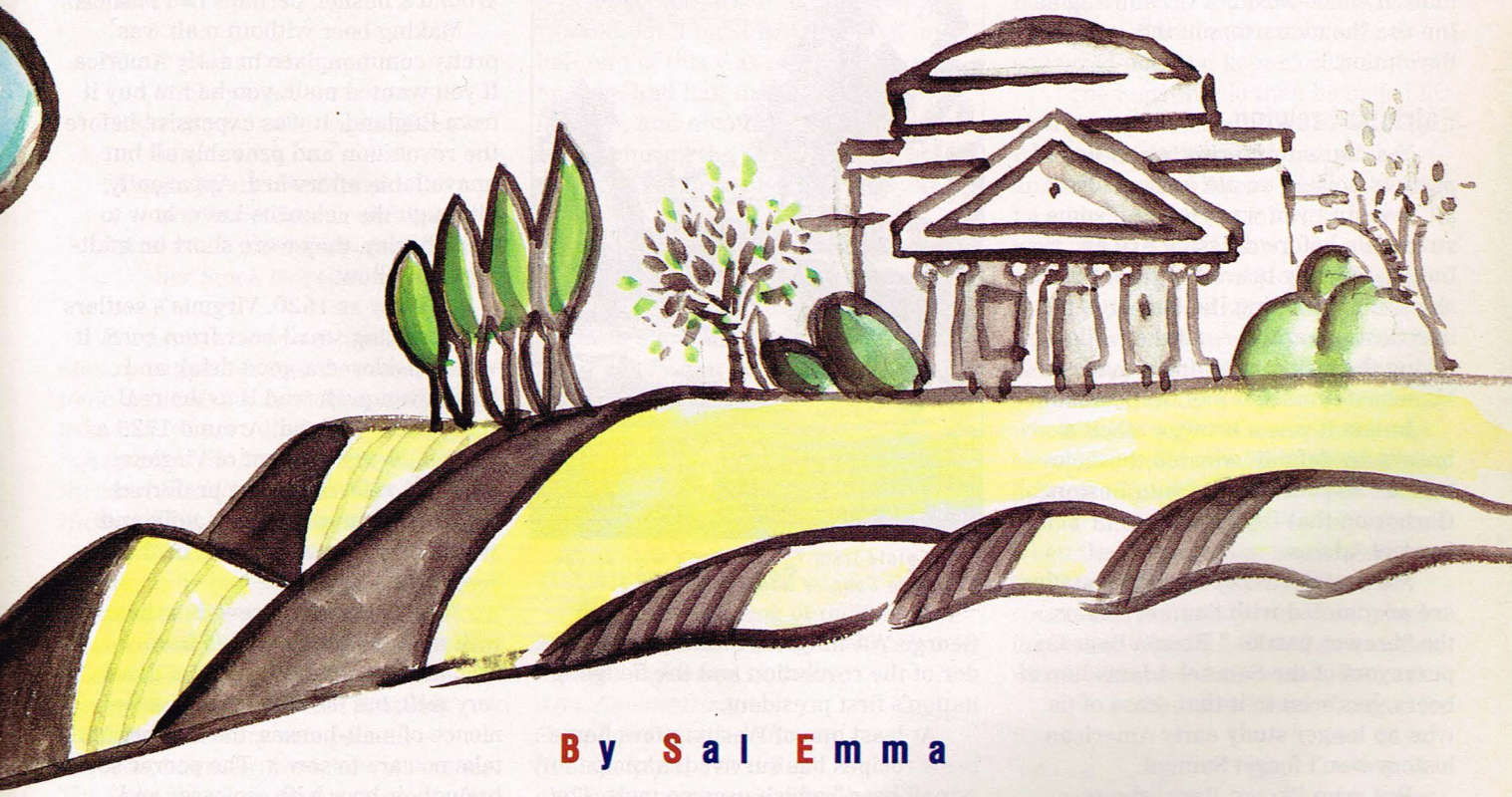
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BRING HOME THE GOLD

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REVOLUTIONARY BREWING



By Sal Emma

Imagine the scene: a dimly-lit, chilly tavern in 18th century Boston, Philadelphia, or perhaps New York. The fire is blazing, occasionally sending cascades of spark and flame rocketing onto the hearth, almost in unison with the fiery rhetoric of revolution being whispered in hushed tones in a dark corner of the room. Clouds of Virginia tobacco smoke cling blue to the air, perfumed in equal parts with rum, sweat, and ale.

It might be a bit of a stretch to say beer helped found America. Conservatives and neo-prohibitionists might shudder at the thought. But the fact remains: Taverns sold a lot of ale in those days. And the tavern was an important political, social, and military meeting place during the birth of this nation.

Consider the words penned by E.L. Bynner:

"They were the centres of so much of its life and affairs, the resort at once of judge and jury, of the clergy and the laity, of the politician and the merchant; where the selectmen came to talk over the affairs of the town, and higher officials to discuss the higher interests of the province; where royal governors and distinguished strangers were entertained alike with the humblest wayfarer and the meanest citizen; where were held the carousals of roistering red-coat officers, and the mid-

night plottings of muttering stern-lipped patriots; where, in fine, the swaggering ensign of the royal army, the frowning Puritan, the obnoxious Quaker, the Huguenot refugee, and the savage Indian chief from the neighboring forest might perchance jostle each other in the common taproom."

Taverns were meeting rooms, strategy chambers, courtrooms, prisons, barracks, officers' headquarters, and even hospitals. Daniel Webster himself called Boston's Green Dragon Inn the "headquarters of the Revolution."

Patriotic Brewing

Yes, those muttering, stern-lipped patriots hoisted an ale or two. After all, wouldn't you want to quaff some strong ale before dressing like an Indian, illegally boarding the King's ships, and dumping His Majesty's tea into Boston harbor — all the while taking the risk of catching a made-in-Manchester musket ball in the head?

In fact it was a brewer, albeit a brewer by default, who led those costumed "Sons of Liberty" into Boston Harbor on that December eve in 1773: Samuel Adams.

Most modern-day beer aficionados are acquainted with Samuel Adams, the "brewer patriot." Boston Beer Co., purveyors of the Samuel Adams line of beers, has seen to it that those of us who no longer study early American history won't forget Samuel.

But even Boston Beer admits Adams was not much of a brewer. When his father died, Samuel inherited the lucrative brewery. He was never interested in the family business. Beer held little attraction for him. He preferred the political debate, public oration, writing, and general rabble rousing intended to stir up the Redcoats. Within a few years of his father's death, everything the elder Adams had labored for was gone. Samuel's lack of managerial interest translated into the demise of the brewery.

But all was not lost. Having grown up in the beer business — and running it himself for a few years — he was at home in the colonial pub. It was a logical place to meet, scheme, and plot against the King. And plot they did.

Recipes

As far as we know, none of the Adams family recipes have survived the ages. Not so for Adams' compatriot George Washington, military commander of the revolution and the fledgling nation's first president.



Cover plate from *The Farmer's Wife or The Complete Country Housewife.*

At least one of Washington's homebrew recipes has survived: a recipe for "small beer," which uses no malt. The term "small beer" described one of two beverages — either that made from the second or third runnings of mashed malted barley in the brewery, or a reasonable facsimile made at home. This recipe of President Washington's falls into the latter category.

"To make Small Beer

"Take a large sifter full of bran, hops to your taste. Boil these 3 hours. Then strain out 30 Gall'ns into a Cooler. Put in 3 Gall'ns Molasses while the Beer is Scalding hot or rather draw the Molasses into the Cooler & strain the Beer on it while it is boiling Hot. Let this stand till it is little more than Blood Warm then put in a quart of Yeast. If the weather is very Cold, cover it over with a Blanket & let it work in the Cooler about 24 hours. Then put it into the cask — leave the Bung open till it is almost done working — Bottle it that day a week [after] it was brewed."

When General Washington wrote "a large sifter" of bran, he meant a large, shallow winnowing basket, woven in a coarse pattern to act as a large sieve. These were used to separate chaff from grain after the crop was threshed by iron flails or the hooves of draft animals treading on the grains. A large sifter would have held somewhere around a bushel, perhaps two bushels.

Making beer without malt was pretty commonplace in early America. If you wanted malt, you had to buy it from England. It was expensive before the revolution and probably all but unavailable afterward. Apparently, although the colonists knew how to grow barley, they were short on malting know-how.

As early as 1620, Virginia's settlers were making small beer from corn. It was considered a good drink and some even preferred it to the real thing from England. Around 1720 a contemporary account of Virginia daily life referred to the preferred small drink as wine, beer, milk and water, or water alone. The beer is described as follows:

"The richer sort brew their beer with malt, which they have from England, though barley grows there very well; but for the want of convenience of malt-houses, the inhabitants take no care to sow it. The poorer sort brew their beer with molasses and bran; with Indian corn malted with drying in a stove; with persimmons dried in a cake and baked; with potatoes and with the green stalks of Indian corn cut small and bruised; with pompions, with the Jerusalem artichoke, which some people plant purposely for that use, but this is the least esteemed."

There's an ingredient list to keep the creative homebrewer busy for a few years! By the way, *pompion* is an old term for *pumpkin*. Pumpkin ale is nothing new!

Farm Wife, Brewer

Nearly every farmer's wife in those days included brewing among her million other daily chores. Early cookbooks and recipe collections commonly included directions for the aspiring

homebrewer. A popular manual in the colonies, first published in London around 1770, was entitled *The Farmer's Wife or The Complete Country Housewife*. It contained, among instructions for tending sheep, hogs, chickens, and bees, "The Method of Making Cyder, Perry, Mead, Mum, Cherry-brandy &c.; Full Instructions how to brew beer and Ale, of all the various kinds made in this Kingdom."

The frontispiece of this volume was inscribed:

"To Tend the Dairy, and the
Poultry rear,
"Bake, Brew, and hive the Bees in
seasons fair.
"Taught by our Work, the
Housewife learns with ease.
"And while she learns shall find
her Stock increase."

Beer was also recommended as a dietary supplement and all-around tonic. In 1869 Dr. A.W. Chase published *Dr. Chase's Recipes, or, Information for Everybody: An Invaluable Collection of About Eight Hundred Practical Recipes*.

Dr. Chase was a staunch advocate of beer, to be taken by men and women to strengthen the constitution and ward off sickness. The collection includes the following basic ale recipe, which is remarkably well built and probably would make a very nice pale ale:

"Ale, home-brewed, how it is made: The following formula for the manufacture of a famous home-brewed ale of the English yeomanry, will convey a very clear idea of the components and mixture of ordinary ales. The middle classes of the English people usually make their ale in quantities of two barrels, that is, seventy-two gallons.

"For the purpose, a quarter of malt (8 bus.) is obtained at the malt-house — or, if wished to be extra strong, nine bushels of malt — are taken, with hops, 12 lbs.; yeast, 5 qts.

"The malt, being crushed and ground, is mixed with 72 gals. water at the temperature of 160 degrees, and covered up for 3 hours, when 40 gallons are drawn off, into which the hops are put, and left to infuse. Sixty gallons of water at a temperature of 170 degrees are then added to the malt in the mash-tub and well-mixed, and after standing 2 hours, sixty gallons are drawn off. The wort from these two mashes is boiled with the hops for 2 hours, and after being cooled down to 65 degrees, is strained through a flannel bag into a fermenting tub, where it is mixed with yeast and left to work for 24 or 30 hours. It is then run into barrels to cleanse, a few gallons being reserved for filling up the casks as the yeast works over.

"Of course, when the yeast is worked out it must be bunged. If one-half pint of this was taken each meal by men, and half that amount by females, and no other spirits, tea or coffee, during the day, I hesitate not in saying that I firmly believe it would conduce to health. I know that this, which a man makes himself, or some of the wines mentioned in this work, home-made, are all that any person ought to allow themselves to use in these days when dollars and cents are the governing influences of all who deal in such articles."

Homebrew, medicine, philosophy, and finance. Dr. Chase was a man after our own hearts.

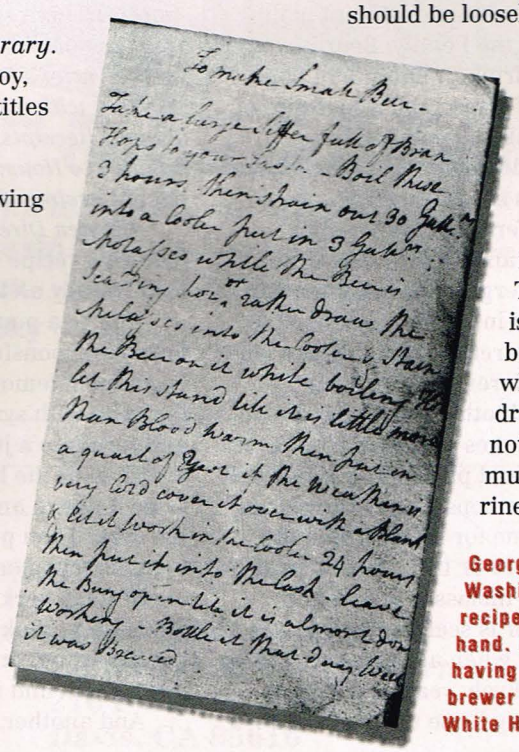
Is It All in the Hops?

