

Big Brew
Coming May 5!
See Pages 4, 50, and 64!

Vol. 24 No. 2 March/April 2001 The Journal of the American Homebrewers Association

ZYMURGY

FOR THE HOMEBREWER AND BEER LOVER

Taming Those Brewery Bugs

Doing it the Easy Way:
Tips for Success

Principles of Cleaning
& Sanitation

Beer Bugs Revealed

PLUS:

Fermenter Materials
& Options

In Geeks:

Water Salts in an IPA

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A Publication of the Association of Brewers

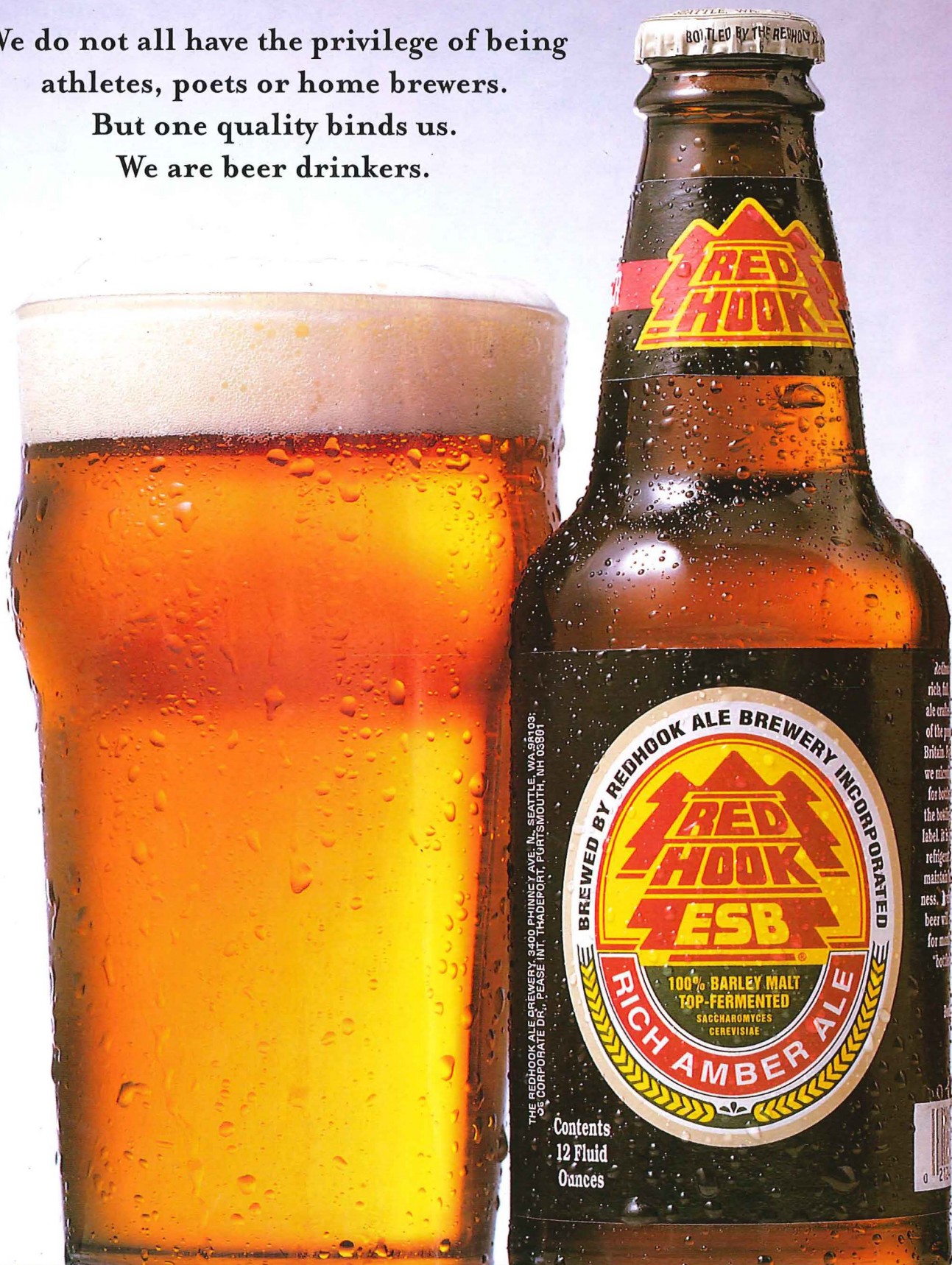
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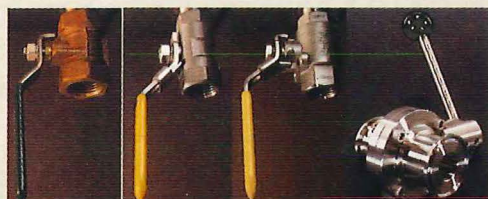
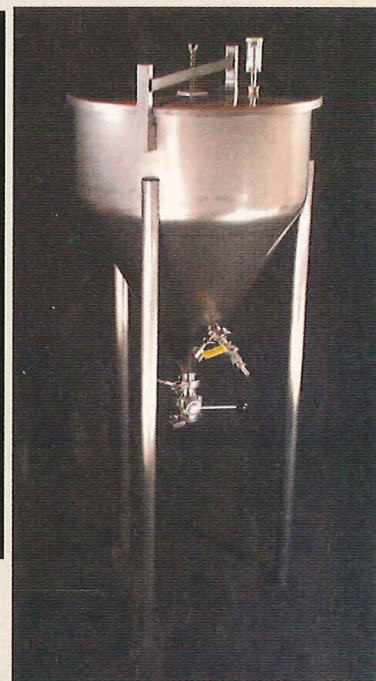
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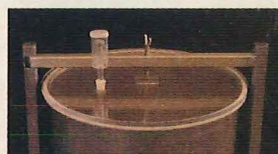
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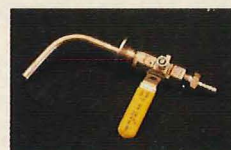
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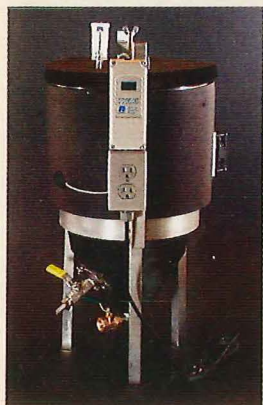
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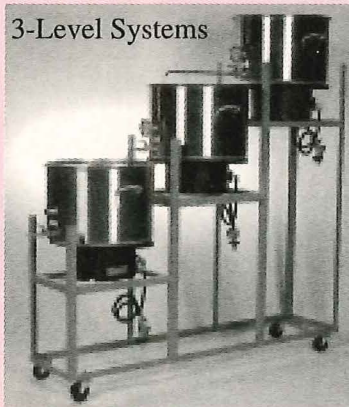
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ZYMURGY®

