

Vol. 20 No. 3 Fall 1997 Published by the American Homebrewers Association

# ZYMURGY

FOR THE HOMEBREWER AND BEER LOVER

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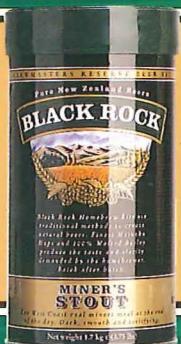
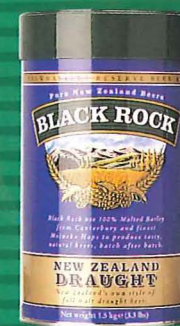
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To promote public awareness and appreciation of the quality and variety of beer through education, research and the collection and dissemination of information; to serve as a forum for the technological and cross-cultural aspects of the art of brewing; and to encourage responsible use of beer as an alcohol-containing beverage.

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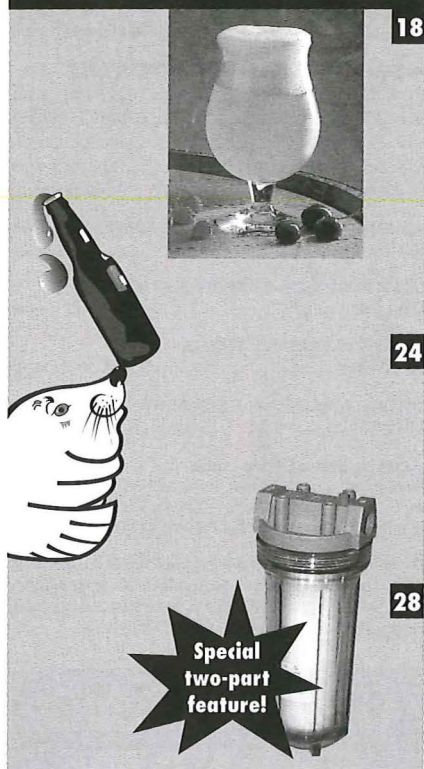
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# EDITORIAL



Dena Nishek

## Teach the World to Homebrew

**W**e are all advocates of homebrewing and good beer. Part of our responsibility as homebrewers entails sharing our knowledge and enthusiasm about beer and brewing and, of course, teaching people to homebrew.



a taster's perception of what beer was and what it can be.

Critical to being part of any healthy teaching/learning exchange is listening and adapting. By now you probably have heard about the

new AHA member benefits. I hope you've had a chance to try TechTalk and Talk Back, two new forums available to members. This community-wide communication is important both for members and the AHA. By providing this means of exchange and education, members have access to experts and information they might not have found otherwise. The AHA staff also has more opportunity to communicate with members. We can more readily learn what members are interested in, what they want to talk about and which direction they want to see the Association move.

You'll notice a new regular feature in this issue of *Zymurgy* – a survey. I hope you'll take a few minutes to fill it out and let us know what you think of the content of this issue and answer a few questions about the new benefits. Each issue of *Zymurgy* will contain a survey with content-related and Association questions so we can keep tabs on what's working and what needs adjustment.

As always, you are invited to write to me with feedback and article ideas at PO Box 1679, Boulder, CO 80306-1679; FAX (303) 447-2825 or dena@aob.org via e-mail.

In May I went to Chicago to judge in the first round of the AHA National Homebrew Competition and to attend the Midwest International Beer Expo the same weekend. At the Expo Randy Mosher and Michael Jackson gave a fascinating talk on ancient beers. They discussed the history of gose, graetzer and sahti, then Randy shared his homebrewed versions and recipe formulations. As I sipped and savored, I realized these brews represent the past and future of homebrew. They combine history, creativity and spirit in a way that could change

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# DEAR Z Y M U R G Y

Our Readers

## Corrections

The correct phone number for Vino-Filtro is (514) 483-5386. The 800-number on page 61 of *Zymurgy* Summer 1997 (Vol. 20, No. 2) is for Canada only.

In the Water Purification Systems Summary table on page 97 of *Zymurgy* Summer 1997 (Vol. 20, No. 2) the substances removed by carbon filters should be "simple organics (chlorine)" and substances not removed should be "minerals."

The correct weight for the CWE cider kit described in "Best from Kits," *Zymurgy* Summer (Vol. 20, No. 2) is 3.3 pounds (1.5 kg).

## Capturing the Spirit

Dear *Zymurgy*,

I finally got around to reading "Why We Brew," *Zymurgy* Special Issue 1996 (Vol. 19, No. 4) and have read it cover to cover. Although I began brewing in 1984, recently I have been moving often and have not brewed since spring 1994. I will be returning home soon and plan to return to homebrewing. Your excellent issue captured the art of homebrewing. I initially began brewing to create good beers which I could not buy. Despite the penetration of imports and some excellent craft beers, I will return to homebrewing as it is an act of creation. Your issue captured that idea. *Zymurgy*, the AHA and its associated competitions promote excellent beer production and improve homebrewing techniques. What distinguishes us from miniature professionals was

captured in your issue. I look forward to homebrewing and hope to make it to the National Conference this year. Best of luck on your continued success.

Yours truly,  
David H. Sharkis  
New Bern, North Carolina

## Mead Men Strike Again

Dear *Zymurgy*,

For those who haven't seen Spencer Thomas' article on Dan McConnell and Ken Schramm, brewers of the 1996 AHA commemorative mead, in *Zymurgy* Spring 1997 (Vol. 20, No. 1) it is definitely worth a read. Those photos are down right artistic. There are some good and "interesting" recipes from Ken and Dan for cysers and meads, and some discussion on blending finished meads (as well as other liquids) that approaches the radical and provocative. I quite enjoyed it.

Always a pleasure to read something that strays from the middle of the road. Thanks!

Mark Koopman  
via e-mail

## Elusive Real Ale List

Dear *Zymurgy*,

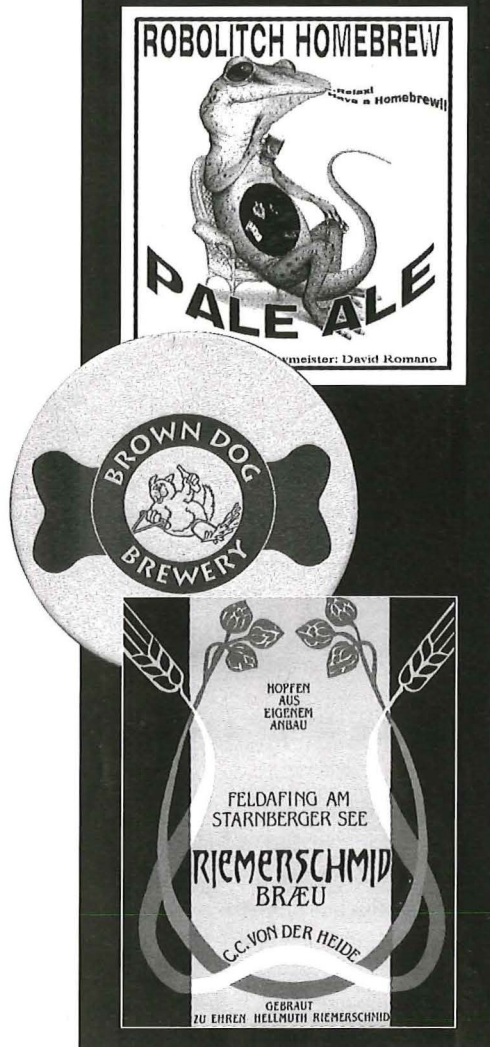
I think you will find real ale becoming more available in the United States. The list of brewpubs and breweries listed on page 49 of *Zymurgy* Spring 1997 (Vol. 20, No. 1) is probably just a small subset of the total. I hope you will print a follow-up article to this one with a more complete list of brewpubs and breweries that serve or make real ale.

I would like to add two to the list. In my little corner of the world there are two places where real ale can be obtained. The Old Dominion Brewery in Ashburn, Va., not only produces real ale but has a real ale tap in the brewpub located in front of the brewery. A real ale tap can also be found at



**Tom Nichter of Corpus Christi, Texas, came across this law office in Angola, Ind. Too bad you can't pay with a pint.**





Hero's Tavern in Manassas, Va., which is typically pouring Old Dominion products.

I think these people deserve recognition for providing real ale to their patrons.

Mark A. Zurich  
Dulles, Virginia

*The list you describe would be interesting, indeed. I'll mention the idea to the Institute for Brewing Studies. — Ed.*

## More Water Wonders

Dear *Zymurgy*,

Thanks for the recent article on water treatment, "Sips Ahoy," in *Zymurgy* Summer 1997 (Vol. 20, No. 2). Your readers should know that there is one more category of water filters that is better than others for homebrewers. Granulated carbon filters can add unhealthy levels of silver and can promote

growth of bacteria. Reverse osmosis systems waste two to five gallons of water for each gallon produced and remove the natural minerals (hardness) brewers usually want in their water. Fortunately there is an alternative. Solid carbon block filters do not add silver, do not promote bacteria growth, do not waste water but do leave natural minerals in the water. They remove chlorine, lead, pesticides, trihalomethanes and asbestos. I no longer have to worry about the health of my children, and I have clean water (minerals included) for brewing excellent beer. There are various distributors of solid carbon block filters. I get mine from Multi-Pure Corp., 21339 Nordhoff St., Chatsworth, CA 91311; (800) 622-9206.

Sincerely,  
Francis M. Dunn  
Goleta, California

*Thanks for the tip, Francis. — Ed.*

## Where's Our Water Wonder?

Dear *Zymurgy*,

I was stunned and disappointed when I read Ginger Wotring's article on brew water treatment in the Summer Issue. How is it possible that the author did not include water filtration products regularly advertised in your magazine and designed specifically for the homebrewer? The companies mentioned in the article have never spent a nickel on advertising in *Zymurgy*. I am outraged that you have turned your back on your own advertisers.

The homebrewing industry always has and must continue to rely on the integrity and loyalty of its members to support and sustain the dedicated manufacturers, retailers, homebrew clubs and homebrewers. Because *Zymurgy* is viewed as a national source of homebrewing information, some degree of responsibility and sense of fair play must be exercised when articles like this are published.

At Zymurtech we have worked hard to establish name recognition as well as a customer base including a network of retail homebrew shops that carry both our products as well as your magazine. When we support *Zymurgy* with advertisements and subscriptions we don't expect it to be a one-way street.

Sarah Phillips  
Owner, Zymurtech  
San Diego, California

*We regret the omission of Zymurtech and The Filter Store's products in our recent water filtration devices feature. However, to preserve journalistic integrity, the decision to include a product in an article is not based on advertiser status. — Ed.*

## No Interruptions, Please

Dear *Zymurgy*,

I have been reading *Zymurgy* for the past three or four years, and I treat each issue like my favorite IPA. As soon as I start it, there's no stopping me until I'm done.

There was one change I noticed that I must protest — all of the featured articles were broken into segments (continued on page XX). I find *Zymurgy* interesting enough that I read it like a book — front to back — and the last thing I want to do is haphazardly flip around looking for the continuation of an article. I found that it made me either lose interest in the article (Do I really feel like continuing?) or lose my spot in the magazine (Now where did the first half of this article end?).

I will continue to read *Zymurgy*, however I can't guarantee that I will continue to read all of *Zymurgy*.

Apprehensively resisting change,  
Paul B. Pizzimenti  
Pearl River, New York

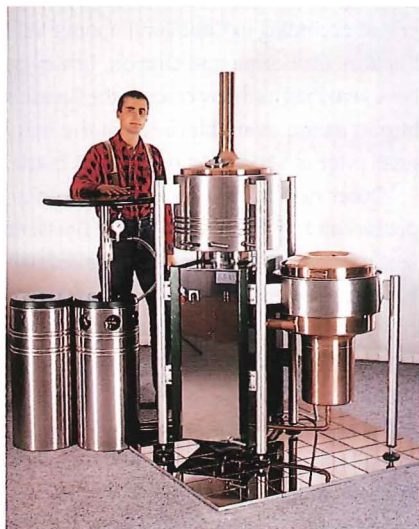
*A few readers have expressed emotions ranging from mild dissatisfaction to suggesting the decision to jump *Zymurgy* articles is ruining their lives. While hearing the reasons for the decision may not make you like it, they may help you understand why. Jumps are a magazine industry standard. Breaking up articles enables us to better balance the content of the magazine from beginning to end and lets us conserve art resources, because we spend less on color signatures and support art within articles. This means more money for more features. We hope the content keeps you reading. — Ed.*



# BREWNEWS

Amahl Turczyn

## HEAD LINES



Put this on your wish list!

### German Brewing Wonder

Designed by Dr. Heyo Menenga, the Braxonia Beer Machine – a marvelous example of German overengineering – soon will be available in the United States. Making its first appearance at the Hannover Trade Fair, the automated brewery can handle any recipe – extract or all grain – and can even execute a decoction mash. Once malt is put in the top receptacle, which acts as a mash tun, kettle, wort chiller, hop back and fermenter, Braxonia does the rest. Water is run into the malt at the specified temperature, mixed to the ideal mash consistency and then each step of your preprogrammed infusion or decoction mash is executed. Braxonia can even interface with the earliest model 386 PC, which can be used to

input and store all recipe specifications and time and temperature preferences, promising consistent brews each time. The high-surface-area heater raises the temperature of the mash or decoction and is guaranteed not to scorch.

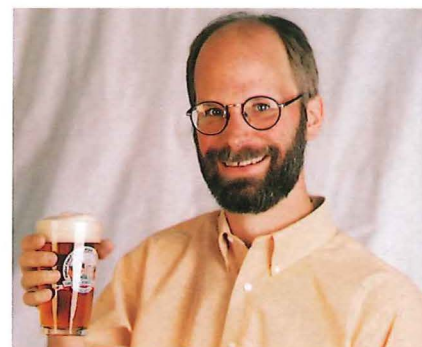
When the mash has been completed the slurry is carried to the lower chamber where the grain is lautered (if grain is used). Braxonia heats the sparge water to the optimum temperature then sprays it onto the draff and pumps the wort back to the upper receptacle for boiling. During the boil, the lower chamber empties and cleans itself, without a drip or a grain ever hitting the floor – this too is guaranteed. Waste water is pumped to a nearby drain.

After the boil, the chiller cools the wort at a rate of 1 Kelvin per minute, as fast as most German commercial breweries. The wort is then gravity fed back to the lower container and whirlpooled for optimal separation of hot and cold break material, then siphoned off to either the top container or an auxiliary vessel for fermentation. Braxonia's chiller can accommodate other stainless-steel fermenters, so another brew can begin simultaneously.

Though small – the maximum yield is five U.S. gallons (19 L) of 1.060-gravity wort per batch – Braxonia can be left to brew around the clock. Its computer-automated consistency makes it suitable for pilot brewing by home and commercial brewers alike. The device is constructed primarily of stainless steel with some copper parts and a few replaceable plastic parts.

The price? Early estimates suggest you can have Braxonia up and running for less than half the cost of a base-model BMW. (Courtesy of Clive W. La Pensée)

### Parker Takes Helm of AHA



Jim Parker of Boulder, Colo., was named director of the American Homebrewers Association in late May. In addition to various beer journalism projects during the last 10 years, including the founding of the Rocky Mountain region's first newspaper, *Rocky Mountain Brews*, Jim has worked as a professional brewer. He performed all brewing tasks at Dimmer's Brewpub in Fort Collins, and has owned a Fort Collins-area beer bar, The Mountain Tap. This past year Parker has worked for the Association of Brewers as administrator of the Institute of Brewing Studies.

"I've spent most of the past 10 years making my living from beer. But, by far, my greatest thrills have come from sharing beer I've made with friends," said Parker, a homebrewer of more than 10 years. "So if I have one overriding goal for the AHA, it's to see that more people get to experience the fun of brewing with friends for the pure joy of it."

Parker was interviewed by key members of the Association staff as well as several AHA board of advisers members. Contact Parker at (303) 447-0816, ext. 122, FAX (303) 447-2825 or jim@aob.org via e-mail.



## North American Brewery List

The following information is provided by the Institute for Brewing Studies. A complete list of breweries and brewpubs is updated quarterly and available for \$5 from the Association of Brewers at (303) 447-0816. Check <http://beertown.org> on the web for more frequent updates. For additions or corrections contact David Marcati at (303) 447-0816 ext. 135 or [davem@aob.org](mailto:davem@aob.org) via e-mail. This list reflects openings and closings as of May 29, 1997.

### OPENINGS

#### UNITED STATES

##### Microbreweries

**Alaska:** Borealis Brewery, Anchorage  
**California:** Great Beer Co., Chatsworth  
**Florida:** Indian River Brewing Co., Melbourne  
**Georgia:** Black Bear Brewing Co., Atlanta  
**Iowa:** Racoon River Brewing Co., Des Moines  
**Michigan:** Woodward Avenue Brewers, Ferndale  
**Minnesota:** Ambleside Brewing Co., Minneapolis  
**Pennsylvania:** Troegs Brewing Co., Harrisburg  
**Washington:** Whitstran Brewing Co., Prosser

##### Brewpubs

**Arizona:** A-Z Brewing Co., Paradise Valley  
**California:** Rock Bottom Restaurant and Brewery, Campbell; Barney's, Glendale; Crawford Brewing Co., Nevada City  
**Colorado:** Alcatraz, Littleton; Dillon Dam Brewery, Dillon; Phantom Canyon Brewing Co. (No. 2), Colorado Springs  
**Florida:** Brewzzi, Boca Raton  
**Ohio:** Mault's Brewpub, Portsmouth  
**Indiana:** Firkin Brewpub, Evansville  
**Kansas:** Sports Page Brewery, Lawrence  
**Minnesota:** Great Waters Brewing Co., Saint Paul  
**Missouri:** Hofbrauhaus Brewery and Bier Garten, Kansas City; Ry Bread and Apple Cor's, Springfield  
**New Jersey:** JJ Bitting's Brewpub, Woodbridge  
**New Mexico:** High Desert Brewing Co., Las Cruces; Sierra Blanca Brewing Co., Carrizozo

**New York:** The Lake Placid Pub and Brewery, Lake Placid; Fireworks Brewery and Restaurant, White Plains; Davidson Brothers Restaurant and Brewery, Glen Falls

**North Carolina:** Steve and Clarks Brewpub and Sausage Co., Durham

**Oregon:** Mia and Pia's Pizzeria and Brewhouse, Klamath Falls

**Washington:** Elysian Brewing Co. at Gameworks, Seattle

**Wisconsin:** Rock Bottom Brewery, Milwaukee

### CLOSINGS

#### UNITED STATES

##### Microbreweries

**California:** Shields Brewing, Ventura  
**Colorado:** Silver Plume Brewing Co., Silver Plume  
**North Carolina:** Woodhouse Brewing Co., Pfafftown; Smokey Mountain Brewery, Waynesville  
**Ohio:** All-American Brewing Co., Dublin

##### Brewpubs

**California:** Joe Joe's Brewing Co., Simi Valley; Albany Brewing Co. Inc., Albany  
**Colorado:** Fleetside Pub and Brewery, Greeley  
**Georgia:** Cherokee Brewing Co., Atlanta  
**Florida:** Tortuga's/Laggerhead Brewery, Jacksonville Beach  
**Massachusetts:** Main Street Brewing Co., Worcester  
**New York:** Zip City Brewing Co., New York City  
**Wyoming:** Bowman's Pub and Brewing Co., Laramie

##### Contract Breweries

**California:** William and Scott Brewing Co., Huntington Beach

## U.S. Drinkers Craving Belgian Beers

With the popularity of Belgian beer on the rise, as evidenced by an overwhelming demand for imported and domestic brands, a wider variety of Belgian imports are becoming available. Cantillon, described by some as the classic Belgian lambic, will begin showing up in specialty shops coast to coast this year. Curiously, one of the states with the greatest interest in these styles will not receive Cantillon – Colorado. Apparently distributors are unwilling to carry the brand, claiming the Colorado market already is saturated according to Cantillon importer Will Shelton. California and Oregon, however, have snatched as many cases of the Brussels import as are available, even at the hefty retail price of \$10 to \$14 per 750-mL bottle.

Other new Belgian imports are triple-, double- and white-style beers from Brasserie Lefebvre, as well as a honey beer called Barbâr and Schaapskooi's La Trappe (technically from Holland, though an authentic Trappist ale) available on tap in many states.

In Cooperstown, N.Y., Belgian beer importers Vanberg and DeWulf continue work on their farmstead brewery. Bert De Wit was named head brewer for Vanberg and DeWulf's Brewery Ommegang. De Wit, a graduate of Leuven University in Belgium, worked at Affligem and Moortgat for the past year. (*The Malt Advocate*, Special Awards Issue; Paulaner North America; Will Shelton; and the Vanberg and DeWulf web page)

## Council Created to Support Homebrew Industry

The AHA has developed a business program to encourage growth and provide a resource for homebrewing suppliers. The Home Beverage Suppliers Council is designed to:

- provide members with industry data and education in all aspects of retailing;
- open avenues of communication within the homebrewing community;
- build public awareness of homebrewing as a hobby. (continued on page 77)

## Kareem Criticized for Beer Ads

Professional basketball player Kareem Abdul-Jabbar has been criticized by fellow Muslims for doing Coors beer commercials. In 1971 the Los Angeles Lakers Hall of Famer converted to Islam, a religion that forbids the use of alcohol. Although Abdul-Jabbar said he was care-

ful not to be shown actually holding a beer and thought the commercial "was tastefully done," the Islamic Society of North America and the Colorado Muslim Society disapproved. Throughout his career, Abdul-Jabbar and his teammates have taken part in promotions of various alcoholic beverages. "Why now, at this point, do I get this static?" he asked the Los Angeles Times. (*Rocky Mountain News*, Jan. 24, 1997)



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Boston Ale Golden Pilsner Honey Porter Cream Stout Lightbip Scotch Ale Triple Bock Cherry Wheat Double Bock Oktoberfest Cranberry Lambic Winter Lager Old Fazzwig



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Walter Scheurle  
David Grinnell

Jim Koch

Jose Ayala  
Jim Pericles

William Reed (not present)

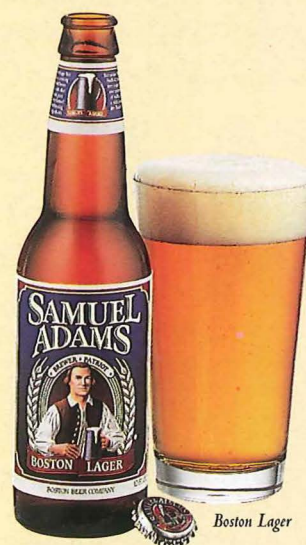
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## The Brewers of Samuel Adams Beer



Boston Lager



# HOMEBREW COOKING

Jerry Zeidler

## The Pretzel – Beer's Best Friend



**H**ave you ever relaxed with a fantastic beer while snacking on a wonderful, warm soft pretzel? Why not? After all, pretzels are beer's best friend! What, then, could possibly be more rewarding for the homebrewer than homemade soft pretzels to accompany that perfect brew?

We homebrewers have an intimate relationship with yeast. We select one or two varieties from hundreds for the specific properties they contribute to our beer. We nurture our little friends from a state of dormancy into a condition of healthy growth through the introduction of the proper nutrients. We keenly observe their progress as they work their way through our wort, transforming it into something altogether different – something to be admired.

It's only natural for a homebrewer to be enthusiastic about the use of yeast elsewhere in life. A good many homebrewers also are exceptional bakers. Take for example the creator of the pretzel – a 17th century Belgian monk who baked up these tasty treats as rewards for young students who worked hard at their lessons. Is there a more potent symbol of finely crafted beer than the image of a 17th century monk? Do you really believe he gave away all the pretzels he made? Not likely, when you consider how well a warm yeasty pretzel lightly sprinkled with salt goes with a rich Trappist ale. It's a match made in heaven.

Once you've made homebrew, especially if you've brewed partial- or full-



**Mmmm ... pretzels. Jerry says nothing beats a warm, homemade soft pretzel savored with a handcrafted homebrew.**

mash recipes, baking a batch of soft pretzels is a snap. You've already learned the first step in any recipe is advance planning. Just as you would when preparing to brew your favorite concoction (or decoc-tion, perhaps), take a look at your recipe and determine what ingredients and equipment you will need. Gathering all the items first and arranging them in some semblance of order helps immensely.

Pretzel recipes can be quite similar in structure (and sometimes ingredients) to beer recipes. Many homebrewers find pretzelmaking a natural extension of their creative personalities. The possibility of experimentation with new and unusual

ingredients and methods invariably leads to unique and delicious discoveries.

Basic soft-pretzel dough consists of flour, water, yeast, a little salt and sugar. These ingredients are mixed, kneaded and allowed to rise in a warm place. The next step is to roll out pencil-thin sections of dough about 15 to 20 inches long and twist into the classic pretzel shape, which is much easier than you might imagine.

The secret to great soft pretzels often is overlooked in modern recipes. The trick is to submerge the unbaked pretzels into a bath of boiling water, baking soda and salt for 15 to 30 seconds before arranging on a lightly greased baking sheet. In many



## Tying the Knot

Twisting a length of dough into a pretzel can be done two ways, the hard way or the easy way. The hard way comes naturally to most of us, so here we'll settle for a description of the easy way.



First, grasp each end of a rope-shaped piece of dough, allowing the center of the rope to dangle down in a U-shape directly over a lightly floured surface.



Next, begin to lay the dough down, preserving the U-shape. When you have roughly half of the rope on the surface, cross the ends about three or four inches from



the ends. Cross the ends a second time then allow ends to lay across the rest of the pretzel, near the bottom. Firmly press loose ends into main section of pretzel.



It should look very much like a skinny pretzel. If it doesn't, relax! Don't worry! Have a homebrew and try again. At this point, the dough is reasonably forgiving and can be manipulated without much problem. If you find you have twisted the dough into a Gordian knot instead of a pretzel, you can squash the whole mess and reroll it into a rope for a second shot.

Pretzel twisting comes much easier with practice. By the end of your first batch, you may even find yourself twisting them in mid-air, holding only the ends. Now that's something to shoot for!

recipes the dough is then liberally brushed with a mixture of egg yolk and water to achieve a perfectly baked golden-brown color. Traditionally, a sprinkling of coarse kosher salt is the last step before baking.

Some of the ingredients homebrewers may wish to experiment with include milk, whole-wheat flour, hot peppers, cheese, cinnamon or other spices, malt extract, or even finely ground specialty grains. For example, when ground into a coarse flour, crystal malt adds a depth of flavor this beer and pretzel lover finds irresistible.

Homemade soft pretzels are best served piping hot with a hearty supply of robust homebrew and shared with good friends. Many pretzel eaters, myself included, insist upon some type of dipping mustard for their soft pretzels. My personal favorite is a German-style horseradish mustard, but the fine art of mustard appreciation is another matter entirely.

Once you taste your first batch of homemade pretzels and wash them down with a brew you made, you'll know why beer and pretzels are bound to be the best of friends.

## Pennsylvania Dutch Pretzels

Makes about 2 dozen

- 1 package dry bakers yeast
- 1/2 cup warm water (110 degrees F) (118 mL)
- 1/2 cup sugar (118 mL)
- 1 1/2 tsp salt (7.4 mL)
- 2 cups milk, scalded and cooled (473 mL)
- 1/4 cup light vegetable oil (59 mL)
- 6 cup flour (852 g)
- 3/4 tsp baking powder (3.7 mL)
- 2 quarts boiling water (1.89 L)
- 3 tbsp salt (44.4 mL)
- 1 egg yolk, beaten and diluted with
- 1 tsp (4.9 mL) water or milk
- coarse kosher salt

Dissolve yeast in warm water. Add sugar, 1 1/2 teaspoons (7.4 mL) salt, scalded milk and oil. Slowly mix in 3 cups (426 g) flour. Cover and let rise in warm place 40 minutes.

Slowly add 3 more cups flour and baking powder. Knead until dough is no longer

sticky, using a little more flour if necessary to form a smooth, elastic dough.

Roll out and pat dough into 9- by 15-inch rectangle. Cut lengthwise into strips about one-half-inch wide. Roll each strip into rope 18 to 20 inches long. Twist into pretzel shape. Allow to rise uncovered for 30 minutes.

Preheat oven to 400 degrees F. Dissolve 3 tablespoons (44.4 mL) salt in boiling water. Dunk each pretzel into boiling water for five to 10 seconds. Drain briefly and arrange on greased baking sheet one inch apart. Brush with diluted egg yolk and sprinkle with coarse kosher salt.

Bake 20 minutes, or until golden brown. Serve warm.

## Extra Dough



When making pretzels, keep in mind you might not need as much dough as your recipe will yield. Don't cut the recipe in half, though. Make the full batch and freeze what you don't use.

Bakers yeast will bounce back from a few days in the freezer and the dough will remain usable as long as it is wrapped and sealed carefully. It's a good idea to knead the dough for about five minutes before freezing and shaping into a smooth ball or loaf to make unwrapping the frozen dough much easier.

To thaw, simply place in a lightly greased bowl large enough to accommodate the dough after it rises again. A metal bowl will greatly reduce defrosting time. Cover the bowl and allow it to rest at room temperature for about an hour. When the dough is soft enough, knead for a few minutes then return to the bowl to rise again. After the dough has doubled in size proceed as you normally would.



## Basic European-style Soft Pretzel

Makes 2 1/2 to 3 dozen


- 3 cups warm water (110 degrees F) (710 mL)
- 2 packages active dry bakers yeast
- 1 tbsp salt (14.8 mL)
- 2 tbsp light vegetable oil (29.6 mL)
- 8 to 9 cups flour (1136 to 1278 g)
- 2 qt boiling water (1.89 L)
- 2 tsp baking soda (9.9 mL)
- dash salt
- 1 egg yolk, diluted with 1 tsp (4.9 mL) water
- coarse kosher salt

In large bowl mix 3 cups (710 mL) water, yeast, sugar and salt. Allow to stand 30 to 45 minutes, or until yeast is rehydrated and active. Add oil and 2 cups (284 g) flour. Mix well. Add remaining flour 1 cup at a time, mixing thoroughly until a smooth dough forms. Knead for eight to 10 minutes. Place in lightly greased bowl, cover and allow to rise in warm, draft-free place for about 45 to 60 minutes, or until doubled in size.

Preheat oven to 475 degrees F.

Punch dough down. Remove pieces about double the size of a golf ball and roll into a 15- to 20-inch rope on a lightly floured surface, working from the center outward. The rope should be about the diameter of a pencil. Twist into classic pretzel shape and firmly press loose ends into main section of pretzel. Using a slotted spoon, submerge pretzels into bath of boiling water, baking soda and a dash of salt for 15 to 30 seconds or until pretzels float on the surface, whichever is longer. Pretzels will puff up some during this process. Relax, don't worry, have a homebrew and proceed by removing the pretzels from the bath and arranging on a baking sheet one inch apart. Brush with diluted egg yolk, sprinkle with coarse kosher salt and bake for 12 to 14 minutes at 475 degrees F.

Serve warm with homebrew (and horseradish mustard if I'm invited).

**Jerry Zeidler** is a part-time free-lance writer aspiring to write full time. A homebrewer since 1988 and pretzel maker for more than 15 years, Jerry's favorite snack is homemade soft pretzels, horseradish mustard and a tall glass of Dusseldorf-style altbier – homebrewed. 



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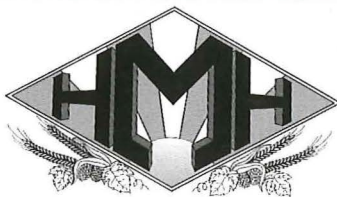
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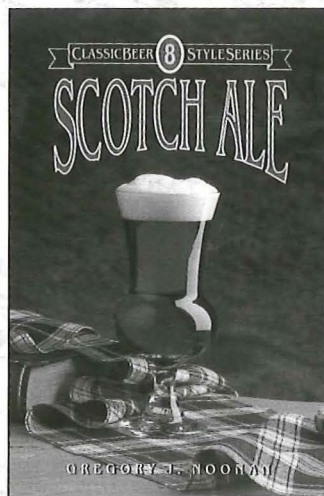
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# Travel the World of Beer

## First Stop: Scotch Ale



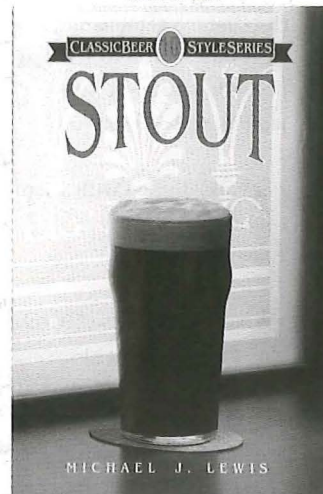
### Scotch Ale

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### Stout

In *Stout*, Dr. Michael Lewis uncovers the origins of stout, traces the history of some of the famous Irish stout breweries, explores the flavor profile of stout by conducting a blind panel tasting, and shares results of commercial stout brewers. Lewis provides recipes and instructions on how to brew your own batch of this classic beer style at home or in your professional brewery.

## Next Stop: Stout



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# TIPS & GADGETS

Homebrewers Like You

## Carboy Conundrum

**T**here you are, the cooled wort is in the carboy, the yeast is pitched and it is time for the airlock. You line the stopper up with the hole and apply pressure. Suddenly your attention is diverted: The dog is drinking from the sanitizer bucket, the Suns are leading a game in the fourth quarter or you are thinking about the mess you have to clean up before your significant other comes home. Then, oops, the stopper goes into the carboy.

You replace the stopper with a spare and decide to worry about the lost stopper and your new objet d'art after you rack the beer. What follows is a short list of ways to extract a stopper from a carboy.

Make a J-shaped retrieving wire from a stiff coat hanger. Work it through (from the bottom to top) of the center hole and, with a soapy solution in the carboy, gently pull it out. If this approach fails, lay the carboy on its side on your fireplace mantel and proudly show it off to your friends as "cork in the bottle." With luck they will believe you did it on purpose.

*Anonymous*

Well, unfortunately, I can speak from experience. I didn't worry about the stopper in the brew, which turned out just fine. To get the stopper out I flipped the carboy over until I got the stopper to line up flat with the hole. Then I took a

1 1/5-inch molly bolt and stuck it through the hole in the stopper. Here's the hard part: While the carboy is flipped over, screw the molly bolt tight. Eventually the bolt will grip the stopper. Then take a pair of needle-nose pliers and yank the stopper out. This destroys the stopper, by the way, but it is a small price to pay for saving a carboy.

*Joe Maino, Mount Laurel, N.J.;  
icr@mosquito.com*

Put a handkerchief halfway in the carboy neck. Tilt the carboy so the stopper rolls down into the neck and is laying on the handkerchief. Pull the handkerchief out and

the stopper will come with it. Use some hot water to lubricate the stopper if necessary. This procedure is an old magic trick for removing a wine cork from inside a bottle.

*Dale Hosack*

Cut off a half-inch length of a small nail, tie it to a string at the midpoint, slip it down through the stopper then pull the stopper out.

*Jeff Crowell of Meridian, Idaho;  
jcrow@boi.hp.com*

Get the stopper as far out as possible and then use a corkscrew to finish pulling it out. Works every time.

*Anonymous*

If the stopper doesn't have a hole, put the carboy in a refrigerator or somehow cool it down. Use a stick with double-sided tape on the end and affix it to the smaller end of the stopper, turn the carboy upside down and lodge the stopper in the mouth of the carboy. Once the stopper is lodged well enough so air cannot escape, place the carboy in the sun to warm up. The building pressure inside the carboy should force the stopper out.