Another cookbook of the day was *Mackenzie's Five-Thousand Receipts in All the Useful and Domestic Arts: Constituting A Complete Practical Library*. (Philadelphia, 1829) Boy, did they love gigantic titles in those days!

Mackenzie's contained, in the following collection of run-on sentences and comma splices, a recipe for a smaller quantity of homebrew:

"To brew ale in small families: A bushel and three-quarters of ground malt, and a pound of hops, are sufficient to make 18 gallons of good family ale. That the saccharine matter of the malt may be extracted by infusion, without the farina, the temperature of the water should not exceed 150 or 160 deg. Fahrenheit's thermometer. The quantity of water should be poured on the malt as speedily as possible, and the whole thing being well mixed together by active stirring, the vessel should be closely covered over for an hour; if the weather be cold, for an hour and a half...During this time this process is going on, the hops should be infused in a close vessel, in as much boiling water as will cover them, for two hours. The liquor may then be squeezed out, and kept closely covered.

"The hops should then be boiled for about ten minutes, in double quantity of water obtained from the infused hop, and the strained liquor, when cold, may be added to with the infusion, to the wort, when it has fallen to a temperature of 70 deg. The object of infusing the hop in a closed vessel previously to boiling, is to preserve the essential oil of the hop, which renders it more sound, and, at the same time, more wholesome. A pint of good thick yeast should be well stirred into the wort and hops, and covered over in a place of the temperature of 65 deg. Fahrenheit; and when the fermentation is completed, the liquor may be drawn off into a clean cask previously rinsed with boiling water. When the slow fermentation which will ensue has ceased, the cask should be loosely bunged for two days, when, if the liquor be left quiet, the bung may be properly fastened. The pale malt is the best, because, when highly dried, it does not afford so much saccharine matter. If



George Washington's beer recipe in his own hand. Imagine having a homebrewer in the White House!

Persimmon Fever-Bush Spruce Beer

Like their present-day counterparts, early American homebrewers were an experimental bunch. While Germans were sticking to their purity law (the Reinheitsgebot) which dictated that beer consisted only of water, hops, barley, and yeast, 18th and 19th century Americans were adding anything and everything to flavor their beer.

If you want to brew like your forefathers (or somebody's, at least), try adding these ingredients, all found in popular 18th and 19th century recipes, to your brew.

- Bran
- Dried persimmons
- Dried pumpkin
- Fever bush
- Horseradish
- Indian corn stalks (green and bruised)
- Jerusalem artichokes
- Malted Indian corn
- Molasses
- Potatoes
- Roxberry
- Spruce
- Sweet fern
- Treacle

the malt be new, it should be exposed to the air, in a dry room, for two days previously to its being used; but if it is old, it may be used 12 or 20 hours after it is ground. The great difference in the flavour of ale, made by different brewers, appears to arise from their employing different species of the hop."

A Potato in the Boil

Mrs. Child's *The American Frugal Housewife. Dedicated to Those Who Are Not Ashamed of Economy* appeared in Boston in 1833. Within, Mrs. Child describes several beer variations, made with and without malt:

"Beer for the Family: Beer is a good family drink. A handful of hops, to a pailful of water, and a half-pint of molasses, make a good hop beer. Spruce mixed with the hops is pleasanter than hops alone. Roxberry, fever-bush, sweet fern and horseradish make a good and healthy diet-drink. The winterevergreen, or rheumatism weed, thrown in, is very beneficial to humors. Be careful not to mistake kill-lamb for winterevergreen. They resemble each other. Malt mixed with a few hops makes a weak kind of beer; but it is cool and pleasant; it needs less molasses than hops alone. The rule is about the same for all beer. Boil the ingredients two or three hours, pour in a half-pint of molasses to a pailful, while the beer is scalding hot. Strain the beer, and when about lukewarm, put a pint of lively yeast to a barrel. Leave the bung loose till the beer is done working; you can ascertain this by observing when the froth subsides. If your family be large, and the beer will be drank rapidly, it may as well remain in the barrel; but if your family be small, fill what bottles you have with it; it keeps better bottled. A raw potato or two, cut up and thrown in, while the ingredients are boiling, is said to make beer spirited."

Keep a Mallet Handy

The shortest recipes of all come from the cookbook with the longest title of all: *The Kitchen Directory, and American Housewife, Containing the Most Valuable and Original Receipts, in All the Various Branches of Cookery; Together with a Collection of Miscellaneous Receipts, and Directions Relative to Housewifery. Also the Whole Art of Carving.* (New York, 1844.)

Kitchen Directory, etc. contains the following recipe for "instantaneous beer," really an instant ginger ale:

"Put to a pint and a half of water four tea-spoonsful of Ginger, a table-spoonful of lemon juice — sweeten to the taste with syrup or white sugar, and turn into a junk bottle. Have ready a cork to fit the bottle, a string or wire to tie it down, and a mallet to drive in the cork. Then put into the bottle a heaping tea-spoonful of super-carbonate of soda, cork it immediately, tie it down, then shake the whole up well, cut the string, and the cork will fly out. Turn it out, and drink immediately."

And another, for Treacle Beer:

"Take a pound and a half of hops and boil in thirty-six gallons of water for an hour, then add fourteen pounds of treacle, and a little yeast to work it, ferment and bottle."

And for the hungry imbiber, Devilled Ale:

"Cut a slice of bread about an inch thick, toast and butter it, then sprinkle with cayenne pepper and ginger, and place it in the bottom of a jug. Add a pint of warm ale, and sugar to taste."

Delicious and nutritious!

Ale was an important staple and the basis of many mixed drinks of the day. In addition to Devilled Ale, American barmen whipped ale into all sorts of strange concoctions, including "Flip" and "Bogus," short for "Calibogus," which was beer spiked with rum.

"Flip" was made in hundreds of variations, depending on the locale and the mood of the barman. The basic recipe was strong beer, sweetened with sugar, molasses, or dried pumpkin and a shot of rum. The final flourish was achieved by thrusting a red-hot "loggerhead," or small poker, into the mug. This heated the drink, created a burned, caramelized flavor, and caused a dramatic overflowing of foam. The bartender kept several loggerheads in the fire at all times, to keep up with the demand on busy nights.

A Boston Flip variation was called "Bellow's Top," described as Flip with a last-minute addition of beaten egg, cream, and sugar. It was so named because the froth billowed over the rim of the mug when the loggerhead was thrust in.

Hot beer, gin, and sugar was "Dog's Nose." Hot beer, brandy, and eggs, "Huckle-my-Buff."

And from the Don't-Try-This-At-Home Department, hailing from colonial Salem, Mass.: "Whistle-Belly-Vengeance," an aptly-named slurry of sour beer, simmered with molasses and brown bread crumbs, consumed piping hot.

(The staff, publisher, and editors of *Brew Your Own* and its worldwide subsidiaries take no responsibility for physical or emotional effects, real or imagined, as the result of the making or drinking of Whistle-Belly-Vengeance, or from inhaling fumes emanating from same.)

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STEAM BEER

CALIFORNIA'S GOLD RUSH DAYS LEFT AN AMBER LEGACY THAT YOU CAN BREW AND ENJOY

By Martin Lodahl

It was born of necessity, the legend has it, in the days of California's gold rush. Surely no one then ever thought that nearly a century and a half later there would still be such a thing as steam beer — or that it would be one of America's finest and most distinctive beers.

But what does the name mean? What could beer possibly have in common with steam? Of all of steam beer's mysteries, the name is the most impenetrable; to even make a good guess we need to take a look at the style's history. And since steam beer wasn't considered a classic style in its day (some insist it was never a style at all), it's not such an easy thing to do.

Beer styles, as a rule, don't just appear. They're always the result of something, such as a characteristic of local brewing materials (especially water) or local tastes. Steam beer seems to follow the rule here, with the remarkable twist that the original steam-beer brewers made not just one or two but a whole series of alterations to their brewing methods in adapting to the conditions they found.

The prevailing legend is that along with the huge number of fortune hunters in the massive migration to California following the news of the gold discovery at Sutter's Mill, there came many who had less interest in gold itself than they had in starting businesses to meet the miners' needs. These often became the most successful of the settlers, digging the miners' gold from their pockets as fast as the



miners dug it from the ground.

Knowing that life without beer would be just as unthinkable to the miners as it is to us, brewers came west in the migrations of 1849. In the years before the California gold rush the "lager revolution" had changed the face of American brewing dramatically, so most of these brewers were firm believers in lager beer, and they brought with them pots of the lager yeast they'd been using in the more settled areas of the country.

California just wasn't the place for that yeast, though, as they learned a little too late. California weather tends to be temperate. Much of California never freezes, and other than in the high Sierras there are few winter icefields where ice can be harvested and stored for later use. There is nothing at all like the system of rivers and lakes convenient for that purpose in the midwestern and eastern US. For more than 20 years after the miners arrived, there was no transportation capable of bringing adequate quantities of ice down from the Sierras.

Naturally, mechanical refrigeration was out of the question. This was disaster, as there was no practical way to ferment at real lager temperatures. It's not recorded who made the discovery that beer fermented in the shallow cooling tun had fewer off-flavors, but

The Birthplace of Modern Steam Beer

by Nico Freccia

San Francisco's Anchor Brewing Co. is one of the most unique small breweries in the world. Its traditional, 50-year-old, handmade copper brewhouse is coupled with the fermentation practices of steam beer breweries of the mid-19th century and the most modern finishing and packaging operations available.

Owner and brewmaster Fritz Maytag invented modern steam beer through a decade of trial and error, experimenting with ingredients and methods, trying to recreate the steam beer of his imagination from the questionable steam beer of the decrepit brewery he took over in 1965.

It may be argued that Bass Ale is the prototype for what we have come to understand as English pale ale. In the same manner, Sierra Nevada Pale Ale has come to define the uniquely American variation of the same style. Because of the singular methods employed to produce Anchor's flagship Steam Beer, some would suggest that Anchor has created a new style of beer, uniquely American, called "steam."

Though Maytag continues to support the small brewers through his insight and advice, he feels strongly the need to retain an element of secrecy and the "dignity of privacy" when it comes to divulging the particulars of his recipes and process. Rightly so, Maytag feels this approach maintains some of the fun and individualistic style that was the genesis of the microbrewing movement.

The exact grist bill for Anchor Steam is one such secret. But it is known that the bill consists of pale and crystal malts yielding wort with an original gravity of about 1.050, and resulting in a brew of about 4 percent alcohol by weight. The wort is boiled for an hour and a half with three additions of fresh, whole, air-dried Northern Brewer hops at the rate of 30 to 40 IBUs (bittering units). The relatively high hopping rate of Anchor Steam is probably a result of the original steam breweries' practices of generously hopping their beers to aid in keg preservation, and more so to hide off-flavors of the beers brewed under primitive conditions.

After boiling, the wort is whirlpooled, chilled through a plate heat exchanger, aerated, and run into one of their shallow open-fermentation pans. The four pans measure 20 by 30 feet and are about two feet deep. A proprietary, bottom-fermenting "steam beer" yeast strain is propagated at the brewery and pitched into the wort at about 60° F. The ferment may reach a high of 70° or 72° F, and the pans are cooled by filtered, foggy, and mild San Francisco air. Refrigeration automatically kicks in if ambient temperatures become too warm.

Upon completion of primary fermentation, the beer is racked to aging tanks where it is warm conditioned for several days, then kraeusened with newly fermenting beer at 15 to 20 percent of the total volume. The beer continues to age in the sealed tanks for several weeks, becoming slowly and naturally carbonated. Anchor feels that this method produces a much finer bubble and a better bonding between the beer and carbon dioxide, contributing to a creamy, long-lasting head.

The final beer will have a higher-than-normal carbonation level, again reflecting its distant historical antecedents, at between 2.85 and 3.0 volumes of CO_2 (standard beers are generally in the 2.4 to 2.6 range, with English style draft bitters as low as 1.5 volumes).

The fully conditioned, carbonated beer is centrifuged, then rough filtered to remove yeast. The beer is flash pasteurized (like a reverse heat exchanger, beer is heated up in a thin, flowing stream and quickly cooled, minimizing unwanted effects on flavor) and then stored in refrigerated holding tanks prior to packaging.

The Anchor story is compelling, not only for the unique beer that they made famous but also because of the rare culture of the company itself. Though production levels have been steadily increasing over the years, they have done so at the rate of 5 to 15 percent annually rather than the more common 40 or 50 percent that many of the other large micros have enjoyed.