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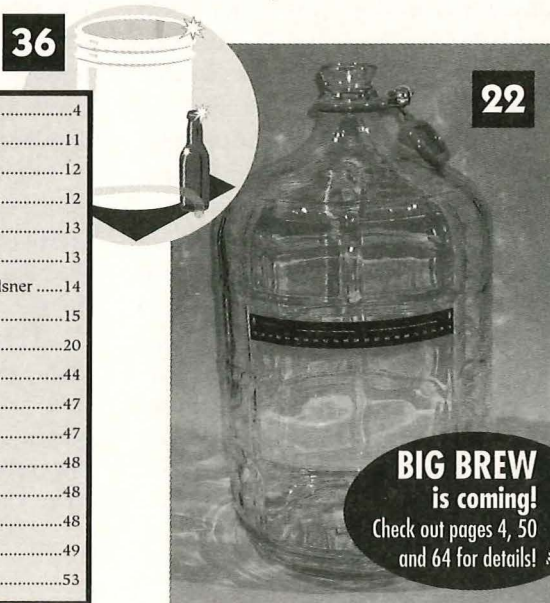
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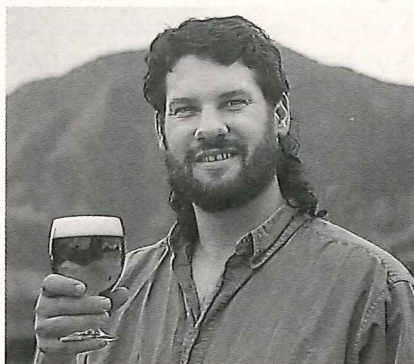


American Homebrewers Association Big Brew 2001

Millennia ago, the Chinese Brewing Calendar was developed which represents the circular nature of brew kettles, ring burners, brewing seasons and the glassware used for sampling homebrewing. Our current cycle is known as the Year of the CAP (as sung by the musician Al Stewart in the 1970s). CAP is, of course, short for Classic American Pilsner, a revival of the pre-Prohibition style of lager beer popular before the Prohibition consolidation of brewing companies and limitation of commercially available beer styles in America.

Saturday, May 5th is the lucky 13th anniversary of the congressional decree of National Homebrew Day. Four years ago, the kernel of an idea by Brian Rezac exploded into one of our most popular and public-awareness achieving programs—The Big Brew. For those who have not participated before in Big Brew before, here's how it works. We suggest the recipes for a day of brewing solidarity and community. Brewers around the world clink for a simultaneous toast at noon central standard time and brew one or more batches of beer on May 5th. The AHA staff recommends having a party around the event with lots of brewers and non-brewers alike. We encourage shops to brew out in front of the shop, homebrew clubs to gather at one or more sites, brewpubs to invite the public by for a batch on the pilot system or, for the brewpubs that wish to go all out, make a batch of CAP on your big system for sales as a summer seasonal.