*Chris Wiacek*

*These tips are reprinted with permission from the Brew Meisters Anonymous February 1996 newsletter.*

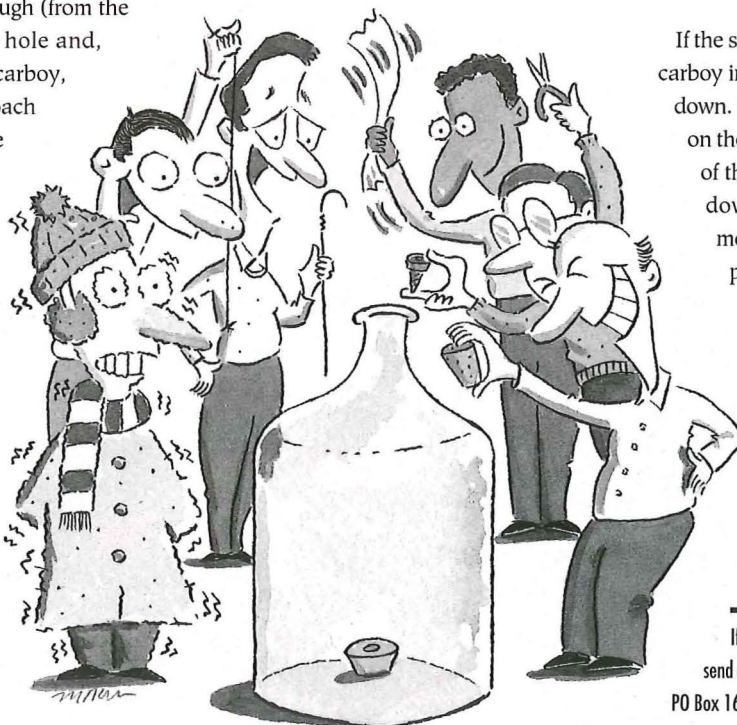
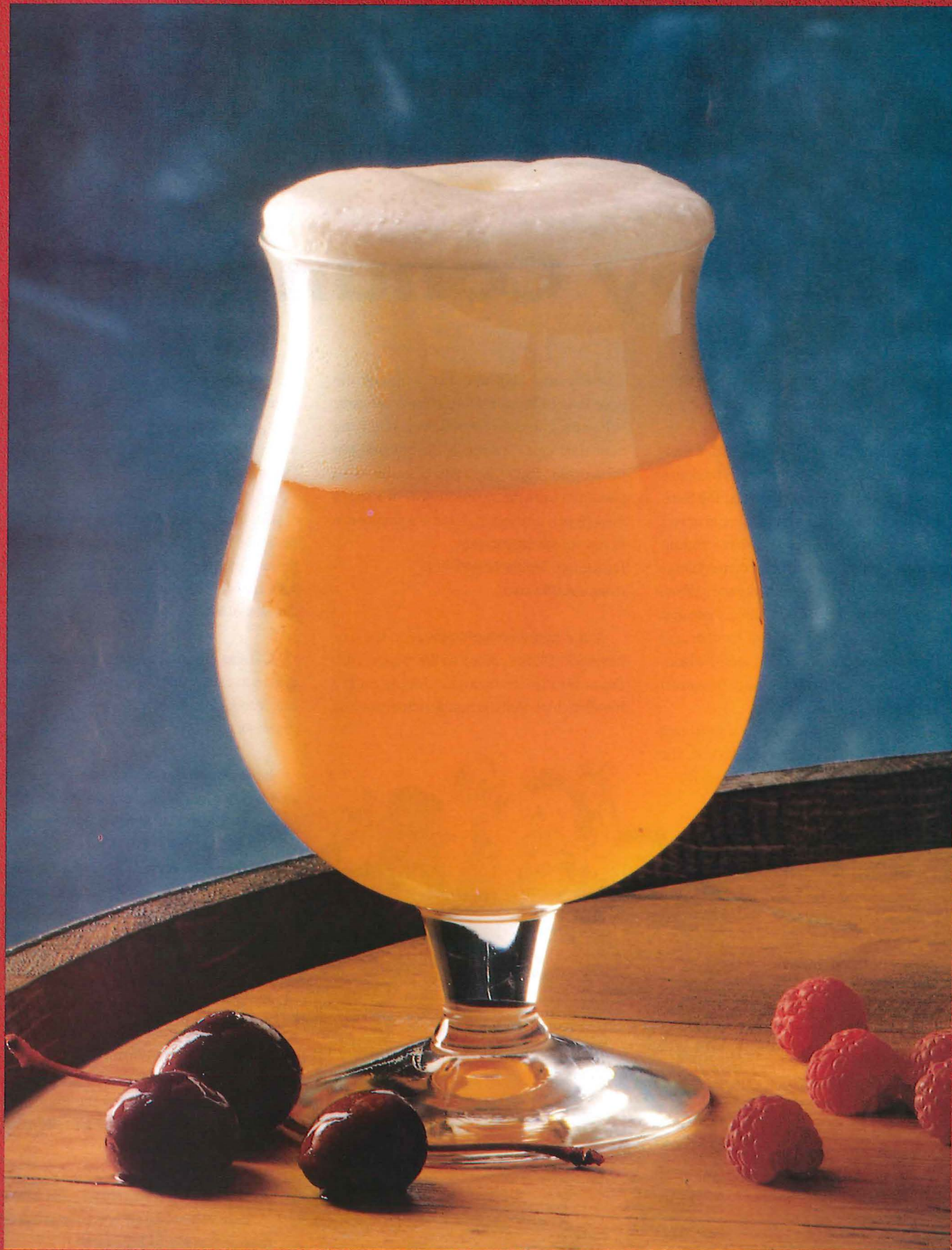


ILLUSTRATION BY MICHAEL MORAN

ZYMURGY Fall 1997

If you have a quick tip or tested gadget to share, send a brief description and photos to Tips and Gadgets, PO Box 1679, Boulder, CO 80306-1679.









The holes in the roof of the Cantillon Brewery are integral to their lambic brewing. Airborne microbial flora inoculate the wort to produce Cantillon's unique product.

# for the love of Lambic

Why not bring a little bit of Belgium to your basement? This sour sensation is worth the wait.

By John Isenhour

Lambics may be the most exotic beers to brew. The range of flavors and intensity varies incredibly from the very sour traditional style that puckers the mouth to the thicker, fruitier, sweeter styles that are the most popular sellers. And the array of fruits appearing in lambics is simply amazing. Somewhere in this cacophony of flavors and aromas should be a beer you can enjoy. But beware! Once you try them you might never be the same.

True lambic comes from a small area of Belgium in the province of Brabant called the Senne Valley. A 10-mile area around Brussels, a district called Payottenland, is the only source of this famous brew. The naturally occurring floras in this area are responsible for the beverages' depth of character. Lambics are inoculated by open air methods and it is believed that orchards are the source of the microbes.



Lambics are shrouded in mystery – even the origin of the name is in doubt. The root of the Latin “lambere” refers to sipping. The name of a town in the brewing area, Lembeek, may have evolved into lambic. “Alambic” is reportedly the name of a mash tun used for brewing lambics. Some, including Michael Jackson, speculate the name was derived from the Spanish word, “alam-bic,” for distillery during their presence in



the brewing area. In any case, the style itself is old, with one report from 1559 that made reference to lambic as an “old recipe.”

Indeed, it is arguable that a kind of “lambic” is the oldest style of beer. True lambic requires open-air inoculation of the wort, the so-called spontaneous fermentation method, and the earliest formal evidence for brewing, from about 6000 B.C., likely used similar inoculation methods. Only

relatively recently has yeast been recognized as a fermentation agent of choice and purified cultures become available.

Producing a lambic breaks almost all the normal rules of brewing: a long mash schedule using unmalted wheat and leaving dextrins and proteins in the wort, stale hops (“superannuated” is a kinder term), very long boils, overnight exposure in a barn-like atmosphere, extended periods of fermentation, a huge variety of organisms successively growing in the wort and the addition of all manner of fruit, even though some

## Lambic Fermentation Agents

The following is a general description of fermentation agents and a time line of their activity. These are ballpark estimates because brewery technique, temperature and batch-to-batch differences can create large variations. Quite a few fermentation organisms have been isolated from lambic (Michael Jackson indicates more than 80) so this list is not inclusive. It serves to point out that, although there are general phases in the process, brewing lambic is more an art than a science and explains why I believe a starter from a bottle of real lambic will add more complexity than using just a few pure cultures. The shortcoming of pitching starters made from commercial lambics is this selects the bugs dominant in the late stages of fermentation. The alcohol, acidity and lack of nutrients have killed the enteric bacteria and others that are active in the early stages of the spontaneous fermentation, which are responsible for substantial flavor complexity.

**Phase one:** From the first few days to about the one-month point marks the butanediol ferment, a mixed acid-producing ferment initiated largely by a variety of enteric bacteria.

Below are some of the bacteria and yeast that are generally present in the early stages of ferment. Of homebrewing importance is *Kloeckera*, the yeast strain present during the enteric phase. This strain is sometimes cultured and added to the ferment. Although the end result is not a strong flavor, it does secrete proteases into the wort that may break down proteins. The enteric phase of the ferment has not been the subject of intense research in the homebrewing arena – many enteric bacteria are *not* “Generally Regarded As Safe” by the FDA. Homebrewers usually are content to obtain sourness from a later stage of fermentation using *Pediococcus*. With real lambic the enteric stage is where much of the sourness comes from as the bacteria ferment glucose into 2,3-butanediol and ethyl acetate.

Acetic, lactic, formic and other acids also evolve at this point, which is why it is called a “mixed acid” fer-

mentation. The breakdown of formic acid into hydrogen and CO<sub>2</sub> during the first week is largely responsible for the early foaming that occurs. Large amounts of dimethyl sulfide (DMS) are produced, a real attenuation of around 15 percent is achieved and the pH drops to about 4.4.

Typical bacteria present include *Klebsiella*, *Hafnia alvei*, *Enterobacter cloacae*, *Citrobacter freundii*, *Escherichia coli* and *Kloeckera apiculata*.

**Phase Two:** From about two weeks to about four months mark the alcoholic ferment. Quite a variety of yeast are active at this point. After about two weeks the yeast population begins to rise and alcoholic fermentation begins. An attenuation of about 55 percent is achieved and the pH falls to around 4.0. Homebrewers can use a regular ale yeast for this phase. Indeed, it does not seem to matter what strain is used because any character will be stripped away or masked by other characteristics.

Active fermentation agents include *Saccharomyces globosus*, *S. diariensis*, *S. uvarium*, *S. bayanus* and *S. cerevisiae*.

**Phase Three:** From the third month until around eight months is the lactic acid phase, characterized by an increase (5 to 6 grams per liter) of lactic acid, and a drop in pH to around 3.2. *Pediococcus damnosus* is the major souring organism, some *Lactobacillus* have been isolated.

The primary sour bugs are: *Pediococcus damnosus* and *Lactobacillus*.

**Phase Four:** During and after lactic fermentation a secondary alcoholic ferment, lasting up to the eight-month mark, occurs where ethyl lactate increases and a large amount of attenuation occurs. Real attenuation increases to 80 percent and ethyl lactate increases an order of magnitude. The barnyard aromatics and some smoky aromas may develop.

Phase four fermenters are: *Brettanomyces bruxellensis* and *Brettanomyces lambicus*.



## Suppliers

This is a sampling of suppliers; some may vary their stocks. Check with your local homebrew supply shop.

### Yeast Culture Kit Co.

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this fermentation is traditionally done in oak barrels. After about a year a pretty good beer is beginning to develop. Some batches will be much more sour than others so many brewers blend to obtain a more stable flavor profile. Lambic blending is an art. In some cases commercial lambic blenders do not actually brew at all.

This might seem complicated, especially because most of us can't run down to

the Payottenland Brew-On-Premises Barn and run off a batch. The truth is, we don't stand a chance of making a true lambic unless we use all of the traditional techniques and methods, and we are brewing within about 10 miles of Brussels. Although we may not be able to replicate a true lambic, we can emulate the effect, sometimes with surprisingly good results.

(continued on page 81)



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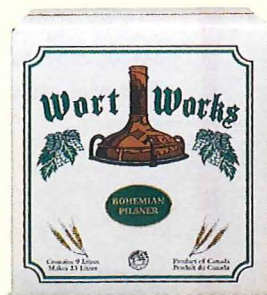
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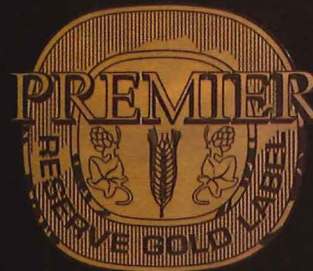
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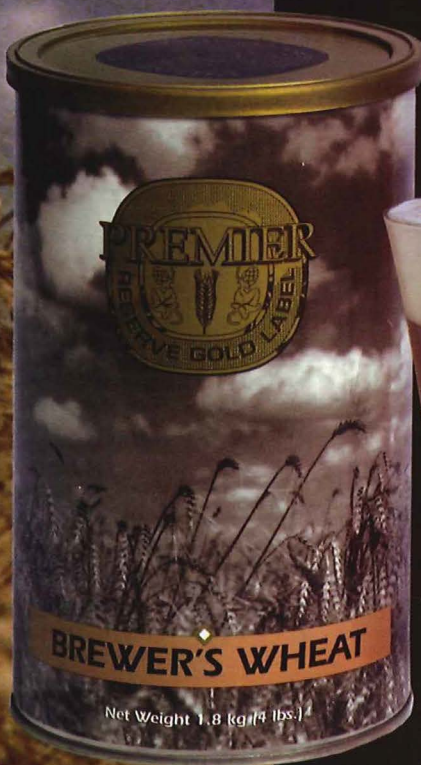
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# CHILL OUT!

## Put Your Refrigeration Fears on Ice

TEMPERATURE TRAUMA?  
LEARN HOW TO BUILD A CUSTOM  
REFRIGERATION SYSTEM FOR  
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SERVING YOUR PERFECT BREW.

When only the barest essentials of brewing technology had been developed, brewers used God-given yeast, simple tools and techniques that were only as complex as needed to produce reliable results. Fermentation was conducted at the prevailing temperature in their dwellings, and the beer was drunk just the same. The yeast we now know as the top-fermenting or ale type still is found to perform best at temperatures typical of an unheated cellar, and the beers thus produced exhibit their best flavors at similar temperatures.

As early as 1420 A.D., monks in Bavaria began to develop a technique using cooler fermentations and long aging periods to produce a distinctive type of beer. Although they were not aware of it, they were selectively cultivating bottom-fermenting yeast and sowing the seeds of the lager revolution.

By the mid-1800s, southern Germany's lager beers had become well-known and the most popular in that part of the world. These beers not only were fermented and aged at low temperatures, they also were better served at lower temperatures than their top-fermented cousins. German brewers were now more than ever dependent on seasonal temperature changes and whatever natural cooling they could achieve through caves, cellars and natural ice.

### MARRIAGE OF REFRIGERATION AND BREWING

About this time some attempts at mechanical refrigeration were meeting with success. A few of the earliest projects were

aimed specifically at chilling beer for consumption in hot climates, but most were concerned with producing ice in summer for a variety of uses, or preserving perishable foods (such as meat) by freezing for long-term storage or shipment to distant markets.

In the brewing industry, another key technological development of the industrial revolution – steam power – had caught on in a big way. Steam allowed brewers to increase production by reducing their needs for manpower and horsepower, but brewing activities still were limited to the portion of the year when cooler temperatures discouraged the growth of beer-spoiling bacteria and wild yeast. This limitation was most bothersome in Germany where bottom-fermenting beers were the fashion and laws prohibited the production of beer during warm weather. Large brewers who had invested heavily in mechanization had to let a lot of expensive equipment stand idle all summer.

### THE SEDLMAYR/VON LINDE CONNECTION

One of the best-known developers of the bottom-fermenting style was Gabriel Sedlmayr II of the Spaten Brewery in Munich. He did much to advance the understanding of lager brewing techniques, and was keen to introduce technological innovations. Sedlmayr approached engineer and academic Carl von Linde and asked him to develop a refrigerating system that would permit year-round brewing. Von Linde designed a mechanical refrigeration system that used the available steam power to drive a compressor

---

## By Martin P. Manning



which circulated ammonia through the Spaten cellars, creating the first successful refrigeration system of its type. Spaten still is one of the largest breweries in Germany, and Linde is a well-known name in refrigeration throughout the world.

## BASICS OF REFRIGERATION MACHINES

On the surface refrigeration appears to do something that goes against natural law – it causes heat to flow from a low temperature to a higher one. But just as water can be made to flow uphill by means of a pump and some added mechanical energy, there is a way to make heat flow in what seems to be the wrong direction. Machines that can accomplish this feat include refrigerators, heat pumps and air conditioners. All are essentially similar devices and most operate using exactly the same principles as the machine von Linde designed to cool the Spaten cellars. They work by using an intermediate fluid (refrigerant) to carry heat. The refrigerant absorbs heat from the cooled space as it is boiled from liquid into vapor (evaporation) and releases it to the surroundings as it condenses back to liquid.

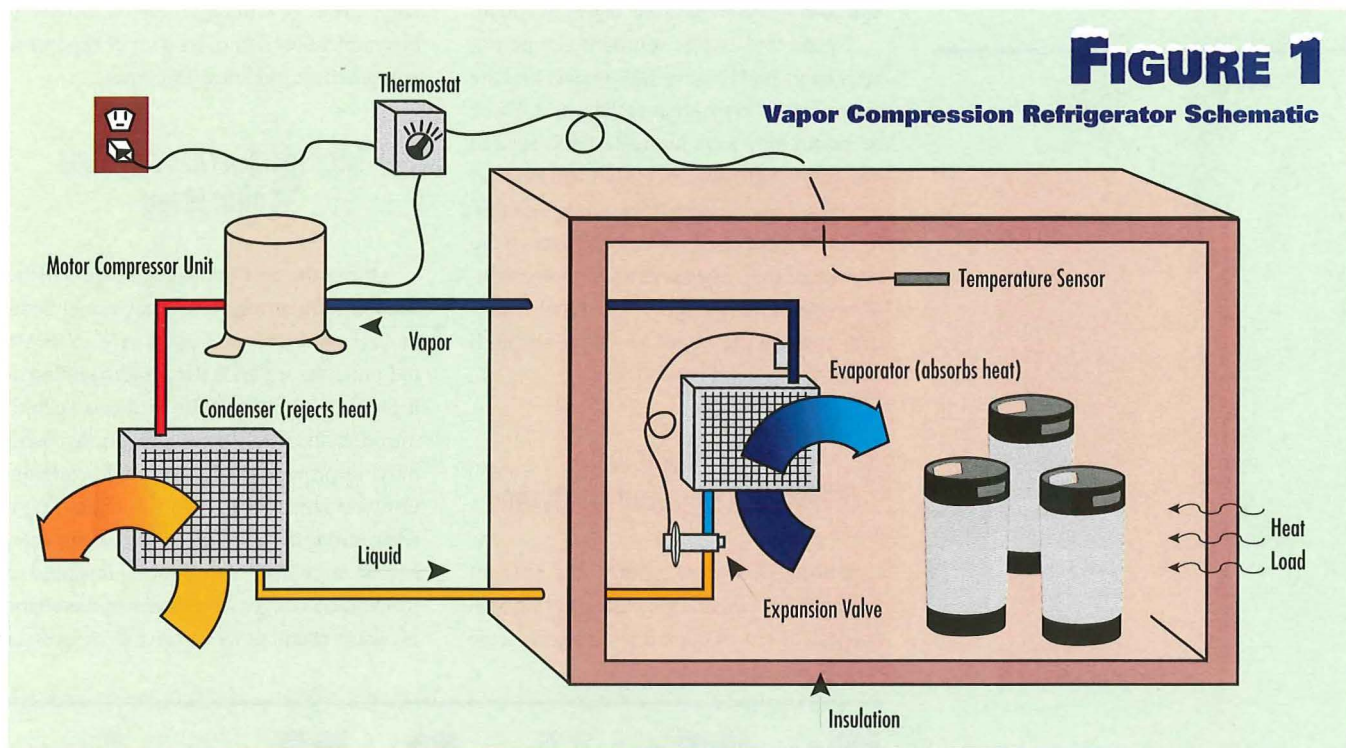
The trick is to select a substance with a boiling temperature lower than the desired temperature of the cooled space (at some reasonable pressure), and then shift the condensing temperature of the vapor above that of the surroundings by compressing it to a higher pressure. If you have a CO<sub>2</sub> tank you probably have observed this firsthand. The compressing and condensing already have been done somewhere else and the liquid CO<sub>2</sub> has been cooled to room temperature. When you turn on the gas flow some of the liquid CO<sub>2</sub> in the tank boils off, absorbing heat from the surroundings, and the tank gets cold. If you could capture the escaping CO<sub>2</sub>, compress it, condense it and return it to the tank, you would have a working refrigerator. Devices that use these principles are referred to as vapor compression refrigerators.

A variety of substances can be used as refrigerants. The choice depends on the evaporating temperature required and the convenience of the two pressures involved. Ammonia was found to fit these requirements early on, and remains in use to this day. Later, refrigerants such as Freon® were designed to have the proper characteristics while being less toxic to humans if leaked. Because it has been determined that these

refrigerants (chlorofluorocarbons or CFCs) are harmful to the earth's ozone layer, the search for new refrigerants such as hydrochlorofluorocarbons (HCFCs) goes on.

## THE COOLED SPACE

A household refrigerator, a walk-in cooler and an air-conditioned house all have a defined space in which the air temperature is to be maintained at a level below that of the surroundings. Insulation is used to resist the flow of heat into the space from the outside. Heat leaking through the walls, floor and ceiling of the enclosure is one type of heat "load" on the system. Other types of heat loads include opening a door and allowing warm air to flow into the space, bringing warm items into the space and housing items within the space that are capable of generating heat such as light bulbs, fan motors, humans and fermenting beer. The refrigerating system must be capable of removing all of the heat from these various sources quickly enough to prevent the temperature inside the space from rising appreciably, and making sure warm items are cooled in a reasonable period of time.





## CHILLING CAPACITY

The capacity of a refrigeration system can be measured by the number of BTUs (British thermal units) of heat it can remove from the cooled space in one hour (Btu/hr). One Btu is defined as the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit. Another older but still common unit of refrigeration is the ton. This term relates to the days before mechanical refrigeration when ice was used for cooling. One ton of refrigeration is the amount of heat one ton (2,000 pounds) of ice absorbs by melting over a 24-hour period. One ton of refrigeration is equal to 12,000 Btu/hour. A typical central air-conditioning unit might be around four tons, a window air-conditioner unit about one ton and a household refrigerator might be only one-tenth of one ton. While they are among the smallest of refrigeration machines, household refrigerators are much more impressive when you think of them as providing the cooling power of 200 pounds of ice per day.

## OPERATION

In practice, the capacity of a refrigeration system typically is set so it operates only about 40 minutes out of each hour under normal loads. A thermostat cycles the machinery on and off to keep the temperature in the cooled space at the desired level. The thermostat does not hold an exact temperature, rather it allows the refrigerator to run until the sensed temperature drops a few degrees below the set point and then shuts it off. It does not restart the machine until the temperature has climbed back up to the set point. The difference between the stopping and set point temperatures is called the "differential." If an attempt is made to hold a very precise temperature by reducing the differential to near zero degrees, the compressor would still be required to run the same number of minutes per hour (to match the heat load), but it would be required to stop and start many more times, decreasing its service life.

## VAPOR COMPRESSION REFRIGERATOR COMPONENTS

Vapor compression refrigerators have four main components. These are the motor-compressor unit, condenser, expansion valve and evaporator.

Motor-compressor units in domestic equipment are of the hermetically sealed type, meaning the motor and compressor are welded into a steel canister with only the piping and electrical leads passing through

the casing. In this type of system the circulating refrigerant is used to cool the motor and compressor, and any leaks past the shaft bearings and piston rings are automatically contained and returned to the system.

The condenser is a radiatorlike array of tubes with fins attached to facilitate the transfer of heat to the surrounding air. Because the condenser is the part that rejects heat from the system, it is placed outside the cooled space. Refrigerant in the condenser is at as much as 170 psi and 120 degrees F (49 degrees C), so (continued on page 88)

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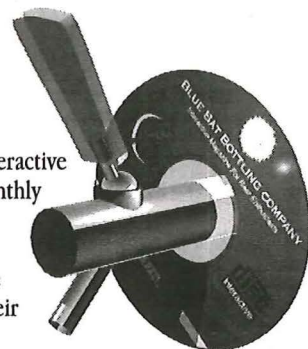
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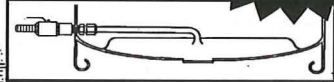
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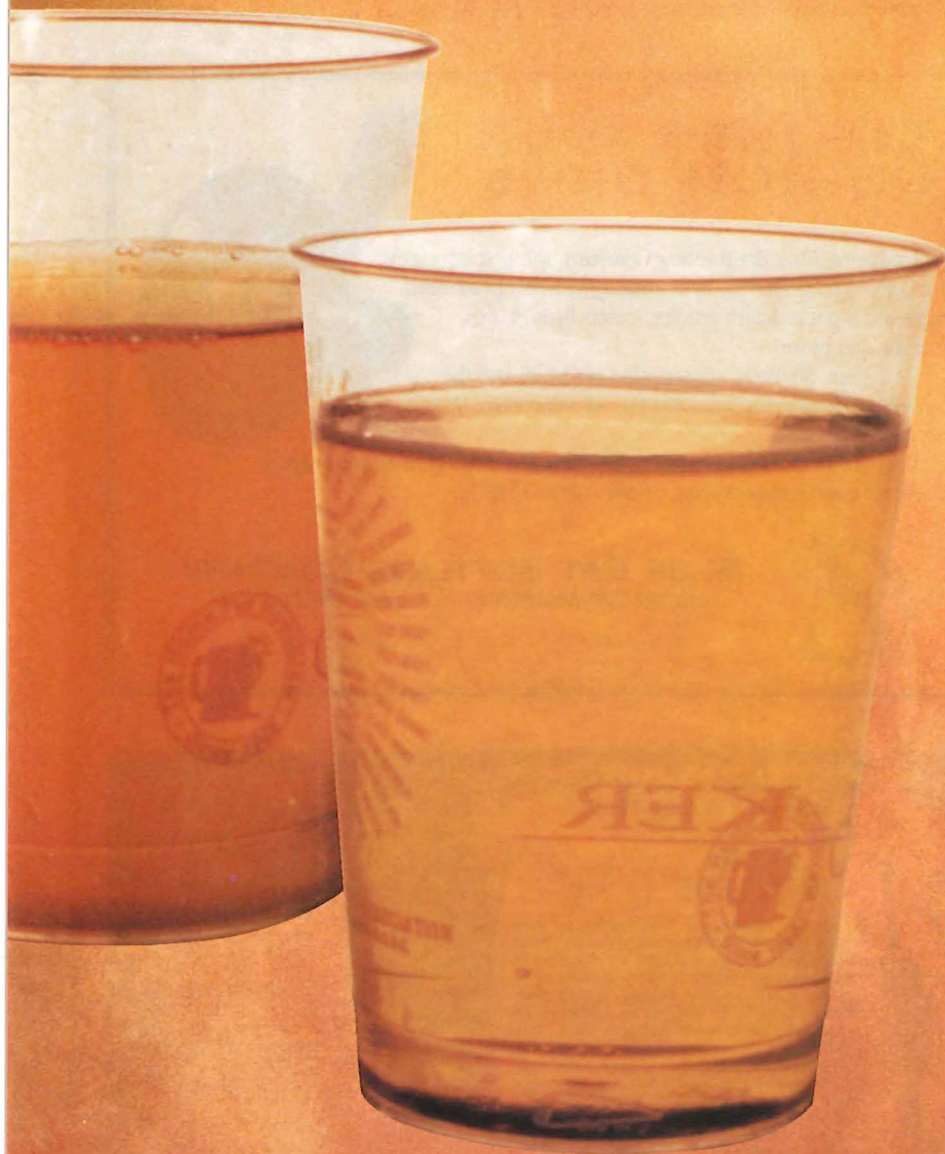


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# How Clear

**If you've ever pondered beer clarity you'll appreciate this thorough discussion of filtration theory.**



**To observe basic qualitative differences between unfiltered and filtered samples, look at the R in Crosby and Baker on the far side of the glass to compare results.**

**T**he history of beer chronicles a long line of refinements and improvements to the beverage we love. In ancient Mesopotamia, it was enough that beer contained alcohol and imparted an intoxicating effect. But as people began to consume it regularly, the actual flavor of the beverage became important: certain grains were favored over others and specific techniques proved to make better beer than others.

By the early 1800s, after nearly 5,000 years of evolution, beer had become quite a sophisticated beverage. It included hops to balance the malt sweetness and was available with a variety of flavor profiles. One feature we commonly associate with beer today had not yet been achieved – clarity.

Until the mid-1800s, beer was generally served in wood, stone or metal drinking vessels. Furthermore, most of the beers were fairly dark in color. This meant consumers generally couldn't see their beer, so they placed little importance on its clarity.

All of this changed during the mid-1800s. From 1800 to 1850 India pale ale led a trend toward lighter colored ales in England. At nearly the same time, the dark lagers of Munich were upstaged by Pilsener, first brewed in 1842.

At the same time mass production of glass vessels emerged from the rapid industrialization sweeping Europe and the United States.

Consumers now took note of beer clarity prompting brewers to focus on producing



# is Your Beer

## **PART I** The Wonderful World of Filters

consistently clear beer. In the United States one effect of this effort was the adoption of corn and rice adjuncts in formulating lager beers during the mid-1800s. At the time, the standard American six-row malt contained high levels of protein that left a haze in the finished beer. By using adjunct for a portion of the grist, the protein concentration was diluted and the haze abated.

In the 150 years since the shift to pale beers in glass containers, many of the innovations in brewing science have focused on the production of clear beer. Among them we find fining and clarifying agents as well as filtering techniques and materials. Today brewers can call on a sizable armory of tools to produce crystal clear beer. Among these choices, perhaps the most common is filtration. Use of the technique is so ubiquitous it sometimes extends into the homebrew arena.

While filtration is not needed for most homebrewed beers, it can be quite useful in certain situations. Most homebrew is enjoyed by its maker and an understanding circle of forgiving associates. Within this audience, a bit of haze is easily overlooked. But when brewing a show beer for consumption or evaluation by those who are less understanding, filtration can become not only desirable, but essential to achieving the desired level of clarity. Such circumstances include hotly contested homebrew competitions as well as social occasions like weddings.

In order to equip homebrewers with knowledge to select and use filtration tools, it is important to understand both the theory and practice of filtration. This begins with a look at what makes beer hazy and what approaches are available in the quest for clarity. Further, it is important to understand what happens during filtration and what types of filters are available.

### **The Problem with Beer**

The issue of clarity in beer arises as it nears completion of the conditioning period. For homebrewers, the issue usually comes at the end of secondary fermentation when the beer has finished fermenting and is nearly ready for bottling. At this stage, some beers will have cleared nicely while others will be a murky mess of haze.

Generally, brewers find two types of haze in beer. The first is caused by suspended yeast, the second by protein-tannin complexes. Of course, yeast is present in all beer during fermentation. In some cases, it will settle out rapidly as fermentation comes to an end. In other cases, the yeast will remain stubbornly suspended in the beer even when chilled. Flocculation describes a yeast cell's tendency or ability to bind to other yeast cells in groups known as flocs. Because the flocs constitute bigger, denser particles than the individual yeast cells, they tend to settle out of solution more quickly.

Thus a yeast with good flocculation characteristics tends to produce beer that clears quickly. Low flocculation or powdery yeast remains suspended in the beer for a much longer time. When this occurs, filtration may be used to remove it.

After yeast is removed, protein-tannin complexes account for the remaining haze. In extreme cases, the haze may completely obscure the transparency of the beer. A good example would be wheat beers. Even in the narrowest serving vessels, many wheat beers can prevent you from seeing your finger on the far side of the glass.

In less extreme cases, protein-tannin complexes produce a less severe but still distracting haze. Some of these hazes, known as permanent haze, are visible when the beer is at room temperature. Others, known as chill haze, will not appear until the beer is cooled for serving. Chill hazes can be particularly maddening because they disappear and reappear as the beer temperature rises and falls. At 48 degrees F (9 degrees C) the beer may be crystal clear. But chill it to 38 degrees F (3 degrees C) and you'll find an ethereal fog clouding your view through the glass.

Protein-tannin hazes can be dealt with in a number of ways. When you work regularly with the same ingredients and brewing process, haze reduction can begin with the selection of ingredients and management of the brewing process. Low-protein grains and protein rests can help reduce

**By Ray Daniels**



haze, as can the use of Irish moss and proper separation of wort from the hot and cold break prior to fermentation.

In most cases, however, homebrewers face the problem of haze long after the brewing process has concluded. When finished beer turns up with a haze, brewers can choose between the use of finings such as alginate or PVPP, and the use of filtration techniques. While filtration can be quite effective in removing hazes, it has the potential to remove flavor compounds from the beer at the same time. This is one reason why chemical approaches to haze removal have been developed. On the other hand, some brewers object to using chemical additives no matter how natural the source. In addition, some argue haze can be filtered out without any appreciable effect on beer flavor. When this is true, filtration can represent a faster and more desirable method of dealing with unclear beer.

The real issue when looking at filtration solutions comes down to a question of size. Filters can be produced to remove particles of any size from beer. As the particle size gets smaller, the danger of flavor removal during filtration increases. When talking about beer filtration, the standard measure is microns. One micron is one one-millionth of a meter or 0.000039 inches.

Figure 1 shows the relative size of some important beer components in microns. From this you can see yeast cells are relatively large, ranging from about three to 20 microns in size. By contrast, even the largest protein-tannin complexes or colloids are smaller than a yeast cell and the smallest are more than 1,000 times smaller at 0.001 microns in size.

Other items of interest to brewers are bacteria. While they do not commonly produce haze in beer, they are a well-known source of off-flavors and spoilage. In recent years, large breweries have touted their sterile filtration techniques that completely remove bacteria from beer. Homebrewers sometimes look to filtration in the hope of removing bacteria before they become a problem. As the chart shows, bacteria are relatively large, ranging from about 0.5 to 70 or 80 microns in size. Unfortunately, the use of filtration as a technique to sterilize homebrew is fraught with difficulty.

## Understanding Filters

The fundamental concept of a filter is easy to understand: pass a fluid through a screen that will remove any impurities. In practice, however, things are not so simple. Variations in the way filters work and their effectiveness give rise to a variety of classification systems.

The basic mechanism of liquid filtration is known as direct interception. This means the solid particles are intercepted or retained by a filter medium when they are too large to pass through the holes or channels in the medium.

Imagine using a tennis racket as a filter. The mesh created by the strings would exclude most types of balls, from footballs and soccer balls all the way down to golf balls, Ping-Pong balls and even most marbles. To pass through the tennis racket, an object would have to have a very small diameter, something on the order of a BB or shot pellet.

If you dumped a whole bucket of BBs on the tennis racket, most of them would fall right through. However, a few might not. If two or three arrived at the same hole at the same time, they might get stuck in a clump and stay above the racket rather than falling through. This illustrates one way every filter medium can filter particles smaller than its hole or pore size.

Next, consider what would happen if you dumped a bucket containing some BBs and many marbles onto the tennis racket. Because the marbles can't pass through the strings, they would form a layer on top. This layer would make it difficult for the BBs to get to the strings. As a result, many of the BBs could be trapped and the effective size excluded by the filter would be much smaller than normal.

Now let's consider what would happen if you poured a bucket of toothpicks on the tennis racket. In one dimension, these items are quite thin. If properly oriented, they can easily pass through. On the other hand, if they land flat, they'll be stuck. If enough toothpicks land flat, they will begin to build up, reducing the ability of any toothpick to pass through the strings. Because most particles are not round but

odd shaped, this represents a more realistic model for how filters work.

In practice, filters are assaulted by a variety of shapes and sizes all at once. A portion of those that are smaller in some dimension than the pore size will manage to pass through. But the exact number and type of particles that make it through will vary based on the mix and concentration of particles in the solution to begin with.

As you can see, we are dealing with two considerations with regard to the performance of a filter: first, what *can* pass through and second, how often such particles *will* pass through.

Equipped with these concepts, we are ready to discuss some of the different ways filters work. The first point of differentiation among filters comes in the way filtration is performed. In using the tennis racket analogy, we have considered one mechanism commonly referred to as a surface filter. Two other mechanisms also are recognized: depth and adsorption.

Surface filtration works just like the tennis racket. The filter medium generally is fairly thin, like a sheet of cloth, and can be made of metal, cloth, polymer materials or membranes. Through our tennis racket examples, we have seen that surface filters can remove particles smaller than their pore size by a number of mechanisms. On the other hand, surface filters have just one chance to catch each particle. If a particle finds one hole big enough to pass through, it will then continue to the finished beer without any further challenge. Furthermore, particles too big to pass through the filter at one point may not be trapped immediately on the filter surface and may get multiple chances to find a hole big enough for passage.