Maytag believes strongly in the idea of maintaining a small business. Though demand always exceeds supply, Maytag's goal is to produce a high-quality glass of beer, employing a small but tightly knit group of people who are all involved in every aspect of the process, whose offices all face onto the brewhouse, whose senses are daily overwhelmed by the special product they create.

Business hours are civilized, employees are treated as members of the family, and Maytag feels that is part of the harmony and pleasure of a venture such as this. In an era of increasing production, IPOs, and dollar-sign-happy management and financial types descending on the world of beer, it is refreshing to have a model such as Anchor to look to. Growth is good, beer is good, and maybe profit isn't everything.

by the time the first technical articles were written about steam beer in the final years of the 19th century, fermentation in these shallow pans (usually made of lacquered wood) was a common feature of the style.

Local Beer

From the beginning steam beer was beer intended to cut the serious thirst of people who worked hard, and as an 1893 article in Western Brewer magazine dryly noted, was "not a connoisseur's drink." Apparently to make it more thirst quenching, most brewers seem to have hopped it very heavily. That would also have helped maintain stability in a beer brewed under primitive conditions and stored in a warm climate without refrigeration.

There seems to be no remaining record of the type of hops used, but it's reasonable to conclude that the bulk of the hops would have been grown within California, again because of the difficulties in transportation. In fact California was for many years the seat of the majority of America's hop production, but there are only a few hop cultivars that find the latitude of California congenial, most preferring the day-length pattern found further from the equator.

During California's hop-growing years the primary variety grown was Cluster, and the California hop industry collapsed when consumer preference shifted to favor the more delicately flavored strains derived from Hallertauer. Some Fuggles were grown in coastal areas of northern California, but it seems likely that on the whole the hops available to steam beer brewers were a rough lot.

Barley grows well in California, especially in the northernmost part of the state, but malting facilities apparently lagged far behind their eastern and midwestern counterparts throughout the first two decades of the steam beer period. Transportation, always a problem, made it next to impossible to ship beer far from the brewery, so a large number of very small breweries dotted the state. It was about this time that breweries in the rest of the US began to use such adjuncts as rice and corn to lighten the body of their beers (the economic advantages of adjuncts didn't become the dominant concern in brewing texts until after Prohibition), but the technique seems to have caught on more slowly among the less technically advanced steam beer brewers.

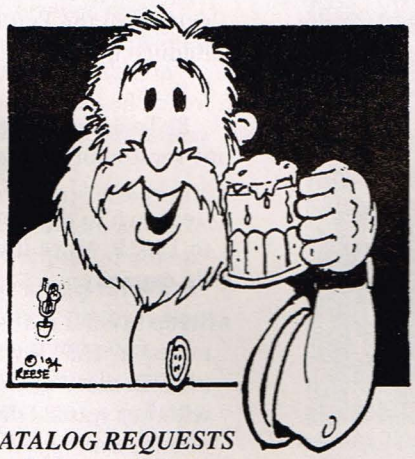
Readers of the day understood that steam beer drinkers were creatures utterly without taste and refinement.

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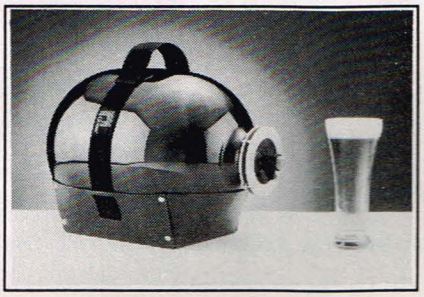
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Lost Appeal



Very little is known about the flavor characteristics of steam beer until the 1890s. By that time mechanical refrigeration had appeared in the more settled areas of the West Coast, and the range of steam beer had grown considerably. One authority has traced the production of steam beer as far north as Alaska and as far east as Wisconsin, but brewers still considered it to be primarily a California phenomenon.

Lager beer, especially bottled lager beer, had completely taken over the "high end" of the beer market, leaving steam beer as the cheapest swill a saloon was likely to sell. In his 1891 novel *McTeague*, Frank Norris has the doomed dentist spend his Sunday afternoons drinking steam beer. Readers of the day understood that steam beer drinkers were creatures utterly without taste and refinement. A mug of steam beer generally cost five cents in San Francisco then, while bottled lager beer was three times as expensive.

Turn of the century brewing texts describe the steam beer of the day in terms that sound familiar a century later. It was generally an amber beer, often compared to Munich beer. The color was due to caramel malt, roast malt, caramelized sugar, or any combination of these. Specific gravity was in the range of 1.044 to 1.050. The grist (mash ingredients) was sometimes all malt but often contained corn grits, and sugar was very frequently added in the kettle, sometimes comprising as much as 33 percent of the total fermentables.

The practice was to open the bung the night before the keg was to be put on line, and the first rush of carbon dioxide would look and sound like steam being released from a boiler.

The hopping rate was approximately equivalent to two ounces of hops for a five-gallon batch, though it would be difficult to make an effective guess at the alpha-acid content of the hops of a century ago. Many different mashing schedules and methods were used, but it was very common for the final conversion temperature to be at or near 158° F. The boil was generally from one to two hours.

After the boil the wort was cooled in the usual way, and about one pound per barrel of a bottom-fermenting yeast was pitched. Interestingly, several texts make a point of calling this a "special" yeast; the maintenance of a special yeast strain for steam beers appears not to have survived Prohibition. Pitching usually took place in tanks with a relatively high aspect ratio, and high kraeusen (the peak of fermentation) was usually established within 14 hours. The beer was then run into the shallow fermentation tuns to ferment for two to four more days at temperatures generally in the low 60s.

From there it was racked into trade packages, usually wooden barrels. Surviving steam-beer barrels are impressively strong vessels, made with

California Uncommon
(Inspired by Anchor Steam)
(5 gallons)

Ingredients:

- 6.5 lbs. domestic two-row pale malt
- 6 oz. domestic 80° Lovibond crystal malt
- 6 oz. domestic 40° L crystal malt
- 1.5 oz. rye malt
- 2.75 oz. Northern Brewer hops
- .75 oz. corn sugar

Step by Step:

Mash in with 11 quarts of water at 115° F; rest 40 minutes. Raise to 126° F; rest 15 minutes. Raise to 145° F; rest 20 minutes. Raise to 156° F; rest one hour. Mash out at 170° F; hold 10 minutes. Sparge with five gallons of water at 170° F.

Boil 90 minutes, adding: .75 ounce Northern Brewer (assuming 7.5 percent alpha acid units) at the beginning, one ounce Northern Brewer at 45 minutes, one ounce Northern Brewer at 80 minutes.

Ferment at 60° to 65° F with steam beer yeast, available from Wyeast, BrewTek, and others.

Prime with corn sugar.

OG: 1.052
FG: 1.012

Extract Options:

1) To do a partial-mash version of this recipe:

- Reduce mash water to five quarts
- Reduce pale malt to 2.5 pounds
- Reduce sparge water to two gallons
- Add four pounds of pale, unhopped extract to the kettle before it boils. Reduce boil time to one hour.

2) To do an extract-plus-specialties version of this recipe:

- Heat two to three gallons of water to 155° F. More if you have the kettle capacity.
- Steep special malts (crytsal and rye malts) in 155° F water for 30 minutes. Remove grain bag and rinse with hot water. Dissolve 6.5 pounds unhopped pale malt extract syrup or 5.25 pounds of spraymalt into liquor and bring to a boil. Boil 60 minutes using the above hopping schedule. Adjust wort volume to 5 gallons after the boil.

very thick staves and lined with pitch. Some 30 to 40 percent of the volume racked into the kegs was fresh beer at high kraeusen, depending on the desired degree of carbonation. The unfermented reducing sugars in this kraeusen beer would condition the beer in the keg during five to 10 days of aging at the brewery. Finings would be added along with the kraeusen. At the saloon, the keg would be allowed to settle for two days, and then it would be ready for serving, except...

Except for the fact that with all that kraeusen, it's running some 40 to 70 pounds per square inch (psi) of pressure! That might be fine if the keg's kept in a cellar several floors below the taproom and the beer lines are *extremely* long. But as a practical matter, there's just no way to dispense a beer with that much pressure. So the practice was to open the bung the night before the keg was to be put on line, and the first rush of carbon dioxide would look and sound like steam being released from a boiler. So strong was the resemblance that the practice was called "steaming" the beer. Could this be the origin of the name? We'll probably never know, but it seems to be a reasonably good guess.

Anchor Steam

The style appears to have altered little in the period between the turn of the century and the beginning of Prohibition. A few breweries, mostly in northern California, brewed steam beer regularly. Many others brewed an occasional batch. After Prohibition only one seems to have brewed steam beer primarily: a small San Francisco brewery called Anchor.

After Prohibition, many others still brewed the occasional batch, and a few surviving texts give recipes for steam. These recipes are strikingly different from the pre-Prohibition steam recipes, in that they never seem to mention anything that would create the amber color previously considered a defining feature of the style. Most specify a grist composed solely of pale malt and corn grits, a few adding sugar in the kettle.

There seemed to be little enthusiasm for steam, though, and by the 1950s it had disappeared from the brewing schedule of virtually every brewery — except Anchor.

At Anchor, steam beer was being interpreted in a fashion the miners would have recognized. Its principal characteristic may have been inconsistency, with individual kegs ranging from superb to undrinkable. As demand fell off, they brewed less frequently. Rather than culture their own yeast, on a day they planned to brew they would send an employee with a pail to one of the large breweries in the area, visiting each in rotation so that none would feel the visits were too frequent. Finally, demand fell below the minimum required to keep the brewery alive, and the few remaining Anchor draft accounts were told that the brewery was closing.

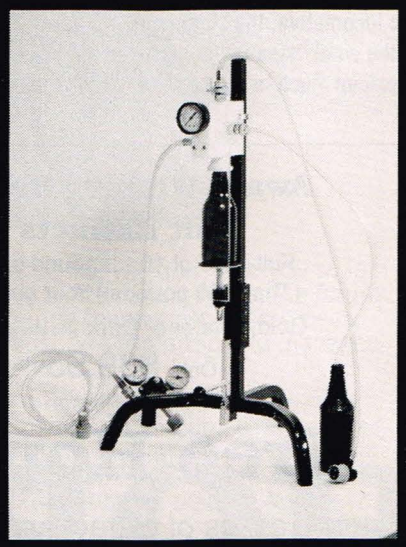
This was the beginning of what's probably the most familiar story in craft brewing. News of the brewery's closure reached a young man named Fritz Maytag. Yes, one of the appliance-company Maytags. It had never previously occurred to him to have anything to do with the brewing business, but he looked into the situation at Anchor. Conventional wisdom was certainly that the best thing to do was to

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CIRCLE 64 ON READER SERVICE CARD

It Could Have Been "Geyser Beer"

by Nico Freccia

Part of the great pleasure and fascination with steam beer has to do with the history and mystery of the name. The bad old days of the California gold rush rouse our imaginations and maybe, in the end, our ruminations would rather land on fantasy than fact.

Most likely, the name alludes to the physical phenomenon of steam. After all, steam was the engine of the industrial revolution that had been sweeping Europe and the eastern US since the beginning of the 19th century. The power of steam represented progress, the present and future growth of the nation. Steam was on people's minds, maybe even more so in 1850s California, where technology and modern industrial practices were absent at a time when they were most needed for the serious work of building cities and mining for gold.

With the advent of the steamboat, the steam locomotive, the steam engine, perhaps the word "steam" had entered the popular lexicon much in the same way terms like "the net" or "web surfing" have entered ours today. It seems likely, therefore, that "steam" was the automatic choice for the name ascribed to that rush of carbon dioxide exiting the cask for this particular type of beer. Perhaps if there had been no steam engines yet in the world, today we'd be drinking "geyser beer" instead.

While it's likely that California steam beer got its name from the appearance of the escaping CO_2, and steam-powered equipment would not have been used, this was not the case in other parts of the world. Michael Jackson, in his *Beer Companion,* notes that "the legend 'Steam Beer Brewery' can still be seen in the brickwork of some buildings of the mid- to late 19th century in Europe." These breweries were so named because they did employ the newest steam technology available in the brewhouse.

Another theory about the name focuses on the practice of allowing cool, ambient air into the fermentation cellars of San Francisco steam beer breweries, and the possibility that the fog resembled steam rolling into the chambers. Others have suggested similarly that the creamy head that developed from the kraeusening looked like the same San Francisco fog.

On the more fantastic side are the stories linking the name to notorious California gold rush characters. Anchor Brewing suggests that there may have been a well-known West Coast brewer named Pete Steam whose name became associated with beers of the day. And then there's Jack Steam, a maybe-mythic-and-maybe-not 19th century beer swiller and hell raiser who might have donated his name (along with his liver) to the legacy of beer in California.

Whatever the origin of the name, it is clear that "steam beer" is wrapped up in the history and mythology of California and the country. Perhaps it would be best not to discover the definitive origin of the name. Speculation is much more interesting.