The first big goal of Big Brew is to have a good time brewing with a sense of community that we are a part of a larger brewing world that shares common interests. The second big goal is to generate as much media attention as possible for the event. We encourage everyone hosting a site to contact the local media to try to get pictures and a story into the local paper or on television. We'll have a



template press release for you to add your Big Brew crew's names and site information in order to get the press there. We'll also provide a follow-up press release with statistics, so that we can quantify everyone's success. Thanks to the huge participation of the Southern California Homebrewers Festival we were able to quantify 2,180 participants at 256 brewing sites in 8 countries and 47 states in our record year of 1999. My goal is for all U.S. states, all Canadian provinces and 10 other nations to participate with sites.

In order to quantify the success of the Big Brew, we use our website, www.beertown.org as the information center for the Big Brew. The rules (or lack thereof), the full list of recipes, the press release, the registration and remittance forms, and hopefully a link to the chat site hosted by Scott Abene will all be available on www.beertown.org.

As I mentioned above, it is the Year of the CAP. CAP revivalist Jeff Renner presented on the topic (with tasty samples) at the 2000 AHA National Homebrewers Conference and coordinated the brewing of "Your Father's Mustache" as the commemorative beer given out to conference attendees, he wrote about CAP in the 2000 Special Issue of *Zymurgy*, and now we tap Jeff's expertise again for the official recipe of "Your Father's Mustache."

Not everyone has the temperature control to do lagers at home, so we are also providing additional recipes. Scott Abene offers up his Cream Ale, called "Genessee My Butt" to fill the hybrid gap between lagers and ales, and the AHA staff contributes "Lucky 13 Brown Ale," an American Brown Ale for those looking to brew an ale. All three recipes are presented in three forms—one based on an extract kit, one based on extract with specialty grains, and one all-grain. We don't have the space available to present each of the nine recipes with detailed instructions in this column. The recipes and instructions will be available on the website; and the CAP all-grain recipe was additionally published in the *Zymurgy* September/October Special Issue, so I won't take up space with a repeat. Feel free to adjust the recipe quantities or ingredients based on availability or the methods of your system. Perhaps we can entice Louis Bonham to convert a recipe or two to no-sparge versions. Here is the five-gallon all-grain recipe for the Cream Ale and the five-gallon extract kit recipe for the American Brown Ale. (Instructions, target gravities and all recipes are on www.beertown.org).

"Genessee My Butt"

- 5.5 lb Canadian lager malt (6-Row)
(2.5 kg)
- 2 lb U.S. flaked maize (.91 kg)
- 1 lb U.S. vienna malt (.45 kg)
- 0.67 lb U.S. 10L munich malt (.3 kg)
- 0.67 lb U.S. 10L crystal malt (.3 kg)
- 8 gal. water (3 for mash, 5 for sparge) (30 L)
- 1.3 oz U.S. Liberty hops (bittering) (40 g)
- 1.3 oz U.S. Liberty hops (aroma) (40 g)
- Wyeast 2035 American liquid lager yeast

(continued on page 53)

BY RAY DANIELS

See No Evil

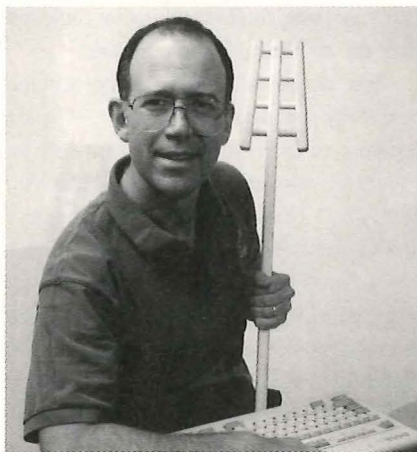
I've always been skeptical of anyone who claims they have "never had a problem" with sanitation and infected beer. Maybe it is just my ego getting in the way, but given the occasional trouble that I have had with infections, I find it hard to believe that any homebrewer can completely avoid problems throughout their entire brewing career.

Part of the problem, I suspect, is blissful ignorance. Homebrewers possess varying levels of knowledge about beer flavor. Those who are just learning often don't know whether a specific flavor in their beer belongs there or not. As an example, I know now that the second batch of homebrew I made was badly infected. At the time though, we just thought we didn't care for "Bavarian Dark Lager" or whatever it was the kit label claimed to produce.

Folks are also sometimes reluctant to trust their palates. In some cases, they only become concerned about infection when there is a gross visual anomaly such as a large slimy sheet of mold growing on the top of their fermenter or crusty, granular rings growing around the necks of their beer bottles.

Cellar blindness is another problem. This is the inability to objectively analyze your own beers. Folks who are fully capable of identifying problems in other people's beers suddenly go blind to those faults when tasting the product of their own hard work. It is as if the image they have in their minds of what the beer was *supposed* to be is more powerful than the data being transmitted from their mouths. As a result, they can be producing infected beer and slurping it down with a smile on their face.