There are two issues to consider when dealing with surface filters. First, are the pores of uniform size throughout the media? Second, will the pores maintain their size during use?

Where inconsistency in pore diameter occurs, the size of the largest pores will define the largest particles that can pass through the filter and into the finished beer. Also, pore size may increase during filtration because of changes in the pressure applied to the media. This can create new opportunities for previously trapped particles to pass through.



The second filtration mechanism is known as depth filtration. This technique relies on a bed of filter media with many channels and passageways for the liquid to follow. Solid particles in the liquid enter these channels and become trapped in the body of the media. These systems are less like our tennis racket and more like a hunk of Swiss cheese. The surface holes may be big enough to admit a baseball, but the size and type of particles that make it through to the other side will be very similar to those that make it through the smaller tennis racket holes.

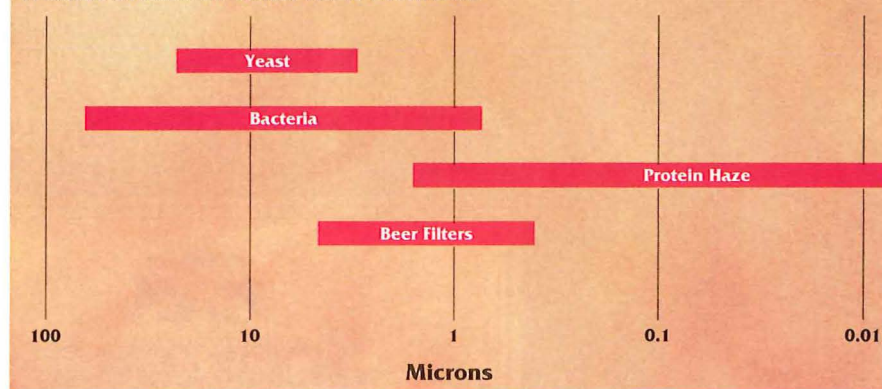
Depth filters can be made from a variety of materials including sand, cellulose, cotton, polymers, metal and ceramics. The most popular filtering system used by professional brewers is a depth filter with powdered media forming the filtration bed. The powder is diatomaceous earth or DE. This material is made up of the fossilized remains of single-celled algae called diatoms. Their silicon-dioxide structures present a microscopic panacea of shapes from snow flakes to starfish to cylinders. This powder is added to the beer as it flows into a filter housing equipped with metal screens to stop the DE particles. The DE creates channels with many nooks and crannies where solids are trapped.

Unfortunately, DE systems are rather costly and difficult to use. Furthermore, the powder itself is a serious hazard if inhaled and must be handled carefully. In homebrew settings, DE is extremely rare, but depth filtration can be provided by cellulose filter pads.

The final filtration mechanism is adsorption. Here, particles small enough to pass through the filter medium are retained because of the attraction between particle and medium. This attraction is generally the result of small differences in electrical charge. A similar effect is seen whenever you try to empty Styrofoam® chips out of a cardboard box. A number of the chips will stick to the box because of static electricity and cannot be removed without being swept out physically.

This mechanism shows another way particles smaller than a filter's pore size may be filtered out. However, the effect of this mechanism varies with the charge carried by the particulate matter, a feature that cer-

**FIGURE 1. Size of Yeast Haze Elements**



tainly will change with the varying pH of beer-related liquids.

## Filter Performance Ratings

When people talk about filters, they rarely discuss the overall performance of the system. Instead, they tend to give a specific size as a measure of the filter's effectiveness. For beer, we generally talk about filters sized between 0.5 and 5.0 microns. The real question is what do these measures mean?

Filters can be rated according to size based on two very different systems known as nominal and absolute. A nominal filter rating captures elements of both pore size and the frequency of particle passage. Unfortunately, the exact system used for establishing a nominal rating varies. Generally, the nominal rating of a filter means it will eliminate 98 to 99.9 percent of particles that size or larger. Unfortunately, the real meaning of a nominal measure is difficult to assess because there is no industry standard procedure for establishing such a rating. Both the percentage admitted and the exact composition of the challenge particles (particulate matter to be removed) may vary. As a result, one manufacturer's one-micron filter may give different results from another manufacturer's one-micron filter.

This also gets back to why sterile filtration is difficult to achieve. Figure 1 shows that bacteria are generally larger than 0.7 microns in size. From this, many brewers think a filter with a nominal rating of 0.5 microns will provide sterile beer. In practice, however, some percentage of particles, including bacteria, larger than 0.5 microns

will make it through this filter and into the finished beer.

For sterile filtration, where a specific particle size must be completely removed you have to rely on a different type of filter rating. The absolute rating of a filter gives the largest particle size a filter will pass under any circumstances. If you examine the beer filtered by a five-micron absolute filter, there will be no particles present larger than five microns.

It is nearly impossible to compare absolute to nominal ratings. In practice, a filter with an absolute rating of 30 microns might eliminate more particles of all sizes than a filter with a nominal one-micron rating. If you ran a one-micron absolute filter next to a one-micron nominal filter, the results would be startlingly different in most cases.

In part two of this article five commercially available beer filters are put to the test under standard homebrewing conditions. If you are considering adding a beer filter to your homebrewing setup, reviewing these results is a must.

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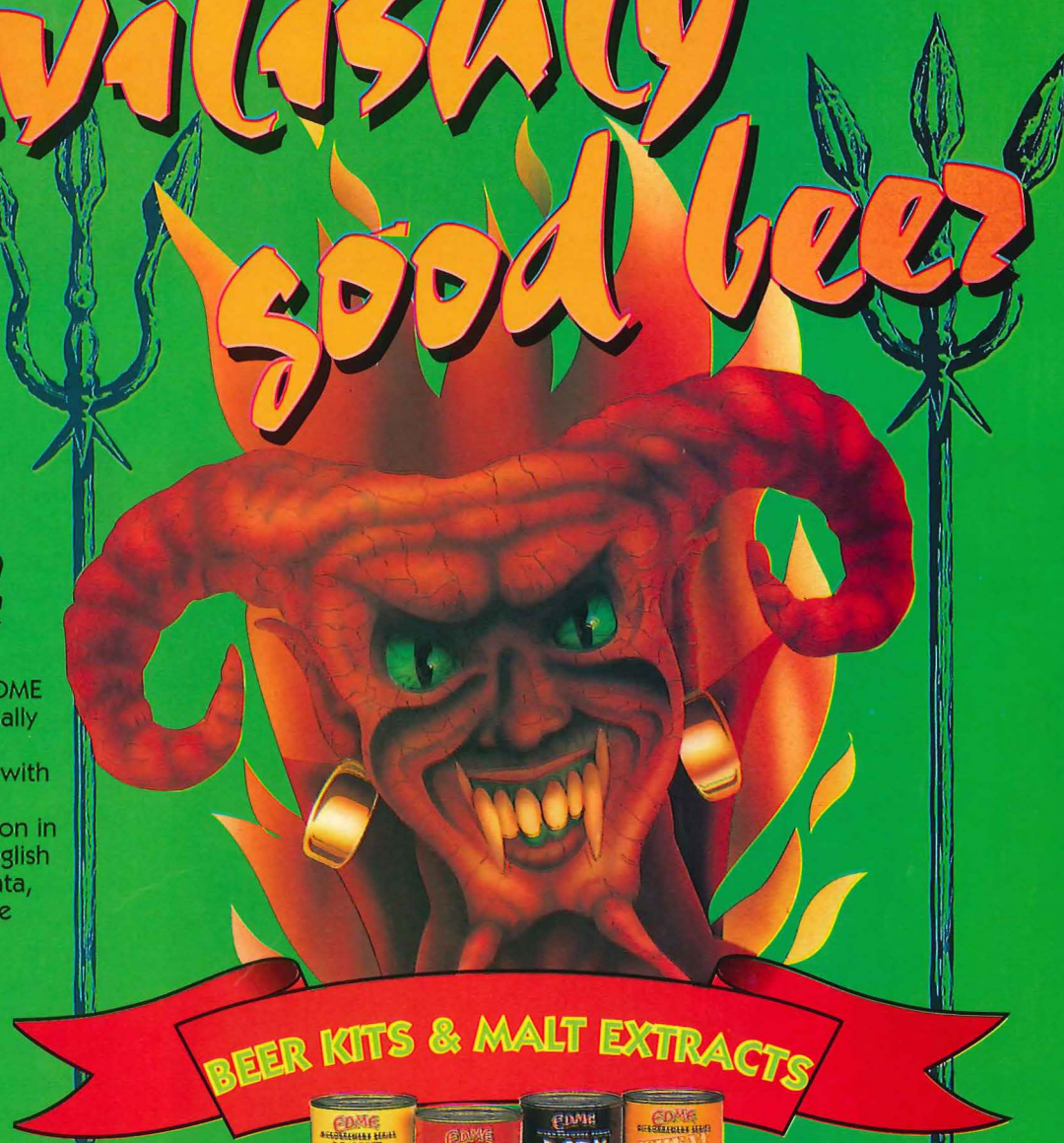
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# How Clear



**The Marcon Carosello System, one of five filter products evaluated, was put to the test at Goose Island Brewing Co.**

**F**or this beer filter road test, we sought out filters that would remove yeast and protein haze from finished beer. Our search turned up five systems spanning a considerable range in terms of size, shape, cost and performance. Each is available to homebrewers and will be reviewed here with regard to operation and performance in practical homebrewing settings.

The five included a cartridge system, a custom system and three sheet filters. The cartridge system comes from The Filter Store Plus in Rush, N.Y., and retails for \$79, including a 0.5-micron filter. The custom system is made by Zymurtech of San Diego, Calif., and sells for \$15.95. The first sheet system came from Vinotheque USA in Marlboro, Mass., with a price of about \$42.50. The second sheet system was provided by The Vintage Shop in Surry, British Columbia. Although this system is not available in the United States as of this writing, it should arrive soon, priced near \$35 retail. The final system came from Marcon Wines in Woodbridge, Ontario. This company offers several systems, but the configuration tested can be purchased for about \$115.

These systems were subjected to two test procedures, each designed to evaluate a different aspect of performance. The first test looked at protein haze removal in cold, lightly carbonated beer. The second assessed yeast removal in a noncarbonated high-yeast-count solution. During the testing each system was set up, prepared, operated and



*This research was funded by the AHA.*

PHOTOS COURTESY OF RAY DANIELS



# is Your Beer

## PART II A Beer Filter Road Test

cleaned at least two times. This provided an opportunity to assess ease of use and other operational parameters.

After testing, all the information about the systems was collated and analyzed to provide the overall rating and analysis presented here.

### The Gear



**The Filter Store Plus Homebrew Filter™**

**The Filter Store Plus Homebrew Filter** The cartridge filter system from The Filter Store probably is the most popular system used by homebrewers in the United States today. It has been available for a number of years, is advertised widely in homebrew magazines and commonly stocked by homebrew stores.

One reason for this popularity is pricing: \$79 for the housing plus a 0.5-micron nominal filter. The housing probably will last for

as long as you can continue to make homebrew, but the pleated polypropylene filters need to be replaced periodically. The supplier says each filter should clear 150 to 200 gallons of beer. When it comes time to replace the filter, or if you want a different grade of filter, you'll have to shell out nearly half the original price of the system, some \$34 to \$38. The 0.5-micron filter is the most expensive, with 1.0-micron and 5.0-micron units priced at \$2 and \$4 less. While you might use this system for years without buying a second filter, the high cost of individual filters could balloon your total use cost if you want to vary filter grades or filter a great deal of beer.

The cartridge design makes this system easy to assemble. Just unwrap the filter cartridge, drop it in the housing and screw on the top. The first time you use the unit you'll have to screw in the two hose-barb connectors (requiring a wrench), and attach a hose to each.

To prepare the filter for each use, the supplier recommends that five gallons of sanitizing solution be passed through the filter. This is easy to do assuming you have an extra soda keg sitting around empty. If not, you may have to settle for soaking the filter in another container.

After using the system, back flushing is recommended. This requires sanitizing solution to be run through the system again, this time in the opposite direction. To complete this step, there is no getting around the need

for an empty soda keg. When performed, this step helps lift debris deposited on the surface of the filter for a thorough cleaning. Despite this procedure, I found the filter retained some color after a couple of uses. The directions suggest that, when not in use, the filter be stored in a plastic bag in the refrigerator, presumably to discourage growth of any little beasts that might cling after cleaning.

The directions supplied by The Filter Store are excellent. They begin with a complete list of items included in the kit and the additional items that need to be supplied by the user. Illustrations are given for operation and cleanup along with a set of step-by-step instructions for each phase of operation.

During the water test, I ran five gallons of water (with one teaspoon chlorine bleach added) through the system with the regulator set at 10 psi. This took about 20 minutes and no leakage was observed from the filter housing or connections.



**Zymurtech Clear Beer Filter**

**Zymurtech Clear Beer Filter** This system was the most intriguing of the five tested because of its design and price.

## By Ray Daniels



# TABLE 1: Filter Test Data

Filter Maker	FILTER STORE	ZYMURTECH	VINOTHEQUE	VINTAGE SHOP	MARCON
Model Name	The Homebrew Filter™	Clear Beer Filter	Flomaster	Wine/Beer Plate Filter	Carosello System
Type	Cartridge	Custom	Sheet	Sheet	Sheet
Dimensions (in inches)	12.5 x 5 x 5	8 x 1.5 x 1.5	10.5 x 10.5 x 3	9.5 x 9.5 x 3	8 x 8 x 8
<b>Economics</b>					
System Price <sup>1</sup>	\$40.00	\$15.95	\$42.50	\$35.00	\$115.00
Filter Price <sup>2</sup>	\$39.00	\$—	\$3.00	\$2.25	\$2.50
5 gal. batches/filter	37.5	12.0	1-2	1-2	1-2
Filter cost/batch	\$1.04	NM	\$2.00	\$1.50	\$1.67
<b>System Cost<sup>3</sup></b>					
25 gallons	\$ 79	\$ 16	\$ 53	\$ 43	\$123
100 gallons	\$ 79	\$ 32	\$ 83	\$ 65	\$148
500 gallons	\$157	\$144	\$177	\$136	\$227
<b>Ease of Use</b>					
Instructions	Excellent	Good	Poor	OK	OK
Setup	Easy	Very Easy	Moderate	Moderate	Moderate
Cleanup	Moderate	Very Easy	Easy	Easy	Easy
Overall Ease of Use (Easy = 1)	2	1	3	3	3
<b>Water Test</b>					
Driving Pressure	10 psi	10 psi	6 psi	6 psi	6 psi
Flowrate (gal/min)	0.25	0.33	0.2	0.2	0.33
Leakage	v. small	0.2 oz/gal	2 oz/gal	3 oz/gal	1.8 oz/gal
<b>Haze Removal</b>					
Filter Medium Code	—	—	AF4	AF4	4
Nominal Filter Rating	0.5	1	2	2	0.4
Driving Pressure	12 psi	12 psi	6 psi	6 psi	12 psi
Flowrate (gal/min)	0.2	0.17	0.05	0.04	0.17
Filtrate Appearance	Slight haze	Cloudy	Slight haze	Clear	Brilliant
Turbidity Reading <sup>4</sup> (Unfiltered = 368)	98	257	122	33	34
<b>Yeast Removal</b>					
Filter Medium Code	—	—	AF3	AF3	3
Nominal Filter Rating	0.5	1	2	2	0.6
Driving Pressure	12 psi	12 psi	6 psi	6 psi	6 psi
Flow Rate (min/gal)	3	7	7	4.5	7.5
Filtrate Appearance	Brilliant	Cloudy	Brilliant	Brilliant	Brilliant
Turbidity Reading <sup>4</sup> (Unfiltered = 567)	6	460	2	2	2

<sup>1</sup> System Price excludes the cost of removable filter media. <sup>2</sup> Filter price represents the total quantity of filter material needed to operate the unit. <sup>3</sup> Total system cost equals system and filter costs for the volumes indicated. <sup>4</sup> Turbidity = spectrophotometer absorbance read at 700 nm and multiplied by 1000. NM = Not meaningful



The glass on the left in each photo contains unfiltered beer. The glass on the right in each photo contains the results of the haze test for each filter.



Zymurtech has developed several products custom designed for homebrewing. This one packs a 1.0-micron nominal filter into a piece of plastic pipe just eight inches long and 1 1/2 inches in diameter. Best of all, the whole system sells for \$15.95 – well within the budget of the average homebrewer.

Because the filter is a permanent part of the system, the entire device is thrown away once the filter poops out. The supplier says one unit will filter 50 to 60 gallons of beer. This means the unit is essentially disposable. The low cost and low replacement cost could be excellent for those who only have occasional need for a filter unit. Of all the systems tested, the Clear Beer Filter qualifies as the easiest to use. Because the filter is integral to the device, there is nothing to take out or install and little to connect. Threaded hose-barb connectors fit on either end enabling you to connect a hose and the required keg connections for filtering. Other than this, there is literally nothing to do before you start.

This uncomplicated system does offer one option. The standard package includes some small disk filters that can be placed in the outlet hose barb to remove even more sediment. In the tests described, I ran the Clear Beer Filter with and without these disk filters but saw no difference in the performance when they were included.

Preparation and cleanup of the system is just as easy as assembly. The supplier recommends soaking the unit in a dilute chlorine bleach solution (one teaspoon per gallon) for 10 minutes before use. After filtration they recommend removing the hose barbs from each end and back flushing the unit using a garden hose or sink faucet.

The instructions detailing setup, preparation and cleaning covered just one side of a sheet of paper, providing adequate information and useful illustrations.

During the water test, I ran five gallons of water (with one teaspoon chlorine bleach added) through the system with the regulator set at 10 psi in about 15 minutes. There was a slight leak around the input hose barb, but the total loss was about one ounce for five gallons. A bit of Teflon tape probably would stop the problem.

**Vinotheque Flomaster** This system provides the first example of a sheet filtering sys-



**Vinotheque Flomaster**

tem. Sheet systems use two cellulose filter pads sandwiched between the plastic portions of the device to filter the beer. The filter media used by these systems is disposable, although one set of pads probably could be used to filter 10 to 15 gallons of beer all on one day. The Flomaster system sells for about \$42.50, with pads going for about \$2 per set.

The filter pads come in a variety of grades and their low cost enables the user to keep several grades on hand. With a little experimentation and experience, you can select appropriate filters (continued on page 93)

## MARCON FILTERS

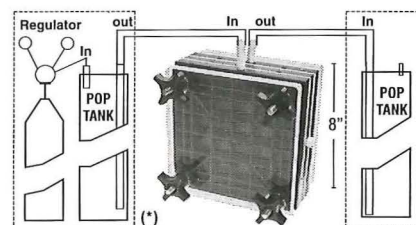
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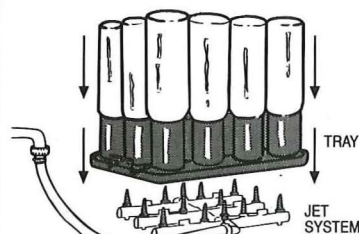
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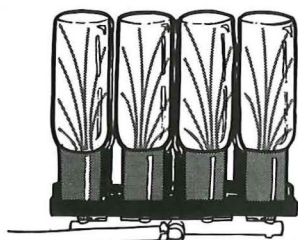
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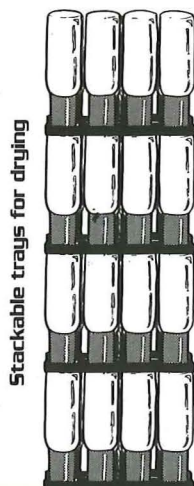
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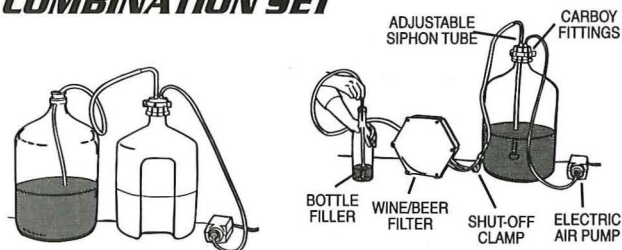
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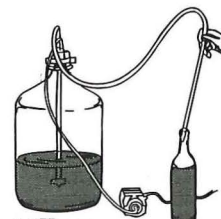
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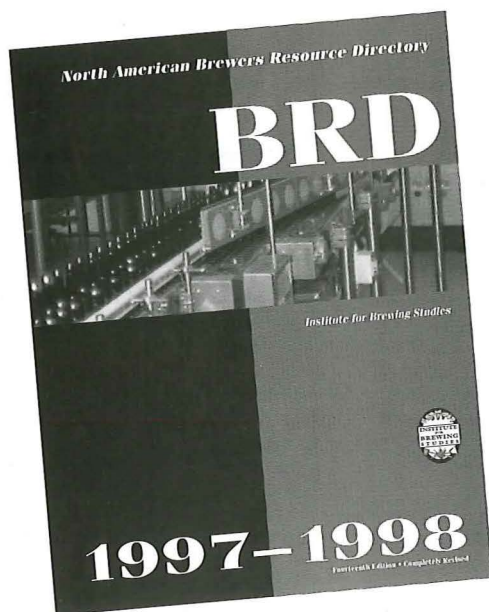
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# FOR THE BEGINNER

Mark Moylan and James Spence

## Are You Practicing Safe Sanitation?

**H**oward Hughes was obsessed with germs, often providing pages of notes and instructions to his assistants that he hoped would keep him germ free. Handing him a spoon, cutting his hair and giving him a manicure became detailed procedures of mythical quality. To the novice, sanitation in the homebrewery may seem Hughesian in principle, but fortunately understanding a few simple concepts of sanitation and microbiology can lead to significant improvements in beer quality consistency.

Important distinctions to make first off are the differences between cleaning, sanitation and sterilization. Cleaning is getting the dirt, dust, hop residue and general grime off your brewing equipment. Sanitizing is reducing the population of microorganisms to a safe level – a level that will stop further growth of distasteful organisms. Sterilizing is eliminating all forms of life on the sterilized surface. In case you're wondering, pasteurization is simply a method of sanitizing.

It is important for homebrewers to realize that sterilization is not really necessary in brewing. If you hear homebrewers talk about how they sterilized their equipment, it means they have access to a pressure cooker or an autoclave. Even boiling is not sterilization – endospores survive the temperature of boiling water and wort. Sanitation is wholly sufficient. We have an ally, you see, in yeast. If we curtail the growth of bacteria and wild yeast, we allow our \$4 pure yeast culture to take over the environment (wort), and eat up all the food that bacteria and wild yeast need. Vicious, but delicious.



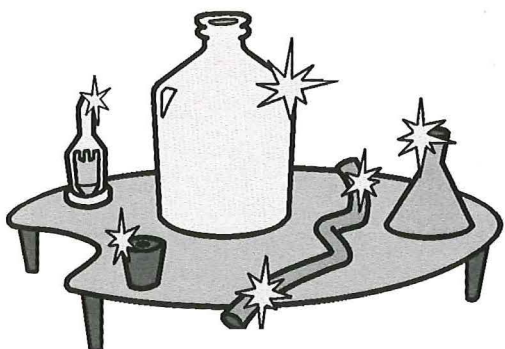
Sanitation is quite simple and more a practice of good habits than anything else. Bacteria are weak and homebrewers (and yeast) are strong. From common household bleach and dairy-grade iodine sanitizers to a couple of commercial products, sanitizers are basically inexpensive and easy to use. Add your product of choice to a tub or bucket of water, add equipment, allow for the correct contact time, shake off or rinse then proceed. Easy!

### Cleaning

One point should be stressed. Sanitation is not cleaning, and the effectiveness

of your sanitation methods will be reduced if your equipment is not sparkling clean. Clean means your equipment is free of dirt and fermentation deposits. Dried trub and other kinds of residue must be scrubbed away. In most instances, a good detergent coupled with rapid bicep activity will effectively clean your equipment. Do not use soaps or cleaners with strong fragrances, and always rinse very thoroughly to remove detergent residue. For tougher jobs, trisodium phosphate (TSP) found in the paint section of your hardware store will clean just about anything. Again, rinse thoroughly and avoid prolonged contact between TSP and any part of your body.





Standard chlorine bleach also cleans well when you practice the same precautions as with TSP. Both substances, however, can react with your equipment. With prolonged exposure, TSP can damage glass, and bleach will oxidize metals. Be judicious, careful, and smart when using these powerful chemicals.

## Sanitizing

Sanitizing requires immersing your clean equipment in a sanitizing solution for a prescribed contact time. There are a number of factors that produce a sanitary environment, but the two main ones are the concentration (strength) of the solution, and the contact time with the surface. There are several sanitizing products available to the homebrewer. They all work perfectly well, but differently. You should always follow the directions given by the manufacturer of a sanitizer. Using a higher or lower strength than recommended can make your procedures ineffective. For example, one good sanitizer, isopropyl alcohol, is actually more effective at a 70 percent solution than 95 percent. The water content actually increases the disruption of cell activity. Beyond altering effectiveness, using too much sanitizer might make your beer taste like the sanitizer, or kill your \$4 yeast culture when you pitch it into your wort. Too weak a sanitizing solution might allow distasteful, off-flavor producing microflora to flourish. Your choice of sanitizer will depend mainly on price and your patience with the sanitation process. Bleach is cheap, but you have to watch a couple of sitcoms while it does the job. Iodine solutions (Iodophor) are really fast, but more expensive.

## When and How

There are typically three stages in the brewing process when you must sanitize: after the boil, before you add your yeast culture; during an optional transfer from primary to secondary fermenters; and when you package (bottle or keg) your beer.

To sanitize your primary fermentation equipment, fill the primary fermenter with properly diluted sanitizing solution, and soak your funnels, airlock, stopper, lid, siphon hose, racking tube and anything else that will be touched by your fresh wort. This method works especially well if you use a plastic bucket as a primary – you can sanitize your fermenter and other equipment all in one container. If you use a carboy, the purchase of a big cheap plastic container (BCPC), like those storage containers sold by our nation's largest retailers, will become a godsend. One of the trickiest items to sanitize is your racking cane. Be sure to buy a BCPC long or deep enough to hold your racking cane. Alternatively, many racking canes will fit right in the mouth of your carboy or fermenter. Be sure to wash your hands and wrists with hot water and soap before, intermittently during and after sanitizing. Pretend you're a surgeon. If you are indeed a surgeon, pretend you're a mechanic trying to get the grease off at the end of the day.

To sanitize for racking to secondary, do exactly what you did for the primary: fill your secondary fermenter with solution, and soak it and your accessories for the recommended time. Racking to secondary is a little risky – because of the decreased fermentation activity, your beer is more vulnerable to infection. Be a little extra careful and conscientious.

To sanitize during bottling, soak your clean bottles, bottle filler and racking hoses in your BCPC for the recommended time. In a small bowl, soak your bottle caps in sanitizing solution. Take a look at your capper. Wash it if it's gooey with dried beer from your last capping session. Wash your hands.

One effective and almost labor-free way to sanitize your clean bottles is to run them

through a full (including heated drying) dishwasher cycle. The temperature and humidity effectively pasteurizes your bottles. Use them immediately after the cycle is done. Don't use any dishwashing detergent or rinsing agents. Filling the detergent cup with bleach can't hurt, but probably isn't necessary. Make sure your bottles are clean – don't count on the dishwasher water getting into the narrow bottle openings and rinsing out gunk.

A word about kids and pets. Even though you probably have the urge to sanitize them, keep them away from sanitizers. Police them when you're sanitizing with the same attention you give boiling wort. Even in dilute solutions, sanitizers can be dangerous to eyes and mucous membranes so these solutions must be treated with respect. If you have kids or pets, it's probably a good idea to wear safety glasses and rubber gloves when you are sanitizing, not just for your own safety, but to help get the message across to those curious young minds.

## Which Sanitizer to Use?

Believe it or not, scientists are not really sure how sanitizers work. A common theory is that the compound denatures the protein makeup of the cell wall, causing the cell to explode, dry up, starve, stop reproducing, or just give up. This means two things: any sanitizer is pretty much as effective as its cohorts and the sanitizer you decide to use in your homebrewery will probably depend mostly on two factors – ease of use and cost. The following comments on some of the products available to homebrewers should help you decide. You may wish to use cheaper products for bulk sanitizing, and more expensive but quicker acting products for smaller applications like yeast culturing or making starters.

- Bleach – Inexpensive, (no, cheap is a better word), and two tablespoons unscented bleach in five gallons of water needs only a 30-minute contact time to sanitize. Not recommended for stainless-steel kegs because it corrodes the steel. Don't forget that bleach loses its effec-



tiveness over time and with exposure to heat and light. Overnight soaks in bleach solutions don't enhance your sanitizing procedures, and in fact might be a hindrance. Always use fresh, properly diluted bleach solution as sanitizer, and make sure you store that 89 cents worth of chemical warfare in a cool, dark place.

- Iodine – A bit more expensive than chlorine bleach, but needs only one minute of contact time. When mixed to the correct dilution rate, rinsing is not required. Iodine for sanitizing is sold as iodophor, which is iodine mixed with a carrier compound that increases its effectiveness.
- B-Brite Sanitizer – A chlorine-free sanitizer needing a 30-minute contact time. Sold in eight-ounce tubs, dilution is one tablespoon per gallon of water.
- One Step™ Sanitizer – Oxygen based, chlorine-free sanitizer, sanitizes on contact and doesn't require rinsing.
- Sanibac™ Chlorine Sanitizer – Use half an ounce in five gallons of water. Sanitizes in 30 seconds.
- Saniclean – A relatively odorless no-rinse acid anionic low-foaming sanitizer. Use one teaspoon per gallon of water. Sanitizes in 30 seconds.

These are some of the sanitizers available to homebrewers. Pick one or two you are comfortable using, make sure everything that touches your beer is clean and sanitized and you'll have far fewer problems. Choosing equipment-specific sanitation products is a good idea, too, just don't mix your chemicals.

## Rinsing

Guess what? If you follow the dilution instructions provided with your sanitizing solution, or the dosages given here, you don't have to rinse. Just drip dry with a couple of shakes, and you're done. You can rinse if you want, but always keep in mind that you are reducing the effectiveness of your sanitation procedures. Even though you can get away with it most of the time, you won't get away with it all the time.

Scrupulous sanitizing is no substitute for general cleanliness in your brewery. Sani-

tation only works on clean equipment. Safe sanitation is not like pulling teeth. Rather it's akin to brushing your teeth after meals on a regular basis – a good habit. And the beer you make will be something to smile about.

## Further Reading


"Ward off the Wild Things A Complete Guide to Cleaning and Sanitation," by James Liddil and John Palmer, *Zymurgy* Fall 1995 (Vol.18, No. 3).

Mark Moylan is a free-lance writer in Michigan who has been homebrewing for 10 years. He makes a good glass of beer, bakes a fine loaf and has been spotted attempting the fine art of composting.


James Spence, a National BJCP judge, has twice judged the Great American Beer Festival's® Professional Panel Blind Tasting and the Campaign for Real Ale's Champion Beer of Britain at the Great British Beer Festival. James is an editorial adviser and technical editor for *Zymurgy*.

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# WINNERS

C I R C L E

Amahl Turczyn

**F**all marks the rejuvenation of the homebrewing season. With cooler temperatures in store, now is the time to replenish your beer cellar and stock up on brewing supplies with fresh ingredients from the harvest. The year's hop crop soon will be available and fresh fruit, vegetables and herbs are abundant to inspire your recipe formulations. This last installment of recipes from the AHA 1996 National Homebrew Competition features some heavier beer styles to prepare now so they'll be ready in time for holiday enjoyment.

Keep in mind the recipes calling for Bavarian lager yeast strains absolutely require cold fermentation – several weeks if not months of cold storage or lagering – to give their traditionally smooth, clean character. If you brew without the use of refrigerated storage space, consider waiting until the weather in your area is consistently cold enough to keep these beers below 50 degrees F (10 degrees C). Even a short period of fermentation at higher temperatures may cause uncharacteristic and undesirable off-flavors.



**Jackie Rager and Dan McConnell judged best-of-show mead at the 1996 AHA National Homebrew Competition.**

## BARLEY WINE



**BRONZE MEDAL**  
**AHA 1996 NATIONAL HOMEBREW COMPETITION**  
**David Pappas and Gary Michel**  
**Ocoee, Florida**  
**"Barley Winer"**  
**Barley Wine**

### Ingredients for 3 U.S. gal (11.4 L)

- 9 9/10 lb Northwest Gold malt (4.5 kg)
- 1 lb crystal malt (0.45 kg)
- 1 lb pale malt (0.45 kg)
- 5 oz Chinook hop pellets, 12% alpha acid (142 g) (60 min.)
- 1 oz Cascade hop pellets, 5.1% alpha acid (28 g) (30 min.)
- 1 oz Cascade hop pellets, 5.1% alpha acid (28 g) (five min.)
- Wyeast No. 1056 American ale liquid yeast culture
- 2/3 cup corn sugar (145 mL) (to prime)

- Original specific gravity: 1.112
- Final specific gravity: 1.050
- Boiling time: 60 min.
- Primary fermentation: one month at 68 degrees F (20 degrees C) in glass
- Secondary fermentation: one month at 68 degrees F (20 degrees C) in glass
- Age when judged (since bottling): 7 1/2 months

### Brewers' Specifics

Mash grains at 155 degrees F (68 degrees C) for one hour.



## SCOTTISH ALE



### SILVER MEDAL

AHA 1996 NATIONAL HOMEBREW COMPETITION

**Thomas J. O'Connor III**

**Rockport, Maine**

**"T-Duck's Scottish Ale"**

**Scottish Ale/Scottish Export Ale**

### Ingredients for 5 U.S. gal (19 L)

- 7 lb pale malt (3.18 kg)
- 1/2 lb English crystal malt (0.23 kg)
- 1/4 lb black treacle sugar (0.11 kg)
- 2 oz roasted barley (57 g)
- 1 oz Fuggles hops, 4% alpha acid (28 g) (60 min.)
- 1 tsp Irish moss (5 g) (20 min.)
- Wyeast No. 1728 Scottish ale liquid yeast culture
- 1 tsp Fermax™ yeast nutrient (5 g)
- force carbonate in keg

- Original specific gravity: 1.055
- Final specific gravity: 1.016
- Boiling time: 60 min.
- Primary fermentation: 24 days at 55 degrees F (13 degrees C) in glass
- Age when judged (since bottling): five months

### Brewer's Specifics

Mash grains at 128 degrees F (53 degrees C) for 35 minutes and at 158 degrees F (70 degrees C) for 160 minutes.

### Judges' Comments

"Smoked malt evident but subtle and pleasing. Nice smooth, clean maltiness with hints of roast and smoke weaving in and out. A bit overcarbonated. Bit too much smoke."

## STOUT



### SILVER MEDAL

AHA 1996 NATIONAL HOMEBREW COMPETITION

**Randy Johnson**

**Alton, Illinois**

**"Oatmeal Stout"**

**Oatmeal Stout**

### Ingredients for 6 1/2 U.S. gal (24.6 L)

- 5 lb American two-row malt (2.27 kg)
- 1 lb English crystal malt (0.45 kg)
- 1/2 lb English two-row chocolate malt (0.23 kg)
- 1/2 lb American six-row malt (0.23 kg)
- 1/4 lb Belgian biscuit malt (0.11 kg)
- 1/4 lb DeWolf-Cosyns Belgian Special "B" malt (0.11 kg)
- 1/4 lb roasted barley (0.11 kg)
- 18 oz oatmeal (Quaker Old Fashioned Oats) (510 g)
- 1 oz Styrian Golding hop pellets, 4.5% alpha acid (28 g) (60 min.)
- 1 oz East Kent Golding hop plug, 5% alpha acid (28 g) (45 min.)
- 1 oz East Kent Golding hop plug, 5% alpha acid (28 g) (30 min.)
- 1 oz East Kent Golding hop plug, 5% alpha acid (28 g) (15 min.)
- 1 tsp Irish moss (5 g) (15 min.)
- 2 oz Fuggles hop plug, 4% alpha acid (57 g) (15-min. steep)
- Wyeast No. 1098 British ale liquid yeast culture
- 1 1/2 cups light dry malt extract (355 mL) (to prime)

- Original specific gravity: 1.060
- Final specific gravity: 1.022
- Boiling time: 60 min.
- Primary fermentation: one week at 68 degrees F (20 degrees C) in glass
- Secondary fermentation: three weeks at 38 degrees F (3 degrees C) in glass
- Tertiary fermentation: two weeks at 68 degrees F (20 degrees C) in glass
- Age when judged (since bottling): three months

### Brewer's Specifics

Mash grains at 90 degrees F (32 degrees C) for four hours. Raise mash temperature to 120 degrees F (49 degrees C) for 20 minutes, then to 145 degrees F (63 degrees C) for 30 minutes and finally to 160 degrees F (71 degrees C) for 60 minutes.