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let it die. The process of major national producers forcing smaller brewers out of the marketplace had been steadily thinning the ranks of breweries since the end of Prohibition. A small, poorly run, poorly equipped brewery producing an irregular style for which there was little apparent demand must have seemed an extraordinary risk.

Maytag wasn't intimidated by conventional wisdom, though, and sold stock in the family business to finance the purchase of the brewery. Over the next few years he threw himself into personally running Anchor, and in the process transformed the brewery, the beer, and the face of the brewing industry. Most of today's craft brewers were inspired at least in part by his example.

With Maytag's transformation of the steam-beer style, it became for the first time a beer worth seeking out, and remains so today. The deep amber color and high hopping are back, though the hop used now is Northern Brewer, and the gravity's in the same range it occupied 100 years ago. Highly carbonated, this new form of steam beer is kraeusened in bulk rather than in the trade package and is cold-aged far longer than the original steam ever was. Once again a special bottom-fermenting yeast strain is used, and fermentation is done in shallow pans. The result is a beer with a singularly assertive flavor and a delightfully spicy hop bouquet. It's a beer with a certain edge to it, but one that from the first sip proclaims itself as one of the world's classic beers.

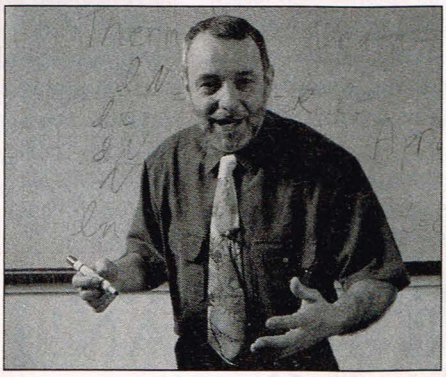
One reality that an article such as this one can't ignore is that "steam beer" is a registered trademark of the Anchor Brewing Co. It's possible to imagine at least one rationale Anchor might have for this: As mentioned before, steam beer as a generic style had a very poor reputation, and with the exception of a single example had died out all together. Anchor reinvented the style, keeping some parameters but dramatically changing the overall impact of the beer. Very few people now living can claim to have tasted a steam beer not inspired by or actually made by Anchor. Therefore, it could be argued that the term has passed out of the general usage and into the specific, and further, that anyone else using the term for a commercial product could expect to benefit by Anchor's prior use of the name.

Not long ago an Anchor spokesman advanced another argument in a trade journal, to the effect that "steam beer" had never referred to a specific style of beer but was rather applied to beer in general by Californians of the Gold Rush days. There's too much evidence to the contrary, though, to give this argument much consideration. The legal control over the use of the term is sometimes a nuisance to those of us with the task of sorting out beer styles one from another, but it's difficult to see how it could be of any harm to the industry.

Brewing Tips

Whether it's called "steam beer" or by the much more generic name "California common beer," this can be a very satisfying style to brew. For those looking to get just "in the ballpark," an amber wort similar to a bitter or an

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CIRCLE 60 ON READER SERVICE CARD



India pale ale represents a good starting point, and hopping with Northern Brewer and fermenting with one of the excellent yeasts available for the style will get you close enough to the original to begin the tuning process.

Grain brewers will find that if they have very soft water a little gypsum can be quite helpful. One to 2 percent of rye malt in the grist seems to add just that touch of sharpness that's so pleasing in the commercial example. If you're thinking of kraeusening in a Cornelius keg though, make very, very sure that the safety pressure-release valve is functioning correctly! And please, don't even think of trying the kraeusen levels described above in bottles. When (not if) they explode, the flying glass fragments can easily injure or kill!

Martin Lodahl is currently writing a book on steam beer with John "Brook" Ostrom for Brewers Publications.

Between the Wars Steam

(A very close interpretation of a post-Prohibition commercial steam beer recipe)
(5 gallons)

Ingredients:

- 5 lbs., 2 oz. domestic six-row pale malt
- 6 oz. 80° Lovibond crystal malt
- 2 lbs., 1 oz. corn grits
- 1.5 oz. Cluster hops
- 1 oz. Northern Brewer hops
- .75 oz. corn sugar

Step by Step:

In one mash vessel (the "cooker"), mash in 11 ounces of the six-row in one gallon, three ounces of water at 117° F. Add the grits, raise the temperature to 167° F over a period of 30 minutes, then heat to boiling.

Meanwhile, in a larger ("main") mash vessel, mash-in the remaining six-row in five quarts of water at 117° F. Return the mash to 117° F, and hold it for the duration of the cooker's boil.

Boil the cooker mash for one hour, then add to the main mash. The temperature will probably be around 143° F. Raise the mash to 150° F; hold 12 minutes. Raise the mash to 158° F; hold until converted (won't be long). Mash out at 165° F for 10 minutes. Sparge with 5.5 gallons at 165° F.

Boil 90 minutes, adding Cluster hops (Sacramento Valley, alpha acid percentage unknown) at 30 minutes and Northern Brewer hops (a concession to modern tastes) at 70 minutes.

Ferment at 60° to 65° F with steam beer yeast, available from Wyeast, BrewTek and others.

Prime with corn sugar.

OG: 1.052
FG: 1.013

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CIRCLE 35 ON READER SERVICE CARD

Keg Cleaning Made Easy

Build This Simple User-Friendly Quick-Connect System for Less than $50

by Tom Fuller

One afternoon my good friend and kegging mentor Dan stopped over for a beer. I drew him a glass of my harvest mulberry. I was feeling really proud because this was the best mulberry harvest I had to date and this year's brew was particularly wonderful.

Dan is not one to hold back his feelings or opinions. Until this point he had at least not spit out one of *my* beers. He took in the aroma and was pleased. He sipped it, got a queasy look on his face, and made a mad dash to my sink. While giving me a disgusted look, he spit and then held his hand to his mouth and with his tongue pushed out a little black and white globule. He said, "You know you have to clean your faucet and stuff don't you?"

This led to a discussion and a disassembly of nearly my whole keg fridge. Upon disassembly of the faucet and quick disconnects, I found some of the most disgusting mold formation I'd ever seen this side of a dorm-room toilet. That was the moment I put together my first "friendly" keg system.

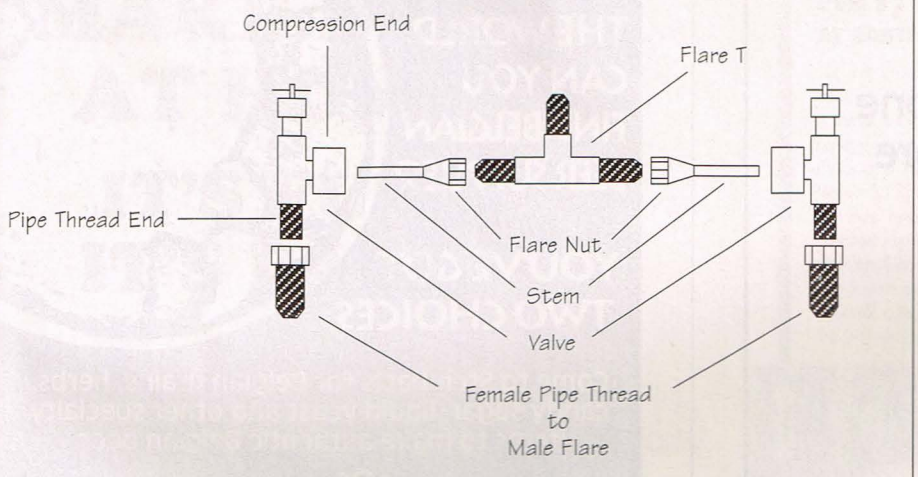
If you already have a keg system set-up, you may find this information, particularly the sections on faucet disassembly, helpful when it comes time to completely clean your system. Over the years and after disconnecting the system many times to clean, I've come across the problem of shrinking hoses. Every time you have to disassemble the system, your hoses get shorter and shorter because you must cut off the hoses from the barbs. This design tackles that problem by eliminating the barbs entirely.

You don't have to clean all of the hoses after every keg, but you do need to clean the faucet, shank, and disconnects. Flushing sanitizer through all of these parts just doesn't get into all of the areas you need to clean.

These instructions set up a two-keg system for easy disassembling and cleaning. The complete system is configured around 1/4-inch flare fittings and 3/16-inch tubing.

FIGURE 1

GAS MANIFOLD



Easy Setup

This set-up is divided into two groups: carbon dioxide and beer. It is designed for a two-keg system. The only tools you need are an adjustable wrench, a hacksaw or tubing cutter, and a pipe-flaring tool (optional).

Carbon Dioxide

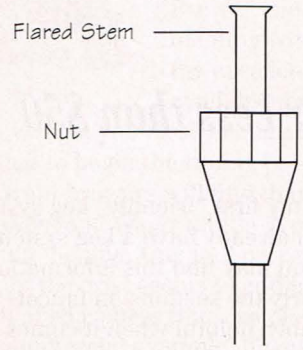
The design starts with an easy disassembly for your CO_2 tank and some shut-off valves for keg changing and accessories. Next come quickly removable hoses for reconfiguration and ease of transportation.

Parts Needed

5 – 1/4-inch flare nuts (49 to 69 cents).

FIGURE 2

FEMALE FLARE FITTING



1 — two-foot length of 1/4-inch "L" copper tubing ($1).

1 — length of 3/16-inch ID (inner diameter) vinyl tubing, rated for 25 psi (pounds per square inch) or higher.

The length varies depending upon your set-up. You will be using this same tubing for beer as well as CO_2.

2 — 1/4-inch gas flare fittings.

2 — quick-disconnect soda keg fittings ($3 to $5).

Assembly

Step one is to make or purchase some female flare fittings. You can purchase these already made from some homebrew supply stores and hardware stores. They will cost from $1.99 to $3.99 each.

To make your own, cut a two-inch length of the 1/4-inch copper tubing. Using a flaring tool, flare one end and insert it into the flare nut (see figure 2). This is now the stem you will insert into the tubing. For this project you will have to make seven stems. While you're at it, you might as well make 10 — you will always need them for future projects.

Screw the CO_2 supply hose (the one that goes into your refrigerator) onto your regulator output. The other end of the supply hose will connect to the gas manifold.

Gas Manifold

Parts Needed

2 — 1/4-inch compression needle valves with 1/4-inch pipe thread.

2 — 1/4-inch female pipe thread to 1/4-inch male flare adapter.

1 — 1/4-inch male flare T.

1 — length of 1/4-inch "L" copper tubing.

Assembly

Insert the flare stem into the compression end of the valves with flare nut already on the other end and tighten down. Screw flare nut onto flare T (see Figure 1, page 51).

Screw pipe-thread-to-flare-thread adapter onto pipe-thread end of valve. Do this to other side of T. This is your gas manifold. Empty end of T goes to CO_2 hose. Screw supply lines onto

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valve ends to route to your keg's quick-disconnects.

Beer

Now we have to get from the keg to the glass. This should be as simple to set up and tear down as the rest of the system. This also needs to be the easiest to clean.

Parts needed

2 — 1/4-inch flare nuts with stems (made previously).

2 — faucet shanks without hose barb.

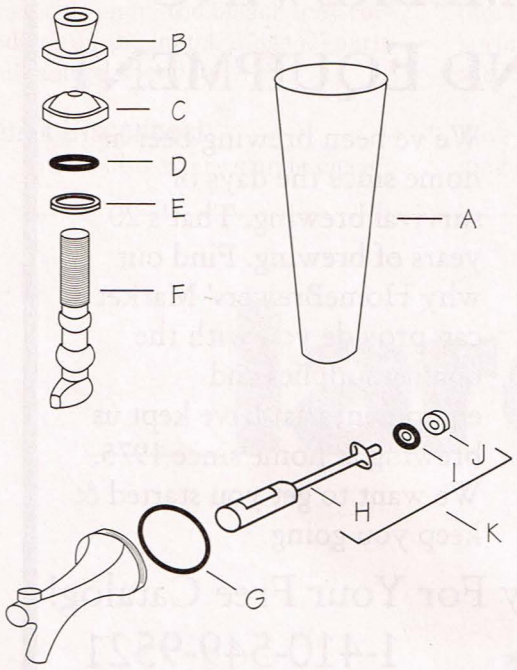
2 — 1/4-inch hose tail pieces (65 cents to $1).

2 — coupling wing nuts ($1.50).