Finally, there is the fact that it just isn't the brewer's fault at times. We assume that the yeast we pitch is pure and clean, but this is not infallibly true. If the yeast you borrowed, bought or brewed up from a small sample is contaminated, then the beer that



you brew will likely turn to swill. Of course these days, we have reliable yeast suppliers and this is less of a problem than it was at times in the past.

In fairness, I'll admit that I'm not compulsive about sanitation. Careful, yes. But not compulsive. Indeed, my problem tends to be one of neglect in the latter stages of fermentation rather than contamination issues that begin on brew day. More often than not, it is a forgotten secondary fermentation carboy that sprouts an acetic bloom after its airlock goes dry and oxygen begins to diffuse into the vessel. "Oops," I think, "Lost another one."

If you feel embarrassed by my immodest admission of these sins, don't. I'm in good company, I can assure you. I've toured a lot of commercial breweries over the past ten years and among them, I've seen some incredible pig sties and tasted beers that showed obvious signs of infection. Often as not the perpetrators are well-known and respected names in brewing. At the very least, all have been "successful" as defined by the fact that they operate at a profit and generally have for many years.

I remember visiting one small but wide-renowned brewery in the Midlands of

England. At an area near the cool ship where wort resides for several hours while cooling before being pitched, I was greeted by a strong vinegar aroma—evidence of a flourishing population of acetobacter in the area, and probably much more. At a small farmhouse brewery in Franconia, I found the brewing area littered with years of rubbish and the surfaces of the fermentation cellars overgrown with black mold. In both cases, the beers displayed flavors that could clearly be traced to the condition of the brewery.

What this points out is that the adequacy of the brewer's sanitation methods tends to lie in the palate of the beer drinker. If people drink the beer and exhibit the behavior the brewer desires (fawning compliments, offers of sainthood, or just regular patronage) then what the brewer is doing is OK. For a homebrewer, this might be carried to an extreme. If you are the only person who ever drinks your beer, you *could* ignore sanitation altogether as long as you like the resulting beer.

The only problem here is that beer is generally a social drink. Sooner or later every homebrewer shares his or her beer with others. Every time you cross that threshold, you have to be prepared for a dose of reality. If you made a stinky beer, people will tell you that, one way or the other. Some will blurt it out, others will pull a face and move away quickly in search of the nearest floor drain, others diplomatically beat around the bush hoping that you'll figure it out for yourself. Whatever the case, it is up to you to read the signs. If you can't figure out what they are saying, be blunt and ask. "Does this beer have any off flavors?" And if so, "What are they and what do I have to do to get rid of them?"

Like me, you've probably known some compulsive sanitation types. I remember

In fairness, I'll admit that I'm not compulsive about sanitation. Careful, yes. But not compulsive.

one fellow I met in my early days of brewing who carried things to what I felt was an extreme level. Through a friend, he acquired sterile surgical supplies that he would use during brewing. Surgical drapes were laid on the counters. Sanitized utensils were laid on them until ready for use. While handling all this stuff, he wore sterile surgical gloves and a face mask. Seems like he might have used alcohol spray for some things too.

Perhaps all this care reduced the number of organisms in his wort and beer to a certain degree. But it seems to me that he was ignoring the most important possible source of infection: the inside of his fermenter and racking tube or hose as well as the surfaces of the wort chiller that touch the beer. Since all of these come into contact with wort or beer, they are a double whammy: they get dirty (or perhaps "worty") every time you use them and there-

fore become an ideal place for infecting organisms to grow between uses. Then, if not fully cleaned and sanitized before the next use, they have the potential to deliver a dose of infectious beasts into your brew that is far larger than anything that could fall from the air or rub off of your hand.


This "double whammy" concept is at the core of my own personal "golden rule" when it comes to beer sanitation. That rule is, "never let your beer see anything that you can't see." Thus I prefer glass fermenters and immersion wort chillers. And even though I own a small food-grade centrifugal pump for moving liquids around the brewery, I limit its use to hot-side applications—once the wort is chilled, I move it only with a clear plastic racking cane hooked to a clear plastic hose.

This may seem silly, but I believe in it. Both plastic and stainless fermenters hide dirt better than glass, increasing the risk of

infection. Ditto with pumps and counterflow wort chillers: no matter how rigorous your cleaning regimen, you can never inspect the surfaces that touch the beer. (Professional brewers can and do take apart their plate heat exchangers to check for dirt and mineral build-up, stuck hop flakes and the like.)

Of course the world is full of homebrewers who don't follow my rules. They use non-glass fermenters for every batch, loathe immersion wort chillers and pump cold wort and beer like there is no tomorrow. And I'm sure they all make great beer—at least most of the time. It is the fact that they have different opinions on this subject, the fact that they do things their way that makes this hobby so great.

But just remember that nobody is perfect. When they pour you a glass of their latest concoction and begin to go on about how they *never* have a problem with sanitation, just remember that floor drains and potted plants make great receptacles for sour beer.

Ray Daniels brews beer in Chicago and hopes not to infest his new house with an active population of beer spoilers. 