### Judges' Comments

"Good caramel sweetness. Clean. Good oatmeal fullness. Good balance."



## FRUIT AND VEGETABLE BEER



**SILVER MEDAL**  
**AHA 1996 NATIONAL HOMEBREW COMPETITION**  
**Douglas Faynor**  
**Woodburn, Oregon**  
**"Black Kevorkinator"**  
**Raspberry Doppelbock**

Ingredients for 7 1/2 U.S. gal (28.39 L)

- 7 1/4 lb Pilsener malt (3.29 kg)
- 1 lb Victory malt (0.45 kg)
- 6 lb Munich malt (2.72 kg)
- 2 lb Belgian aromatic malt (0.91 kg)
- 1/2 lb wheat malt (0.23 kg)
- 1 3/4 oz Mt. Hood hops, 3 to 6% alpha acid (50 g) (60 min.)
- 1 3/4 oz Liberty hops, 3.5 to 5.5% alpha acid (50 g) (60 min.)
- 1/2 oz Crystal hops, 3 to 3.6% alpha acid (14 g) (60 min.)
- 1 oz Liberty hops, 3.5 to 5.5% alpha acid (28 g) (15 min.)
- 1/2 oz Liberty hops, 3.5 to 5.5% alpha acid (14 g) (two min.)
- Wyeast No. 2206 Bavarian lager liquid yeast culture
- 5 lb Black Cap raspberries (2.27 kg) (secondary)
- 3/4 cup corn sugar (177 mL) (to prime)

- Original specific gravity: 1.080
- Final specific gravity: 1.020
- Boiling time: 90 min.
- Primary fermentation: one month at 50 degrees F (10 degrees C) in glass
- Secondary fermentation: 1 1/2 months at 50 degrees F (10 degrees C) in glass
- Age when judged (since bottling): three months

### Brewer's Specifics

Use a double mash, with Pilsener and Victory malts mashed at 155 degrees (68 degrees C) for 15 minutes, then at 158 degrees (70 degrees C) for 45 minutes. Remaining malts should be mashed at 149 degrees (65 degrees C) for 60 minutes.

Add raspberries to secondary fermenter.

### Judges' Comments

"Good raspberry aroma. Slight roastiness. Beautiful deep ruby color with a pink head. Fruit comes through well. Higher alcohols are apparent."

## CALIFORNIA COMMON BEER



**BRONZE MEDAL**  
**AHA 1996 NATIONAL HOMEBREW COMPETITION**  
**Steve Rittenhouse**  
**Los Angeles, California**  
**"Mort's Steamer"**  
**California Common Beer**

Ingredients for 5 U.S. gal (19 L)

- 5 lb Klages pale malt (2.27 kg)
- 1/2 lb six-row pale malt (0.23 kg)
- 1 lb 40 °L crystal malt (0.45 kg)
- 3 1/3 lb gold malt extract syrup (1.52 kg)
- 1 1/3 oz Northern Brewer hops, 8.8% alpha acid (39 g) (60 min.)
- 1/2 oz Cascade hops, 4.9% alpha acid (14 g) (10 min.)
- 1/2 oz Chinook hops, 10.7% alpha acid (14 g) (10 min.)
- 1/2 oz Cascade hops, 4.9% alpha acid (14 g) (dry)
- Wyeast No. 1056 American ale yeast culture
- 3/4 cup corn sugar (177 mL) (to prime)

- Original specific gravity: 1.050
- Final specific gravity: 1.014
- Boiling time: 60 min.
- Primary fermentation: eight days at 55 degrees F (13 degrees C) in glass
- Secondary fermentation: 14 days at 55 degrees F (13 degrees C) in glass
- Age when judged (since bottling): five months

### Brewer's Specifics

Mash grains at 155 degrees F (68 degrees C) for 60 minutes.

### Judges' Comments

"Toasty malt aroma with subtle hops. Caramel flavor is pre-dominant. Somewhat fruity. Very drinkable beer."

"Nice malt and slight fruit to back it up. Excellent effort, great control. A well-made beer."



## MÄRZEN/ OKTOBERFEST



**BRONZE MEDAL**  
**AHA 1996 NATIONAL HOMEBREW COMPETITION**  
**Dan Ritter**  
**Grangeville, Idaho**  
**"Octoberfest"**  
**Märzen/Oktoberfest**

### Ingredients for 5 1/4 U.S. gal (19.87 L)

- 8 lb 1.8 °L Belgian Pilsener malt (3.63 kg)
- 14 oz 22 °L CaraVienne malt (0.39 kg)
- 5 oz Belgian Special "B" malt (142 g)
- 1/2 lb 20 °L CaraPils malt (0.23 kg)
- 1 1/4 oz Hallertauer hop pellets, 3.4% alpha acid (35 g) (60 min.)
- 3/4 oz Hallertauer hop pellets, 3.4% alpha acid (21 g) (30 min.)
- 1/2 oz Saaz hop pellets, 3% alpha acid (14 g) (10 min.)
- Wyeast No. 2206 Bavarian lager liquid yeast culture
- force carbonate in keg

- Original specific gravity: 1.056
- Final specific gravity: 1.016
- Boiling time: 90 min.
- Primary fermentation: 20 days at 48 degrees F (9 degrees C) in glass
- Secondary fermentation: two weeks at 46 degrees F (8 degrees C) in glass
- Tertiary fermentation: three weeks at 34 degrees F (1 degree C) in stainless steel
- Age when judged (since bottling): five months

### Brewer's Specifics

Mash grains at 153 degrees F (67 degrees C) for 90 minutes.  
 Mash-out at 172 degrees F (78 degrees C) for 10 minutes.

### Judges' Comments

"Sweet buttery aroma. Some toasty notes."  
 "Smooth, malty; well-balanced for style. Clean and drinkable."

Every gold-medal-winning recipe from the AHA 1997 National Homebrew Competition will be printed in *Zymurgy* Special Issue 1997 (Vol. 20, No. 4) "Winners Circle."



## HAIL TO ALE

### CLUB-ONLY COMPETITION WINNER



**Shekhar and Paula Nimkar**  
**Lynn, Massachusetts**  
**Representing the Boston Wort**  
**Processors**  
**"Amer-Ind. Ale"**  
**American-style Amber Ale**

### Ingredients for 10 U.S. gal (37.85 L)

- 19 lb Munton and Fison pale malt (8.62 kg)
- 1 1/2 lb Hugh Baird crystal malt (.68 kg)
- 10 AAUs Perle hops (70 min.)
- 8 AAUs Mt. Hood hops (70 min.)
- 8 AAUs Mt. Hood hops (10 min.)
- 8 AAUs Cascade hops (finish)
- 1 pint Wyeast No. 1056 American ale yeast starter (0.47 L)
- 1 1/2 oz Cascade hops (43 g) (dry, two weeks)
- force carbonate in keg

- Original specific gravity: 1.048
- Final specific gravity: not available
- Boiling time: 90 min.
- Primary fermentation: 10 days at 65 degrees F (18 degrees C) in glass
- Secondary fermentation: two weeks at 65 degrees F (18 degrees C) in glass
- Age when judged (since bottling): six months

### Brewers' Specifics

Mash grains at 150 degrees F (66 degrees C) for two hours.

### Judges' Comments

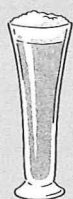
"Big hoppy aroma – citrus and grapefruit – real nice. Slight caramel sweetness up front. Maltiness is a bit overwhelmed by the big hops. A very clean, well-made beer."





## LUSCIOUS LAGER

### CLUB-ONLY COMPETITION WINNER



**Greg Scharrer**  
**Scottsdale, Arizona**  
**Representing Brewmeisters**  
**Anonymous**  
**"Saazbürger"**  
**German Pilsener**

#### Ingredients for 10 U.S. gal (37.8 L)

- 11 lb German Pilsener malt (5 kg)
- 10 lb Briess two-row malt (4.5 kg)
- 1 lb dextrin malt (0.45 kg)
- 1 lb 10 °L crystal malt (0.45 kg)
- 4 oz Spalt hops, 4.3% alpha acid (113 g) (60 min.)
- 1 1/2 oz imported Saaz hops, 3% alpha acid (43 g) (15 min.)
- 2 oz imported Saaz hops, 3% alpha acid (57 g) (finish)
- 2 oz imported Saaz hops, 3% alpha acid (57 g) (dry)
- Yeast Culture Kit Co. L17, Pilsner Urquell strain,  
in prepared starter
- force carbonate in keg

- Original specific gravity: 1.050
- Final specific gravity: 1.014

- Boiling time: 75 min.
- Primary fermentation: 14 days at 50 degrees F (10 degrees C) in glass
- Secondary fermentation: 21 days at 40 degrees F (4 degrees C) in glass
- Tertiary fermentation: 120 days at 33 degrees F (1 degree C) in stainless steel
- Age when judged (since bottling): five months

#### Brewer's Specifics

Mash grains at 130 degrees F (54 degrees C) for 30 minutes, raise temperature to 150 degrees F (66 degrees C) and hold for 90 minutes, then to 170 degrees F (77 degrees C) for 10 minutes.

#### Judges' Comments

"Great beer. Represents style well."

"Nice aroma. Pretty color and head."

Amahl Turczyn of Boulder, Colo., has been homebrewing since 1985 and brewing professionally since 1995. In May he finished his master's in English at the University of Colorado at Boulder and is now the AHA project coordinator.



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Your responses to the following questions will help make **Zymurgy** and the AHA even better. Please take the time to write your answers, remove the page, fold and mail it, or fax your response to (303) 447-2825. You can also fill out the survey in the AHA members-only – [www.beertown.org](http://www.beertown.org) on the web. Thank you!

Cheers,

*Dena Nishek*

Dena Nishek  
Editor, **Zymurgy**

## Are you an AHA member?

☐ yes

membership number \_\_\_\_\_ (optional)

☐ no

## PLEASE RATE THE FEATURES IN THIS ISSUE.

### "For the Love of Lambic"

☐ Very interesting/helpful

☐ Somewhat interesting

☐ Not my mug of beer

### "How Clear is Your Beer? Part 2: Beer Filter Road Test"

☐ Very interesting/helpful

☐ Somewhat interesting

☐ Not my mug of beer

### "Chill Out – Put Your Fears of Refrigeration on Ice"

☐ Very interesting/helpful

☐ Somewhat interesting

☐ Not my mug of beer

### Overall, how to you rate Zymurgy content?

☐ Too technical

☐ Nice balance

☐ Too basic

### "How Clear is Your Beer? Part 1: The Wonderful World of Filters"

☐ Very interesting/helpful

☐ Somewhat interesting

☐ Not my mug of beer

### Which new AHA membership benefits do you plan to try?

☐ Talk Back/Members-Only Web Site

☐ TechTalk

☐ Maps on Tap

☐ Brew U

### What additional membership benefits would you like the AHA to offer?

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### Do you have internet access?

☐ yes: e-mail account \_\_\_\_\_

☐ no

### Do you have World Wide Web access?

☐ yes

☐ no

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**Zymurgy/AHA Questionnaire**

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# WORLD OF WORTS

Charlie Papazian

## Beelzebub Double Stout

It was a nice day to relax and have a homebrew, or two, or three, if you know what I mean. It was on this day, during these beers I began to form a conclusion that it is the water! You have to understand water has never been my strong point. I mean I'd much rather drink beer than water. There are better things to do with water than drink it—like make beer with it, for example. The day was sunny and, in the company of others, I just so happened to be in the mood to pop open a few of my recent and not-so-recent homebrews.

The first one was a simple pale ale made from dried malt extract and whole hops—no grains whatsoever. We admired it for all its reminiscence of the American pale ale style. I'd put it up against the classic Sierra Nevada Pale Ale. The foam and head retention of my Plateau Pale Ale was to be admired. What followed was a chilled Adjudicated Smoky Munich Lager, which is a bit on the bitter side for the Munich style, but a wonderful floral hop aroma wove its essence through the subtle smoked malt character. I was once again struck by the creamy, dense, mousseline character of the foam, head retention and Belgian lace clinging to the glass. This was a partial-mash lager.

The sun was still up and it was time for Beelzebub Double Stout, an extract beer steeped with crystal and roasted grains. Quite

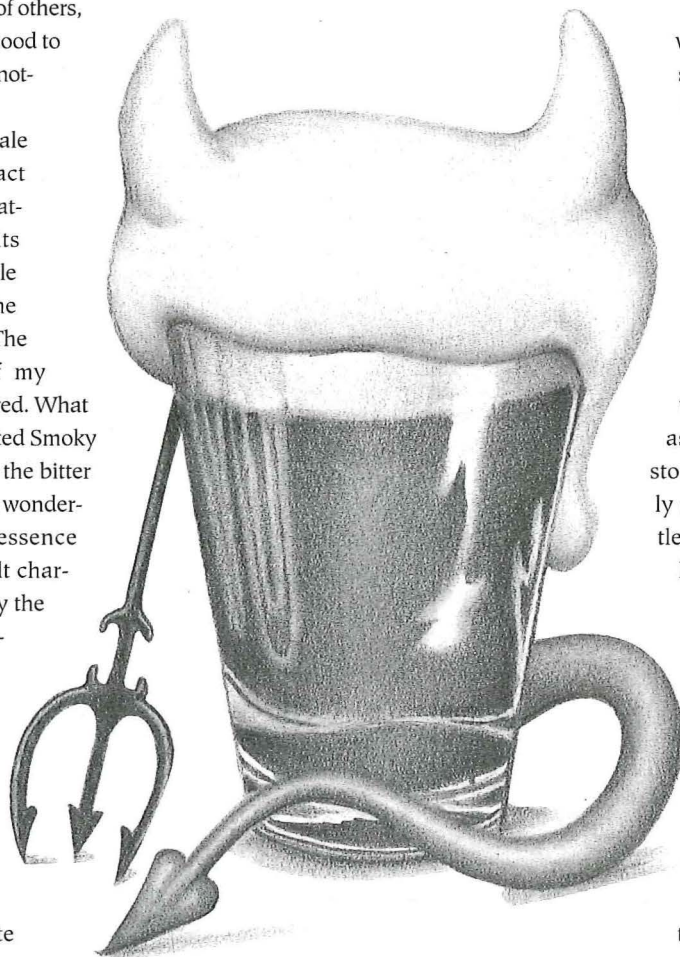
a remarkable stout, perfect for the day's last light and anticipation of the sunset.

This brew had the transfixings of the devil himself. My intention was to brew a 1.038 Irish-style stout but sweeter, like Murphy's or Beamish. This time it was not to have the wonderful hop bite of Guinness. Something happened either in the brew-

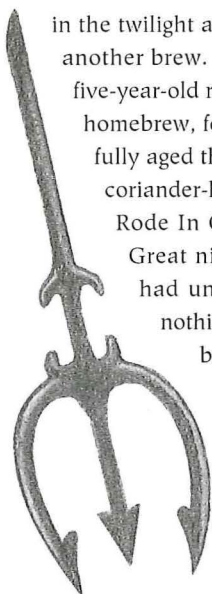
house or with my arithmetic and I ended up with an original gravity of 1.0666666—not the quaffable, easy drinking, let's have many, Irish-country-draft stout I intended to brew. Yes, I could have added more water, but my hop balance would have been way off so I pitched the yeast and waited until bottling to decide whether or not to dilute its strength.

When the time came to bottle I was faced with a dilemma. This stout tasted great just as it was. Should I add deaerated water and risk ending up with an unbalanced brew? The dilemma was real, but short-lived. Hell no! It was bottled as Beelzebub himself must have intended. What a treat. A nice, rich, roasted malt aroma and gentle chocolatelike malt sweet flavor are pivotally balanced with a hop bitterness that doesn't assert itself. Despite its strength this stout is quite quaffable and deceptively smooth. As with the previous bottle-conditioned beers, this stout had a head you could float a dime on—dense, tan, rich, creamy and lasting to the bottom of the glass as it clung like Belgian lace to the sides of the glass. By this time I was mystified by my foamy achievements.

These three beers were the first three batches made at my new homebrewing location and with a well as the water source. Is it the water? It was a question that hung







in the twilight air, but it was time for another brew. Out came a bottle of five-year-old raspberry lambic-style homebrew, followed by a wonderfully aged three-year-old apricot-coriander-honey The Horse You Rode In On Ale. Great beers. Great night. But these beers had unremarkable heads – nothing special. They were brewed with city water at my former homebrewery. I recalled my diligent efforts of complex mashing, designed to enhance foam density and head retention; especially mashing with a protein rest at around 132 degrees F (56 degrees C). It helped, but the foam quality was never notable.

I just bottled an all-grain January Weizenbock, a mash-extract Crocodile Tears RauchPils and an all-malt extract syrup with crystal and roasted grain Morena Mild. The ales were fermented at less than 65 degrees F (18 degrees C) and “cellared” at 52 degrees F (11 degrees C). The lagers began at 60 degrees F (16 degrees C), fermented at 52 degrees F (11 degrees C) and lagered at 40 degrees F (4 degrees C). There was a small degree of dissolved carbon dioxide at bottling and I couldn’t help noticing the persistence of the foam in the hydrometer cylinder. These would be densely foamed beers as well.

There’s a certain charm to the mystery of what happens in the brewing process. I’m the kind of homebrewer who keeps on brewing, often never discovering the reason things turn out exactly the way they do. In this case I’m really curious. Is it the water? This is the only consistent difference in my brewing ingredient or techniques. I’ve used various lager and ale yeast strains. I imagine cooler fermentation temperatures may have helped foam quality, but hell’s bells, I’ve fermented and lagered beer at cool and cold temperatures plenty of times. Furthermore, I know lots of microbrewers who have great control over their fermentation temperature. Just like my former homebrews, most American beers lack the foam

quality one is likely to experience with many decoction-mashed German lagers and even infusion-mashed Belgian ales. You know what I’m talking about if you’ve spent good money on great German and Belgian beers. The foam speaks to you.

As I said earlier, water was never my strength. Water chemistry is a bit too esoteric for my personality. I don’t have much desire to wholly understand the interactions and chemistries, but I sure do appreciate the wisdom of those who do. We all have our strengths and weaknesses. So I’m offering you the recipe for Beelzebub Double Stout and the data I received from an analysis of my well water. Maybe someone out there can confirm my suspicion that the water is why I’ve experienced a sudden and spectacular improvement in foam quality and head retention.

So let’s cut the shuck and jive and get on with the recipe for Beelzebub Double Stout.

#### Malt extract recipe for 5 U.S. gal (19 L)

##### For the grain steep:

- 1 1/2 lb 40 °L crushed Belgian crystal malt (0.68 kg)
- 3/4 lb crushed American roasted barley (0.34 kg)
- 2/3 lb crushed black malt (300 g)

##### Add to the mash runoff:

- 5 1/2 lb extra light dried malt extract (2.5 kg)

#### And boil with hops:

- 4 Homebrew Bittering Units (113 MBUs) English Kent Golding whole hops for bittering (60 min.)
- 2 1/2 Homebrew Bittering Units (71 MBUs) English Kent Golding whole hops for flavor (30 min.)
- 1/4 tsp Irish moss
- 2/3 cup corn sugar (132 mL) (to prime) ale yeast appropriate for a stout

- Original specific gravity: 1.064 to 1.068 (16 to 17 °B)
- Final specific gravity: 1.018 to 1.022 (4.5 to 5.5 °B)
- IBUs: about 20

Steep the crushed grains in six quarts (5.68 L) water at 150 degrees F (66 degrees C) for 30 minutes. Strain the grains out of the specialty grain malt extract you’ve made. Sparge with hot tap water to make a total volume of two gallons (7.57 L) and add the dried malt extract. Bring wort to a boil. The total boil time will be 60 minutes. Add bittering hops at the beginning of the boil. When 30 minutes remain add the flavor hops. When 10 minutes remain add Irish moss.

After 60 minutes of total boiling time, strain the hot concentrated wort into a sanitized fermenter to which you’ve added 1 1/2 gallons (5.68 L) of water. It helps to prechill the water to 33 degrees F (1 degree C) before

**HOME BREW BITTERING UNITS (HBUs)** are a measure of the total amount of bitterness in a given volume of beer. Homebrew Bittering Units can easily be calculated by multiplying the percent of alpha acid in the hops by the number of ounces. For example, if 2 ounces of Northern Brewer hops (9 percent alpha acid) and 3 ounces of Cascade hops (5 percent alpha acid) were used in a 10-gallon batch, the total amount of bittering units would be 33: (2 x 9) + (3 x 5) = 18 + 15. Bittering units per gallon would be 3.3 in a 10-gallon batch or 6.6 in a five-gallon batch, so it is important to note volumes whenever expressing bittering units.

**INTERNATIONAL BITTERNESS UNITS (IBUs)** are a measure of the bitterness of a beer in parts per million (ppm), or milligrams per liter (mg/L) of alpha acids. You can estimate the IBUs in your beer by using the following formula:

$$\text{IBU} = \frac{(\text{ounces of hops} \times \% \text{ alpha acid of hop} \times \% \text{ utilization})}{\text{gallons of wort} \times 1.34}$$

Percent utilization varies because of wort gravity, boiling time, wort volume and other factors. Homebrewers get about 25 percent utilization for a full one-hour boil, about 15 percent for a 30-minute boil and about 5 percent for a 15-minute boil. As an example, 1 ounce of 6 percent alpha acid hops in five gallons of wort boiled for one hour would produce a beer with 22 IBUs:

$$\text{IBU} = \frac{1 \times 6 \times 25}{5 \times 1.34} = 22 \text{ IBUs}$$

**METRIC BITTERNESS UNITS (MBUs)** are equal to the number of grams of hops multiplied by the percent alpha acid.



adding it to the fermenter rather than simply adding warmer tap water.

IBU bitterness of between 18 and 20 was calculated for this recipe by making the following assumptions: (1) whole hops were used, (2) the wort boil was concentrated with about three pounds (1.36 kg) of extract per gallon (3.79 L) of liquid boiled, (3) 23 percent utilization was assumed for 60 minutes of boiling, 21 percent utilization was assumed for 30 minutes of boiling. Beginners and intermediate brewers should relax, don't worry and have a homebrew.

Pitch a good dose of healthy active stout ale yeast and primary ferment at temperatures between 65 and 70 degrees F (18 and 21 degrees C) until complete. You may rack and "cellar" at 50 degrees F (10 degrees C) for two to three weeks if desired.

Prime with sugar and bottle when fermentation is complete. Relax. Don't worry. Have a Beelzebub. And if you know the reasons for my foam, I'll buy you one next time we're out and a-stout.

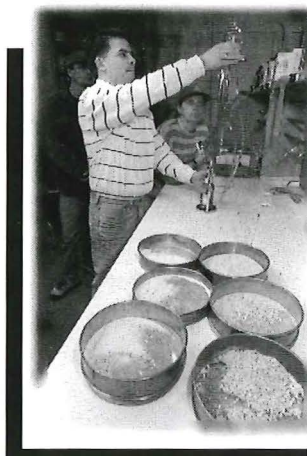
### Water Report

pH	6.74
Sulfates	57 ppm
Hardness (total Ca + Mg)	8.1 grains per gallon (considered by the report to be "Hard")
Total Alkalinity (CaCO <sub>3</sub> )	123.3 ppm
Chloride	35 ppm
Calcium	44 ppm
Iron	0.025 ppm
Magnesium	6.96 ppm
Potassium	1.3 ppm
Sodium	30 ppm
Silicon	6.7 ppm

I add 2.5 milliliters of 80 percent lactic acid solution to my mash and sparge water.

Charlie Papazian is the founding president of the Association of Brewers and author of *The New Complete Joy of Home Brewing* (Avon 1984, 1991) and *The Home Brewer's Companion* (Avon 1994). Charlie's newest work, *Home Brewer's Gold*, a book of prize-winning recipes from the 1996 World Beer Cup Competition, will be published by Avon in fall 1997.

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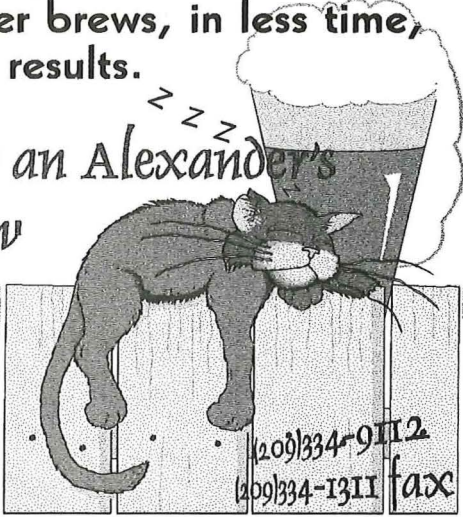
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## DEAR

P R O F E S S O R

Foamy Mountain  
Breakdown

Dear Professor Surfeit,

When I boil my wort I get a sort of foam that rides on top of my newest creation. It starts out looking like the head of a Guinness covering the whole top surface right after the malts are added, and then diminishes to a small section of the brewpot looking more like soap bubbles. I know it's not soap – I never use soaps on any of my brew equipment. I suspect it is some type of sugar residue.

I once read that the foam should be skimmed off when cooking mead. Is the same true with beer? What the heck is that stuff anyway? Should I be bothered with trying to eliminate it? Will hop oils be taken away with the elimination of the foam? What about sugars and flavors being taken out of my brew?

Not worried, just sipping a homebrew and wondering.

Hoppy fermentations,  
Jim Hackett  
Hamden, Connecticut

Dear Jim,

No. No. No. Relax. Just watch the stuff. It was meant to be watched. There's no need to do anything but kick back and have a homebrew. What you're observing is what's often called the hot break. Boiling malt extract causes proteins to coagulate and, during the transition, they go through

a stage where the molecules have a brief structure whereby they cause the kind of surface tension that creates and suspends bubbles. As the boiling continues and the proteins break down they are less able to sustain foaming and bubbles during a hot wort boil. It's often during the first five minutes where we all have experienced, at least once in our homebrewing lives, a boilover because of inattention at this stage of the process.

Whether you're boiling three gallons or 1,000 barrels, all brewers need to take precautions during the initial boiling stage, but with three or five gallons the boil is easier to control, and you can even have a homebrew while you're at it.

When making mead and choosing to boil the honey with water you're also coagulating proteins present in the honey. They are albumenlike (like egg-white meringue) and form a meringuelike foam on the surface at the beginning of the boil. I prefer to skim this off my honey boil because it helps produce a clearer mead.

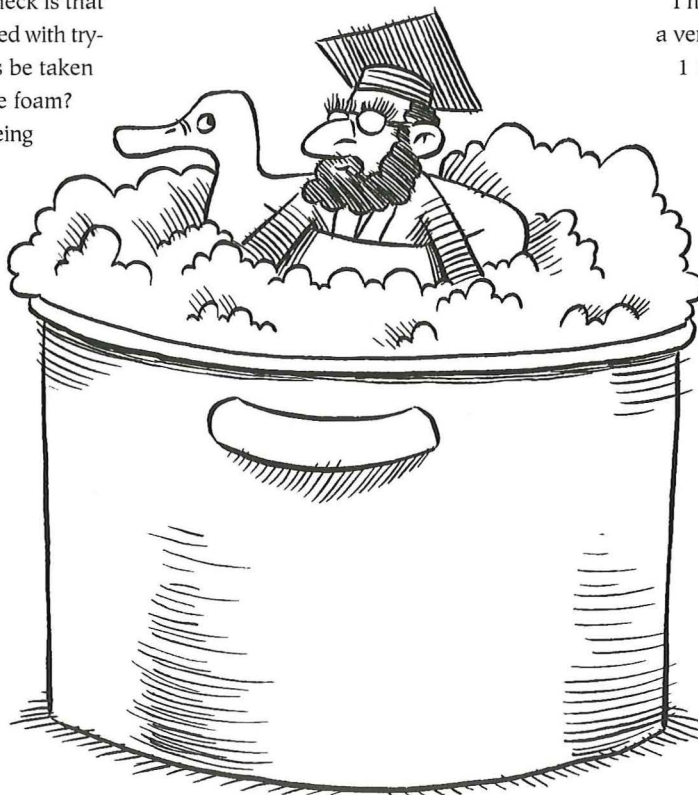
Keep on sipping. Keep on wondering.  
The Professor, Hb.D.

Wise Use of Rice  
by a Wise Guy

Dear Professor Surfeit,

I have made several attempts to brew a very light-bodied ale using rice. I boil 1 1/2 pounds (0.68 kg) of rice for an hour, then mash with three pounds (1.36 kg) of American two-row, one-half pound (0.23 kg) of CaraPils and one-half (0.23 kg) pound of light crystal malt. Then I add three pounds (1.36 kg) of light malt extract, one-quarter ounce (7 g) Cascade hops and Irish moss. I ferment with a neutral ale yeast.

The problem is the mash. I use a round five-gallon (19-L) Gott® picnic cooler with a Phil's Phalse Bottom. The false bottom works great with all-malt recipes. The wort runs clear after recirculating only a quart of liquid, but





when using rice the mash sets every time and I have a clogged lauter tun.

What would help? (1) Six-row instead of two-row? (2) More malt and less extract? (3) Raising the mash-out temperature? I currently don't, I just lauter as soon as the mash has converted. (4) All of the above?

John Thisdell  
Roanoke, Virginia

Dear John,

Hey John, you forgot (5). You know, "(5) None of the above." That's my answer.

*You're using a hefty 27 percent rice in your mashing regime. A large amount but not unmanageable. My assumption is that you're not milling the rice into smaller particles before boiling. That's the single most important step you could add to your technique, while also using a high enzyme six-row malt to help assure complete conversion. Because your particle sizes are large and perhaps your enzyme supply is marginal, I'm guessing you have some sticky unconverted rice starch gumming up the works.*

*Rice can be nice,  
The Professor, Hb.D.*

## Bum Rap for Sparging

Dear Professor Surfeit,

After I read the commercial article about Japanese Kirin Ichiban beer, I had to write and ask about the necessity of sparging.

According to this article, Kirin attributes the beer's taste to the unique "no sparging" process. They claim the original wort contains less tannin than the second wort (sparged wort), and no sparging is the most luxurious way to pursue great taste regardless of the cost.

They say the no-sparging process extracts the original wort only and generates smoother taste than sparged beers because with sparged beers the original wort is mixed with sparged wort.

I am skeptical of this because it might lead readers to believe two points: (1) Sparging is just adding water to rinse the mash and would make the beer thinner. Sparging allows brewers cost savings only. (2) Sparged wort is second-quality wort.

Would you please comment and give sparging the place it deserves?

Regards,  
Shannon Chen  
Homebrewer in Taiwan

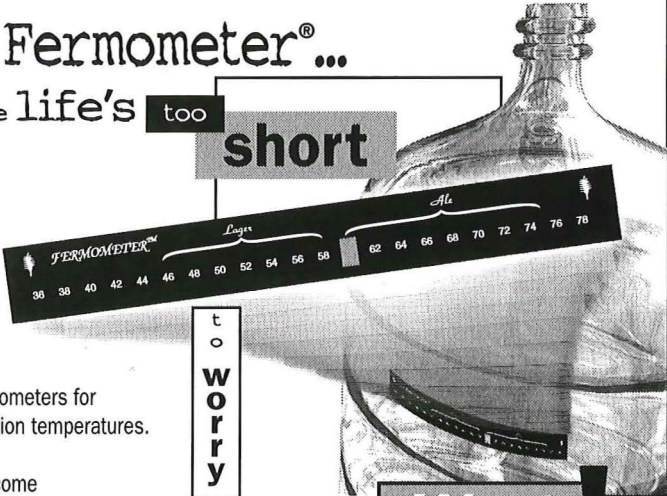
Dear Shannon,

*In the world of minutia, molecule counting and keeping high-priced sophisticated beer analysis machines busy (have to justify the cost somehow, right?), first wort is indeed a luxurious means to achieving the best wort possible. But I'm with you! We're not analytical machines counting molecules. We are big juicy sensual living taste buds and what we are able to perceive is what is most important.*

*Now, I'll concede that if what a brewer is after is an extraordinarily smooth, light-tasting beer without the minimal character contributed by tannins, then first runnings are the way to go. But you've got to go the distance and everything you pursue after the sparge must be keyed to produce a beer that takes advantage of the reduction of tannins.*

*Tannins aren't the bad guys they're made out to be. A certain (continued on page 97)*

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## Counterflow Chiller

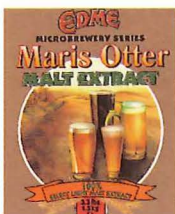


Precision Brewing Systems has designed the Maxichiller, an all-copper counterflow wort chiller that cools five gallons (19 L) of boiling wort to 60 degrees F (16 degrees C) in nine minutes using 30 gallons (114 L) of 50-degree-F (10-degree-C) water. This quick chilling improves the cold break, giving the brewer cleaner fermentation and clearer beer.

The inner wort coil of the chiller is set up with half-inch outside-diameter tubes on the inlet and outlet. The outer water coil has male garden hose thread on the inlet and outlet. While many chillers have an outer shell made of garden hose, the Maxichiller has an all-copper outer shell that allows for easier use and movement with no chance of pinching which might restrict flow and cause pressure build-up. The Maxichiller measures seven inches tall and six inches in diameter.

The manufacturer's suggested retail price is \$99.95. For information or to order contact Precision Brewing Systems, PO Box 060904, Staten Island, NY 10306; (718) 667-4459; FAX (718) 987-3942.

## Maris Otter Extract



Edme has produced single-varietal Maris Otter malt extract syrup. This light malt extract is part of Edme's Microbrewery Series unhopped line. Maris

Otter malt is prized by traditional British breweries for its low nitrogen content and unique sugar spectrum and flavor profile, especially in premium pale ales. Recipes can be found on the inside of the can label or at [www.edme.com](http://www.edme.com) on the Web.

The manufacturer's suggested retail price for a 3.3-pound can is about \$14.50. To find a supply shop near you that carries Edme's Maris Otter malt extract contact Brewmaster (800) 288-8922; or L.D. Carlson (800) 321-0315.

## Coopers Larger Cans

Coopers malt extract cans have increased in size from 3.75 pounds (1.7 kg) to four pounds (1.8 kg). The new can size is available in all six Coopers varieties: Lager, Draught, Real Ale, Bitter, Stout and Classic Old Dark Ale.

The manufacturer's suggested retail prices for the larger Coopers Malt Extract kits is the



same, about \$14.75. For a retailer near you contact Ryan Rockwell at Consolidated Beverages, PO Box 714, Medina, WA 98039-0714; (800) 368-9363; FAX (206) 635-9364; <http://www.conbev.com> on the Web.

## 12-Liter Homebrew Keg



Master Brewers of Queensland Australia introduces to American homebrewers its Beer Keg with Beer Gun. This 12-liter system, both a fermenter and serving keg in one, is designed to fit in a refrigerator for conditioning and storage. The keg is quarter-inch food-grade polypropylene.

Manufacturer's suggested retail price is \$99.50 plus \$15 shipping and handling to U.S. destinations. For more information or to order contact Master Brewers, 53 Seaview Terrace, Sunshine Beach, Queensland, Australia 4567; phone 07 54475934, FAX 07 54472761.

## Brew Kettle

Southern Stainless has entered the brew kettle market manufacturing five- and 10-gallon kettles with handles, a half-inch nipple connection and lid with a built-in



bi-metal probe thermometer. The kettles are manufactured from 16-gauge stainless steel.

The manufacturer's suggested retail price is \$98 for the five-gallon kettle, \$110 for the 10-gallon kettle, plus shipping. Southern Stainless brew kettles are available by C.O.D. from the manufacturer. For information or to order contact Southern Stainless, 300 E. Beech, McAllen, TX 78501; (210) 630-1097.