1 — length of 3/16-inch ID vinyl tubing, rated 25 psi or higher. You need a length of tubing long enough to hook up the CO_2 and to reach from

FIGURE 3

BEER FAUCET



A. Tap handle
B. Collar
C. Bonnet
D. Friction washer
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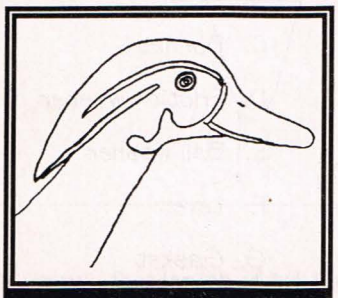
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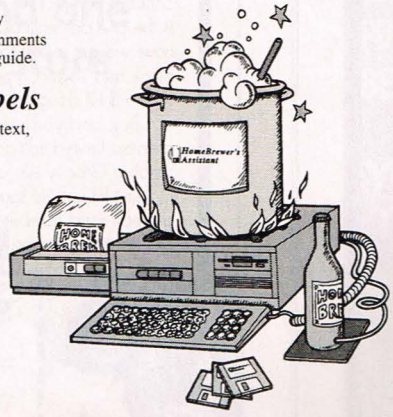
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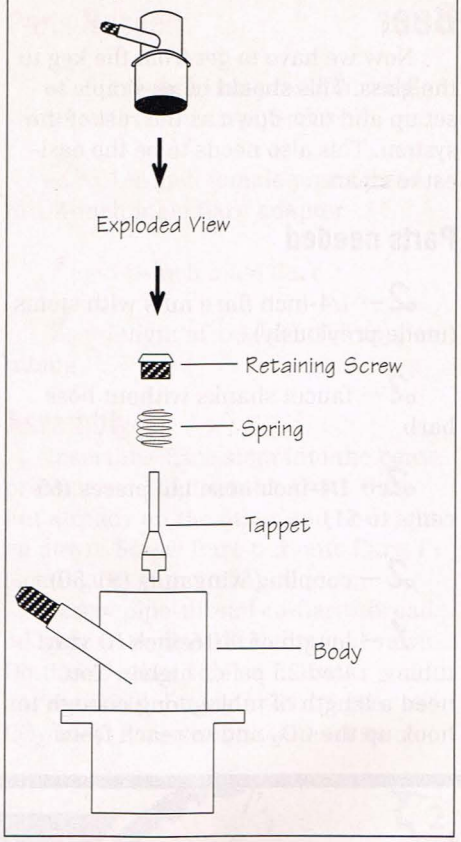
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FIGURE 4

QUICK DISCONNECT



your beer kegs to the faucets.

2 – 1/4-inch beverage flare fittings.

2 – quick-disconnects (soda keg fittings).

Assembly

Cut your tubing to size to reach from kegs to faucets. Insert previously made flare nut and stem into one end of each piece of tubing. Slide coupling wing nut over the other end of the tubing, push it along the tubing to cover the nut and stem. Insert the hose tail piece for the faucet. If your faucet is a hose barb type, you can cut the barb off with a hacksaw and still achieve a seal. Screw tail piece onto faucet shank and flare fittings onto disconnects. That's it. You are now ready to pour yourself a pitcher.

Typical System Cleaning

This should be your typical, quick system cleaning method. It is best to

clean your kegs immediately after you empty them. If for some reason this can't be done, at least keep them under pressure to ensure a stable "clean" environment.

Keg Cleaning Tip

Scrub your keg and be sure it is free of all yeast splooge (technical term) and other yuckies (another technical term). The next step is to clean out your beer lines.

Fill the keg with sanitizer (such as 180° F water, iodophor). Connect the filled keg to your system as you would for beer. Pressurize to 10 psi. Shut off the CO_2 and open the faucet, draining the keg into a bucket. When the keg comes to a slow drain, close the faucet and let set for five minutes. Pressurize the keg again. Shut off the CO_2 and drain the keg again. When the flow stops, your lines are clean.

To keep the keg clean between brews, fill the keg with cool water and about one ounce of iodophor (an iodine-based sanitizer that won't harm stainless steel). Seal the keg and fill it to 10 psi. Release this pressure and then fill it again to 10 psi. You then can store it until you next need to use it. It will remain clean with iodophor, and the CO_2 fills all of the air space, keeping it clean.

Faucet Cleaning

As intimidating as it may seem, the beer faucet is actually a very simple piece of machinery. The faucet consists of 10 parts (see figure 3) that are very simple to disassemble and thoroughly clean. For quick changing from keg to keg, simply running a faucet brush dipped in sanitizer in and out of the faucet a few times will be sufficient. About four times a year or if a keg has been on for a month or more, it is a good idea to disassemble the faucet for cleaning. The faucet shank can be cleaned with a good cotton pipe cleaner or a long, wooden-handled cotton swab such as those used to clean heads on tape decks.

To disassemble the faucet, remove the handle and unscrew and remove the collar. Unscrew and remove the bonnet. Pull the knob lever up and out of the body and shaft. Push the shaft out of body from the front of body. Then you can remove the shaft nut and clean the shaft seat and inspect it for damage. Clean all parts with a toothbrush and faucet brush in a mild bleach or TSP solution. Don't soak them overnight; the bleach may corrode or pit the metal. Rinse all parts well and reassemble.

Quick Disconnect

This is also a very simple piece, consisting of four parts (see figure 4). These should be cared for the same as the faucet.

Unscrew the retaining screw with a quarter or other non-damaging item (not a screwdriver). Take out the spring and tappet. Clean the same as the faucet.

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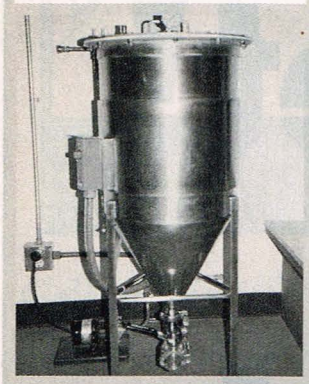
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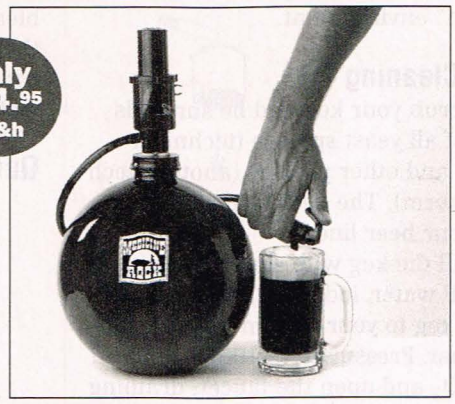


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Calling Dr. Science

A Peek Through the Doors of a Brewery Lab

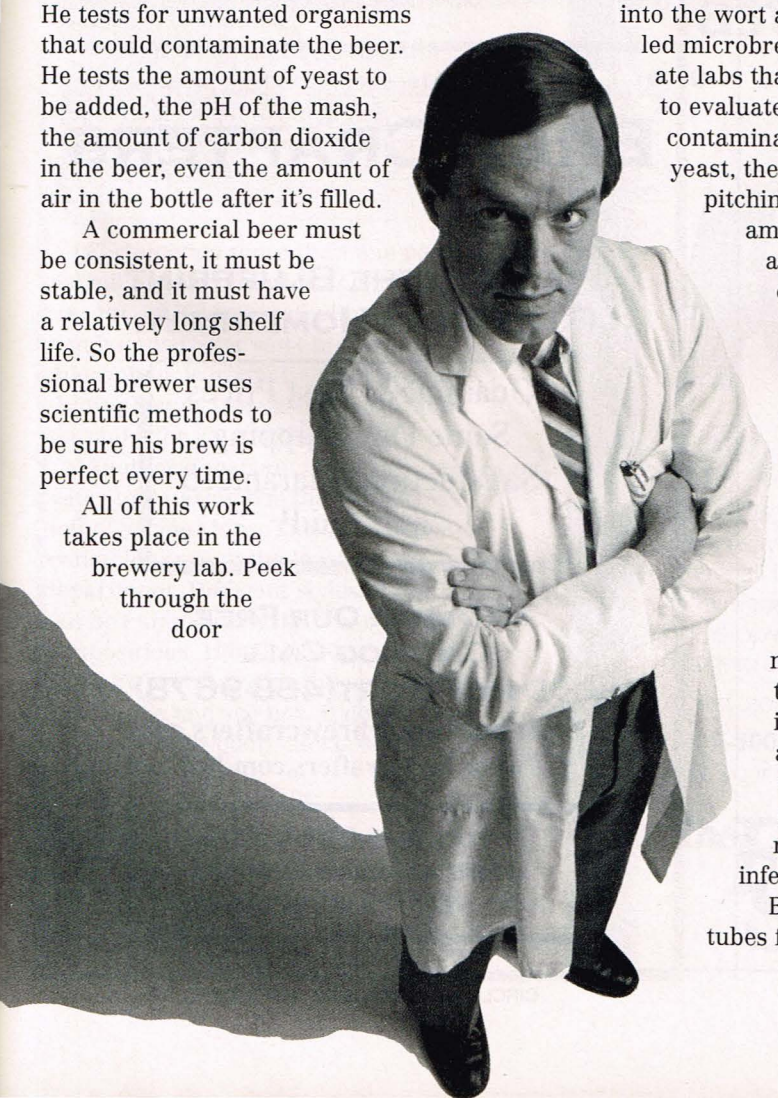
by Keith Wayne

Maybe you've heard this comparison: Each beer, to a passionate homebrewer, is like a child. The brewer has raised the beer from nothing. He's nurtured it. He's eagerly monitored its progress. And when it turns out well, he's justifiably proud.

Well, professional brewers sometimes feel that way, too. But a pro's beers are less like children and more like patients. The pro creates the beer and nurtures it just as the homebrewer does. But a commercial brewer also has to know every detail of his beer's health. He tests the water used to make the beer to be sure it's just right. He tests for unwanted organisms that could contaminate the beer. He tests the amount of yeast to be added, the pH of the mash, the amount of carbon dioxide in the beer, even the amount of air in the bottle after it's filled.

A commercial beer must be consistent, it must be stable, and it must have a relatively long shelf life. So the professional brewer uses scientific methods to be sure his brew is perfect every time.

All of this work takes place in the brewery lab. Peek through the door at a brewery lab and you'll see lots of equipment, from Bunsen burners to pressure cookers. You'll also likely see a brewer busy testing beer, wort, mash liquor, or any of the beer's components: malt, hops, yeast, or water.



Counting Yeast

Yeast is scarce in filtered beers. However, its fermentation by-products are the key to making beer taste like beer. The yeast presents a tricky problem in beer production because, by the nature of the fungus, yeast is difficult to sanitize. What this means is that whatever is with the yeast when it is inoculated into the wort goes into the wort as well. This has led microbreweries to create labs that are outfitted to evaluate the bacterial contamination of pitching yeast, the viability of pitching yeast, and the amount — the actual number — of yeast being pitched.

Typically, only one strain of yeast, and no bacteria, is welcomed into the wort and beer by the brewer. Selective growth media are used to detect any intruders, which are best described as contaminants rather than infections.

By stabbing test tubes full of Hsu's lactobacillus and pediococcus media with samples of pitching yeast, the brewer detects the presence of these bacteria. Lactobacillus and pediococcus are prime spoilage organisms in wort and beer, and they are viciously indiscriminate. The growth medium is simply a solution that provokes these specific organisms to multiply, making them easier to detect.

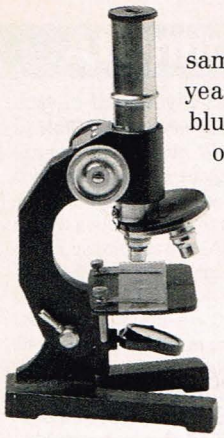
Another nasty contaminant is "wild" yeast. Wild yeast other than the saccharomyces species (the species that brewers use) can be detected with another experiment. A petri dish is filled with lysine medium. Next, a small amount of the pitching yeast is picked up on a sterile loop and streaked onto the medium. Then the dish is incubated for two or three days at 80° F. Saccharomyces won't grow, but other species do. If there are unwanted yeast types present, they soon become painfully apparent.

Yeast also must be tested for unwanted strains of the saccharomyces species. This is a bit more difficult but fortunately, non-brewing strains of the species tend to be more resistant to an antibiotic called Actidione (or cyclohexamide) than are brewing strains. The test starts with a growth medium called universal beer agar. It consists of beer mixed with a jelling agent, agar, that is made from seaweed. Actidione is mixed with the universal beer agar at a concentration of 20 parts per million.

The yeast sample is then plated on a petri dish containing this medium and incubated. If there is any yeast growth, it will be unwanted strains.

It's Alive!

Yeast will not make beer if they are dead, so it's important to make sure the yeast being pitched has some life in it. To do that, the brewer stains a



sample of pitching yeast with methylene blue dye, five pH, and observes it under a microscope at a magnification of at least 400 times. Living cells will appear colorless, while dead cells will appear blue.

A good way to figure out how many yeast cells are in a slurry while conducting a viability test is to put the sample on a hemocytometer. A hemocytometer is just a special slide with grids on it. It has an exact capacity of 0.0001 ml of liquid used for counting blood cells. By counting the number of cells in the grids and multiplying by 10,000, the brewer can determine the concentration of pitching yeast in a slurry. Once the total number of live cells per given volume is known, the brewer can properly and consistently pitch his or her wort.