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BY OUR READERS

A Cryptic Cover

Dear *Zymurgy*,

I just received the November/December and enjoyed it thoroughly. I am confused about the cover. A young attractive couple and a carboy in the foreground. Does the couple have anything to do with beer? The young lady is placing a water bottle (Nalgene, I own several and use them for hiking) in the man's daypack. Many magazines have an explanation about the cover on the inside page. The cover is attractive and appealing, but has little to do with beer. Please explain.

David Craft
Greensboro, NC

Dear David,

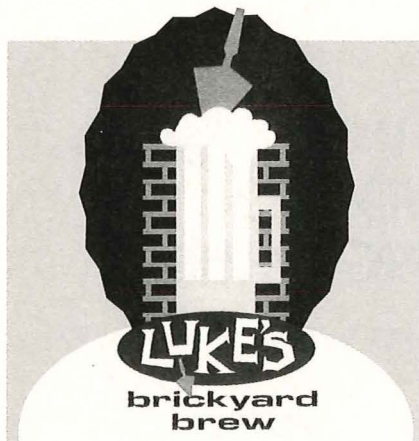
As the focus of the November/December issue was to reinforce both the convenience and quality of brewing with extract, the cover was meant to depict a couple (represented here by our own member services supervisor Crissy Anderson and resident computer whiz Scott Farling) who had already brewed a batch of beer on a Saturday morning, and still had plenty of time to go on a hike (which you correctly associated with the Nalgene bottle) the same day.

Editor

Doing it the Hard Way

Dear *Zymurgy*,

Three cheers for your publication and the new department for us geeks; I enjoyed it greatly. Ray Daniels' comments on the direction of *Zymurgy* are also well taken. I'm not an extract brewer now, but I started out that way. I have no problem with extract brewers and brewing, but personally, I get better, more consistent results doing it the hard way. And results are what it's all



about. Thank you for a valiant effort to be, if not all things to all brewers, at least the next best thing.

Wayne Freeark, Ph.D.
Alamosa, CO

*Thanks, Wayne. Glad you like "Geeks." Making *Zymurgy* approach the level of "all things to all brewers" is our goal here, but we can't do it without feedback from our readers, so please, whether they are positive or negative, keep the comments coming!*

Editor

Trying to get Weiss Wise

Dear *Zymurgy*,

I have been trying to make something close to Paulaner Hefe-weizen and I am completely lost so where do I begin. Also, does the wheat have to be from Germany?

Nick Wietlisbach

Dear Nick,

In our experience the trick is in the yeast. Getting a good strain of German weizen yeast and fermenting at the right temperatures will do the trick. For full details, see

Eric Warner's excellent addition to the Beer Style Series called German Wheat Beer. Warner trained at the citadel of Bavarian brewing, Weihenstephan, and he knows his stuff when it comes to weizen.

Oh, and the yeast seem to be bilingual: they don't give a hoot whether the wheat is American or German.

Editor

A Fred and a Half

Dear *Zymurgy*,

I just received my copy of the November/December 2000 issue, and hurried off to page through it. I was thrilled to see a feature (albeit short) on the beloved Hair of the Dog brewery in Portland. I've been enjoying the strong, unique flavor of Fred since I moved to the Pacific Northwest in 1998, and have been lucky enough to tour the brewery and see first hand his brewing.

One thing that was not mentioned in the article that may be of interest to readers afraid to extend the effort (not to mention the money on grain) to mash a whopping 30 pound grain bill for a 5-gallon batch of beer is that Hair of the Dog actually brews two beers from the same mash. As it is stated in the recipe, you should minimize sparging to maximize wort gravity. But, once Fred is in the brew kettle, they fill the mash kettle up with sparge water and get ready to brew "Ed" (or "half of Fred"). Ed is a unique "small beer" brewed with the second runnings of Fred and the same hop bill. It's a distinct twist on the pale ales normally found in the Portland area—and one of my personal favorites. The brewery also does the same with their flagship Belgian-style ale, "Adam," making a small beer called "Jake."

So, before you run scared thinking about how much grain is spent on a 5-gallon batch of Fred, consider that you can then make Ed

from the same mash, just by adding a second round of hops to the boil kettle.

Thanks for the recipe, and happy brewing!

Casey Puyleart
Vancouver, WA

Good idea and a nice suggestion. Thanks.

Editor

Overheated

Dear Zymurgy,

In the "Brewing with Extract" article of the November/December 2000 edition, the author recommended using a large sterilized ice cube to cool the wort. The statement was made, "An 8 cup sterile cube should cool three to four gallons of wort within 15 minutes." I did some calculations, which told

me it wouldn't work well, then tried it anyway with 1 gallon (16 cups) of frozen water.