## Star-San Sanitizer

Five Star Affiliates, a producer of cleaning and sanitizing products for professional breweries, has released a line of its products for homebrewers. Among them, Star-San will probably be the most useful to homebrewers. Star-San is a no-rinse, relatively odorless phosphoric acid-based foaming sanitizer. Unlike chlorine, Star-San will not leave chlorophenolic off-flavors in beer. The product includes a surfactant as one of its inert ingredients, which allows the product to spread out and coat surfaces quickly.

Star-San is available in one-gallon and one-quart sizes from homebrew supply shops at the manufacturer's suggested retail price of \$40 and \$21, respectively. For information or to find a retailer near you contact Five Star Affiliates Inc., 6731 E. 50th Ave., Commerce City, CO 80022; (303) 287-0186; (800) 782-7019; FAX (303) 287-0391.

## Narrow-Range pH Papers



Fil-Chem Inc. has developed a set of narrow-range pH papers accurate to within 0.05 pH. Fil-Chem has 20 different ranges in the narrow-range line, each covering about 1.5 pH units in steps of 0.02 or 0.03 pH. The control and reference indicators are on the same strip, allowing readings in seconds.

Prices vary based on quantity and shipping location. Test strips come in boxes of 200. For the range that covers the 5.1 to 5.4 mash pH, ask for No. 3855 at your local

homebrew supply shop or from Fil-Chem Inc., 60 Franklin Ave., Brooklyn, NY 11205; (718) 625-3400.

## Indigenous Ingredients

The first fermented beverage in North America was brewed by the Aztec more than 2,000 years ago from the sweet juice of the agave plant, also known as a century plant. A brew called Pulque is still made from this plant in many regions of Mexico. Agave nectar is now available to homebrewers. This 75° Plato syrup is now available from homebrew supply shops.

The extract will be available in three- and six-pound containers with prices comparable to amlt extract. Contact F.H. Steinbart (800) 735-8793, to find a retailer near you. For more information and recipe ideas, contact Don Van Valkenburg, Stein Fillers Brewing Supply, 4180 Viking Way, Long Beach, CA 90808; (562) 425-0588 or donvanv@msn.com via e-mail.

## Wort Aerator



Batkem Industries announces the Gasbat wort aerator. The Gasbat works with or without an air pump or oxygen tank as the wort is sent from the kettle to the fermenter. The small device attaches to the siphon hose and comes with instructions and a mounting fastener. The Gasbat eliminates the need for a separate aeration step, saving time and reducing chance of contamination.

The Gasbat is plugged into the siphon hose and, as wort flows through the device, draws air in through the gas port mixing and aerating the wort. Dissolved levels of air or oxygen up to 22 ppm are achieved by connecting the hose from an air pump or source of pure oxygen to the gas port. The Gasbat conserves oxygen supply and allows control of the oxygenation level.

The manufacturer's suggested retail price is \$19.95. The Gasbat is available at homebrew supply shops or Batkem Industries,

7285 Spanghurst Dr., Cleveland, OH 44146; (216) 232-9962; FAX (216) 232-6933; <http://junior.apk.net/~bq340/gasbat.html>; bq240@apk.net.

## Counterpressure Bottling Clamp



Lee Design has created the Bottle Clamp counterpressure bottler with Memory Flow filler. The Bottle Clamp attaches to any soda keg or half-barrel keg, or fastens to a wall or refrigerator and accommodates bottles up to 14 inches tall. A spring bar holds the bottle in place while the filler is operated then releases the bottle for capping.

The adjustable four-valve Memory Flow filler speeds up bottling by using separate valves for flow rate and purging. The brewer sets the flow during the first bottle or two and the filler remembers the proper flow for the rest of the bottles.

The system includes instructions, a stainless-steel and brass filler, hoses with stainless-steel fittings and the aluminum and steel Bottle Clamp. The brewer provides the keg of cold, carbonated beer, disconnects, CO<sub>2</sub> tank with regulator, bottles, caps and capper.

The manufacturer's suggested retail price for the Bottle Clamp is \$169 plus shipping. For information or to order contact Lee Design, 432 Harvey Ct., Placerville, CA 95667; (916) 626-9626; FAX (916) 642-1438.

Compiled by Paul Gatz, homebrewer, part owner and manager of What's Brewin' Homebrew Supply in Boulder, Colo., Hop Barley and the Alers president of vice and treasurer of the reorganized American Mead Association.

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# T H E B E S T F R O M KITS

Jim Zebora

## Brew Bavaria's Best

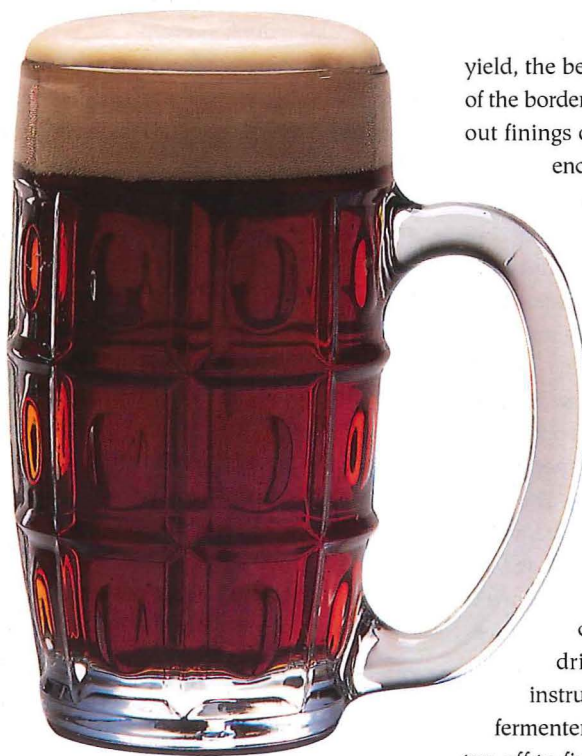
**T**his year's Märzen was already bottled when the opportunity came along to extend a string of late-winter, early-spring lagers. No mashing, sparging or even any boiling – well, just a little. These brews would be from hopped extract kits and the goal would be to see just how easy it is to make good beer.

The style was Bavarian lagers, two dark and one light. The recipes and vastly different brewing techniques were provided by the kit makers – The Brew House Munich Dark Lager from Spagnol's Wine and Beer Making Supplies of Canada; John Bull MasterClass Bavarian Lager, a British kit; and Morgan's Master Blend Munich Dunkel from Australia. The extracts were high-quality and all-malt, the manufacturers' proclaimed. The instructions called for no non-barley sugars to be added, nor would there be, except for priming.

My instructions were to follow the instructions, wherever they might lead, which was, in the end, to a batch each of light and dark alt beers and a sort of dunkel California common.

With the John Bull Bavarian Lager the goal was actually a Munich helles with its relatively low bitterness, medium malt body and no caramel or fruity flavors. The Brew House and Morgan's kits aim at a classic dunkel with its complex blend of roasted, chocolate and pale malt flavors and moderate hop bitterness. With the Morgan's kit, the instructions were to make a couple of additions of Tettnanger hops. The Brew House kit stood alone with no additions required.

A unique product, The Brew House kit is a pre-kettled high-gravity wort. Yes, it already



has been boiled and given its requisite hop additions. The wort arrives in a heavy 15-liter pouch set into a cardboard cube and needs only the addition of a couple of gallons of water and a packet of yeast. Before you can say *Reinheitsgebot*, it's bubbling away.

All you must do is pour it into the fermenter, add two gallons (8 L) of room-temperature water and sprinkle on the yeast. The Canadian-market kit I brewed was supplied with a 15-gram packet of Windsor ale yeast, so I resigned myself to making an alt beer rather than a lager.

Spagnol's has reformulated its high-gravity wort kits for the American market and cut them down to a 19-liter or five-U.S.-gallon

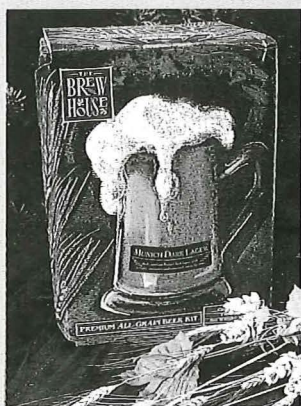
yield, the better to fit our fermenters south of the border. The American kits come without finings or yeast, but with instructions encouraging the brewer to use more advanced techniques, including liquid yeast, flavor and aroma hops plus cold fermentation and conditioning. The goal is to let brewers who so wish make a genuine lager beer. Kits are available for American premium lager, Pilsener, pale ale and extra special bitter as well as the Munich dark.

The John Bull's MasterClass kit, a 6.6-pound (3-kg) can of extract and a packet of dried yeast, came with sparse instructions. Empty the can into the fermenter, add boiling water to dissolve, top off to five imperial gallons, pitch and wait. "Boiling the wort isn't necessary," according to the can. "We've done it for you already in England."

John Bull also has formulated and hopped the extract – no adjuncts necessary – and chosen the yeast, so you can pretty much sleep through the brewing process, resting assured the manufacturer has done its best to provide a quality kit. The John Bull extract was a lovely ruby color that turned richly golden when diluted. The aroma had just enough hops to be promising.

This helles started at 1.042 and finished quickly at 1.011, good enough for the style. With no instructions for a secondary fermentation, I was eager to bottle. But after





11 days it was still very cloudy, which soured my mood until I decided to look on this as a transitional beer – born after the date that brewers began using paler malts but before lager yeast and refrigeration came to Munich.

John Bull's MasterClass kit was as easy as brewing can be, a fact I came to appreciate when I approached the Morgan's Master Blend. Not a unified kit at all, Master Blend is a system that requires mixing extracts and adding hops to produce the intended style. Morgan's, with greater attention to American homebrewing practices and preferences, includes packets of both ale and lager yeast, and encourages hopping for the proper flavor, aroma and bitterness.

The Munich dunkel recipe, specified in a Morgan's brochure subtitled "The New Direction in Beer Making," started with a 3.7-pound (1.7-kg) can of Light Barley Malt Master Base Extract. This all-malt extract is hopped to yield 15 International Bitterness

Units in six U.S. gallons (23 L) of beer, and is available in three additional varieties: dark barley malt, rice malt and wheat malt.

Morgan's Master Blends are unhopped 2.2-pound (1-kg) cans of malts mixed for flavor and color, and available as lager malt, wheat malt, Caramalt, chocolate malt, dark crystal malt and roasted black malt. There also is a "beer enhancer," made with pale malt, glucose and honey. According to supplied recipes, a can of light barley base plus a can each of Caramalt and beer enhancer forms the extract bill for an India pale ale, while a can of wheat extract and one of chocolate malt starts a batch on the road to becoming a dunkelweizen.

This was where Morgan's lost me. Extract is not the easiest substance to pour and measure. By the time I was done I had ribbons of hardening brown malt on the counter and stovetop and sticky stuff all over my hands and clothes. I'd rather crush and steep grains to provide the right character to a light barley base than face this malty mess again.

I didn't think to predict my starting gravity from the Morgan's Master Blend. If I had, I would have topped up to five U.S. rather than imperial gallons because the hydrometer reading came in at a weak-willed 1.034, sort of a lite dunkel. I'd have been happier with 1.040. The beer finished at 1.011.

John Bull gave me a pleasant surprise when I opened my first bottle about 2 1/2 weeks after priming. The malty-sweet nose



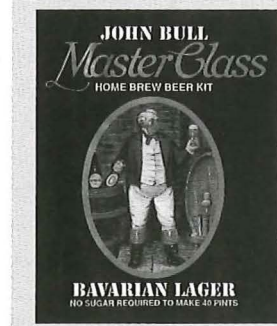
was appropriate for a light Bavarian lager, and the beer poured clean and clear. The first sip revealed that this was a well-balanced beer, nicely bittered for a hopped extract, and with a fair amount of hop flavor and aroma. Next time I'd use some finishing hops, but they're not really necessary. A lager strain and proper fermentation temperature would turn this into a super brew. And super easy.

While I was doubtful at first about The Brew House Munich Dark because it didn't clear up as well as the others, its roasty nose and thick, rocky head seemed promising. The flavor was sweet and surprisingly dry, with roasted malts adding a good bite to the taste. The biggest shock for me – after a runaway fermentation with ale yeast – was the absence of fruity esters. This was a clean-drinking beer that easily could be mistaken for a true dark lager.

Morgan's yielded a well-conditioned, good looking amber/brown brew, but just as I had a problem reconciling the complex process of brewing this extract dunkel, the beer also had a problem making all its ingredients work together. Since it was the only beer made with lager yeast, I'm planning to give this one some more time to mature.

Spagnol's The Brew House kits should be pretty formidable with advanced brewing techniques emphasized and American preferences taken into account. John Bull's MasterClass is a fine malt base that would produce superb beer with attention to procedure. Morgan's is on a high-quality track, but more style-specific extracts and less mess would make a better brewing experience.

In short, these kits are great places to start and will yield a good beer easily and simply. Applying your own brewing knowledge and techniques, however, will almost certainly produce a better result. (continued on page 98)



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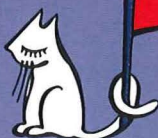
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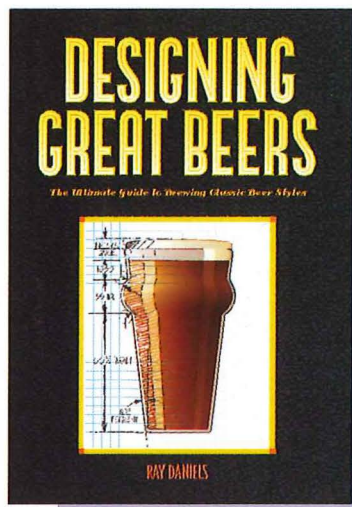
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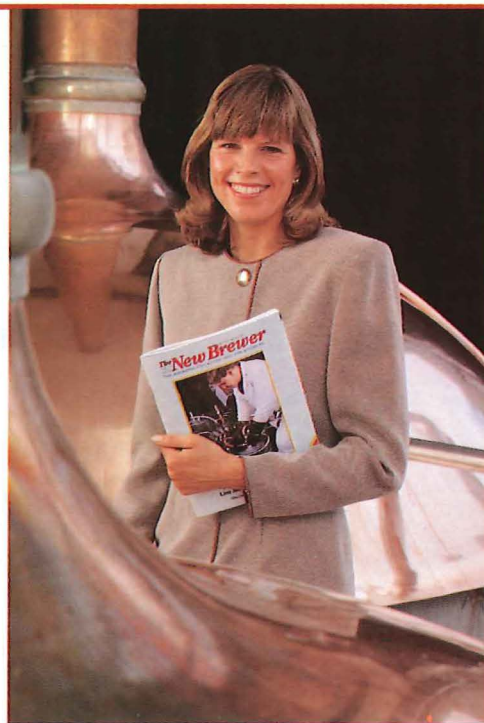
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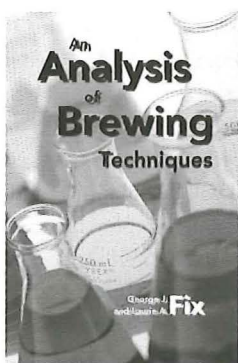
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# REVIEWS

**T**he opinions of individual reviewers do not necessarily represent the opinions of the American Homebrewers Association or *Zymurgy*.

## ***Analysis of Brewing Techniques***



*Analysis of Brewing Techniques* (Brewers Publications, 1997) sets a new standard for small-scale brewing texts. George and Laurie Fix are no strangers to technical topics; George's *Principles of Brewing Science* (Brewers Publications, 1989) has become the standard reference for homebrewers wishing to know something of the chemistry and microbiology involved in brewing. *Analysis of Brewing Techniques* builds on the strengths of the earlier book by applying the fundamental science of brewing to practical issues.

While this book assumes a fairly high level of knowledge, it is written so a Ph.D. in biochemistry is not required to understand the information presented. The intended audience is the advanced homebrewer and the commercial craft brewer. If you have mastered the advanced homebrewing texts currently available, this is the book you've been waiting for.

*Analysis of Brewing Techniques* introduces information not covered in other books, including first wort hopping and an in-depth

guide to mash schedules based on malt characteristics. First wort hopping, according to the authors, results in superior aroma and flavor characteristics in the finished beer. Fix and Fix acquaint the reader with the analytical data on hop aroma and flavor constituents, and present test brew results using the first wort hopping technique.

They present a series of mash schedules for different malt types, and explain how and why mash programs should be tailored to the properties (e.g., protein content) of the malt. The information presented permits the brewer to fine tune his or her mashing program, based on the characteristics of the various malts now available to the small-scale brewer. Again, the authors include data from many test batches to support their claims. If nothing else, this section of the book will have provided a great service if it encourages homebrew suppliers to make malt analyses available to their customers as a matter of course.

The authors' guidelines for correct use (including safety considerations) of cleaners and sanitizers are, by far, the most complete in the homebrewing literature. Fix and Fix offer many important recommendations on bottling, kegging and storage. One of the more useful is a thorough analysis of the effects of filtration, including the pros and cons of filtration at different micron ratings.

*Analysis of Brewing Techniques* provides in-depth coverage of most major brewing topics with very few weaknesses. A couple of points deserve mention, though.

The book has a good discussion of water quality and the effects of various dissolved inorganic ions on mashing and beer flavor.

What is missing is a how-to guide to mineral salt additions. A discussion on the proper measuring of mineral salts and a guide for the constituent ion returns that result from adding salts to water of known composition would have been in keeping with the rest of the book.

In the chapter on beer evaluation, the authors propose a weighting scheme for homebrew competition judging scores, based on a triangle test of each judge and two prescored ringers introduced into each flight. This procedure is used in many professional panel evaluations and improves the precision and accuracy of beer judging. These reviewers believe there are problems with the proposal on the homebrew competition level, but the scheme may have applications at the second round of the AHA's annual National Homebrew Competition.

In conclusion, *Analysis of Brewing Techniques* is a tour de force on advanced brewing methods. The Fixes' book marks a significant step forward in the evolution of quality craft brewing. Adoption of the stated techniques, and the implicit ethos of excellence, should result in a substantial improvement in the quality of beer brewed in the home or at a small commercial brewery.

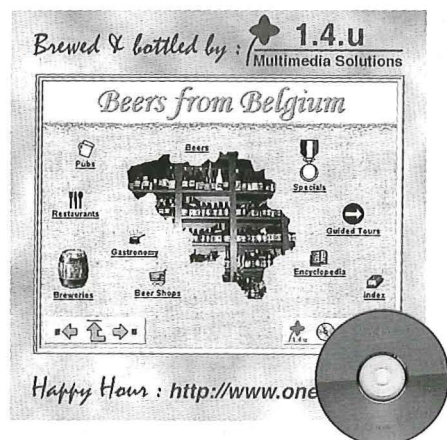
*Analysis of Brewing Techniques* by George and Laurie Fix, Brewers Publications, 1997, 272 pages. Publisher's suggested retail price is \$19.95.

*Reviewed by John Kessel and John Wolff.* A city planner in McKinney, Texas, Kessel has been a homebrewer for seven years and is a BJCP Certified judge. Wolff, a geology professor at Washington State University who has been homebrewing off and on since 1976, is a BJCP Certified judge. They are members of the Knights of the Brown Bottle homebrew club.

© 1997 John Kessel and John Wolff



## Beers From Belgium CD-ROM



If you aren't one of the lucky homebrewers to have visited Belgium, maybe you are planning a trip. A number of books have been published to assist in planning such trips for actual and armchair travelers. The first references available were Michael Jackson's *New World Guide to Beer* (Running Press, 1988) and *The Simon & Schuster Pocket Guide to Beer* (1986, 1988, 1991, 1994). Recently, more specialized books have become available, such as Jackson's *Great Beers of Belgium* (MM Communications, 1995) and Tim Webb's *Good Beer Guide to Belgium and Holland* (CAMRA 1994).

Now a Belgian company called 1.4.u Multimedia Solutions has released *Beers From Belgium CD-ROM* dedicated to the world of Belgian beer, and it is an invaluable addition to the books.

The initial menu gives you the main topics covered on the CD, including pubs, bars and restaurants, breweries, beer shops, gastronomy, encyclopedia and guided tours. If you have difficulty choosing between these tantalizing options, clicking on the guided tours icon is a good way to begin. Its menu offers Trappist breweries, abbey beers, Christmas beers, the Zenne Valley, animals and beer, diabolical beers, folklore and history. Clicking on Trappist breweries brings you to icons of the five Belgian Trappist breweries. From there you can view a series of photographs: an aerial shot of the brewery, beautifully reproduced; the brewery's equipment; their bottles, labels

and glasses; and a highlighted dot on a map of Belgium (a useful feature although the map is missing any detail).

Beside these assorted pictures is another window with history of the brewery, beer overviews including alcohol percentages, recommended serving temperatures and aroma and taste profiles of each of the brewery's beers. These are linked with style profiles, ingredients and lists of similar beers. If you find a beer of interest you can identify the style and get a list of beers of the same style, all with close-up photos of their labels – a nice touch that should make future identification easier when confronted with the hundreds of bottles available in one of the Belgian beer stores listed. In the margins are the address, phone and fax numbers, hours of operation and yearly output, plus tour hours and availability.

It's easy to become so enraptured by these subjects that you lose all track of time and space while clicking from one subject to another. The extensive links make skipping around a breeze. The Christmas beer section alone absorbed me for hours – the beautifully rendered labels of many obscure and wonderful looking beers, most of which I had no idea even existed. The complete list of breweries is truly staggering – it would take a long time with many digressions to scroll through all of them. For anyone merely curious about Belgian beer, for those planning a trip and for previous visitors who just want to relive old memories, this CD ROM is a must. Beware, though, the lasting effect of traveling through this CD is an irrepressible desire to set out for Belgium.

*Beers From Belgium CD-ROM* is available from 1.4.u Multimedia Solutions, (03) 775 54 73, FAX (03) 458 11 97 or [info@one4you.be](mailto:info@one4you.be) via e-mail. The CD can be ordered at <http://www.one4you.be> on the web. Manufacturer's suggested retail price is \$35 plus VAT and shipping.

*Reviewed by Paul Sullivan, a homebrewer since 1992, National BJCP judge and a gold-medal winner in the 1994 and 1995 AHA National Homebrew Competitions, as well as the grand winner of the AHA 1995 Invitational Brew-off. He has formulated and brewed recipes for two New York City brewpubs and writes for several beer publications.*  
© 1997 Paul Sullivan

## Koch's Kmasher



The Koch's Kmasher is a low-cost recirculating infusion mash system (RIMS) built around a 48-quart insulated picnic cooler. All component parts stack neatly into the cooler for compact storage and shipping. Unlike most RIMS, the Kmasher is conceptually simple, replacing the automated controls with manually operated pump and heater switches.

Assembling the unit the first time will take a bit longer than usual because the equipment will be unfamiliar and there are some preliminary steps to take before using. A five-page instruction sheet describes the setup and use procedures.

The control panel, pump and heating element are mounted to a wood platform that sits to one side of the cooler. Plastic tubing connects the masher to the pump and the heating unit output to a sprayer in the lid of the cooler. The drainage manifold in the bottom of the cooler is built of slotted PVC pipe and enclosed in stainless-steel mesh. A dial thermometer displays the mash temperature as liquid is continuously pumped from the mash through the heating element and back to the top of the grain bed via the sprayer.

Your first task when assembling the unit is replace the cooler's drain plug with a copper fitting. The instructions for doing this are terse and the illustration does not accurately depict the parts involved (especially the adapters). It is fairly straightforward, but the instructions should provide more information. There was no recommendation in the instructions to test run the unit the first time using clean water. Most people would do this anyway, but I think it should be mentioned because my first run rinsed a fair amount of dirt, plastic and metal particles



from the unit. The test run also showed where leaks occurred in the tubing connections so I could tighten clamps before running a mash through it. Other points and steps in the instructions are incomplete. For example, the instructions tell you to set the unit on blocks, but don't indicate one end should be elevated).

Mashing in is easy and straightforward. Water can either be preheated or the unit's heating element can be used to bring the water to strike temperature. Operating the controls manually is no trouble. A simple dimmer switch controls the pump speed and a toggle switch turns the heating element on or off. A dial thermometer on the heating manifold lets you monitor mash temperature and cycle heat as needed. Maintaining the temperature within one degree of target was easy. As with other RIMS, the starch conversion was quick and the runoff ran clear within a few minutes.


To sparge just open two valves and manually pour or spray water over the grain bed. This is easy enough to do, but I think it could be done more efficiently by running a tube from the sparge water container into the feed line for the pump. This would use the existing sprayer inside the lid and would rinse sweet wort out of the pump, heater manifold and tubing, where it tends to accumulate.

The Kmasher is generally well-designed, effective and easy to use. At the suggested retail price of \$375, it is one of the least expensive ways to try recirculated mashing. It lacks the automated control of many RIMS, but that control is not truly necessary, and for the cost-conscious hobbyist, the simpler approach of the Kmasher offers excellent value. I would like to see clearer, more complete instructions for the first-time user, and improvements in the sparging procedure, but overall I am impressed with the results and ease of use of the Kmasher.

The Koch's Kmasher is available for \$375 from Koch's Concepts, 9510 Bruce Dr., Silver Spring, MD 20901; (301) 587-5293.


*Reviewed by Mark Stevens, of Lovettsville, Va. Mark, a member of BURP (Brewers United for Real Potables) and a National BJCP judge, has been homebrewing for 11 years.*

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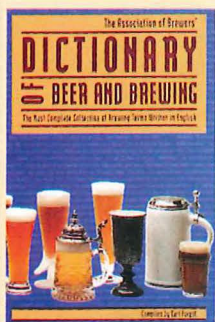
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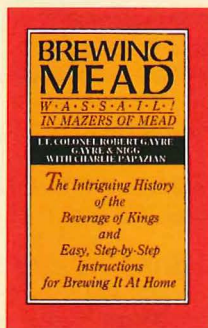


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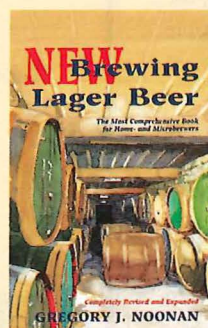


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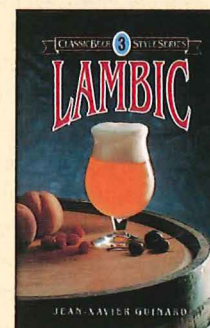


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FAX (612) 884-1065

### **WindRiver Brewing Co. Inc.**

7212 Washington Ave. S.  
Eden Prairie, MN 55344  
(612) 942-0589; (800) 266-HOPS;  
FAX (612) 942-0635

## **MISSOURI**

### **The Home Brewery**

South Old Highway 65  
PO Box 730  
Ozark, MO 65721  
(417) 485-0963;  
(800) 321-BREW(2739);  
FAX (417) 485-0965;  
homebrew@dialnet.net

### **Johnny Brew-Meister's**

Crossroads West Shopping Center  
2101 W. Broadway  
Columbia, MO 65203  
(573) 446-8030; FAX (573) 446-8031;  
jbrew2101@aol.com

### **St. Louis Wine & Beermaking**

251 Lamp & Lantern Village  
St. Louis, MO 63017  
(314) 230-8277; FAX (314) 527-5413

### **Winemaker's Market**

4386 N. Essex Ave.  
Springfield, MO 65803  
(417) 833-4145; FAX (417) 833-8949

### **Witt Wort Works**

1032 S. Bishop Ave.  
Rolla, MO 65401  
(573) 341-3311

### **Worm's Way Missouri**

2063 Concourse  
St. Louis, MO 63146  
(314) 994-3900; (800) 285-9676

## **MONTANA**

### **Billings Homebrew Supply**

1916 3rd Ave. N.  
Billings, MT 59101  
(406) 256-0261

## **NEBRASKA**

### **Carter's BYOB, Inc.**

1921-23rd. St.  
Columbus, NE 68601  
(402) 562-6266;  
hwcarte@megavision.com

### **Kirk's Do-It-Yourself Brew**

1150 Cornhusker Hwy.  
Lincoln, NE 68521  
(402) 476-7414

## **NEVADA**

### **Mr. Radz Homebrew Supply Shop**

4972 S. Maryland Pkwy. #4  
Las Vegas, NV 89119  
(702) 736-8504; Outside NV; (800)  
465-4723; FAX (702) 736-7942;  
mrradz@b@aol.com

## **NEW HAMPSHIRE**

### **Beer Essentials**

611 Front St.  
Manchester, NH 03102  
(603) 624-1080; (800) 608-BEER

### **Hops & Things**

122 E. Main St.  
Tilton, NH 03276-5125  
(603) 286-7209;  
brewmaster@cyberportal.net

### **Hops & Dreams**

PO Box 914  
Atkinson, NH 03811  
(888) BREW-BY-U;  
<http://www.de-inc.com/~hdreams>

## **NEW JERSEY**

### **BEERCRAFTERS Inc.**

110A Greentree Rd.  
Turnersville, NJ 08012  
(609) 2 BREW IT

### **The Brewmeister**

115 N. Union Ave.  
Cranford, NJ 07016  
(908) 709-9295; (800) 322-3020

### **Cherry Hill Homebrew Supply**

1845 Route 70 East  
Cherry Hill, NJ 08003  
(609) 424-3636;  
NJHOMEBREW@compuserve.com

### **Cumberland Brew Works**

1101 N. 2nd St., Reema Plaza  
Millville, NJ 08332  
(609) 825-0040

### **Hop & Vine**

11 DeHart St.  
Morristown, NJ 07960  
(201) 993-3191; FAX (201) 993-3193;  
<http://www.altitude.com/hop&vine>

### **The Keg & Barrel**

535 Vaughn Ave.  
Forked River, NJ 08731  
(888) BRU-BEER;  
aleman@webspan.net

### **Red Bank Brewing Supply**

111 Oakland St.  
Red Bank, NJ 07701  
(908) 842-7507

### **Small Change Homebrew Depot**

82 Nassau St., Suite 20  
Princeton, NJ 08542  
(609) 252-1800; FAX (609) 252-1800;  
schd@pluto.njcc.com

### **U-Brew Co.**

319 1/2 Millburn Ave.  
Millburn, NJ 07041  
(201) 376-0973; (201) 376-0493;  
DJBrew@AOL.COM

### **Wine Rack**

293 Route 206  
Flanders, NJ 07836  
(201) 584-0333

## **NEW YORK**

### **Arbor Wine & Beermaking Supplies Inc.**

23 E. Main St.  
East Islip, NY 11730  
(516) 277-3004; FAX (516) 277-3027;  
<http://www.hhog.com/arbor;>  
arborbeer@aol.com

### **At Home Warehouse Distributors**

PO BOX 185  
Clarence, NY 14031  
(800) 210-8585 (Mail Order/Retail);  
FAX (716) 681-0284;  
AHWD@ag.net;  
<http://WWW.AHWD.COM>

### **The Brew Shop @ Cornell's**

310 White Plains Rd.  
Eastchester, NY 10707  
(800) 961-BREW;  
FAX (914) 961-8443;  
brewshop@cornells.com;  
<http://www.cornells.com>

### **Brewers Den**

24 Bellemeade Ave.  
Smithtown, NY 11787  
(516) 979-3438; (800) 499-BREW

### **D.P. Homebrew Supply**

1998 E. Main St., Route 6  
PO Box 625  
Mohegan Lake, NY 10547  
(914) 528-6219

### **E.J. Wren Homebrewer Inc.**

Ponderosa Plaza (behind Heids)  
off Old Liverpool Rd.  
Liverpool, NY 13088  
(315) 457-2282; (800) 724-6875

### **Heller's Homebrew Supplies Inc.**

120 Milton Ave.  
Syracuse, NY 13204  
(315) 426-1044

### **Homebrew and Grow-East Coast Hydroponics Inc.**

439 Castleton Ave.  
Staten Island, NY 10301  
(718) 727-9300; FAX (718) 727-9313

### **The Homebrew Experience**

110 Fairview  
Kingston, NY 12401  
(888) BREW-GUYS (toll free);  
brewguys@brewguys.com;  
<http://www.brewguys.com>

### **Homebrew Shop at Karp's**

#2 Larkfield Rd.,  
Inside Karp's Hardware  
East Northport, NY 11731  
(516) 261-1235; FAX (516) 261-1573;  
alannnt@aol.com;  
<http://members.aol.com/kimlgt/beer.html>

### **Mighty Niagara Brewer**

744 Elmwood Ave.  
Buffalo, NY 14222  
(716) 883-1040

### **The Brews Brothers at KEDCO - Beer & Wine Supply Store**

564 Smith St.  
Farmingdale, L.I., NY 11735-1168  
(516) 454-7800; (800) 654-9988  
(outside N.Y. only);  
FAX (516) 454-4876

### **New York Homebrew**

221 Old Country Rd.  
Carle Place, NY 11514  
(800) YOO-BREW;  
FAX (516) 294-1872

### **Niagara Tradition Homebrewing Supplies**

7703 Niagara Falls Blvd.  
Niagara Falls, NY 14304  
(716) 283-4418; (800) 283-4418

### **Party Creations**

RD 2 Box 35 Rokeby Rd.  
Red Hook, NY 12571  
(914) 758-0661



## NORTH CAROLINA

### *Alternative Beverage*

114-0 Freeland Lane  
Charlotte, NC 28217  
(704) 527-9643; (800) 365-BREW

### *American Brewmaster*

3021-5 Stoneybrook Dr.  
Raleigh, NC 27604  
(919) 850-0095

### *Brew Better Supply*

10207 C Chapel Hill Rd.  
Morrisville, NC 27560  
(919) 467-8934; (800) 915-BREW  
BREW BETTER @ AOL.COM

### *City Beverage Homebrew Shop*

915 Burke St.  
Winston-Salem, NC 27101  
(910) 722-2774; (910) 725-1481;  
FAX (910) 725-1481

### *Homebrew Adventures*

9240 Albermarle Rd.  
Charlotte, NC 28227-2624  
(704) 535-2277; (888) 785-7766;  
FAX (704) 535-2060; homebrew@  
homebrewadventures.com;  
<http://www.homebrewadventures.com>

## NORTH DAKOTA

### *Happy Harry's Bottle Shops*

2051 32nd Ave. S.  
Grand Forks, ND 58201  
(800) 367-BREW; (701) 780-0902;  
FAX (701) 780-0905

## OHIO

### *The Grape and Granary*

1302 E. Tallmadge Ave.  
Akron, OH 44310  
(330) 633-7223; (800) 695-9870;  
<http://www.grapeandgranary.com>

### *HoMade Brewing Supplies*

505 Superior St.  
Rossford, OH 43460-1246  
(419) 666-9099; (888) 646-6233;  
homade@primenet.com;  
<http://www.primenet.com/~homade>

### *JC Homebrewing Co.*

8306 State Route 43  
East Springfield, OH 43925  
(614) 543-4200; (800) 899-5180  
<http://www.jchomebrew.com>;  
jcbrew@clover.net

### *Portage Hills Vineyards*

1420 Martin Rd.  
Suffield, OH 44260  
(800) 418-6493;  
[portage@ix.netcom.com](mailto:portage@ix.netcom.com);  
<http://www.portagehills.com/portage>

## OREGON

### *Home Fermenter Center*

123 Monroe St.  
Eugene, OR 97402  
(541) 485-6238; FAX (541) 485-2220;  
<http://www.globalgecko.com/homefermeter>

### *Homebrew Heaven*

1292 12th St. S.E.  
Salem, OR 97302  
(503) 375-3521

## PENNSYLVANIA

### *Bierhaus International*

3723 W. 12th St.  
Erie, PA 16505  
(814) 833-7747; (814) 838-4090;  
bierhaus@erie.net

### *Beer Unlimited*

Routes 30 and 401  
Great Valley Shopping Center  
Malvern, PA 19355  
(610) 889-0905

### *Country Wines*

3333 Babcock Blvd., Suite 2  
Pittsburgh, PA 15237-2421  
(412) 366-0151;  
<http://www.ontv.com/pp/ctrywine/index.htm>

### *The Flying Barrel*

C/O Gettysburg Brewery & Pub  
15 York St.  
Gettysburg, PA 17325  
(301) 663-4491