The best idea for the homebrewer is to keep everything very clean and use fresh yeast — not yeast that has been sitting around doing nothing but dying for a long time. Also, be sure to make up a starter at least three days in advance to get the yeast reproducing and vigorously fermenting before you pitch your precious wort.

Water

Water makes up 90 to 97 percent of finished beer. As the primary ingredient in beer, water should be evaluated prior to its use in brewing. First of all, it should be potable. In other words a person shouldn't become sick from drinking it. Brewing water should be relatively free of chlorine and have a pH no higher than about eight. Professional brewers use either a pH meter or some litmus paper to determine the acidity or basicity of the water. The common swimming pool tester kit can be used to measure chlorine.

Inspecting the Malt

Malt is responsible for 99.99 percent of the dissolved solids in your wort. The best way for a professional brewer to examine it is to get the malt analysis sheet from the malting company. Not only does this save thousands of dollars on the lab budget but also hours of the brewer's time.

However, any conscientious brewer will take the time to visually inspect each new batch of malt. This malt should be sound and free of foreign debris such as soy beans, sunflower seeds, and rodent droppings. Also, the majority of the kernels should be plump with only few of them being small and scrawny, commonly known as "thins." Most important, the malt should smell and taste pleasing, therefore, some should go into your mouth before it goes into your mash.

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Sniffing Out Hops

Beer consists of only about 35 parts per million hop components. However, these hop compounds are extremely strong in flavor and/or aroma. The two important classes of compounds in the hop cone are the bittering agents, humulones and lupulones, and the aroma agents called essential oils.

The alpha-acid content is typically displayed when you buy hops. This is a measurement of the humulones in the hop and is a good indicator of how much bittering power that hop has. Any brewer should note the alpha-acid content before haphazardly dumping them into the boil.

Information on the essential oils of the hop is much more difficult to come across. Most small-scale brewers rely on the information supplied by the hop distributor and an organoleptic (sensory) evaluation.

The hops should be a brilliant green with no browning noticeable. Also, hops begin to smell like cheese when they get old. Hops should smell like hops.

Certainly no more than one part per million free chlorine should be present, as it can react with phenolic compounds in the wort to produce chlorophenols in the finished product. Chlorophenols taste medicinal and do not make for a good beer.

Another important aspect of the water to determine is the concentration of various ions. This information is available through the local water department. Different styles of beer can be enhanced by different water compositions. Homebrewers should begin by brewing with the tap water from home and see how it does. Then, if there is a problem, tackle some water evaluation.

Weighing in on Mashing

The mash is a most important step in whole-grain brewing and needs to be evaluated as such. Standard specifications to record include the temperature of the mash at its different rests as well as any increase in temperature over a given time.

The ratio of water to grist (the grain being mashed) is recorded and should be between two and three pounds of water to one pound of grist. The pH of the mash is recorded using either a pH meter or litmus paper. The reason for having fairly neutral water is to assure that the buffering compounds in the malt are able to reduce the pH of the mash to between 5.2 and 5.4. If the pH of mash liquor is determined at room temperature, it should be 5.6 to 5.8. This pH range is optimal for the amylases, enzymes that help convert starch to sugar and also reduce the extraction of astringent phenolic compounds from the malt.

Another helpful practice is to measure the specific gravity of the wort at specified intervals during the lauter. This is done simply by removing a sample of the wort and either taking a reading with a refractometer or hydrometer. A refractometer measures the refraction of light through liquid. Thus, it tells

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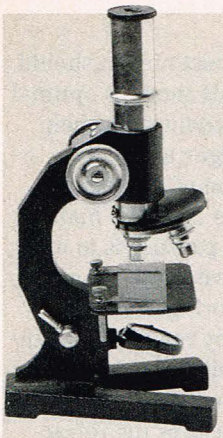
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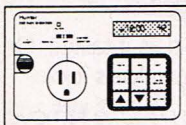
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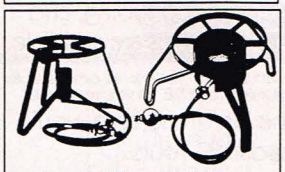


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the brewer the amount of dissolved solids in the wort. A drop of wort is placed between two pieces of glass. The soluble solid content of the wort is determined by measuring the difference in the refraction of the glass and the wort.

Specific gravity provides a similar measure, but as much as 300 ml of wort is required for a hydrometer reading. The wort is poured into a graduated cylinder or similar piece of equipment and the hydrometer is floated in the wort. The soluble solid content can be read off of a scale on the hydrometer, and a slight correction is then made due to the temperature of the wort. Information on wort fractions allows the brewer to compare one lauter with the next.

One final useful bit of information on the mash is the completion of the conversion of the starch to fermentable sugars and dextrins. This can be determined by mixing a drop of iodine with a drop of mash liquor. If a purple color appears, starch is still present and the mash should be continued. Lack of purple color indicates full conversion and time to lauter.

Mash Tests for Homebrewers

When brewing at home, temperature is of utmost importance during mashing and should be monitored. If a properly dilute mash is allowed one hour at 150° to 156° F, full conversion will occur. As for the mash pH, try brewing with your tap water first. If it does not yield a satisfactory result, alter your strike and sparge water as needed by using food-grade phosphoric acid.

To correct the acidity, simply measure the initial mash pH and then mix in 15 ml of the acid. Take another reading of the mash and, if necessary, repeat until the desired pH is achieved.

Wort

When the boil is done, bitter wort is the result of all the work. Forced attenuation (conversion of sugar to alcohol) and a test for wort spoilage organisms are two commonly used methods for evaluating wort.

Forced attenuation provides a simple method to determine the final gravity of the beer before the full-scale fermentation is complete. To force the attenuation of the wort, the brewer pitches half an ounce of active yeast with 10 ounces of cooled bitter wort in a clean 20-ounce jar. The jar is placed in the incubator at 80° F and swirled every couple of hours to provide ample oxygen in the medium.

When fermentation ceases, within approximately 24 to 36 hours, a gravity reading is taken. This is the terminal gravity of the entire batch.

Another test determines the microbial stability of bitter wort — in other words, the potential that unwanted organisms will grow in it and spoil it. This test starts with a 10-ounce sample of the wort, taken using sanitary methods and placed in a sanitary jar. The wort should be taken after it has been cooled and before yeast is introduced. The jar is then held at room temperature and monitored for microbial activity. If there is none within 48 hours, chances are the wort is quite stable. This test yields information on how

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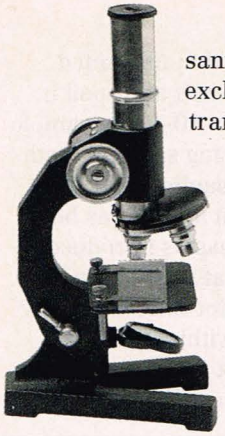
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sanitary the heat exchange and wort transfer processes are.

Neither of these tests is particularly useful for homebrewers for one very simple reason: After the wort has been cooled it is very vulnerable to spoilage. The more that it is tampered with, the better the chance of spoiling the batch.

It's Beer!

Beer, the result of all the work and worry, is evaluated by the small-scale brewer for consistency between batches and shelf life. In three commonly performed tests brewers measure the CO_2 content before packaging and the air content of the bottled product and perform a sensory evaluation.

The amount of carbon dioxide in the beer is measured using the ideal gas law — the product of pressure and volume are proportional to the temperature of the gas (PV = nRT). Brewers measure CO_2 volume to keep it constant between batchs. They use a device that holds a sample of the carbonated beer in a closed container. The CO_2 is forced out of the solution by shaking the container vigorously. The volume of CO_2 is then determined by reading the temperature of the beer and the pressure of the container.

The air content of a bottle is measured to determine how well the filling system evacuates the air and how quickly the beer may oxidize. Air is measured by bubbling all of the gas content of the bottle through a burette filled with a strong solution of sodium or potassium hydroxide. The CO_2, a gas, is converted to bicarbonate, a solid. When the air is the only gas remaining, it can be easily read from the graduations on the burette. Because homebrewers typically bottle condition, the CO_2 content should be consistent if the same amount of sugar and yeast is used each time a particular beer is made. Furthermore, bottle conditioning scavenges any oxygen that may be present in the bottle.

Follow Your Nose

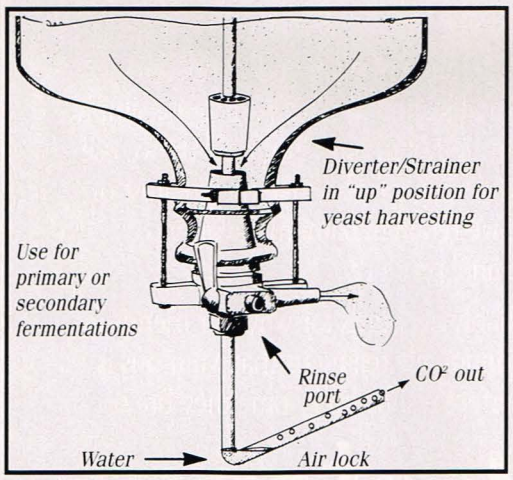
By far the most important test done on the beer is the organoleptic one. The beer should look the same as it always does, it should form and hold its usual head, it should smell and taste the same, and it should feel the same in your mouth. And of course, all of these attributes should be pleasing.

A good brewer should do a sensory evaluation of each batch made to continually improve the quality and consistency of the product.

The brewer's lab is an extremely interesting place. It provides the ability to objectively evaluate beer and place numbers on many of its properties. However, it's important to remember that the object of a beer lab isn't to compile data. It's to aid in making the best beer possible.

Keith Wayne is a brewer at Gray Brewing Co., Janesville, Wis.

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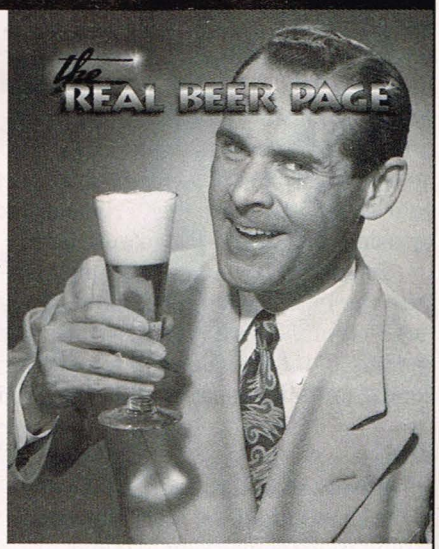
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A is for Amylase

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

A

adjunct - any substitute unmalted grain or fermentable ingredient added to a mash. Reduces cost and produces lighter-bodied, paler, less-malty beers. *You can use rice as an adjunct, but I wouldn't try that leftover chow mein.*

aeration - exposing a substance to air, performed at various stages of the brewing process. *When I used my electric mixer to aerate, I got cookie dough in the wort.*

airlock (or **fermentation lock,** or **bubbler**) - a one-way valve that allows carbon dioxide gas to escape while preventing the entry of contaminants. *Put the airlock on the carboy before the exterminator begins spraying.*

air rest - a break in the steeping process that allows oxygen to enter and stimulate growth.



ale - a generic term for beers produced by top fermentation, usually with infusion mashing. *Good ale cures a lot of ills.*

alpha acid - the soft, bitter hop resin (one of two present in hops, with beta acid) responsible for most of beer's bitterness. Measured as a percentage of the total weight of the hop cone.

alpha acid units (**AAU**) - percentage of alpha acid in a sample of hops multiplied by the weight in ounces of the entire sample. (One ounce of hops with an alpha-acid content of 1 percent contains one AAU of .01 ounce of alpha acid.) *No one told me about alpha acid units. Now I'm bitter, and so's my beer.*



all-grain beer - a beer made entirely from malt (instead of using malt extract).

amylase - generic name for enzymes that break the bonds holding starch molecules together.

attenuation - the drop in specific gravity that occurs as the wort ferments.