The specific heat capacity of water is about 4200 Joules per kilogram degree Celsius. The heat of fusion of water is 334,000 Joules per kilogram. If you start with 4 kilograms of wort at 100° C (boiling) and added 1 kilogram of ice. The melting process would absorb 334,000 Joules. Which is enough to cool the wort about 20° C. Then you have 1 kg of water at 0° C mixed with 4 kg of wort at 80° C. They mix to make 5 kg of water/wort at about 64° C, or about 147° F. You get the same result when you scale it up to gallons as long as the proportions stay the same. My experiment gave me nearly identical results, and it took a long time to cool it down from 147° F to 70° F, but I saved the day by pitching with a one-gallon starter at high krausen.

I've run the numbers again and to cool to a pitching temperature with just a block of ice you'd need a bit less than 3 gallons of wort to 2 gallons of sterile ice. If you do a 3-gallon partial boil this might work really well, you'd get a great cold break, but I like to boil at least 4 gallons.

Mike Benefield, PE
Los Angeles, CA

Dear Mike,

Thanks for the homework! Clearly leaving your wort to cool by itself from 147° F to pitching temperature is not a good idea as it would promote the formation of DMS as well as the growth of wort-spoiling organisms. A simple copper-tubing immersion-style wort chiller seems the best solution for most homebrewers. They are cheap, easy to make and easy to use. Furthermore, you don't have to plan ahead for brew day and one size fits all batches.

Sorry for the over-heated advice. We'll try to be cooler in the future.

Editor

Hey brewers! Do you make your own beer bottle labels?

If so, send us a sample in color or black and white. Every issue, we run a few just to make the letters section more interesting. Provide us with your name, address and homebrew club name (if any) and we'll make sure to mention your name. Send labels to Attention S. Johnson, Association of Brewers, PO Box 1679, Boulder, CO 80306-1679.



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BY PAUL GATZA

More Brewers Helping Brewers

As mentioned in the Brew News section of the September/October 2000 *Zymurgy* Special Issue on Historical Beers, members of the Los Alamos Atom Mashers lost extensive brewing supplies in the Cerro Grande forest fire that swept through the area last spring. In that issue we mentioned many of the companies that provided support to the Atom Mashers through donations of equipment and ingredients to help these brewers back to their paddles and spoons.

Several neighboring clubs and club members also decided to pitch in with assistance. I would like to take this opportunity to recognize the efforts of David Denning. David coordinated a fundraising "Moose Drool" party with other members of the Dukes of Ale Homebrewing Club in Albuquerque, New Mexico to have a good time and raise funds for the Atom Mashers. David also contacted his former club, the Knights of the Brown Bottle in Arlington, Texas, who also raised cash to resupply the Atom Mashers. Revelers at the Cerro Grande Survivor's party also donated cash to the effort, and other member of the Atom Mashers willingly gave equipment to their friends who lost gear in the blaze. The AHA would like to thank Atom Masher and AHA board of Advisor members Rob Moline for his help in gathering commercial donations and Michael Hall for keeping us updated on the support that has been donated and the appreciation of the Atom Mashers for that support.

Club Insurance Survey

AHA Advisor Charlie Olchowski has been working with Association of Brewers Vice President Bob Pease to research the possibility of obtaining club insurance for officers, meetings, competitions and other club events. A few clubs have gone out on



Cerro Grande Fire Survivors and the Atom Masher President, looking over the bountiful donations.

their own to obtain insurance for events, but at high rates. If we coordinated those efforts under the Association of Brewers umbrella, we would likely be able to gain a more desirable rate and greater awareness for the availability. This project would need broad support from club members who are also AHA members to make it financially workable. I need your input to know whether it is something we should commit the resources to. If you want it, we can work on it. Please answer these questions as best you can by email at paulg@aob.org or by fax at (303) 447-2825.

What is the name of your club? Who handles your club contact with the AHA? What is their email address? Is your club interested in club insurance? Does potential liability affect your club's ability to get officers? What coverage ranking would you give for the areas of insuring officers, club meetings, competitions, and other club events? Are there any areas you do not believe coverage should be extended to in an effort to save costs? How much is insurance worth to your club for each area? How many club members do you have? How many of your club members are AHA members? If AHA membership were a prerequisite for coverage, would

club members join the AHA? If AHA membership were not a prerequisite, would your club be willing to pay a fee per member to the AHA to cover insurance?

Sorry for all of the questions, but in our efforts to be more of a grassroots association, everyone's input is needed. Thanks.

Historical Beers AHA Club-Only Competition

The American Homebrewers Association would like to thank Tim Nagode, Bob Rescinito and the High Plains Draughters for hosting the Historical Beers AHA Club-Only Competition on December 2nd. We selected the style to highlight the adoption of the Beer Judge Certification Program's Guide to Beer Styles for use in AHA competitions. This competition was the third of our annual cycle of six club-only competitions. Points are awarded on a six-three-one basis for the club-only competitions and the first and second rounds of the AHA National Homebrew Competition. The club whose members have amassed the most points over the year is crowned the Homebrew Club of the Year.

Thanks to the club representative brewers. There were 16 entries in the Historical Beers AHA Club-Only Competition.