### *The Frothy Shoppe*

4807 SR 103 North  
Lewiston, PA 17044  
(717) 242-8744; FAX (717) 899-7723

### *Home Sweet Homebrew*

2008 Sansom St.  
Philadelphia, PA 19103  
(215) 569-9469; FAX (215) 569-4633;  
homsweet@voicenet.com

### *Keystone Homebrew Supply*

779 Bethlehem Pike  
Montgomeryville, PA 18936  
(215) 855-0100; FAX (215) 855-4567;  
keystonehb@juno.com

### *Mr. Steve's Homebrew Supplies-West*

4342 N. George St.  
Manchester, PA 17345  
(717) 266-5954; (800) 815-9599;  
FAX (717) 266-1566;  
brewmatt@aol.com;  
<http://www.netresolve.com/mrsteve>

### *Mr. Steve's Homebrew Supplies-East*

1027 Dillerville Rd.  
Lancaster, PA 17603  
(717) 391-9655;  
brewmatt@aol.com;  
<http://www.netresolve.com/mrsteve>

### *Triangle Homebrewing Supply*

2821 Penn Ave.  
Pittsburgh, PA 15222  
(412) 434-8333; FAX (412) 434-8330;  
delbrew@compuserve.com

## RHODE ISLAND

### *Brew H.orizons*

150 Wood St.  
Coventry, RI 02816  
(401) 826-3500; (800) 589-BREW;  
brewhorizons@ids.net;  
<http://www.brewhorizons.com>

## SOUTH CAROLINA

### *U-BREW*

1207 HWY 17 S.  
N. Myrtle Beach, SC 29582  
(803) 361-0092; (800) 845-4441

## TENNESSEE

### *Allen Biermakens*

4111 Martin Mill Pike  
Knoxville, TN 37920  
(615) 577-2430; (800) 873-6258

### *New Earth Homebrewing & Hydroponics*

139 Northcreek Blvd.  
Goodlettsville, TN 37072  
(615) 859-5330; (800) 982-4769;  
HYDROBREW@aol.com

## TEXAS

### *Brew Masters*

426 Butternut  
Abilene, TX 79602  
(915) 677-1233; FAX (915) 690-1205;  
prisg@camalott.com

### *Canada Homebrew Supply*

1998 C. Industrial Blvd.  
Abilene, TX 79602  
(915) 698-4744; FAX (915) 698-4744;  
(888) 839-2739 (Toll Free)

### *Classic Fermentations*

3307 Canyon Dr.  
Amarillo, TX 79110  
(806) 342-9930;  
(888) 838-BREW (2739);  
classicferm@fia.net;  
<http://home.fia.net/~classicferm>

### *DeFalco's Home Wine & Beer Supplies*

2415 Robinhood  
Houston, TX 77005  
(713) 523-8154; FAX (713) 523-5284;  
(800) 216-2739

### *Fruit O' the Vine*

1616 McDonald Rd.  
Tyler, TX 75701  
(800) 561-9221; (903) 593-4688;  
FAX (903) 561-9291

### *Homebrew Supply of Dallas*

777 South Central Expwy.  
Richardson, TX 75080  
(214) 234-5922; (800) 270-5922;  
FAX (214) 234-5922;  
jmorgan@primaview.com;  
<http://www.primaview.com/homebrew/>

### *Homebrew Headquarters*

2810 Greenville  
Dallas, TX 75206  
(214) 821-7444; Order lines: (800) 966-4144, (800) 862-7474

### *Homebrew Headquarters — North*

1335 Promenade, Suite 1335  
Richardson, TX 75080  
(214) 234-4411; (214) 699-1439

### *Homebrew Headquarters — West*

900 E. Copeland, Suite 120  
Arlington, TX 76011  
(817) 792-3940; (800) 862-7474

### *The Home Brewery*

PO Box 308  
3800 Colleyville Blvd.  
Colleyville, TX 76034  
(817) 281-7252; (800) 817-7369  
(orders); FAX (817) 581-4335;  
foremans@worldnet.att.net

### *Lubbock Homebrew Supply*

1718 Buddy Holly Ave.  
Lubbock, TX 79401  
(800) 742-BREW; (806) 763-7480;  
lubbock.homebrew@door.net;  
<http://door.net/homebrew/>

### *St. Patrick's of Texas Brewers Supply*

12922 Staton Dr.  
Austin, TX 78727  
(512) 832-9045; (800) 448-4224;  
FAX (512) 832-8552;  
stspats@wixer.bga.com;  
<http://www.stspats.com>

### *St. Patrick's at Waterloo Brewing*

401A Guadalupe St.  
Austin, TX 78701  
(512) 499-8544; FAX (512) 499-8621;  
stspats@wixer.bga.com;  
<http://www.stspats.com>

### *The Winemaker Shop*

5356 W. Vickery Blvd.  
Fort Worth, TX 76107  
(817) 377-4488; (800) IT BREWS;  
FAX (817) 732-4327;  
<http://winemakershop.com>;  
brewsome@Onramp.NET

## UTAH

### *The Beer Nut Inc.*

1200 S. State  
Salt Lake City, UT 84111  
(801) 531-8182; FAX (801) 531-8605;  
(800) 626-2739; sales@beernut.com;  
<http://www.xmission.com/~beernut>

### *Brew-Yers*

1879 S. Main St., Suite 160  
Salt Lake City, UT 84115  
(801) 484-8809; brewyers@aros.net;  
<http://www.aros.net/~brewyers>

## VIRGINIA

### *The Brewmeister*

1215G George Washington  
Memorial Hwy.  
Yorktown, VA 23693  
(757) 595-HOPS; FAX (757) 596-1034

### *Pints O' Plenty*

Lower Level of Peddler Antiques  
RT 854 At RT 221  
Forest, VA 24551  
(804) 385-0077

### *Rocktown Brewers*

52 E. Market St.  
Harrisonburg, VA 22801  
(540) 432-6799; furges@rica.net;  
<http://home.rica.net/furges>



**The Weekend Brewer**  
4205 West Hundred Rd.  
Chester, VA 23831  
(804) 796-9760; FAX (804) 796-9561;  
Bequipment@gnn.com;  
[http://members.gnn.com/  
bequipment/wkendbr.htm](http://members.gnn.com/bequipment/wkendbr.htm)

**Vintage Cellar**  
1313 S. Main St.  
Blacksburg, VA 24060  
(540) 953-CORK; (800) 672-WINE;  
vcellar@nrv.net;  
<http://www.nrv.net/~vcellar/>

## WASHINGTON

**Alchemy Brew & Wine**  
104 S. 4th Ave.  
Pasco, WA 99301  
(509) 545-4605; wesa1@gte.net

**The Beer Essentials**  
15219 Pacific Ave. S.  
Tacoma, WA 98444  
(206) 536-8840; (800) 685-2739;  
robn2beer@aol.com

**Brewers Warehouse**  
4520 Union Bay Place N.E.  
Seattle, WA 98105  
(206) 527-5047;  
<http://www.brewerswarehouse.com>

**Cascade Brewing Supplies**  
224 Puyallup Ave.  
Tacoma, WA 98421  
(206) 383-8980; (800) 700-8980;  
GreatBrew@aol.com

**The Cellar Homebrew**  
14411 Greenwood N.  
Seattle, WA 98133  
(206) 365-7660; (800) 342-1871;  
homebrew@aa.net;  
[http://www.cellar-homebrew.com/  
indexr.html](http://www.cellar-homebrew.com/indexr.html)

**The Home Brewery**  
9109 Evergreen Way  
Everett, WA 98204  
(800) 850-2739;  
HmBrewery@aol.com

**Kim's Place**  
Smokey Point Plaza  
3405 172nd St. N.E.  
Arlington, WA 98223  
(360) 658-9577; FAX (360) 659-2792

**Larry's Brewing Supply**  
7405 S. 212th St. #103  
Kent, WA 98032  
(206) 872-6846; (800) 441-BREW;  
<http://www.brewingnw.com/larrys;>  
jtrent@aa.net

**Liberty Malt Supply Co.**  
1419 First Ave.  
Seattle, WA 98101  
(206) 622-1880;  
(800) 990-MALT (6258);  
FAX (206) 322-5185;  
liberty@mdv-beer.com

**Northwest Brewers Supply**  
316 Commercial Ave.  
Anacortes, WA 98221  
(800) 460-7095; FAX (360) 293-4904;  
nwbs@fidalgo.net

**Peninsula Brewing Supplies**  
6820 Kimball Dr., Suite A4  
Gig Harbor, WA 98335  
(206) 851-9265

## WEST VIRGINIA

**Tent Church Vineyard**  
RD 1, Box 218  
Colliers, WV 26035  
(304) 527-3916; (800) 336-2915

## WISCONSIN

**Galaxy Science + Hobby Center**  
1607 N. Richmond St.  
Appleton, WI 54911  
(414) 730-9220

**Homebrew Market**  
520 E. Wisconsin Ave.  
Appleton, WI 54911  
(414) 733-4294; (800) 261-2337;  
FAX (414) 733-4173;  
<http://www.homebrewmarket.com>

**The Hops Shop**  
230 Broad St.  
Menasha, WI 54952  
(414) 722-6281

**Life Tools Adventure Outfitter**  
1035 Main St.  
Green Bay, WI 54301  
(414) 432-7399

**The Market Basket Homebrew & Wine Supplies**  
14835 W. Lisbon Rd.  
Brookfield, WI 53005-1510  
(414) 783-5233;  
FAX (414) 783-5203;  
[http://www.glaci.com/market/  
brewing/homepage.html](http://www.glaci.com/market/brewing/homepage.html)

**North Brewery Supplies**  
9009 S. 29th St.  
Franklin, WI 53132  
(414) 761-1018;  
(800) 4UDRAFT;  
FAX (414) 761-7360;  
briannbs@execpc.com;  
[http://www.execpc.com/~  
briannbs/index.html](http://www.execpc.com/~briannbs/index.html)

## WYOMING

**Brew's Brothers Home Brew Supply**  
2214 A Upland St.  
Rock Springs, WY 82901  
(800) 216-2502

To have your shop listed, please call Linda Starck at (303) 447-0816 ext. 109 or Chris Lowenstein, ext. 108

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<http://beertown.org> for more information.



# CALENDAR

## AUGUST

- 2** North West Florida Homebrewers Competition, **AHA SCP**, Pensacola, Fla. Entries due July 27. Fla., Ga., Ala., Miss., La. only. Contact Doug Mitchell at (904) 434-6211 or nmz71A@prodigy.com.
- 2** Cornish Fair Preservation Committee Competition, **AHA SCP**, Cornish, Maine. Entries due Aug. 9. Contact Randy Metcalf at (207) 625-4617.
- 3** Iowa State Fair Amateur Oenology, **AHA SCP**, Des Moines, Iowa. Entries due July 15, 1997. Contact Greg Helton at (515) 279-1016.
- 2-3** North Texas State Fair Homebrew Competition, **AHA SCP**, Denton, Texas. Entries due July 19 - 26. Contact Roger Jones at (817) 321-6304.
- 9** Beer & Sweat, **AHA SCP**, Cincinnati, Ohio. Entries due Aug. 9. Contact Robert Pinkerton at (513) 251-9754 or 102126.3315@compuserve.com.
- 9** Extract Extravaganza Club-Only Competition, **AHA SCP**, Pittsburgh, Pa. Entries due Aug. 4. Contact Brian Rezac at (303) 447-0816 ext. 121 or brian@aob.org.
- 9** Josephine County Fair Amateur Beers Competition, **AHA SCP**, Grants Pass, Ore. Entries due Aug. 7. Contact Hubert Smith at (541) 597-2142 or brewboy@magick.net.
- 9** Blue Ribbon Chef's Challenge, **AHA SCP**, East Lansing, Mich. Entries due Aug. 6. Contact Fred Clinton at (517) 655-6701.
- 9-19** Fine Beers and Wines of Czech Republic and Hungary, European Brewery Adventures. Call the MIR Corporation at (206) 624-7289 or mir@igc.apc.org.
- 10** Kentucky State Fair, **AHA SCP**, Louisville, Ky. State fair entry forms due July 5. AHA entry form and beer entries due Aug. 9. Contact Bob Reed at (502) 222-7439 or tobias@iglou.com.
- 16** Second Annual Antelope Valley Homebrew Competition, **AHA SCP**, Lancaster, Calif. Entries due July 20. Contact Carl Weyl at (805) 943-8302 or carlsbrew1@qnet.com.

- 16** Evergreen State Fair Beer Brewing Competition, **AHA SCP**, Monroe, Wash. Entries due Aug. 9. Contact Steve Titterness at (360) 658-9577 or kimsplace@tgi.net.
- 16** Montgomery County Fair Second Annual Homebrew Competition, **AHA SCP**, Gaithersburg, Md. Entries due Aug. 9. Contact Bill Lawrence at (301) 963-9314 or billyl@erols.com.
- 16** Monterey County Fair Homebrew Competition, **AHA SCP**, Monterey, Calif. Entries due July 12. Contact Bill Evans at (408) 771-2537 or nipwad@aol.com.
- 16** Michigan State Fair, **AHA SCP**, Detroit, Michigan. Entries due Aug. 8. Contact Spencer Thomas at (313) 994-0072 or spencer@umich.edu.
- 17** Benton/Franklin County Fair Homebrew Competition, **AHA SCP**, Richland, WA. Entries due Aug. 16. Contact Wayne Robertson at (509) 373-6342 or warobertson@worldnet.att.net.
- 22-24** The 10th Anniversary of MASHOUT97 (Mid-Atlantic States Homebrewers camp-OUT), Rocky Gap, Md. Contact Bill Ridgely at (703) 971-5744 or ridgely@burp.org.
- 23** Colorado State Fair Homebrew Competition, **AHA SCP**, Colorado Springs and Pueblo, Colo. Entries due Aug. 15. Contact John Landreman at (719) 579-6977 or jcl3@aol.com.
- 23** Silver Mountain Homebrew Competition, **AHA SCP**, Kellogg, Idaho. Entries due Aug. 17. Contact Claudia Laskey at (208) 783-1111 or http://www.skisilver.com.
- 23-24** The Great California Brews and Blues Festival, Santa Monica, Calif. Contact Steve Whitehead at (310) 328-8448.
- 24** Western Washington Fair Amateur Beer Competition, **AHA SCP**, Puyallup, Wash. Entries due Aug. 16. Contact Candy Blancher at (206) 841-5017.
- 31** Third Annual High Desert Brewers and Eastern Idaho State Fair Homebrew Competition, **AHA SCP**, Blackfoot, Idaho. Entries due Aug. 23. Contact Dine Smith at (208) 526-2115 or dinebrew@micron.net.

## SEPTEMBER

- 1** Mid-America Festivals' Mead, Cider and Beer Competition, **AHA SCP**, Shakopee, Minnesota. Entries due Aug. 24. Contact Jim Ellington at (612) 445-7361 or jellings@me.umn.edu.
- 6** Fourth Annual Microbrewers Expo, Colorado Springs, Colo. Call (719) 473-0241.
- 13** 1997 Thunder Mountain Brew-Off, **AHA SCP**, Sierra Vista, Ariz. Entries due Sept. 5. Contact Paul Lachmanek at (520) 378-4290 or paulgl@primenet.com.
- 13** Second Dayton Beerfest, **AHA SCP**, Dayton, Ohio. Entries due Sept. 6. Contact Mark Schmitt at (937) 236-4857 or DRAFT97@juno.com.
- 13** Boeing Employees Wine and Beer Club, **AHA SCP**, Kent, Wash. Entries due Sept. 1. Contact John Falkowski at (206) 544-0897. Boeing employees only.
- 14** Mickey Finn's Brewer's Dream Homebrew Competition, **AHA SCP**, Libertyville, Illinois. Entries due Sept. 11. Contact Eric Lundquist at (847) 938-6745 or Eric.Lundquist@add.ssw.abbott.com.
- 15-16** National Brewpub Conference, Davis, Calif. Contact Carl Landau at (916) 758-4650.
- 19 - Oct. 2** Tap Into Central Europe with Oktoberfest, European Brewery Tours. Call the MIR Corporation (206) 624-7289 or mir@igc.apc.org.
- 20** Pacific Brewers Cup Homebrew Competition, **AHA SCP**, Redondo Beach, Calif. Entries due Sept. 5. Contact Jay Ankeney at (310) 545-3983 or jayankeney@aol.com.
- 22 - Oct. 24** Intensive Brewing Science and Engineering, Woodland, Calif. Call the American Brewers Guild at (800) 636-1331 or abgbrew@mother.com.
- 22 - Dec. 5** Craftbrewers Apprenticeship Program, Woodland, Calif. Call the American Brewers Guild at (800) 636-1331 or abgbrew@mother.com.

- 22** Mid South Fair, **AHA SCP**, Memphis, Tenn. Entries due Sept. 17. Contact Jim Gosney at (901) 756-5298 or jgosney@compuserve.com.
- 23** Oktoberfest, **AHA SCP**, Toledo, Ohio. Entries due Sept. 21. Contact Tom Stroheck at (419) 243-3731 or strohbrew@juno.com.
- 24-29** Oktoberfest Tour. Contact Beer Lovers Travel at (888) 277-2379 or 103612.3365@compuserve.com.
- 27** Big House Homebrew and Oktoberfest Celebration, **AHA SCP**, Albany, N.Y. Entries due Sept. 15. Contact Rich Michaels at (518) 445-2739.
- 27** Sydney North Brewers Spring Beer, **AHA SCP**, Sydney, Australia. Entries due Sept. 6. Contact Peter Ryan at 02.9913.3040 or Tilook@amaze.net.au.
- 29-Oct. 5** Bamberg Beer Seminar, Bamberg, Germany. Contact Beer Lovers Travel at (888) 277-2379 or 103612.3365@compuserve.com.

## OCTOBER

- 2-4** Great American Beer Festival®, Denver, Colo. Contact the AOB at (303) 447-0816.
- 2-13** Brewing Traditions of England, Scotland and Ireland, European Brewing Adventures. Call the MIR Corporation (206) 624-7289 or mir@igc.apc.org.
- 4** Minnesota Brewfest '97, **AHA SCP**, Minnetonka, Minn. Entries due Sept. 28. Contact Steve Platz at (612) 452-2444 or platz@cray.com.
- 4-5** How to Open a Brewpub or Microbrewery, Denver, Colo. Call the American Brewers Guild at (800) 636-1331 or abgbrew@mother.com.
- 4-5** Sales, Marketing and Distribution, Denver, Colo. Call the American Brewers Guild at (800) 636-1331 or abgbrew@mother.com.
- 9-10** International Beer Summit, Osaka, Japan. Contact Ryoyuji Oda at 81-797-31-6911 or jcba@mxh.meshnet.or.jp.
- 11** Arizona State Fair, **AHA SCP**, Phoenix, Ariz. Entries due Sept. 19. Contact Sherry Pew at (602) 252-6771 ext. 304. Ariz. residents only.



**15-18** 14th Annual Dixie Cup Homebrew Competition, Houston, Texas. Entries due Oct. 7. Contact Sean Lamb at (281) 992-5661 or slamb@ghgcorp.com.

**16-17** The Greater Milwaukee Brew Festival, Milwaukee, Wis. Contact Glenn Helgeland at (414) 242-4810.

**18** Oktobersbest, Zinzinnati Homebrewers Competition, **AHA SCP**, Cincinnati, Ohio. Entries due Oct. 4. Contact Jeff Seeley at (513) 231-6062 or infuser@aol.com.

**18** Farmers Fair Homebrew Competition, **AHA SCP**, Perris, Calif. Entries due Oct. 10. Contact William Satmary at (909) 825-7084x1726 or satmary@pe.net.

**18-19** Advanced Homebrewers Weekend Series, Woodland, Calif. Call the American Brewers Guild at (800) 636-1331 or abgbrew@mother.com.

**25** Weiss is Nice Club-Only Competition, **AHA SCP**, Warrenville, Ill. Entries due Oct. 20. Contact Brian Rezac at (303) 447-0816 ext. 121 or brian@aob.org.

**31** The Brewers Ball, St. Paul, Minnesota. This is a beer tasting event to benefit the Cystic Fibrosis Foundation. Contact Betsy James at (612) 631-3290 or FAX (612) 631-3296.

## NOVEMBER

**1** Trub Nine From Outer Space Homebrew Competition, **AHA SCP**, Durham, N.C. Entries due Oct. 29. Contact Bruce Pitner at (919) 383-4891 or trub9@mindspring.com.

**1-8** Grain to Glass: The Boots-On Brewing Course, Woodland, Calif. Call the American Brewers Guild at (800) 636-1331 or abgbrew@mother.com.

**1-11** Artisan Breweries of Holland and Belgium, European Brewery Adventures. Call the MIR Corporation (206) 624-7289 or mir@igc.apc.org.

**7-9** 97 Real Ale Festival, Chicago, Ill. Contact the Craft Beer Institute at 773-665-1300 or raydan@compuserve.com.

**8** Fourth Annual Rhode Island International Beer Exposition, Providence, R.I. Contact Maury Ryan at (401) 272-0980 or ldcltd19@idt.net.

**15** Brewers of South Suburbia's Sixth Annual Homebrew Competition at the Founders Hill Brewing Co., Downers Grove, IL. Contact Jamie Wika at jwika@concentric.net.

**16** Best of Philly Homebrew Competition, **AHA SCP**, Philadelphia, Pa. Entries due Nov. 7. Contact Steve George at (215) 822-2187 or swg1231@aol.com.

## DECEMBER

**6** Bitter Mania Club-Only Competition, **AHA SCP**, Boulder, Colo. Entries due Dec. 1. Contact Brian Rezac at (303) 447-0816 ext. 121 or brian@aob.org.

**6** BJCP Exam, Princeton, N.J. Contact Bruce Hammell at (609) 393-2946 or LHammell@aol.com.

**7** Le Premier Spectacle de Houblon du Monde Homebrew Competition, **AHA SCP**, Princeton, N.J. Entries due Dec. 1. Contact Bruce Hammell at (609) 393-2946 or LHammell@aol.com.

## JANUARY

**17** Big Bend Brew-Off '98, **AHA SCP**, Tallahassee, Fla. Entries due Jan. 14. Contact Ned Roberts at (904) 562-7105 or nedr@freenet.tlh.fl.us.

## FEBRUARY

**15** Febfest Brewers on the Bluff, **AHA SCP**, Libertyville, Ill. Entries due Feb. 13. Contact Andy Patrick at (847) 970-9737 or andnator@sashimi.www.com.

## MARCH

**21** Palm Beach Draughtsmen's Hurricane Blowoff Homebrew Competition, **AHA SCP**, West Palm Beach, Fla. Entries due March 14. Contact Dale Tojisan at (561) 790-1856 or Tojisan@aol.com.

## APRIL

**4** 12th Annual Gem State Regional Homebrew Competition, **AHA SCP**, Boise, Idaho. Entries due March 27. Contact Loren Carter at (208) 342-4775 or LCarter@claven.idbsu.edu.

**AHA SCP** = American Homebrewers Association Sanctioned Competition Program

The Calendar of Events is updated weekly and is available from the Association of Brewers: info@aob.org or http://beertown.org on the web.

To list events, send information to **Zymurgy** Calendar of Events. To be listed in Winter Issue (Vol. 20, No. 5), information must be received by Oct. 20, 1997. Competition organizers wishing to apply for AHA Sanctioning must do so at least two months prior to the event. Contact Amahl Turczyn at amahl@aob.org; (303) 447-0816 ext. 116; FAX (303) 447-2825; PO Box 1679, Boulder, CO 80306-1679.

## AMERICAN HOMEBREWERS ASSOCIATION • KUDOS • SANCTIONED COMPETITION PROGRAM

### • MARCH 1996 •

**UPSTATE NEW YORK**  
Rochester, N.Y., 147 entries — Peter Garofalo of Syracuse, N.Y., won best of show.

### • APRIL 1996 •

**CRESCENT CITY HOMEBREW COMPETITION**  
New Orleans, La., 189 entries — Mike "Elvis" Karnowski of New Orleans, La., won best of show.

### • JUNE 1996 •

**EIGHT SECONDS OF FROTH**  
Cheyenne, Wyo., 82 entries — Tony DeMarse of Greeley, Colo., won best of show.

### • AUGUST 1996 •

**JOSEPHINE COUNTY FAIR AMATEUR BEERS COMPETITION**  
Grants Pass, Ore., 47 entries — Jim Mills of Ashland, Ore., won best of show.

**MICHIGAN STATE FAIR HOMEBREW COMPETITION**  
Detroit, Mich., 208 entries — Stephen Klump of Plymouth, Mich., won best of show.

**MONTREY COUNTY FAIR**  
Salinas, Calif., 44 entries — Rick Gonzales of Salinas, Calif., won best of show.

### • OCTOBER 1996 •

**TASTE OF THE GREAT LAKES**  
Frankenmuth, Mich., 102 entries — Sanford Barris of White Lake, Mich., won best of show.

### GORDONS CAVE A VIN OKTOBERFEST 1996

Quebec, Montreal, 48 entries — Pierre Valois of Montreal, Quebec, Canada, won best of show.

### • NOVEMBER 1996 •

**GREAT BREWS OF AMERICA HOMEBREW**  
Lake Harmony, Pa., 64 entries — Gary Paterson of High Bridge, N.J., won best of show.

### • JANUARY 1997 •

**BIG BEND BREW-OFF**  
Tallahassee, Fla., 75 entries — Ned Roberts of Tallahassee, Fla., won best of show.

**LAS VEGAS WINTERFEST '97**  
Las Vegas, Nev., 303 entries — Sheldon Jackson of Pahrump, Nev., won best of show.

### • FEBRUARY 1997 •

**FIRST SPOTTED ALES COMPETITION**  
Pinetop, Ariz., 40 entries — Greg Scharrer of Scottsdale, Ariz., won best of show.

**NATIONAL BAY AREA BREW-OFF**  
Pleasanton, Calif., 104 entries — Ron Thomas of Silverton, Ore., won best of show.

**FUR RONDY WINTER CARNIVAL**  
Anchorage, Alaska, 162 entries — Dennis Urban of Anchorage, Alaska, won best of show.

**FLORIDA STATE FAIR HOMEBREWING COMPETITION**  
Tampa, Fla., 77 entries — Jim Wagner of Pasadena, Md., won best of show.

**THIRD ANNUAL COMMANDER SAAZ'S INTERPLANETARY HOMEBREW BLASTOFF**  
Cape Canaveral, Fla., 131 entries — Thomas McConnell of Melbourne, Fla., won best of show.

**HAMPTON ROADS "TAMING OF THE BREWS"**  
Norfolk, Va., 101 entries — George and Bea Amberman of Virginia Beach, Va., won best of show.

**HEARTLAND HOMEBREW COMPETITION**  
Decatur, Ill., 96 entries — James Littrell of Decatur, Ill., won best of show.

**BREW-SKI**  
Flagstaff, Ariz., 101 entries — Greg Scharrer of Scottsdale, Ariz., won best of show.

### • MARCH 1997 •

**EIGHTH ANNUAL REGGAE AND DREDHOP COMPETITION**  
Boulder, Colo., 121 entries — Keith Schwols of Fort Collins, Colo., won best of show.

**CENTRAL ALABAMA STOUT/PORTER SHOWDOWN**  
Birmingham, Ala., 16 entries — Ginger Wolring and Douglas McCullough of Birmingham and Indian Springs, Ala., won best of show.

**FORTH ANNUAL AMERICA'S FINEST CITY HOMEBREW COMPETITION**  
San Diego, Calif., 267 entries — Brian Tapken of El Cajon, Calif., won best of show.

**SKYE'S SCOTTISH ALE HOMEBREW COMPETITION**  
Mt. Vernon, Wash., 40 entries — Tom Strand of Tacoma, Wash., won best of show.

**SECOND ANNUAL KONA BREWERS FESTIVAL HOMEBREW COMPETITION**  
Kailua-Kona, Hawaii, 72 entries — Rod Romanak of Kailua, Kona, won best of show.

**HUDSON VALLEY HOMEBREWERS' INC. SEVENTH ANNUAL HOMEBREW COMPETITION**  
Poughkeepsie, N.Y., 229 entries — Bob Hall of Millbrook, N.Y., won best of show.

**PNW ST. PATRICK'S HOMEBREW AND MEAD**  
Woodinville, Calif., 126 entries — Brian Haugen of Puyallup, Wash., won best of show.

**SECOND ANNUAL PALM BEACH DRAUGHTSMEN HURRICANE BLOW OFF**  
West Palm Beach, Fla., 137 entries — Michael Glinski of North Lauderdale, Fla., won best of show.



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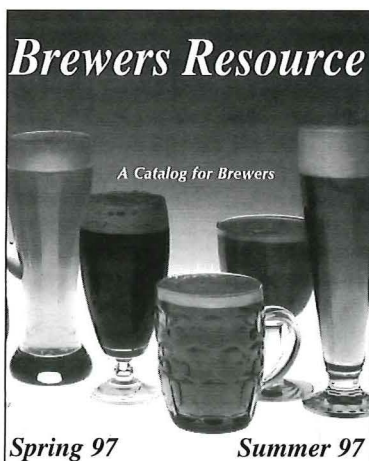
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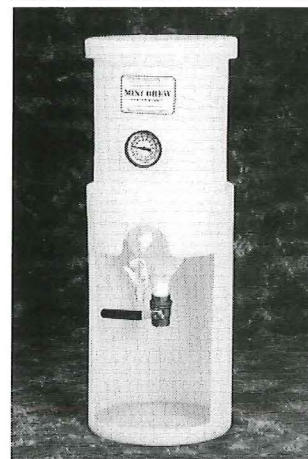
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**News** (from page 10) The Council will provide education in all aspects of retailing including Business of Homebrew sessions at the AHA National Homebrewers Conference, audio teleconferencing throughout the year and the quarterly publication *Shop Talk*, which will feature articles on subjects pertinent to retailing in the industry.

"The AHA believes good information and strong communication among all aspects of the industry – suppliers, shop owners and individual homebrewers – strengthens homebrewing overall," said AOB Vice President Cathy Ewing. "Consumers have myriad ways to spend their leisure time, and it is all of our jobs to make homebrewing the activity of choice. The Home Beverage Suppliers Council is designed to make that happen."

For information or to join the Council, contact John Thomas, Council director, at (909) 676-2337, FAX (909) 699-3477 or e-mail [jthomas@iinet.com](mailto:jthomas@iinet.com). Information also is available at <http://beertown.org> on the Web.

## BIG WORLD OF BEER

### New Japanese Breweries



**The Musashino Mugen Beer Co. in Saitama, Japan opened in June 1996. This new brewery features traditional European beer styles "crafted for the Japanese palate."**

Pub breweries are all the rage in Japan. A collaboration of the German company

Jacob Carl GmbH and Itochu Sanki Corp. of Tokyo has resulted in a supply of 11 complete microbreweries to Japan. Brewery sizes range from 10 to 20 hectoliters. The latest one commissioned, built in cooperation with Sapporo Brewery, is New München located in a restaurant of the same name in the city of Kobe. Jacob Carl GmbH wants to be recognized in Japan as a partner for building larger breweries and as a specialist in energy-saving wort boiling.

At the same time, Kirin Brewery, in partnership with Anheuser-Busch, has moved its

headquarters from New York to Santa Monica, Calif. Brewery operations will move from Canada to California. Company President Takeshi Shimazu said, "We are not concerned whether Kirin is perceived as an import or a domestic beer. What we want to communicate is that Kirin is a superpremium beer in U.S. standards – good in taste, quality and freshness." Shimazu said the company plans to increase production to 130,000 barrels during the new site's first year. Kirin is ranked 15th in sales of imported beer in the United States. (*Brauwelt International 1996/V* and *Beer May 1997*)

## Ode to Homebrew Poetry

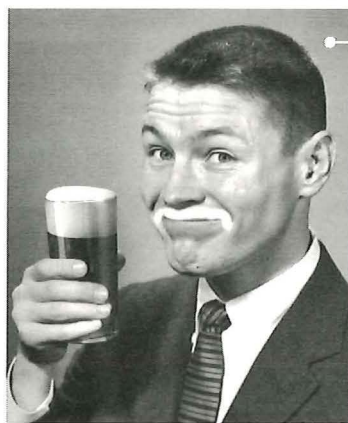
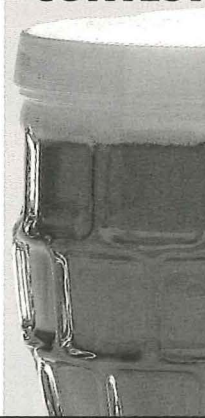
*I think that I shall never see  
a good piece of homebrew poetry.*

*Prove me wrong, dear readers, if you dare  
and a wad of prizes for you we'll spare.*

*Take your inspiration from Bud or Shakespeare.  
The only rule is the theme, and that's beer!*

Contest is for AHA members only. Entries are due by Sept. 8. Send your entry, complete with your membership number, name address and phone number to **Zymurgy Contest Corner**, PO Box 1679, Boulder, CO 80306-1679; or submit your entry through the members-only area on the AHA home page (<http://beertown.org>).

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## China Maximizes Malting

Plans for building and operating a 300,000-ton-capacity malting plant in the brewing city of Qingdao in the People's Republic of China are under way by three Canadian companies. ITI World Investment Group Inc., Lockerbie Ventures Ltd. and Pacific Mountain Brewing Corp. want to build the plant in three phases over 48 months for an

estimated \$116 million. The investors justify the huge project on the basis of estimates that beer consumption in China will rise 20 percent annually. (*Brauwelt International*, 1996/V)

## Guinness' 31-Pub Toast

Last year in Ireland patrons at 20 pubs simultaneously raised toasts as part of the annual Great Guinness Toast. This year on Feb. 28 the pub count was 31 for the fourth

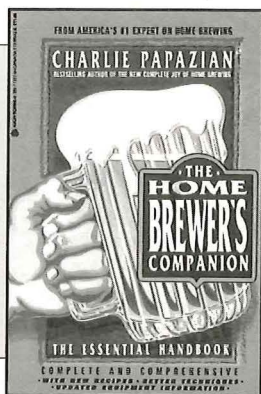
annual event coordinated by Guinness Import Co. The question is, were the folks from that famous Book of World Records on hand? (*Beer*, May 1997)

## Franco-Swiss Particle Accelerator Canned

According to the February/March issue of *Beer Cans and Brewery Collectibles*, the world's largest particle accelerator was put out of service for five days. The \$1 billion project, a 17-mile ring located under beneath the border of France and Switzerland, accelerates subatomic particles to nearly the speed of light. Recently, however, the accelerator simply stopped. Scientists eventually found the problem: two beer cans had been left inside. It is unknown whether the beers were of French or Swiss origin. (*American Brewer*, Trade Show Issue, 1997)

## BREW YOUR OWN — WITH HELP FROM THE EXPERT!

Charlie Papazian, America's leading authority on home brewing, offers readers two comprehensive, in-depth guides to brewing everything from the lightest lager to the darkest stout.



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## Battle of the Buds

Anheuser-Busch has finally ended its 80-year legal dispute with the Czech makers of Budweiser Budvar. A 100-year-old contract prevented Anheuser-Busch from selling beer under the Budweiser name in central Europe. The U.S. giant agreed to sell its beer as "Bud" in nine European countries and as "Budweiser" in 11 others. Because of successful Bud sales, complaints by Anheuser-Busch have declined. Meanwhile, the Budejovicky Budvar SP brewery, formerly owned by the Czech Republic, will undergo privatization early in 1997. Czech Minister for Agriculture Josef Lux will submit the plans to interested buyers, including Bass, Heineken and Carlsberg, Plzensky Prazdroj, Radegast and, not surprisingly, Anheuser-Busch. (*Brauwelt International*, 1996/V)

## TECHNOTES

### Ultrasonic Brewing

Gardeners have been known to sing to their plants, but how many brewers sing to their wort? If only we could reach a pitch



of roughly 18,000 hertz, or cycles per second, we might be able to improve the quality of the beer made from that wort, according to an article published by John Eisenbeiss. Through a series of tests conducted in breweries in the United States, France and Germany, researchers found that, by immersing a magnetostrictive ultrasonic Atlas oscillator directly into the wort, beneficial changes in hop bitterness, astringency, protein coagulation and dissolved gas levels took place.