B

bacteria - one-cell organisms that reproduce rapidly under strict temperature, pH, and other conditions and can be killed by disinfectants. *I know I don't have bacteria in my beer. I put a whole can of Lysol in the wort.*

barm - liquid yeast that appears as froth on fermenting beer. (Can be used as a verb meaning to pitch, to add yeast.)

beerstone (or **beer scale**) - a hard film created by the combination of calcium oxalate, protein, and sugar that is formed when the same vessel is used repeatedly. *Is that cement in the bottom of your carboy or did you let beerstone build up for six or eight years?*

beta acid - a soft, bitter hop resin that is harsher in flavor than the alpha acid but almost insoluble at normal wort pH values.

bitterness units (BU or HBU) - a system to express the bitterness in beer with a unit based on alpha acid content. The homebrewers' bittering unit estimates the bitterness of hopped malt extract by multiplying the amount of hops by the alpha acid unit of the hops used.

body (or **mouthfeel**) - the consistency, thickness, and sensation of fullness created by beer in the mouth. *I prefer a full-figured beer; one with body.*

boil - the step in brewing when the sweet wort is transferred to a brew kettle and boiled with hops to produce a bitter wort.

bottle-conditioned - beer carbonated naturally in the bottle by priming or re-yeasting. *My drinking arm gets bottle-conditioned when I taste a well-carbonated beer.*

break - the clumping and separation of protein matter during the boiling stage (**hot break**) and cooling stage (**cold break**).

brilliance (or **brightness**) - description of beer in terms of clarity and effervescence. (Also called purity). *That beer is brilliant! It doesn't taste that great, but it really sparkles.*



buttery - having a taste like butter or butterscotch, signifying the presence of diacetyl. *My buttery beer may not seem good, but wait 'til you try it on toast!*

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C

caramel malt - a malt that is prepared by "stewing" (kilning in a moist environment) to produce sugars from starch. The sugars caramelize when the malt is dried to yield color and flavor compounds. *Don't worry, adding caramel malt won't make your beer chewy.*

carbonation - injecting or dissolving carbon dioxide gas in a liquid to create a bubbly taste and texture.



carboy - a large glass or plastic vessel with a narrow neck.

chalk - a common term for calcium carbonate, frequently used in brewing dark beers.

chill haze - a haziness in beer caused by the precipitate formed when a beer is refrigerated. *That band is called the Chill Haze. They specialize in Hendrix and homebrew.*

chillproofing - treating beer to make it more resistant to chill haze, usually by holding beer near freezing for several days or adding polycar and/or silica gel during the second stage of fermentation. *Putting a jacket on your carboy won't chillproof your beer. When it's cloudy, you need an umbrella.*

clarification - removing suspended particles from the wort or finished beer through mechanical or chemical means.

closed fermentation - anaerobic fermentation performed in closed vessels.

conditioning - the process of carbonating beer.

crystal malt - see caramel malt. ■

Specialty Extracts:

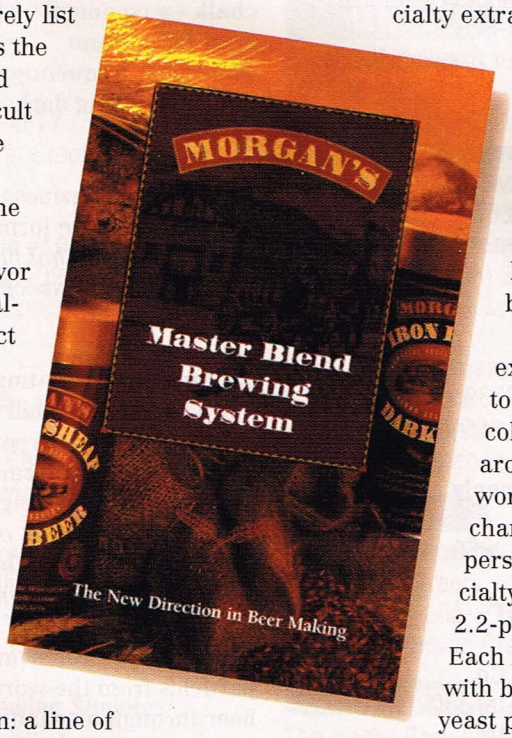
Freedom of Choice for Kit Brewers

One of the most fun aspects of full-grain mashing is the freedom it presents to the brewer. The all-grain brewer has two dozen or so specialty grains to choose from. He can use them in any quantity. He can mix and match. He has broad control over the final makeup and taste of the beer.

Kit brewers have freedom, too. They choose from any of the many excellent style kits on the market to brew beers ranging from India pale ale to stout. A kit brewer who wants to change the malt flavor of the base extract has a dilemma, however. Kits rarely list the type of grains the extract is mashed from, so it's difficult to make accurate changes.

In addition the best option for changing the flavor is to steep specialty grains, in effect doing a partial mash. It's not more difficult, but it does take more time.

Morgan's has come up with an innovation designed to give kit brewers more freedom: a line of specialty extracts. It's an idea whose time has come, and at least two other companies currently have specialty malt lines in development. The new Morgan's Master Blend Brewing System is designed to let extract brewers choose their own flavor combinations and customize recipes to suit their taste and imagination.

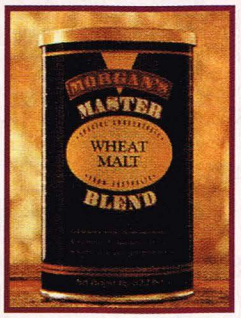


Because the extracts are professionally made they allow extract brewers to create beer that has a higher original gravity than they can generally get by steeping grains, according to Morgan's.

The system includes a set of four base extracts and seven "Master Blend" specialty malt extracts. The first step is to choose a kit from among the base extracts: Light Barley, Dark Barley, Wheat, and Rice Malt. These are lightly hopped (15 IBUs) extracts that come in 3.75-pound cans. Each one can be brewed strictly to type or can be customized by using the specialty extracts. For instance the rice malt could be used to make an Asian-style lager, whereas a wheat base would be used to build any light or dark wheat beer.

Using the specialty extracts allows you to control aspects of color, flavor, and aroma. In other words, you get the chance to assert your personal taste. The specialty extracts come in 2.2-pound (1 kg.) cans. Each base extract comes with both lager and ale yeast packets.

To get the most from the Morgan's system, start with their brochure, which includes color charts, style charts, detailed information about each base and specialty blend, and plenty of recipes. (Ask at your local brewshop.) After you've familiarized yourself with the system and your choices, you can create a shopping list



to suit yourself. Take that shopping list to your local homebrew shop to get the supplies you need and get started brewing a beer that reflects your own taste and goals. Whether that means a traditional German dopplebock or a creation you've just named, you can enjoy the beer *you* chose to make!

Morgan's Master Blends

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Wheat Malt:
- 60% wheat malt, 40% pilsner malt. Adds a wheaten, grainy flavor and boosts the head.

Caramalt:
- 60% caramalt grain, 40% pale barley malt grain. Very light in color, soft caramel flavor.

Chocolate Malt:
- 15% chocolate malt, 85% Munich malt. Light roasted flavor and aroma, darker color.

Dark Crystal Malt:
- 60% dark crystal malt, 40% Vienna malt. Rich, caramel, nutty flavor and aroma.

Roasted Black Malt:
- 12% roasted black malt, 88% Munich malt. A bitter, mocha flavor and aroma, used in stouts.

Beer Enhancer:
- Two-row pale malt extract, glucose, and honey. Enhances rather than changes flavor.

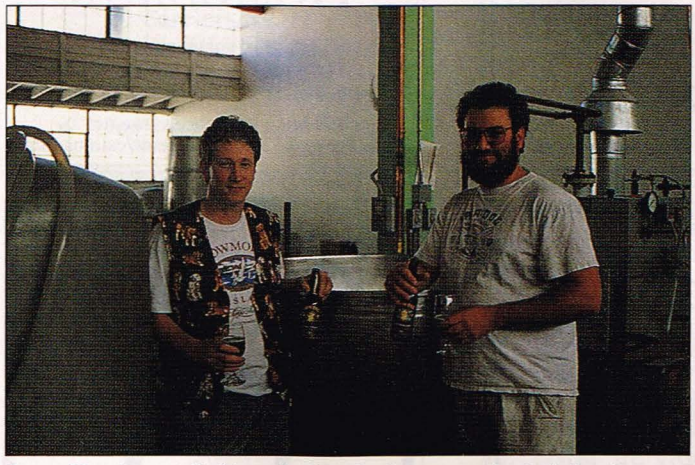
Taking the Road Less Traveled

by Steve Johnson

The discovery of a well-made barleywine is always a beer lover's delight. Like major historical events, such as the first landing on the Moon or the fall of the Berlin Wall, I can remember exactly when and where I was at the time I tried an exceptionally good barleywine.

It was July 25, 1995, at about three in the afternoon that I was sampling the wares at the Horse Brass Pub, one of the long-established British watering holes in Portland, Ore. After trying out the draft products, I asked the barkeep if he had anything special in a bottle. He pulled out an Adambier, made by the local Hair of the Dog Brewing Co. and with a twinkle in his eye he said, "Take a swig of this, mate."

"Curious name, 'Adambier,'" I thought. "Hair of the Dog — catchy. Could it have a bite to it?" The answer came with the first taste and was confirmed by the swallow that followed.



STEVE JOHNSON PHOTOS

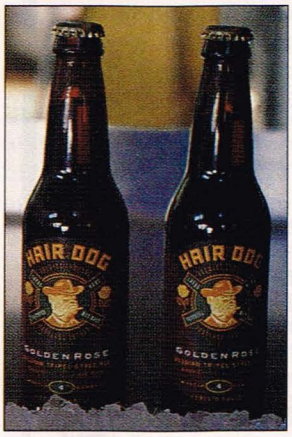
Doug Henderson (left) and Alan Sprints sample their barleywine, modeled after a beverage that allegedly knocked out King Frederick William IV of Prussia.

The nose was rich and malty, with smoky-nutty notes and a hint of alcohol. On the palate it was absolute ambrosia, with deep and complex malts. There was more than a hint of smokiness, with intimations of smoked sausage. It was nutty and well-rounded with a satisfying bitterness; hoppy but not harsh. A very big beer, yet it had its subtleties. Adambier is a beer you can revel in or brood over, depending on your mood. Yes, it did have a bite, a subtle one in the form of a smooth alcoholic warming on the throat. I could almost feel it nipping at my liver.

Adambier, whose name has recently been shortened to Adam, joins a group of outstanding barleywines from the West Coast: Old Foghorn from Anchor, Old Bawdy from Pike Place, Old Crustacean from Rogue, and Big Foot from Sierra Nevada. How does it hold up to this august company? Admirably. Because of its name, drinking pleasure, curious origins, and unusual brewery, it is destined for "cult beer" status.

The people who create this magic brew are Alan Sprints and Doug Henderson, two homebrewers who turned professional. Alan attended the Western Culinary Academy and worked as a chef at some of Portland's finest restaurants. Doug was a programmer for Blue Sky Research, creating fonts for mathematical typesetting systems. They met several years ago at a monthly meeting of the Oregon Brew Crew, Portland's homebrew club.

Soon Alan was hired as an assistant brewer at the local Widmer Brewing Co. and stayed on for two years. While Alan was serving as president of the Oregon Brew Crew and Doug was the editor of the newsletter, they began to discuss another project — starting their own brewery. In November 1993 they formed the Hair of the Dog Brewing Co. and began putting their brewery together. They found a location in a commercial neighborhood in southeast Portland.



Hair of the Dog produces beers that stand up well in good company.

Next they had to find some equipment. Doug says, "Our equipment is an odd collection of many things from many places." The hot liquor tank is an insulated collecting tower. It is fed by a 100-gallon, fast-recovery water heater. The mash tun was created from a modified, 10-barrel dairy trough tank. The brew kettle was a Groen steam-jacketed kettle from Campbell's Soup in Chicago. It holds 150 gallons but only yields four barrels because of the space required to allow for a full boil.

Doug recalls, "We were looking through magazine guides to old dairy equipment. They sent us color Polaroids of three different kettles. When we saw that one, with its bird-bath look, we just knew we had to have it."

They also acquired a grant (a vessel in which one inspects the mash during the move from mash tun to lauter tun), grist mill, and a hop back. The whirlpool, one of their few new pieces of equipment, was purchased from DME Brewing Systems of Canada. The heat exchanger came

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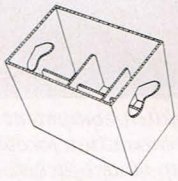
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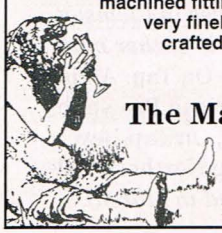
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from Rogue Brewing.

The water for the heat exchanger does not need to be cooled because most of the year the tap water in Portland is 55° F. Alan says that even in the summer when the water temperature rises to 65° to 68° F it is cold enough to chill the wort down.

The two primary fermenters are trough tanks, and the three secondaries are closed dairy tanks. The three tertiary tanks are freon-refrigerated tanks, which were designed for high pressure. The primary and secondary tanks have cold water circulating through their jackets.

Both of Hair of the Dog's beers (Adam and Golden Rose) are bottle conditioned. When bottling the Adam, which is three or four weeks old, they kraeusen the beer, (mixing a new, not-yet-fermenting batch with it just before bottling). Doug says he got the ratio formula for kraeusening from Dr. George Fix's book, *Oktoberfest Vienna Märzen*.

With regard to bottling Doug says, "We have a six-head, gravity-fed wine filler. We don't need a pressure device like a Meheen bottler because our beers are completely flat when they go in the bottle and don't need a counter-pressure system. The cost difference is about $1,200 for the gravity feed system versus about $25,000 for the pressurized filler!"