Congratulations to the following winners:

First Place:

Antoinette Hodges of Carlsbad, California representing Barley Literates Homebrew Club, with a date ale brewed according to the Hymn to Ninkasi named "Sikaru."

Second Place:

Steve Platz of Eagan, Minnesota representing the Minnesota Homebrewers Association, with a 1700 porter made with smoked malt and *brettanomyces* named "Old Porter Again."

2001 AHA Club-Only Competitions Styles

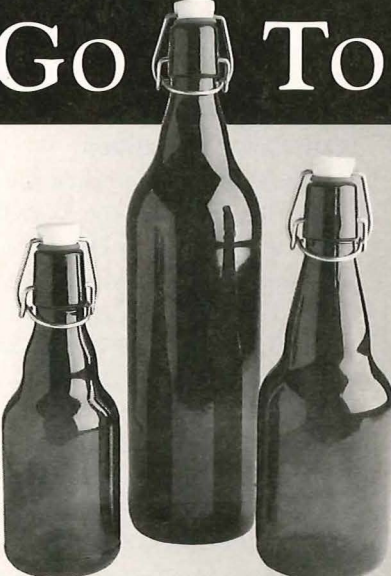
Month	Style or Name	Cat.#	Host
March	Stout	16	Niagara Assn. Of Homebrewers
May	Bockanalia	14	Cincinnati Malt Infusers
August	Witbier	19B	Gold Country Brewers Assn.
October	California Common	6C	Maltose Falcons
December	Mild Ale	10A	Brewers United for Real Potables

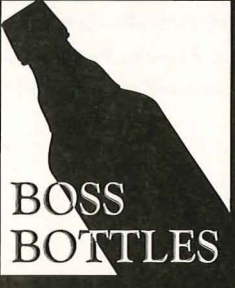
Third Place:

Nathan Moore of Denver, Colorado representing the Brew Rats Homebrew Club, with

a 13th century Eysturoy-style ale from the Faeroe Islands, made with birchwood, ground ivy, and fruit of lemon balm,

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juniper, anise and cloves named "Plague Rat Gruit Ale." Upon receiving the results, AHA staff wondered where the heck the Faeroe Islands were, later to learn that they are off Denmark.

Homebrew Club of the Year Standings

Points	Club
6	Barley Literates Homebrew Club
6	Club Scioto Olentangy Darby Zymurgists
6	Prairie Homebrewing Companions
3	Fermental Order of Renaissance Draughtsmen
3	Minnesota Homebrewers Association
3	Redstick Brewmasters
1	Brew Rats Homebrew Club
1	Niagara Association of Homebrewers
1	Quality Ale and Fermentation Fraternity (QUAFF)

Stout AHA Club-Only Competition

The March AHA Club-Only Competition is Stout. The competition is hosted by Keith Curtachio and the Niagara Association of Homebrewers.

One entry of two bottles is accepted per AHA registered homebrew club for Category 16 in the Subcategories 16A Dry Stout, 16B Sweet Stout, 16C Oatmeal Stout and 16D Foreign Extra Stout. Entries are required to have a \$5 check made out to AHA and an entry/recipe form and bottle i.d. forms. More information on the club-only competitions and forms are available at <http://beertown.org/AHA/clubcomp.htm>. Please send your entry to:

Niagara Traditions Homebrew
1296 Sheridan Drive
Tonawanda, NY 14217

Entries are due March 9, 2001. Judging is tentatively slated for March 17, 2001. Email for questions is goodbeer@niagarabrewers.org. The competition web address is www.niagarabrewers.org.

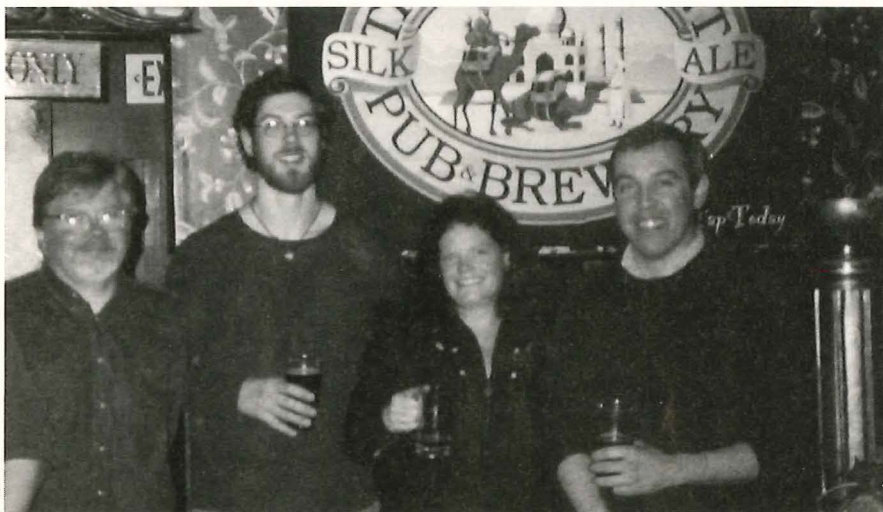
Homebrewer Paul Gatza is the softball coach for Hop Barley and the Alers, a Boulder, CO homebrew club.