According to the article, a substantial amount of bittering compounds in hops are precipitated into the trub or lost in sedimentation during fermentation, filtration and storage. As much as 40 percent of the available lupulin is lost. The process not only breaks down hop compounds into a finer, more easily assimilated form, but also stabilizes dissolved compounds, making them less likely to drop out of solution. In unhopped wort the ultrasonic waves produced a cleaner, maltier product, caused by the breakdown of astringent flavor-causing compounds. Oddly, subsequent analysis of this wort showed that a small percentage of raw maltose has been subjected to fission into dextrose, a process that normally only occurs during fermentation.

Proteins also were affected. The ultrasonic frequencies helped proteins coagulate more rapidly into formations as large as the human hand. Finally, dissolved gas in wort was quickly dispelled during the process, suggesting a possible method of discouraging oxidation in fermented wort. Though the author points out that results varied considerably with how the ultrasonic vibrations were applied, he pointed out that all changes to treated beer wort were positive, and the ease with which brewers can carry out the procedure makes it a promising means of controlling beer flavor. (*MBAA Technical Quarterly*, Vol. 33, No. 4, 1996)

## Modified Isoalpha Acids May Prevent Light Damage to Beer

Hop oils containing chemically modified rho, tetrahydro and hexahydro isoalpa acids have certain molecular differ-

ences from normal isoalpa acids that prevent them from being affected by ultraviolet light in the same way. Beer made exclusively with these modified alpha acids can be bottled in clear glass because there is no danger of the beer being light-struck, which under normal circumstances produces skunky off-flavors and aromas. Unfortunately, the chemically modified preparations provide bitterness only, so researchers are testing ways of combining aromatic and flavoring hop oils and resins with the lightproof bittering com-

pounds. If a suitably cost-effective and natural-tasting blend can be found and used on a commercial scale, light damage to bottled beer may soon be a thing of the past. (*Journal of the Institute of Brewing*, Vol. 102, No. 6, 1996)

Amahl Turczyn of Boulder, Colo., a homebrewer since 1985 and professional brewer since 1995, recently finished his master's degree in English at the University of Colorado at Boulder. He is now AHA project coordinator.

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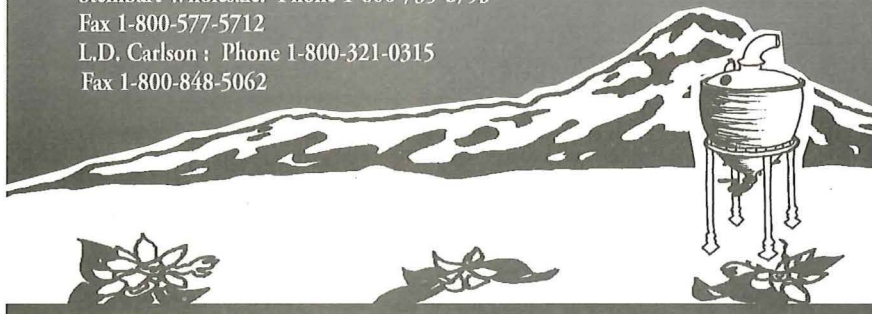
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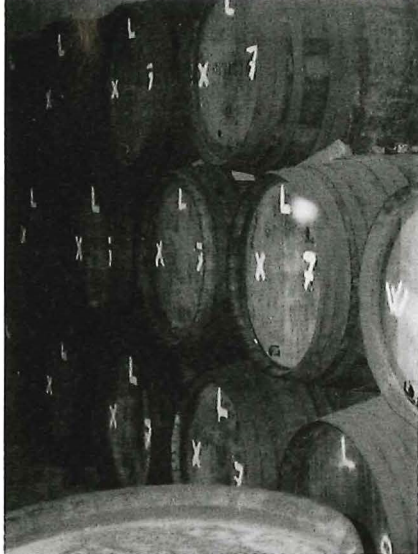
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**Lambic** (from page 21)

## Show Me the Way

There are about as many opinions on the right way to make the lambic style as there are homebrewers, although they divide roughly into the purist and pragmatist camps. I am a pragmatist when it's not practical to be a purist. The brewing process depends on the variety of lambic you prefer.

My first attempt at a kriek was about 10 years ago, and it was little more than a cherry ale – quite tasty – but today I would not submit it to a homebrew competition in the lambic category. Lambic can be quite sour, tart, even acetic, or of the sweeter variety and still be safely within the style. I prefer the most goaty, sour and barnyardlike ones I can find, but this preference certainly evolved over time. In the beginning you may find yourself preferring the sweeter fruited ones, such as Lindemans, and end up with a craving for a gueuze lambic by Cantillon as you sample your way through this most interesting beer style.

## Brewing Lambic at Home

The most important element of lambic brewing is the presence and growth of the various necessary microorganisms. The flavors and aromas are hard to reproduce without the right bugs. I have seen some mention of the sour mashing method to provide lactic sour-

ness, but this seems to produce uneven results. It is possible to add lactic acid, which I have tried with Belgian white beers, but found the results rather one dimensional. It is possible to adjust sourness this way but I would not rely on it as the major source of acidity. Many brewers craft lambics using a few pure cultures such as a *Pediococcus*, *Brettanomyces* and ale yeast producing quite drinkable results, but they still lacked some complexity. I found culturing the dregs of a good lambic provided the richest source of microorganisms. You can supplement by adding pure cultures if necessary.

Although you do not need to inoculate with the same quantity of slurry as you do with ale and lager production, it is important to pitch a healthy starter. I recommend one as large as you can manage. Many of the organisms involved in lambic fermentation are slow growing, meaning you have to be patient with culturing and especially conditioning in carboys or casks. Be prepared for a batch of lambic to take eight to 24 months. Do check on your fermenter periodically, and don't let your airlocks dry out.



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**Lambic** My most successful batches have been fermented using yeast and bacteria cultured from bottles of unfiltered Boon gueuze. This is one of the greatest excuses for purchasing multiple bottles of lambic when you find them. Unfortunately, lambics are a bit expensive, but considering you are buying a nice mix of cultures and you get to drink the delivery vehicle, it is well worth the expense. If you attempt to culture from bottles, try to get as fresh a bottle as possible. Cantillon is another good source for starter organisms, but on occasion I've had these turn quite sour.

Many lambic brewers culture on agar slants, but I have had success with liquid cultures. It may be advisable to use a buffer such as calcium carbonate if you intend to store an acid-producing organism for a long period of time. If the cultures you grow from bottles do not have the desired complexity, you can order pure cultures of whatever is lacking to enhance your ferment. Because the fermentation goes through phases of activity, there has been debate concerning scheduled inoculation that mimics the activity of the process as it occurs in a real lambic brewery.

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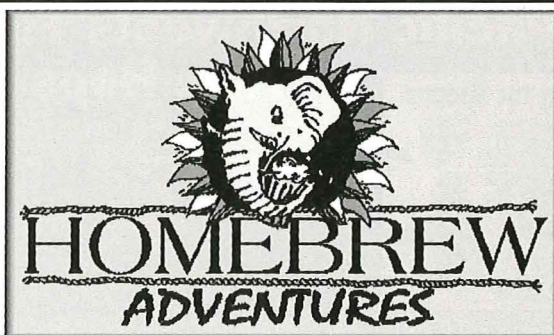
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## Puckerface Goozabase

### Ingredients for 5 U.S. gal (19 L)

- 5 to 7 lb two-row Pilsener malt (You want a light color. Light pale ale malt also will work.)
- 2 to 3 lb malted wheat (You can substitute flaked or gelatinized wheat.)
- 4 oz aged hops (45 min.)  
or
- 1/2 oz low-alpha-acid "noble-type" hops, 2 to 5.5% alpha acid (14 g) (45 min.)

- Original specific gravity: 1.044 to 1.047

Experiment with different percentages or amounts of malts depending on the performance of your mash tun. The idea in mashing a lambic grist is to leave extra starch, dextrins and protein in the wort.

You can do a single-stage infusion mash to keep things simple. Mash at 155 degrees F (68 degrees C) to leave dextrins in the wort. Don't worry if a bit of starch remains after mashing.

A variation on this schedule is a step-infusion mash with a protein rest at 120 degrees F (49 degrees C) for 30 minutes. A saccharification rest at 155 degrees F (68 degrees C) will provide amino acids for the ferment.

To go to a bit more trouble, and to break down wheat proteins even further, a decoction mash can be used. To brew an all-grain batch with raw wheat follow the guidelines above and use the turbid mash schedule.

I have seen a variety of schedules, generally using a top-fermenting yeast first, and almost any variety will work. I prefer a neutral ale yeast with good attenuative properties. Follow this with an addition of a *Pediococcus* for sourness, then *Brettanomyces*. With a good starter from a real lambic culture, you will probably do just fine with no other organism additions, although I recommend adding an ale yeast.

Temperature is important in lambic brewing, and once again the process goes against the grain, traditionally speaking. The different organisms tend to have different preferences for growing temperature. In Belgium, lambics



## Turbid Mashing Theory

Traditionally, the turbid mashing schedule has been a bit complex and raw wheat is not the easiest substance to work with. Schedule specifics can vary widely and still offer good results. Troy Jesse, a food science graduate student who makes award-winning lambics, has hit upon a good homebrewing mash schedule. The specifics are merely guidelines to get you started. As Troy says, "Lambic brewing is the most relaxed [brewing] there is." So don't worry if you don't hit the exact temperature or times. The idea is to periodically draw off milky wort rich in starch, dextrins and proteins and put it in a secondary kettle as you go through temperature steps, adding fresh hot water to the mash.

Start out with about 60 percent malt and 40 percent wheat in your grain bill. It is easier if you blend about 25 percent unmalted wheat with malted wheat. For the first rest, use strike water at about 130 degrees F (54 degrees C) to get a mash temperature of around 100 degrees F (38 degrees C). After about one-half hour add more hot water until the temperature is near 110 degrees F (43 degrees C) and the mash is becoming more liquid. Wait another half hour and scoop out as much liquid as you can. Place this in another pot and bring it close to boiling. Add more hot water to raise the mash temperature to about 130 degrees F (54 degrees C). Hold the temperature for another half hour and transfer more liquid to the second kettle. The next temperature step is 155 degrees F (68 degrees C), normal saccharification temperature, for 30 minutes. (Note: The mash will never pass the iodine test.) Mash-out with water near boiling to make lautering easier. Recirculate only to remove heavy particles or not at all.

typically are not brewed in the summer because of the proliferation of wild organisms. Belgium has a fairly cool climate and there generally are no temperature controls on lambic fermentations, so the natural temperature variation affects the progress of the fermentation. My lambics seem to do well with a seasonal flux of between 50 degrees F (10 degrees C) and 75 degrees F (24 degrees C).

Depending on your geographical location, a connected but unheated section of your house will probably work fine for fer-

mentation. In my experience, avoiding extreme temperatures is all that is necessary. It is always a good idea to control rapid temperature swings to avoid shocking whatever microorganism may be dominant at the time. When fermenting lambics at home, use a single-stage fermentation and do not rack the beer. While violating normal brewing procedures, this accommodates the growth progression of the various organisms and allows them to use what is left behind from the previous occupants.

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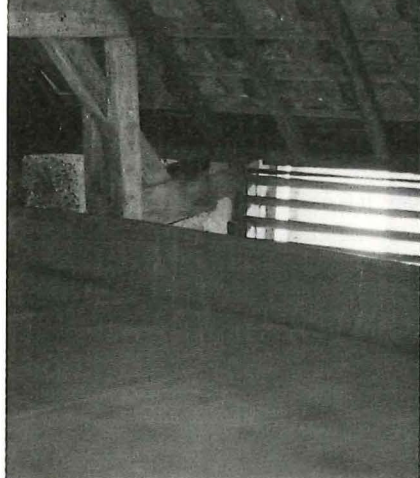


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## Lambic

### Recipe Formulation

Once again, the lambic style appears to break traditional beer brewing rules. Lambics are made from between 30 and 40 percent unmalted wheat, two-row malt and sometimes some six-row malt. Generally, soft white wheat is used as opposed to the hard winter red. Although the prescribed mashing methods can become complex, it is also possible to make a lambic using wheat malt extract. Use the freshest extract you can find created with the least amount of processing. Successful lambics do allow a large variation in recipe and technique.

Those adopting the purist stance will want to use unmalted wheat and the turbid mash schedule. By heating the liquid drawn off the mash you create a wort high in starch, dextrin, free amino nitrogen and protein. The mixed-culture fermentation and long aging process will take advantage of the extra materials in the wort.

Hops used in lambic brewing typically are aged to the point where no other brewer would use them. The normal aromatics and bittering properties are gone, but the antibacterial activity persists. The amount of boiling hops is higher than usual – several ounces per five-gallon batch, and there are no late additions. You may be able to buy older hops at a homebrew supply store for a good price or find them in health-food stores. There has been debate about rapid aging of hops by baking them prior to use. If you try this, spread the hops on a pie tin

or piece of foil and bake on a low setting until the aromatics are toasted away. It also is possible to use a smaller amount of low-alpha-acid (2 to 5.5 percent alpha acid) “noble-type” hops in the beginning of the boil to achieve adequate results. Just avoid adding bitterness, which will interfere with the flavor profile.

Many brewing styles are quite particular about their liquor. Lambics are easy in this regard. It does not seem to make much difference. If your water source makes good ale it should suffice for lambic. Jean-Xavier Guinard writes in *Lambic* (Brewers Publications, 1990), “Most lambic brewers use well water that does not have any outstanding qualities.”

One of the most interesting things about lambics is you can add fruit to them and, because of the sour nature of the beer, the result is fantastic. Make sure you have a good unflavored lambic before you add the fruit. This might mean waiting a year to find out, but it will be worth it. Kriek (Dutch for cherry) is the original fruited lambic, although a variety of fruits are now used by some breweries. The classic fruit in Belgian lambic was the Schaarbeek cherry, a small, dark sour cherry with a large pit. The demand for kriek has grown so much that lambic brewers are now importing cherries. Traditional lambic brewers use only real fruit, although some breweries use fruit syrup.

I prefer sour cherries because they don't impart the cough-drop aroma and flavor of some cherry extracts. The real fruit flavor more closely matches a traditional kriek. I am fortunate enough to have a sour cherry tree in my front yard and use its fruit to conduct lambic experiments. Use a minimum of two to three pounds (0.91 to 1.36 kg) fresh or freshly frozen cherries per gallon. If you prefer a sweeter cherry effect, by all means experiment. A wide variety of cherry products is available: cherry extracts, dried cherries, canned cherries, cherry juice, fresh cherries – if you like the flavor try it in your beer!

Raspberries were the second fruit to be added to lambic beers. I've seen recipes using two to five pounds of raspberries per five gallons, but a good place to start is with 1 1/2 to two pounds (0.69 to 0.91 kg) per gallon. In general, the amount of fruit per gallon in lambics is higher than other fruit

beers because fruit character tends to fade during the lengthy aging periods. I prefer fresh to frozen fruit, but have used both.

Peach is another popular fruit, but its flavor seems to fade easily. One thing I have tried with success is adding a small amount of juiced fresh fruit immediately prior to bottling to enhance the flavor but not so much as to cause overcarbonation. Many other fruits such as strawberry and even banana are used in lambic today.

## Lambic Tips

The following notes apply to all recipes provided.

- Pitch with your cultured-from-the-bottle lambic-blend yeast starter. If you prefer to use your own pure cultures, pitch in the order below with a few weeks in between or according to your preference. Be sure and have at least:
  1. Ale yeast – any healthy yeast will do because the character will be lost in the course of fermentation.
  2. A *Pediococcus damnosus* strain for lactic sourness.
  3. *Brettanomyces bruxellensis* and/or *B. lambicus* for the horse blanket/barnyard notes.
 The above items can be used in addition to your bottle-cultured mix if you so desire.
- Plastic fermenters may be desirable because they tend to allow small amounts of atmosphere to enter the fermentation. This mimics the porosity of the traditional oak casks and the oxygen is thought to promote the formation of the pellicle and complex flavors associated with brettanomyces and oxidative yeasts.
- Do not rack the brew. It should remain in the same vessel until bottled.
- Be prepared to wait! Lambic takes many months to mature.
- If you want to make a fruited version, add the fruit after you have a clean, flavorful lambic.
- Use caution when sanitizing to prevent contamination of other brews. It is a good idea to designate certain equipment for lambics only, particularly porous pieces like airlocks, siphon tubes, stoppers and racking canes.



# Bonehead Gueuze

## Ingredients for 5 U.S. gal (19 L)

- 6 to 7 lb wheat malt extract syrup
- 4 oz aged hops (45 min.)  
or
- 1/2 oz low-alpha-acid "noble-type" hops, 2 to 5.5% alpha acid (14 g) (45 min.)

- Original specific gravity: 1.044 to 1.047

Any good-quality fresh malted wheat/barley malt extract blend should work well. Recently I have been using Alexander's wheat malt extract, which is 60 percent wheat and 40 percent barley. The quantity stated varies because some malt brands are much thinner than others.

The type of hops is not critical as long as it is not a fresh high-alpha-acid hop, which would add unwanted bitterness. Good low-alpha-acid hop candidates are Saaz, Golding, Hallertauer or Hersbrucker. Any aromatic principals will be driven off during the boil.

Boil for about 45 minutes then chill and pitch.

## An Acquired Taste

The great variation of flavor components is caused by differing environmental conditions and interpretations by the brewer. There is even dramatic bottle-to-bottle variation, particularly in the more radical end of the spectrum. However, certain flavors and aromatics should be detectable in varying degrees. The following is an overall guide to what may be perceived.

**SOUR/ACIDIC:** Perhaps the most famous and noticeable characteristic is a sourness in the taste. The sour flavor comes mostly from lactic, ethyl acetate and acetic acids formed by bacteria during the ferment. They generally provide a pleasant sharp effect that is quite quenching. Sourness also balances the sweetness in the fruited versions of the style. Plain lactic acid does not have much of an odor, but acetic acid is quite pungent and

ethyl acetate even more so, with a distinct vinegary odor. Other acid components are provided by fruits. A variety of organic acids present contribute to the sour effect.

**HORSE BLANKET:** This aromatic is described as having the characteristics barnlike, barnyard or sweatlike. These aromas, produced by the *Brettanomyces* strains, are less evident in the mass-market lambics and sometimes masked in the heavily fruited beers. In the realm of the lambic lover, these are sought-after aromatics.

**FRUIT:** The fruit character can vary from sweet to tart and be relatively subdued to

overwhelming, depending on the brewer's choice of ingredients.

**WOODY TONES:** Oakyness is detectable in some brands of gueuze, while other observable woody notes are vanilla, smokiness, and almond, which may be derived from the cherry pits.

**GOATY:** Goaty, cheesy aromatics, possibly tinged with an almost rancid effect, can be present.

**VEGETABLE:** Straw, celery, old vegetation or even enteric notes could be present. It is the sure sign of a serious lambic aficionado if these flavor characteristics elicit a smile.



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


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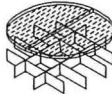
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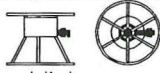
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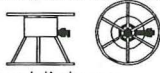
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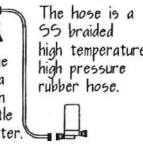


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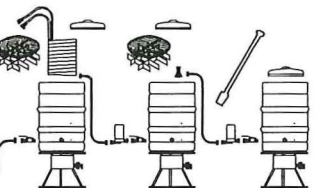
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## Commercial Lambics

Many of these lambics are not sold in the U.S. at this time, but they are becoming more available so ask your local supplier. This list was adapted from a Belgian Web site created by Peter Van Osta.

**Alken-Maes:** Faro Alken; Belle-Vue, Gueuze Belle-Vue, Gueuze Belle-Vue Cuvée, Kriek Belle-Vue, Kriek Belle-Vue Cuvée

**Bockor (Vanderghinste):** Faro, Gueuze Lambic Jacobins, Kriek Lambic Jacobins

**Brabru:** Gueuze Becasse, Gueuze Caves Bruegel, Gueuze Extra Cave St. Pierre, Kriek Caves Bruegel

**Cantillon:** Faro, Gueuze Cantillon, Kriek Cantillon, Lambiek, Rosé De Gambrinus

**De Keersmaecker:** Cassis Mort Subite, Frambois Mort Subite, Gueuze Lambic

Mort Subite, Kriek Lambic Mort Subite, Perzik Mort Subite

**De Neve:** Gueuze De Neve, Kriek De Neve, Perzikbier, Gueuze De Troch, Kriek De Troch

**Drie Fonteinen:** Gueuze Drie Fonteinen, Kriek Drie Fonteinen, Kriek Drie Fonteinen van het vat

**Eylenbosch:** Faro Extra, Kriek Lambic, Lambic, Rodea Gueuze, Rodea Kriek

**Frank Boon:** Faro Pertotale, Frambozenbier Boon, Frambozenbier Boon 1986, Gueuze Boon Mariage Parfait, Kriek Boon, Kriek Boon Mariage Parfait, Lambik Boon, Gueuze Boon

**Girardin:** Gueuze Girardin, Kriek Girardin, Lambik Girardin-Jonge, Lambik Girardin-Kriek, Lambik Girardin-Oude

**Huyghe:** Faro

**Liefmans:** Liefmans Kriek

**Lindemans:** Cuvée Renee Gueuze, Gueuze, Kriek, Pêcheresse

**Louwaege:** Faro

**R. van Roy en Cie.:** Faro, Kriek

**Timmermans:** Gueuze Caveau, Gueuze Lambic, Kriek Lambic, Perzikien bier

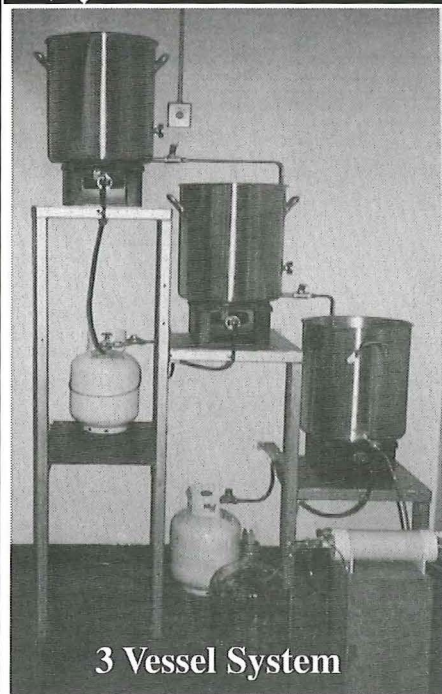
**Van Honsebrouck:** Gueuze Lambic St. Louis, Kriek Lambic St. Louis, Pêche-Lambiek St. Louis

**Vander Linden:** Faro, Gueuze Vieux Foudre, Kriek, Lambiek

**Vandervelden:** Kriek Sherry Poesy Old Beersel, Lambiek

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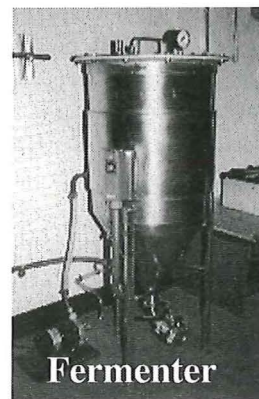
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## The Diverse Flavors of Lambic

Check the list of commercial examples and taste your way through this funky family of beer flavors. The various types of lambics are described here so you'll know what to expect.

**FARO:** A young unflavored lambic, yellow to light amber, possibly with residual sweetness not found in the aged brew. May have hints of caramel. Moderate carbonation if bottled.

**GUEUZE:** A blend of aged and younger lambic with higher carbonation than faro, more complex flavors and aromatics with a drier finish. Traditionally it finishes sharply from the acids evolved.

**KRIEK:** Made with cherries, the range is from wonderfully sour to dessert-grade sweet depending on the brewer/blender. If fermented on real cherries with the pits than an almond note can frequently be detected. Intensity of color can vary but should be ruby red with very aromatic bouquet and high carbonation.

**FRAMBOISE:** Made with raspberries, again highly carbonated and may even have a red-hued head. Very aromatic and should have an intense raspberry bouquet. May have detectable raspberry tartness but several are sweetened.

**OTHER FRUIT:** Recently many fruited lambic-style beers have appeared – banana, strawberry, peach. Almost any fruit can be used to make a lambic, although cherries were probably the original.

Other aromatics and flavors you can expect to detect include oxidation, earthy, vinous, estery and alcoholic characteristics.

## References

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NEW MEDIA  
INVISION AWARDS

NetGuide  
PLATINUM SITE

MM Communications/Coda, 1992.

This list of selected Internet resources is not intended to be inclusive.

The Lambic Digest is an Internet discussion group. Subscribe by sending e-mail to [lambic-request@longs.lance.colostate.edu](mailto:lambic-request@longs.lance.colostate.edu)

Jeremy Bergsmans Lambic Page  
<http://eland.stanford.edu/~jeremybb/lambic/lambic.html>

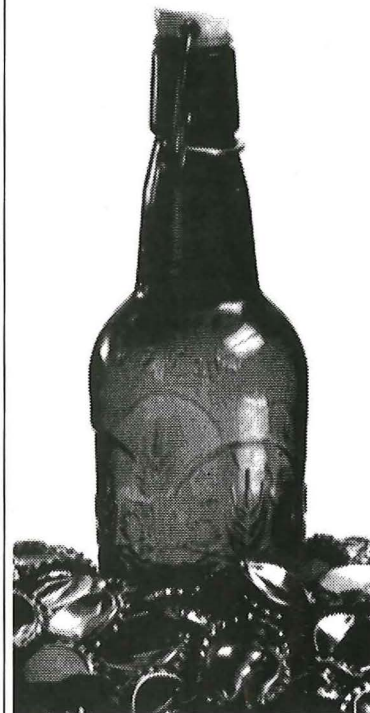
Peter Van Osta's Lambic Lists  
<http://bioc-www.uia.ac.be/u/pvosta/pcrbier1.html>

Jim Liddil's Biohazard Page  
<http://www.u.arizona.edu/~jliddil/>

John Isenhour ([isenhour@usa.net](mailto:isenhour@usa.net)) was Brewmaster at Joe's Brewery in Champaign, Ill., where he was known for brewing lambic and English style beers. He is in the process of opening his own microbrewery which will continue to brew lambic styles. John, a National BJCP judge has been homebrewing for 20 years and won an award in the 1995 National Homebrew Competition prize for a gueuze.

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**Chill Out** (from page 27) it easily loses heat to the surrounding air. On older domestic refrigerators and freezers the condenser coil is visible, usually covering the back of the unit. Newer models hide the condenser under the cabinet near the floor and use an electrically powered fan to circulate air over it. In other types, particularly home freezers, the condenser coil often is distributed around the sides and top of the cabinet just beneath the metal skin. In this type, the metal skin itself is used as a radiator. If your house has central air conditioning or a heat pump system, the motor-compressor unit, condenser and cooling fan are packaged together and placed outside the house. This "condensing unit" is connected to the rest of the system by two copper pipes: a small one that carries the condensed liquid refrigerant out and a larger one, usually insulated, that carries the returning vapor back to the compressor.

After leaving the condenser, the refrigerant is delivered to the expansion valve. The expansion valve is responsible for causing the pressure to drop from the 170 psi condensing pressure to the roughly 50 psi evaporating pressure, and controls the flow of refrigerant in response to the heat load (air temperature at the evaporator). The valve itself is simply a small orifice whose opening is controlled by a pointed metal rod. In small units there is no valve at all, just a long thin tube to cause a pressure drop. When the refrigerant passes through the valve some of it flashes into vapor and the remainder is boiled in the evaporator as it absorbs heat from the air in the cooled space. The evaporating temperature must be somewhat lower than the temperature to be maintained in the cool space.

The evaporator is another radiatorlike device similar to the condenser, and a fan may be used to force air through it. The evaporator and expansion valve are positioned close together and located inside the cooled space. In a domestic refrigerator-freezer, the evaporator is located in or wrapped around the freezer compartment. Freezer units either have the evaporator wrapped around the inside of the cabinet or integrated with the shelving.

## REFRIGERATION FOR YOUR HOMEBREWERY

Adapting and using a refrigerator or freezer for your homebrewery can be a very worthwhile project. Potential uses include temperature-controlled fermentations, cold storage and dispensing of your beers from soda kegs, not to mention storage of beers at proper serving temperature. Aside from the obvious capability you will have to produce lager beers, ale fermentations can be conducted at the proper temperature at any time of year, and a little cold conditioning of any beer will drop remaining yeast out of suspension and cause floating hops (from dry-hopping) to sink. If you don't already have a spare refrigerator or freezer, they can be found for sale in newspaper classifieds for a reasonable price. You might have to wait a while, but something eventually will show up.

**Refrigerator-freezers** are one option. They have two compartments and provide two different temperature environments. In normal operation, the freezer compartment is held at around 0 degrees F (-18 degrees C), and the refrigerator compartment at about 35 degrees F (2 degrees C). Because there is only one cooling system with its evaporator located in the freezer, the two temperatures are not entirely independent. When the refrigerator compartment is controlled to fermenting temperature, say 50 to 65 degrees F (10 to 18 degrees C), the freezer compartment may not be cold enough to function as a freezer but may be usable as a lagering space if you can get it to stay at around 32 degrees F (0 degrees C), and it will accommodate your preferred packaging.

In general, the shape of these units is somewhat inconvenient for homebrewing purposes because they have a small floor area. Usually only one or two carboys can be placed inside with the relatively tall, thin soda kegs faring somewhat better. Nearly all refrigerator-freezers have automatic defrosting equipment, which means an electric heater is operated intermittently to remove the frost from the evaporator coils and the inside of the unit. For our purposes this will never be needed. Unless the defrost mech-

anism is disabled, its function will increase the cost to operate the unit and cause temperature fluctuations inside.

**Upright freezers** are perhaps the worst candidates for homebrewery use because they usually have condenser coils attached to the shelves, which are, as a consequence, permanently fixed in place. Without a lot of extra work these will only accommodate bottled beer.

**Chest freezers** are the homebrewer's best choice. They have a large floor area and are tall enough to accommodate soda kegs standing upright and six-gallon (22.7-L) carboys with airlocks attached. Several carboys and soda kegs will fit in a moderately sized (15-cubic-foot) unit. Because these units were designed to operate at freezing temperatures, they are well-insulated and capable of reaching the coldest lagering temperatures with ease. They rarely have automatic defrost equipment. The biggest drawback is having to lift full carboys and kegs weighing 50 pounds or so over the edge of the compartment.

## OPERATING COSTS

A quick survey of current refrigerator-freezer models reveals the typical 20-cubic-foot unit costs between \$60 and \$70 per year to operate in normal use (assuming an electricity cost of 8.67 cents per kilowatt-hour). For a homebrewer the cost will be somewhat less because of the higher average temperature needed and less frequent opening of the door.

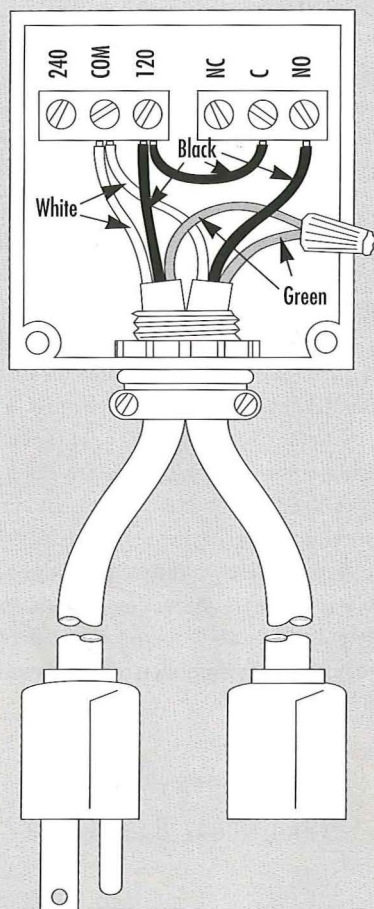
The typical 15-cubic-foot chest freezer is expected to cost only around \$38 per year to run. This figure assumes an internal temperature of about 0 degrees F (-18 degrees C), and relatively infrequent opening. In the homebrewery the freezer will operate at about half of its designed temperature difference (ambient air temperature minus inside temperature). The operating cost can be expected to be about half of normal because of this, or about \$19 per year.

These figures are for new units. When purchasing a used refrigerator be aware that the older models, while cheapest to buy, are less efficient and will cost more to operate.



## FIGURE 2

**Wiring diagram for  
Johnson Controls A319  
Electronic Temperature  
Control (product No.  
A319ABC-24-01).**



### ADDING AN EXTERNAL THERMOSTAT

Getting a refrigerator or freezer is the first step, but it won't work well for our brewing and lagering purposes without some help. A refrigerator thermostat is designed to function within a fairly narrow range of temperature, usually 34 to 40 degrees F (1 to 4 degrees C), and a freezer thermostat is made

to work at around 0 degrees F (-18 degrees C). In both cases, the highest possible temperature setting will likely be too cold for fermenting. The solution is to set the existing internal thermostat to its coldest setting and use an add-on device to switch the power on and off at the plug.

Several homebrewing supply catalogs offer ready-to-use add-on thermostats for around \$60. To use these devices you simply plug your refrigerator into the control and plug the control into a nearby electrical outlet. The control itself can be attached to the outside of the refrigerator cabinet and the temperature sensor placed inside. The thin tube or wire leading to the sensor can be passed through the hinge side of the door where it will be out of the way. The door has a soft rubber gasket that will prevent the tube or wire from being crushed, and will form a seal around it.

The position of the sensor within the refrigerator is important and you will want to do some experimenting to determine the

best location. If you have a refrigerator-freezer unit, you probably will want to place the sensor in the upper half of the refrigerator space but away from evaporator tubes or the outlet of cold air blown in from the freezer. In my chest freezer installation I have placed the sensor near the top edge on one end of the box, above the area where the evaporator coils are located. To calibrate the setting on the control to the actual temperature in the refrigerator, place a glass of water with a thermometer in the refrigerator and leave it alone for a day. The thermal inertia provided by the water will average out the temperature fluctuations and air currents in the refrigerator and allow you to get an accurate reading. Any difference between the setting on the thermostat dial and the reading from the thermometer will remain relatively constant, so just apply this same correction when you want to set a different temperature. Once you are satisfied with the sensor's position, fix it in place with adhesive tape.

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## Chill Out

### DO-IT-YOURSELFERS ONLY

With minimal electrical skills you can assemble your own controller and probably save a few dollars. This is possible because the heart of these units is available as an off-the-shelf part, and it only needs a power cord and a few bits of hardware to make it into a functional control.

A control that offers unusual flexibility at a reasonable price is the Johnson Controls A319 Electronic Temperature Control (product No. A319ABC-24-01). It is all electronic, usable for both heating and cooling applications, functional over a wide range of temperatures (-20 to 100 degrees F or -29 to 38 degrees C), accurate to 1 degree F, and has an adjustable differential (1 to 30 degrees F or 0.5 to 17 degrees C). You can buy these units from a heating and air-conditioning supplier for about \$40. The only other parts you will need are a grounded extension cord, a twist-on connector (called a wire nut), and a seven-eighths-inch cable adapter. These extras can be purchased at any hardware store for a few dollars.

The literature provided with the control contains a complete description and instructions for wiring and adjustments. If you are not familiar with schematic diagrams, Figure 2 and the instructions included here should help clarify things. What I'm describing actually is the real-world implementation of Figure 5 in the control's instruction sheet.

The first step is to install the cable adapter in the hole at the bottom of the control's housing and tighten the securing nut with pliers. Next, cut your extension cord in two and then cut a two-inch piece from one of the cut ends (you'll need a short piece of wire for a jumper inside the control). The lengths of the two long pieces of cord should be chosen so the male end can reach the nearest electrical outlet and the female end can be reached by the refrigerator's power plug. These criteria should be met when the control is mounted in a convenient location on or near the refrigerator.

Remove 1 1/2 inches of the outer covering from both cut ends, strip the insulation from all six wires back three-eighths of an inch and twist the strands at each end

together tightly. Do the same to both ends of the black wire taken from the short length of cord. The wires may be color coded white (common or neutral), black (hot) and green (ground). If the insulation is not color coded the wire itself may be, with silver being the neutral and copper or brass being the hot. In any event, the hot wire should be the one connected to the narrow blade on the plug.