A friend made them a pneumatic bottle capper. The total investment at the time they opened was about $100,000 to $120,000, but Doug emphasizes that they have continued to put money into the business since opening.

Just about the time they were going to open, Alan received an unpleasant surprise. He was sued by Widmer Brewing, his old employer. When Alan joined the Widmer staff, he had signed a contract with a non-competition clause. Widmer worried that former employees might go into business and compete with them using their own recipes. But Widmer makes only draft beer, and Hair of the Dog planned to make bottled beer using recipes that didn't resemble Widmer styles in any way.

Although the case was settled out

of court, it certainly gave Alan and Doug a scare, not to mention staining the nice-guy image Oregon microbreweries had enjoyed.

The inspiration for Adam came from Dortmund, Germany. Local beer writer Fred Eckhardt mentioned the style he had found in the book *The Curiosities of Ale and Beer* by John Bickerdyke, published in London in 1889.

Doug says, "In the book is told the tale of King Frederick William IV of Prussia, who was traveling through the countryside near Dortmund. Because he was a king, a huge tankard of the best ale they had was presented to him. He took it and drank it in one gulp, as he thought a good king should. He immediately passed out for more than 24 hours. What he drank was the local dark, strong ale known as Adam, which was laid down in oaken barrels for 10 years."

Consulting Eckhardt as their beer historian, Alan and Doug set out to recreate this strong ale. It is made with six malts — pale, Munich, caramel (crystal), chocolate, black patent, and a dash of Scottish peated malt — and whole-leaf Northern Brewer and Tettnanger hops. Doug says, "The primary fermentation for Adam is incredibly vigorous. It only takes a day for the gravity to drop from 1.094 to 1.060, and the next day it will go all the way down to 1.030 or 1.024." Because of the heat generated during the rapid fermentation, the primary must be kept cooled by circulating cold water through the jacket. Because they have not yet purchased an augur, they must carry by hand all 700 pounds of malt used to make a batch of Adam. Adam finishes at 10 percent alcohol by volume and has a hefty IBU (bitterness) rating of 65. It is unfiltered and unfined but comes fairly clear because it passes through three fermenters and loses yeast sediment at each stage.



The end view of the primary fermenter reveals the equipment's origins. It is a modified dairy trough tank boasting the Golden Guernsey Milk Products tattoo.

Adam's sister beer, Golden Rose, is another fantastic revivalist style and cannot go unmentioned. Doug says, "This is in the Belgian tripel style. It has a deep golden color and a light, refreshing body. We use Belgian aromatic pale and Canadian honey malts along with Belgian candy sugar to give it a unique and fruity character. It is 7.5 percent alcohol by volume.

It's called a tripel because there are traditionally three additions of Belgian candy sugar. The first addition is in the boil, one in the fermenter itself, and a third is for priming at the end. Because it's had so much sugar, a simple sugar that is consumed immediately, it has a lot of carbon dioxide and a champagne-like dryness. A lot of the tripels are in the 1.080 range. Ours is actually 1.072, and it goes down to 1.010. It finishes dry as a bone with a rock-bottom gravity."

Both Adam and Golden Rose improve with age and can be stored at room temperature (55° to 74° F).

Hair of the Dog Brewing is a great example of how a new microbrewery, operating on a shoestring and having a marketing budget of zero, can not only survive but prosper in a seemingly saturated gourmet beer market. Doug explains it this way: "We started 10 years late in the microbrewery revolution and we really needed something that was a little more distinct in terms of beer, flavor, and name. We looked around and saw there were 16 other microbreweries in the city. We needed something with more distinction. So we dedicated ourselves to providing the beer lover with new and unusual beer styles."



The mix-and-match equipment includes the dairy-tank mash tun, foreground, and Campbell's Soup steam-jacketed kettle, background.

Doug and Alan would be glad to conduct you on a tour of their brewery. It is located at 4509 S.E. 23rd Avenue. Please call the brewery at (503) 232-6585 to make an appointment. For more information, they have a wonderful World Wide Web homepage (http://www.teleport.com/~doug/).

Despite an annual production rate of only about 200 barrels, their beers are now available in seven states: Oregon, Washington, California, Alaska, Pennsylvania, New Jersey, and Massachusetts. ■

Steve Johnson lives in Clemson, South Carolina, and is author of three brewery guidebooks: On Tap: A Field Guide to North American Brewpubs and Craft Breweries, On Tap New England, *and* On Tap Northern California *(to be released in March).*

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Advertiser Index

	Page No.	Circle No.
Above the Rest Homebrew Supplies	48	1
Alternative Beverage	18	3
American Brewers' Guild	14	4
American Heritage Beer Company	68	37
Ancient City Brew Supply	69	16
Anderson's Orchard & Winery, Inc.	16	6
Bavarian South Inc.	68	13
Beer Unlimited	20	8
Beerguy	53	47
Boston Beer Co.	1	15
Brew City Supplies	60	27
Brew King	Cov. II	71
BrewCrafters	58	72
Brewers Resource	26	14
Brewers Warehouse	56	-
Brewery, The	11	59
Brewfellows	68	19
Briess Malt	68	17
C & E Discount Supply	69	20
California Concentrate Co.	22	66
Cellar, The	68	50
Chas Boggini Company	68	55
Consolidated Beverage/Coopers	Cov. IV	18
Crosby & Baker, Ltd.	55	-
Cymba, Inc.	60	75
D & D Supply	56	70
Edme	5	21
Fantastic Fermentations	50	35
Fermentap	62	23
Filter Store Plus	59	24
Full Circle Communications	69	52
Fun Fermentations	45	25
F.H. Steinbart	52	22
Glasses, Mugs & Steins	69	84
Great Lakes Brew Supply	24	26
Happy Harry's Bottle Shop	13	77
Home Brewers Market	54	2
Home Brewery, The	17	29
Home Brewer's Software	54	28
Homebrew Headquarters	53	42
Homebrewing Depot	29	30
HopTech	21	31
James Page Homebrewing & Beermaking	48	-
Jet Carboy and Bottle Washer Co.	14	34
LD Carlson	25	36
Liberty Malt	8	49
Linnea Gruber Designs	68	43
Liquid Bread, Inc.	13	79
Listermann Manufacturing Co.	58	39
Malt Shop, The	68	40
Market Basket, The	69	41
Medicine Rock Division	56	62
Merchant Du Vin	2	44
Morgan's Brewing Co.	7	48
Munton & Fison PLC	61	-
New York Homebrew	13	54
Niagara Tradition	22	51
Northern Brewer, Ltd.	52	45
Northwest Brewers Supply Co.	69	32
Northwestern Extract Co.	20	56
Paine's Malt Ltd.	Cover III	12
Premier Malt Products	35	53
Quoin	45	-
Real Beer Page, The	62	-
SABCO Industries	15	58
Siebel Institute of Technology	49	60
Tkach Enterprises	16	-
TKO Software	29	33
U-Brew	68	38
Vinotheque	47	64
Williams Brewing	24	46
Wind River Brewing Co., Inc.	50	82
Worm's Way	33	83

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Why Don't More Women Brew?

by Daria Labinsky

A few months ago my husband, Stan, and I were in a bar in Albuquerque. I was drinking a porter from Russell Brewing Co., and the bartender asked me if I liked it. I thought for a second, then responded, "There are so many different interpretations of the style, you know. I prefer them a little more roasty, but this one's pretty good."

I wasn't looking at the bartender as I said this; I was looking at the beer. But Stan caught his expression and saw he was taken aback. Apparently, he rarely comes across customers who know something about beer — much less women who do.

I consider myself fairly knowledgeable about beer and brewing. Of course, I'm rather ignorant when compared to, say, a national beer judge or a professional brewer, but because most of the American public knows so little about beer, in just a few years I've become more beer savvy than probably 99 percent of the population. I credit this, first and foremost, to homebrewing.

It's amazing how proficient even the simplest background in homebrewing makes you. The basics of homebrewing, after all, are the building blocks of beer. Fermentation, carbonation, malt, hops, yeast, water — the same components that make up the most complex Berliner weisse also make the simplest pale ale. A homebrewer's beer education continues with every new batch.

As a woman who not only likes good beer but is a homebrewer, I'm definitely a minority. It's not known just how many homebrewers are women, but judging from personal experience, the number is low. I'm the only woman in my homebrew club, the AbNormal Brewers, and I can count on two hands the number of female homebrew judges I have met. Women can make good beer, as Great American Beer Festival and American Homebrewers Association award winners have proven, but there just aren't that many doing it — despite the fact that women were civilization's first brewers.

I dispensed beer advice to a group of men at Oldenberg Brewery's Beer Camp last fall. Most of the guys in the group were married, but none of them had brought their wives along. Most were obviously astonished that I was conversant in beer. When they learned that I brew my own, I even received several joking marriage proposals.

Homebrewing is a hobby Stan and I have shared since he gave me a brewing kit as a first-anniversary present.



Daria Labinsky finds she is usually in the minority when the majority are homebrewers.

Because we've always brewed together, I naively believed that many homebrewers brewed with their spouses. It took me a while to realize that's not the case, and an incident last summer really drove home the point. Two homebrewers' wives were talking at a picnic. One commented that she was waiting for her husband to "get over" beer. She considered homebrewing to be some sort of bad habit that her less-mature mate, who is in his late 30s, would eventually outgrow. I sat there feeling like I was on the wrong planet. Later I wondered, would they rather have their husbands down at the local bar pounding swill with their buddies, or making and drinking quality beer at home?

Homebrew supply advertisements often feature female homebrewers, and I've never once had a brewshop employee treat me in a sexist manner. Still, the percentage of women who homebrew remains discouragingly low.

Could it be that the majority of men don't want women — their wives, girlfriends, or women in general — to become homebrewers? That they're consciously trying to keep this pastime one of those "men only" bonding things? I don't think so. I believe that, like the brewers at Beer Camp, homebrewing men would be pleased if the women in their lives enjoyed making and drinking beer.

"Real Women Don't Drink Light Beer," reads the bumper sticker on our truck. It was a gift from Deb Carey, president of Wisconsin's New Glarus Brewing Co. Deb is another woman — and a mother — who happens to love beer. The stickers are her way of trying to spread the gospel of good beer.

Beer is fun to learn about and fun to make — and yes, it's fun to drink. It's time more women got involved — and fellow homebrewers, you can help. Invite a woman friend over the next time you brew. Bring her along as a guest to your next club meeting. Let's keep beer "the most democratic of beverages" for both sexes. ■

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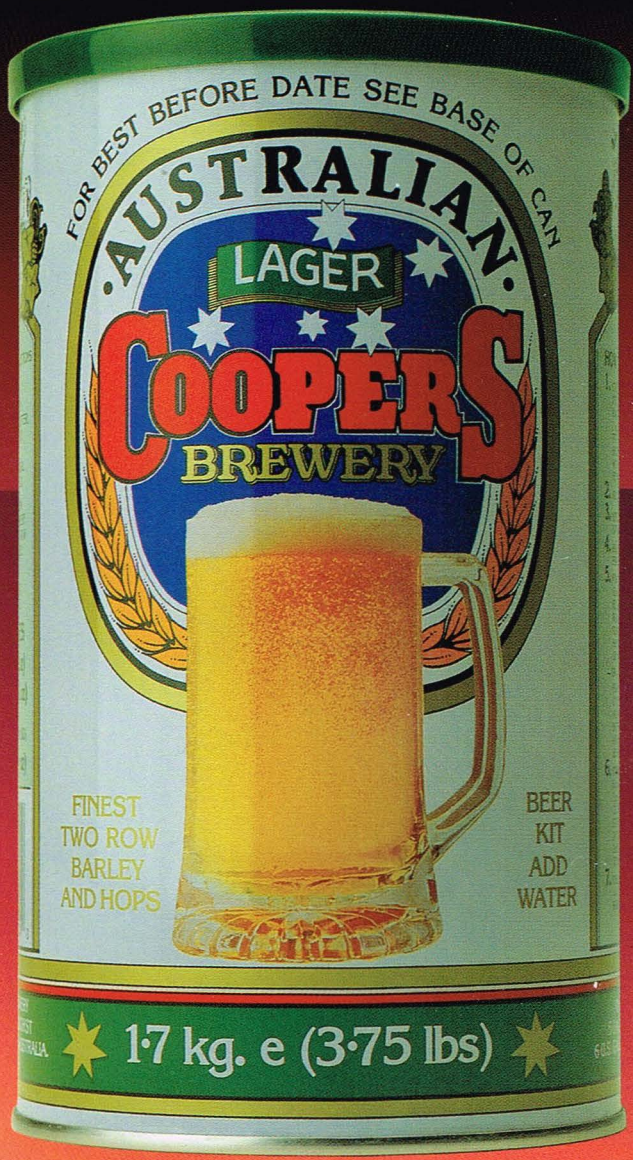
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