Pass the cut ends of the cords through the clamp and feed the bare ends into the appropriate places on the terminal bar. Slip the two neutral (white) wires under the AC COM terminal and tighten it. Slip the hot (black) wire from the male (plug) cord and one end of the jumper wire (taken from your two-inch length of cord) under the 120V terminal and tighten it. Connect the other end of the jumper wire under the C terminal. Connect the hot wire from the female cord to the NO terminal. Finally, use the wire nut to connect the two ground wires together. When all the electrical connections have been made, tighten the cable clamp screws down equally. The clamp will direct forces resulting from tugging on the cords into the housing, preventing the internal connections from coming loose and possibly shorting.

To complete the setup, make sure the jumper block is in the cooling mode position (see instructions), and the differential is adjusted to three degrees. Remember, a differential of three degrees means the unit will run the refrigerator until the temperature is three degrees below the set point temperature and then switch off the power. After some time, the temperature inside the refrigerator will climb back up to the set point and the control will switch the power on again. Don't be tempted to set the differential too small, as this will cause rapid on-off cycling of the refrigerator's compressor and shorten its life. Reassemble the control and hang it on or near the refrigerator using Velcro® or double-stick tape.

Place the temperature probe inside the refrigerator, plug the refrigerator into the female end of your control and the control into an electrical outlet. Use a thermometer placed next to the control's probe in the refrigerator to verify the unit is working correctly. You may also want to experiment with placing the probe at different locations inside the refrigerator. Once you find a good spot, secure the probe with adhesive tape.

## TAPPING THE SOURCE

Should you decide to add a beer tap to your refrigerator, make sure you know where electrical wiring and the evaporator and condenser coils are located before making any holes in the cabinet. Be particularly cautious with freezer units, because they are likely to have the coils wrapped around them. You may be able to tell where the condenser coils are by feeling the outside of the cabinet when the unit is running. If some areas become warm to the touch, you will know where not to make any holes. Similarly, areas on the inside that become cold will tell you where the evaporator coils are. The door or lid is usually safe because the manufacturer will not want to have provided any flexible connections in the refrigerant lines. The flexible plastic used for beer lines will tolerate the motion of opening and closing the door if a little extra length is provided.

I prefer not to keep my CO<sub>2</sub> tank and regulator inside my chest freezer. Condensation will form on the regulator and pressure gauges causing them to corrode. If you want to have CO<sub>2</sub> connected to the kegs in your refrigerator all the time, a good solution is to make a hole for a CO<sub>2</sub> line and run the line in to a distribution manifold mounted inside.

### RECIPE FOR A TRADITIONAL DARK LAGER

When refrigeration was brought into the Spaten brewery in Munich, dark lager was the traditional style of beer. Similar beers exist today; we know them as Munich dunkel, export dunkel or simply dunkel. These dark brown beers are the little brothers to the more flamboyant bocks. They have the same rich malty accent and barely perceptible hop character, but their lower starting gravity (1.051 or 12.5 °P) makes them less full-bodied and sweet-tasting. The traditional production method would have been a double or triple decoction. Purists may want to go that route, but satisfactory results can be achieved in less time with the temperature-controlled step mash described below.



After the long low-temperature lagering period there will be almost no yeast left in suspension. If you are bottle conditioning your beer, be sure to take a small amount of yeast sediment into your priming tank, or add fresh yeast along with the priming sugar.

## SLAM DUNKEL

### Ingredients for 5 1/2 U.S. gal (21 L)

#### All-grain version

- 4 2/3 lb two-row lager malt (45.5 %) (2.1 kg)
- 4 lb Munich malt (40 %) (1.8 kg)
- 1 1/4 lb CaraMunich malt (12 %) (0.55 kg)
- 4 oz chocolate malt (2.5%) (113 g)

#### Extract version

- 22 oz CaraMunich malt (0.63 kg)
- 3 1/2 oz chocolate malt (99 g)
- 6 2/3 lb unhopped German amber malt extract (Ireks is a good choice) (3 kg)
- 6 3/5 oz dry malt extract (187 g)

#### Hop schedule

- 3/5 oz Hallertauer hops, 4% alpha acid or 2.4 HBU (17 g) (60 min.)
- 3/5 oz Hallertauer hops, 4% alpha acid or 2.4 HBU (17 g) (40 min.)
- 3/5 oz Hallertauer hops, 4% alpha acid or 2.4 HBU (17 g) (20 min.)
- Wyeast No. 2206 Bavarian lager yeast
- 4 2/5 oz dextrose (124.7 g) (to prime) or force carbonate to 2.7 volumes

- Original specific gravity: 1.051
- Final specific gravity: 1.014

Mash-in with three gallons (12 L) of water at 131 degrees F (55 degrees C) to achieve initial mash temperature of 122 degrees F (50 degrees C). Protein rest at 122 degrees F (50 degrees C) for 20 minutes.

The first starch conversion rest should be at 140 degrees F (60 degrees C) for 30 minutes. The second starch conversion rest is at 158 degrees F (70 degrees C) for 30 minutes or until conversion is complete. Mash-out at 168 degrees F (76 degrees C)

for 10 minutes. Sparge with 5 gallons (19 L) of water at 168 degrees F (76 degrees C) to collect 7 2/5 gallons (28 L) of wort.

For the extract version place grains in mesh bag and steep in 7 gallons (26.5 L) of water heated to 140 degrees F (60 degrees C) for 20 minutes. Remove mesh bag allowing extract to drain out. Add the unhopped malt extract syrup to the steep water, stir to dissolve completely before applying heat.


Total boil time should be no longer than 60 minutes.

Primary ferment at 48 degrees F (9 degrees C) for 10 days and secondary ferment and lager at 32 degrees F (0 degrees C) for 28 days. Reduce to lagering temperature 2 to 3 degrees F (1 to 1.5 degrees C) per day.


Martin Manning is an engineer with GE Aircraft Engines in Cincinnati, Ohio; a BJCP Certified judge and member and past president of the Cincinnati area's Bloatarian Brewing League since 1989.

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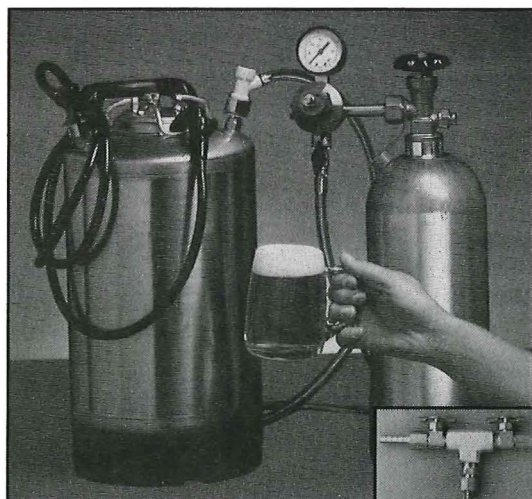
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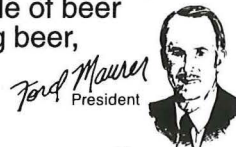
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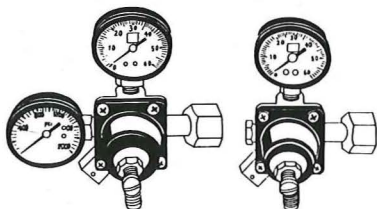
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**Filters** (from page 37) for specific needs. The great thing about sheet filters is having the option of different filter grades without incurring a substantial increase in system cost.

The Flomaster unit uses the standard sandwich design with two outside plates to collect the filtered beer. In the middle is a plastic ring to hold the pads against the outside plates and create a reservoir of unfiltered beer between. The beer flows into the unit through this center ring.

The sheet filter systems I looked at were first developed for wine hobbyists but are now offered to homebrewers. Some systems have adapted to the new market better than others by providing directions and information relevant to brewers' concerns. Unfortunately, the instructions for the Flomaster were in need of substantial improvement. They consisted of a blurry multigeneration photocopy on how to filter wine and a two-paragraph newsletter item. The wine instructions referred to items not included in the kit I received and did not give any illustrations of the system. The newsletter item at least talked about beer filtration, recommending a particular filter grade and transfer pressure, but nowhere did the instructions address the issue of sanitation.

Despite these shortcomings, the Flomaster was fairly straightforward to use. (It did help to read the instructions for the other suppliers' sheet systems first, though!) You assemble the filter sandwich and fasten it all together with six wing nuts around the edge. This system used small washers under the wing nuts and the combination, while effective structurally, was a little awkward. One piece of tubing attaches to the input port on the center ring and a Y hose assembly is used to collect and combine output from the two outside plates.

To prepare the unit for use, the pads need to be flushed with water to remove the papery flavor they can impart. Following the wine instructions I flushed this unit with five gallons of water, a practice requiring an empty soda keg.

Cleanup of the system was easy: After disassembling the unit, throw away the pads and rinse the polycarbonate plates.

In the water test, it took about 25 minutes to run five gallons through this system. Part of the reason for the slower rate is the

lower operating pressure of 5 to 6 psi versus 12 or more for the first two systems tested. Also, the system leaked a bit during the water test, amounting to about two ounces per gallon filtered.



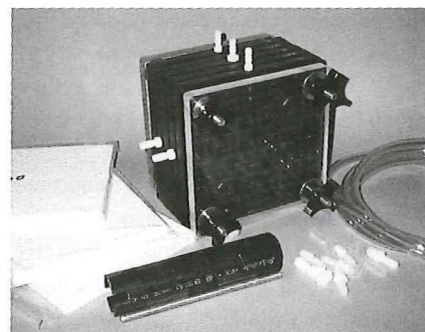
**The Vintage Shop Wine/Beer Plate Filter**

**The Vintage Shop Wine/Beer Plate Filter** This system was similar to the Flomaster in many respects. Based in Canada, the Vintage Shop has only been selling their system for about a year and the company expects U.S. homebrew wholesalers will begin handling it by fall 1997. According to the Vintage Shop, retail prices should be about \$35 and filter pads available for as little as \$1.50.

Functionally, the primary difference between this system and the Flomaster came in the construction and documentation. Using the same sandwich design and identical filter pads, the Vintage Shop system used a better fastening scheme. The bolt-and-nut fasteners were designed so the two never have to be separated. When the nuts are loosened away from the frame, the fasteners pivot out so the sandwich can be quickly disassembled. While the black plastic nuts looked better than the plain vanilla wing nuts on the Flomaster, I found them uncomfortable to tighten.

The Vintage Shop did provide better instructional information including photographs and illustrations. Still, the portions relevant to beer were mingled with information on wine and many of the illustrations showed equipment not used for beer.

During the water test, I set the regulator at 6 psi and it took about 25 minutes to run five gallons through the system. Minor leakage occurred, although it appeared to be coming from around the input hose rather than from the filter itself.



**Marcon Filters Carosello System**

**Marcon Filters Carosello System** This system looked more like the sheet filters frequently used by small commercial brewers. Although obviously smaller, the plates are square rather than round and are held together by four large-diameter bolts that pierce everything in the system: plates, filters and supporting end pieces.

The system comes in three- and five-plate versions. The five-plate unit emulates the structure of commercial systems where beer flows into and out of the system at multiple locations. Alternately, it can be used to perform two grades of filtration with one pass. In addition, Marcon supports the system with a wide array of filter media including five grades of sheet filters, plus carbon filters, membrane filters and even DE and PVPP filter aids.

Despite the similarity in overall structure, the Marcon unit is quite different from other pad filters. The center of the sandwich uses a ribbed plate that supports the filter media while channeling the beer evenly across the filter pads on either side. This solid structure, backed by three-quarter-inch Plexiglas end pieces outside the ribbed collection plates, give the unit the strength needed to withstand high pressures during filtration. As a result, it can generally operate at a higher psi setting and move beer through more quickly than the other sheet systems.

All this comes at a price, of course. The basic three-plate system sells for about \$115. The five-plate system is about \$160, or you can pay the difference later and get the additional plates needed to convert a three-plate system to a five-plate. The basic filter pads themselves are priced the same as those for the other sheet filters, about \$1.67 per set.

Although dedicated to the subject of beer filtration, the instructions for the Marcon



**Filters** unit were as convoluted as they were voluminous. The unit came with 15 pages of instructions discussing everything from filter grade selection to carbonation and counterpressure bottling.

Despite these good points, the directions jumped around a lot. Also, instructions are given for four different setups at the same time (two for five-plate and two for three-plate) when it would be clearer to explain each setup independently.

All the alternative ways to use the system means it comes with fewer parts pre-assembled. Despite this, it doesn't take more than an minute or two to set up the system for the first time.

When preparing the system for each use, the supplier recommends you soak the pads before assembly. This allows easier tightening of the assembly to prevent leakage during use. To fasten the whole sandwich together, this system uses four black plastic hand bolts 2 1/4 inches across. These are easy to handle, although they do require quite a number of rotations to get them to the end plate when using the system in the three-plate format. For the final tightening, Marcon provides a special tool giving you additional leverage without being uncomfortable to use. Cleanup takes slightly longer because of the time needed to unscrew the hand bolts, but overall it is quite easy.

Once set up, the system can be run up

to 25 psi, although I never had occasion to increase it above 12 psi. This higher operating pressure speeds the flow of beer through the system. Even at lower pressures it offers a faster flow than many systems.

In the water test, it took only 15 minutes at 6 psi to run five gallons through the system. As with the other sheet systems, a small amount of liquid leaked during use.

## The Tests

Two performance tests were devised to evaluate the filter systems. Each test corresponds to the kinds of haze seen in beer. While both types of haze may be seen together in some beers, the tests focused on one at a time. The first test evaluated the removal of protein haze, the second evaluated yeast removal.

Prior to the performance tests, water was run through each filter. Suppliers generally recommend a treatment of this type. Other systems recommend this step be conducted with a dilute chlorine bleach solution to sanitize the media. Flow rates and pressures were noted during this phase.

The first performance test was conducted with the assistance of Goose Island Brewing Co. in Chicago, Ill., which donated 30 gallons of their Blond Ale straight from the fermenter for use in the tests. Once beer



**Goose Island brewer Matt Brynildson harvests five gallons of Blond Ale from a 200-barrel fermenter for our tests.**

was run through the filters, the Goose Island crew volunteered their lab to measure turbidity with a spectrophotometer. Brewer Matt Brynildson generously helped with the testing and evaluation.

The grist for Goose Island's Blond Ale is 18 percent wheat malt and the remainder two-row malt with a very small portion of aromatic malt. Their yeast has good flocculation properties, so it settles out fairly quickly once fermentation is complete. The resulting beer has a substantial haze from the wheat malt proteins.

The batch of Blond Ale used for these tests had an original gravity of 1.045 (11.3 °P) and was at 1.009 (2.3 °P) when sampled. Following fermentation, the beer was chilled to 34 degrees F (1 degree C) and that temperature maintained for three days. Like many breweries, Goose Island closes their blowoff port near the end of fermentation, so the beer was modestly carbonated.

To conduct the filter tests, a five-gallon keg was filled with beer directly from a 200-barrel fermenter at Goose Island's production brewery. Each filter was then connected to one full and one empty keg. Carbon dioxide gas was used to drive the beer out of the full keg, through the filter and into the empty keg. The gas pressure was set based on the filter supplier's recommendations. Each receiving keg's gas connection had a pressure gauge with relief valve. This provided a mech-

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anism for gently relieving pressure buildup in the receiving keg during filtration.

Pressure, flow rate and leakage were noted during the testing. Afterwards, the samples were chilled to a common temperature and visually inspected for clarity in standard AHA beer judging cups. Finally, a photometric determination of turbidity was made using a procedure adapted from the American Society for Brewing Chemists' standard procedure for color determination.

Visual review of the results from this test gave a good indication of overall performance. The effective clarity produced by the five filter systems ranged from brilliantly clear to virtually indistinguishable from the unfiltered solution. The sheet filter systems provided the best results – the Marcon system came out on top with brilliantly clear beer. The Flomaster and Vintage Shop units also gave beer clear enough to escape criticism from finicky homebrew judges, at least at temperatures above 40 degrees F (4 degrees C). When colder, the Flomaster sample showed noticeable haze also reflected in the spectrophotometer readings. At the coldest temperatures, the Vintage Shop results were directly comparable to those from the Marcon filter.

The Filter Store filter, despite its 0.5-micron rating, gave poorer results. Beer from this filter, although markedly improved over the unfiltered beer, had a visible haze that was discernible without comparison to any other standard. Most judges probably would not criticize the clarity of this filtered product, except at the highest levels of competition. Finally, the Zymurtech Clear Beer filter, with and without the supplemental filter disks, failed to achieve any visible improvement in clarity compared to the unfiltered product. Photometric readings of the filtered beers are shown in the summary chart.

In the second test, yeast removal was assessed. A yeasty solution with the basic physical properties of finished beer was prepared by combining 1 1/2 pounds of extract with five gallons of water and the pH adjusted to 4.5 with phosphoric acid. The finished solution had a gravity of 1.010. Ten grams of dry yeast were added, putting an estimated 10 million yeast cells per milliliter into the solution. The solution was not carbonated; the test was conducted and results read at room temperature.

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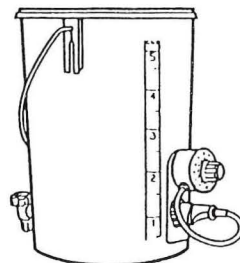
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## CLUB-ONLY COMPETITION

**Filters** Pressure and flow rate were noted. The clarity of the finished samples was assessed visually and photometrically, summarized in the comparison table.

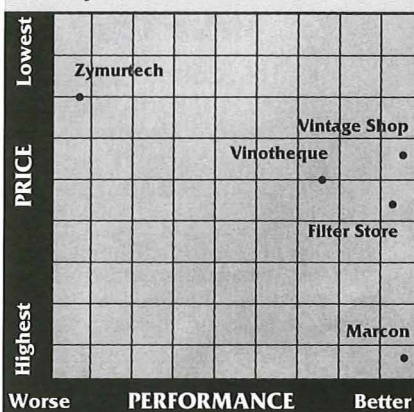
Given that yeast is about the largest haze-producing particle found in beer, one would expect any filter sold for beer to perform well on this type of test. With one exception, the filters did just that. The Filter Store, Vinotheque, Vintage Shop and Marcon filters all produced brilliantly clear solutions. Only the Zymurtech product failed to clarify the test solution. In fact, the results from the Clear Beer unit, with and without the supplemental disk filters, were impossible to distinguish visually from the unfiltered source solution. Only in the spectrophotometer readings did we find some indication that the filter had removed some material.

## Let's Be Perfectly Clear

The five systems reviewed provide homebrewers a wide range of filtration options. Price and performance each varied widely across the units as did ease of use and some other intangibles.

Figure 1 shows the three systems that gave very good performance overall: Vintage Shop, The Filter Store and Marcon. While The Filter Store unit showed noticeably lower clarity in the protein haze test, it made up some ground by providing rapid flow rates in all the tests. The Marcon filter provided the best clarity in every instance and its performance rating would have improved had it been run at the higher pressures it is rated for in each of the tests.

**FIGURE 1. Price/Performance Ratios of Filter Systems**



This figure combines quantitative data about the systems from Table I. The price component is based on a weighted average of the three "Total System Cost" lines shown in Table I. The weightings were 55, 30 and 15 percent respectively for the 25-, 100- and 500-gallon figures. The performance data is based on two criteria: filtrate clarity in both the yeast and protein haze tests as determined by spectrophotometer readings and flow rate during the various tests.

In the overall analysis, we see a strong correlation between price and performance. The \$15.95 Zymurtech unit provided a breathtakingly low price, but this was accompanied by unsatisfactory performance. The Cadillac-priced Marcon, on the other hand, took top honors in nearly every category. These two units might be appropriate for some applications and some brewers, but most will select from the three moderately priced units that manage to bend the price/performance curve.

The units from Vinotheque, The Filter Store and the Vintage Shop all come in above

the line drawn from Zymurtech to Marcon, meaning they provide better performance per dollar paid than the units at either extreme. The king in this category is the Vintage Shop unit with performance matching the Marcon in clarity at a much lower price. The thing to remember is the Vintage Shop flow rate can be very slow when filtering cold carbonated beer. If you filter this kind of beer frequently and don't want to sit around for a couple of hours every time, you should select an alternative unit.

The Filter Store filter also shows well on the price/performance curve, processing beer quickly under a variety of circumstances, but it does not remove protein haze as well as the sheet filters.

The Vinotheque unit, although using the same filter pads as the Vintage Shop, did not perform quite as well. Chill haze emerged in cold samples from the Vinotheque that could not be found in the Vintage Shop results.

My personal choice from this field is the Marcon unit. Its superlative performance and rapid throughput are irresistible attractions. While it is more expensive to purchase, the filter cost per batch is about the same as the Vintage Shop and Vinotheque units. I believe performance, when combined with the flexibility and control offered by the Marcon, make it worth the extra cash in the long run.

In the end, every brewer must decide which filter best fits his or her needs. Not every beer will require filtration and those that do might best be clarified using other methods. For this reason, the purchase of any filter system might best be undertaken as a group project, acquired by a club, or even a homebrew store or brew-on-premises facility for use by members or patrons. By whatever path, homebrew filter systems are a valuable tool. In most cases, the benefits of using them are absolutely clear.

**Ray Daniels is president of the Craft Beer Institute in Chicago and an avid homebrewer. He writes and speaks frequently about beer and brewing to audiences around the world, and is organizer of the Real Ale Festival<sup>SM</sup>. His book, *Designing Great Beers* (Brewers Publications 1996), describes the recipe formulation process for many beer styles.**

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**Professor** (from page 58) *amount helps naturally clarify and stabilize the beer in the aging process. Furthermore, if there is some tannin character in some styles of beer, that can be OK. It adds to the overall flavor profile when not overdone.*

*You're right, sparged wort is not second-quality wort if run skillfully. The most common mistakes with poorly run sparges are excessively hot sparge water or high pH sparge water. Both of these techniques draw out polyphenols and tannins that contribute to harshness.*

*We both know some of the smoothest lagers and ales in the world were sparged. Runnings are meant to extract more of the good stuff, giving beer the nuances and qualities we enjoy.*

*By the way, Kirin Ichiban lager beer is great stuff for what it is. It has slid down my throat along with lots of sushi.*

*No more dis-sparging remarks,  
The Professor, Hb.D.*

## Plastic Life Forms

Dear Professor Surfeit,

What is the life span of an ordinary plastic fermenter? I have brewed about 15 batches in my (first ever) plastic fermenter. I clean it before and after every batch by soaking with an iodine or bleach solution. Although the fermenter has no scratches, it is stained and has an odor that doesn't go away. Time for a new one? I have heard two opposing answers from other experts.

Sincerely,  
Mike Novakovic  
Jenkintown, Pennsylvania

Dear Mike,

*There you are. I can see you clearly. Homebrew in hand, you are scratching your head, looking down at your orange-tinted iodine-stained plastic fermenter imagining or really sensing iodine in your beer. If I were you I'd be doing the same thing. As a matter of fact, I once did just that and decided, well hell, if I can smell iodine in the bucket it sure must be going to smell up*

*my beer. So I started over. Chalk up one dead plastic fermenter.*

*Iodine is a pretty effective sanitizer and when used in proper concentrations shouldn't leave a strong residual odor in dry plastic fermenters, though it could cause a slight stain. If there is a perceived problem with iodine sanitizers it's that homebrewers tend to use excessive concentrations. That's why I suppose you are where you're at.*

*I'm often too careless with my sanitizing measurements, so I've opted for the simplicity of bleach, though the new non-bleach*

*sanitizers are quite attractive and equally effective, but that's another story for another issue.*

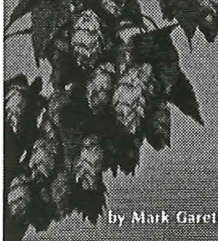
*Meanwhile, my general recommendation is if your fermenter smells like iodine use it as a sanitizing vessel, but not for fermentation.*

*Time for a new one,  
The Professor, Hb.D.*

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## The Brew House Munich Dark Lager

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- 1 4-gal pouch concentrated wort (15 L)
- 2 gal cold water (8 L)
- 1 packet dry yeast
- gelatin and kieselsol finings (German for "little pebbles," kieselsol is silicon dioxide in an aqueous solution according to Tim Vandergrift of Spagnol's)
- corn sugar (to prime)

Add water to sanitized fermenter then pour in the wort. Pitch the yeast and ferment at room temperature. When the specific gravity falls below 1.020, rack to secondary. Add finings when the gravity is less than 1.018. Bottle three to five days later using pouch of corn sugar to prime. Store at room temperature for a few days to let the carbonation develop, then lager cool and long.

## Morgan's Master Blend Munich Dunkel

### Ingredients for 6 U.S. gal (23 L)

- 1 3.7-lb (1.7-kg) can Light Barley Malt Master Base Extract
- 9 oz chocolate malt extract (250 g)
- 26 oz Caramalt extract (750 g)
- 1/3 oz Tettnanger hop pellets (10 g) (45 min.)
- 1/2 oz Tettnager hop pellets (14 g) (finish)
- 1 packet lager yeast
- corn sugar (to prime)

Boil base extract in one gallon (4 L) of water for 45 minutes. Add Tettnanger hops at the start of boil and before removing the kettle from the heat. Dissolve the rest of the malts in the boiled wort, pour into sanitized fermenter and top off to six gallons. When fermentation is finished, prime with corn sugar and bottle.

## John Bull's MasterClass Bavarian Lager

### Ingredients for 6 U.S. gal (23 L)

- 1 6.6-lb can hopped Bavarian Lager malt extract (3-kg)
- 1 packet dry yeast
- 5 1/2 gal water (21 L)
- 1 cup corn sugar (to prime)

Pour extract into sanitized bucket, add one-half gallon (2 L) boiling water. Stir until dissolved. Top off to six gallons (23 L) and pitch the yeast. Prime and bottle when the fermenter has completely stopped bubbling, or the hydrometer reading is the same two days apart.

Jim Zebora is a business editor and author of *What's Brewing*, a weekly beer and homebrewing column appearing in Connecticut newspapers. He has been homebrewing for six years.

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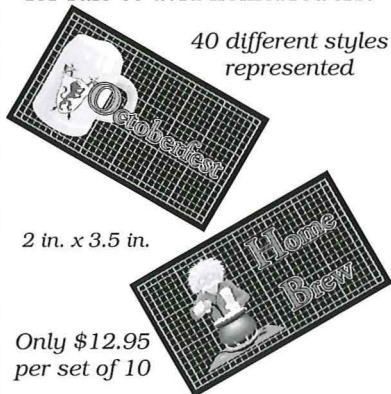
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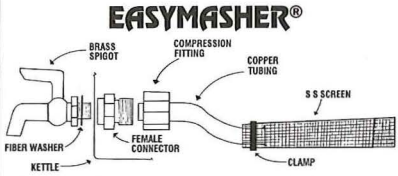
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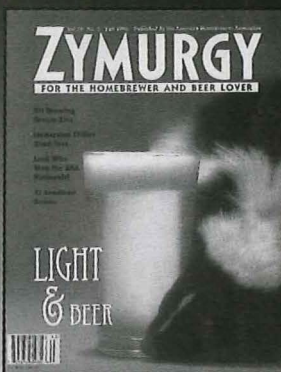
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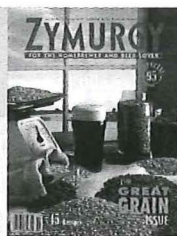
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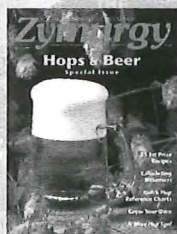
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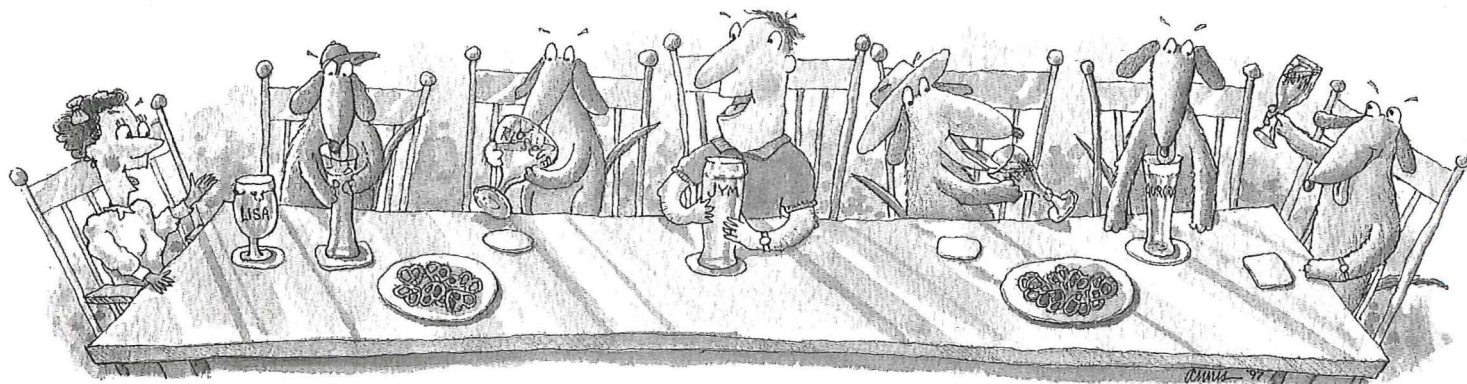
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# LAST DROP

Jym Shearer

## It's a Dog's Brew



In 1993, my wife Lisa and I met Jim Curtain and his wife Jodie, who introduced us to homebrewing. That year we also met and adopted a retired racing greyhound, P.C. Nothing has been the same since.

Our interest in homebrewing has gone from fascination to a garage full of carboys, propane burners, flasks and wort chillers. P.C. now has four greyhound buddies, each with a distinct personality, and each a homebrew critic.

In 1994, we discovered greyhounds can and do appreciate a well-crafted brew. (And for animals without lips it is interesting how far they can spit something they don't like.) Our homebrews are frequently rated by how many hounds will sample the beer. Of the five hounds – P.C., Rescue, Majik, Aurora and Sammi – each has distinct stylistic preferences and judging techniques.

P.C. (Peace Corps) is the ringleader and always first in line. His approach is to gently lap inside the glass while keeping his big schnoz outside the glass. If the brew meets his approval, have a second glass ready because you aren't getting the first one back

(if you'd want it back, that is). His stylistic preferences run mainly in the Belgian category: trippels, dubbels, Gran Crus, lambics and the occasional English mild. P.C. will mug anybody for a Duvel.

Majik's approach is full bore, shove the face in the glass, roll the suds around his muzzle and enjoy. Majik is partial to trippels, lagers, Pilseners and English ales.

Rescue is certainly the connoisseur of the group – rather picky. He will tentatively sniff the glass and lap once or twice to get a taste. More than two licks and you have a good brew there. If he licks more than 10 times, call the AHA for the nearest contest dates, then start building a case for that gold medal. We have found that if Rescue likes it, Lisa will, too. Rescue's beverage favorites are chamomile and mint tea (he's a big dog, so laugh softly), mead, wine and only the exceptionally well-brewed beer.

Sammi is the party girl. She sniffs deeply to get the full bouquet before she tastes. Sammi uses her entire tongue for tasting so we are always prepared to change glasses after her turn. She is partial to fruit lambics,

Corsendonk, English milds, hefeweizens and doppelbocks.

Aurora is the smallest of the bunch and has the most agile snout. Aurora sniffs delicately two or three times and, if the aroma meets her approval, she tastes. If the offering does not meet her approval, she'll wait for a good one or go elsewhere. Aurora prefers lightly hopped brews or those with distinct malty character. Wits, hefeweizens, trippels, wine and mead are her favorites.

When I'm sitting on the back porch with homebrew in hand, a copy of *Zymurgy* in the other, a couple of greyhounds looking at me (or my beer glass) with love and adoration and plans for the next batch rolling through my head, life is somehow complete.

**Jym Shearer of San Antonio, Texas, has homebrewed eight four-out-of-five-greyhounds-preferred batches and two five-out-of-five-greyhounds-preferred brews. The rest he doesn't want to talk about.**

---

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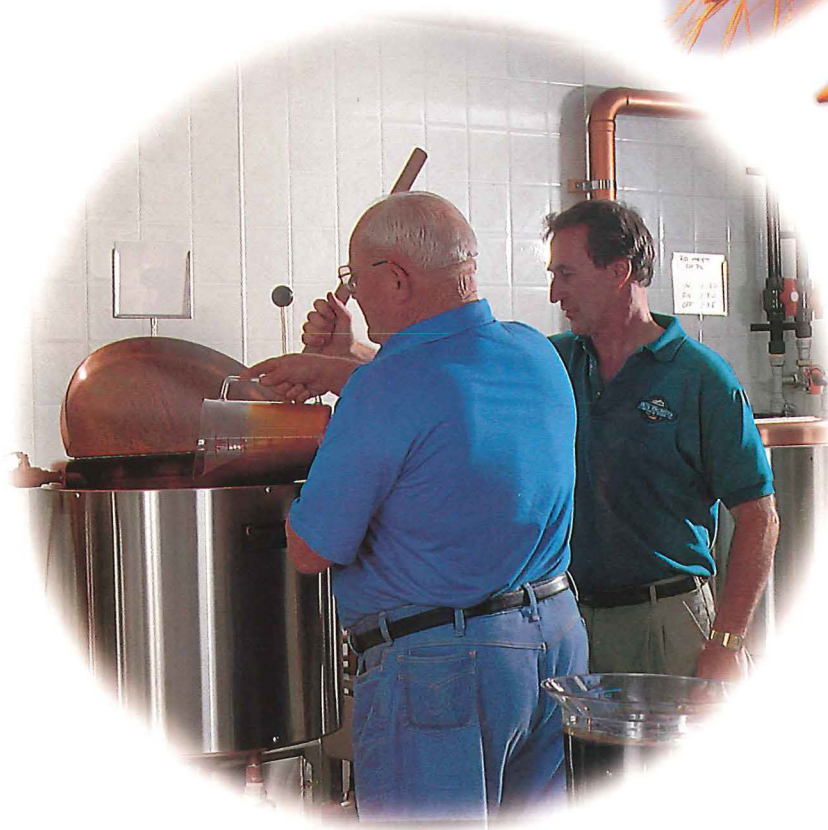


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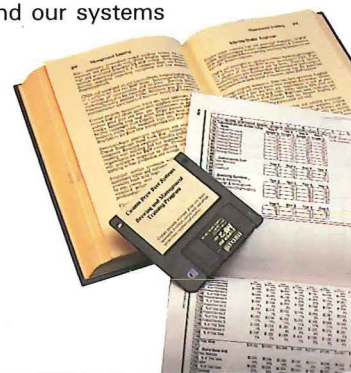
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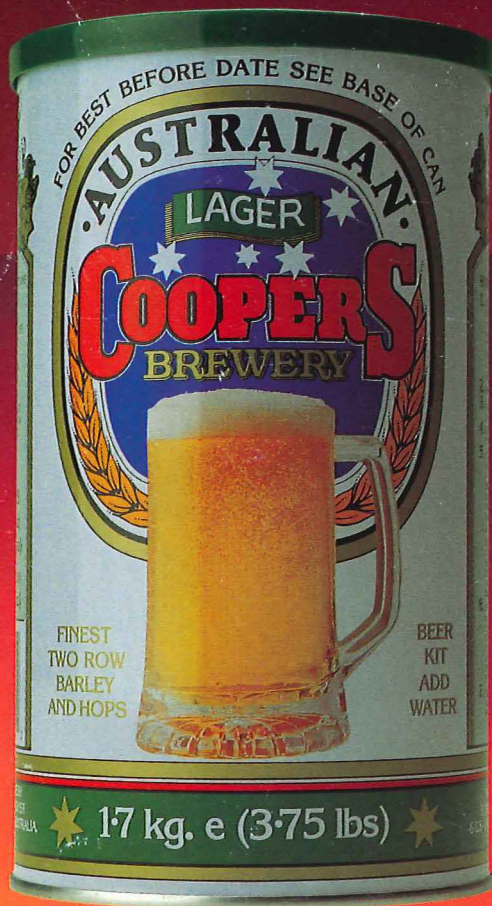
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