BY JAY ANKENY

The Vermont Extract Experiment

This time our ongoing Extract Experiment project went to the green hills of Vermont to recruit experienced homebrewers to explore the creative possibilities of designing different beer styles all starting from the same brand of malt extract. Just as in the last excursion involving members of Southern California's Strand Brewers' Club, the goal was to demonstrate how inventive home brewmeisters can get formulating their recipes around the gateway ingredient into our favorite hobby. On October 12th I met with Jerry Gormley, President of the Green Mountain Mashers Homebrew Cub (<http://home.nycap.rr.com/burke/masher/>), at Greg Noonan's famed Vermont Pub and Brewery in Burlington, VT, for a strategy planning session. Jerry had solicited four other participants of his club, Dave Blumenthal, Bob Genter, Ruth Miller, and Dave Clark to stretch their brewing imaginations for this project. For the last Extract Experiment I had chosen Cooper's Bitter, a hopped malt extract from Australia, as the basic ingredient. For this round we selected Alexanders Pale Malt extract, an unhopped liquid extract from California. And, to boost the "specific gravitas" of this Extract Experiment, the Green Mountain Mashers decided to call upon a panel of New England's BJCP certified judges to evaluate the outcome once the brews were ready for sampling. The results were illuminating.

Alexanders Pale Malt extract is made by the California Concentrate Company in Acampo, CA, founded back in 1962 by Dennis Alexander and his son Andy to produce grape concentrates. In the early 1970s, the senior Alexander had noticed that most malt extracts were boiled with a heating process so traumatic that he felt the ingredients developed off colors and their flavors were inconsistent. Dennis collaborated with renowned Professor of Brewing Sciences at



Left to right: Dave Clark, Dave Blumenthal, Ruth Miller and Jerry Gormley. Bob Genter is not present in photo.

the University of California at Davis, Dr. Michael Lewis, to develop an improved malt extract using American grains. They came up with an evaporation process that drew off the water at only 110-120° F under low atmospheric pressure. "This prevents the discoloration and breakdown of the product," says son Tom Alexander, current scion of California Concentrate Co., "because the ingredients don't have to withstand the effects of high temperature boiling." Today, Alexanders best selling Pale Malt extract comes in four pound cans and is made from a blend of three 2-row and 6-row grains comprised of 50% Harrington, 30% Triumph and 20% Crystal. Its Alpha Amylase (DU) is measured at 53.6 with a Diastatic Power of 120.

"It's the same exact blend that craft brewers such as Sierra Nevada use," Alexander tells us. "Starting in the early eighties we also added a supplemental line of 1.4 pound 'kicker' cans to homebrew supply shops including a pale, wheat, amber and dark style for those who want to make all malt batches of homebrew."

Within a week of our meeting at Greg Noonan's pub, the Vermont Extract Experiment team had picked up their ingredients from Vermont Homebrew Supply (vtbrew@together.net) in picturesque Winooski, VT, and began brewing. The following descriptions give the recipes as well as the results for each of the beers that were made.

Dave Blumenthal's Saison de Mars

Recipe

- 1.5 cans (6.5 lb.) Alexanders Pale malt extract
- 8 oz (226 gm) DeWolf & Cosyn's Pilsner Malt 1.4-1.8 L
- 4 oz (113 gm) Carahell German Light Crystal 8-12 L.
- 1.0 oz (28 gm) DeWolf & Cosyn's Belgian Special-B 100-130 L
- 8 oz (226 gm) Flaked Oats
- 1.0 oz (28 gm) Saaz pellet hops—90 minutes
- 0.75 oz (21 gm) Tettnanger pellet hops—90 minutes

- 1.0 oz (28 gm) Hallertauer Hersbrucker pellet hops—5 minutes
- 0.25 oz (7 gm) Tettnanger pellet hops—5 minutes
- 1.0 oz (28 gm) dried Curacao orange peel—15 minutes
- 1.5 tsp (7.5 ml) ground coriander seed—5 minutes
- 1.5 tsp (7.5 ml) crushed black peppercorn—5 minutes
- Wyeast liquid yeast #1214 Belgian Abbey

Brewing Procedure: Dave mashed the adjunct grains in four quarts of water at 160° F (71° C) for 60 minutes and sparged with two quarts of water at 170° F (77° C). He then added the total of 6.5 pounds of Alexanders pale malt extract and brought it to a boil. The Irish moss was added 15 minutes before the end. During the hopping he added the spices, then cooled the wort, pitched the yeast and transferred it into the fermenter.

- Fermentation: 5 days in primary, 7 days in secondary
- Original gravity: 1.044 (11° P)
- Final gravity: 1.010 (2.5° P)

Team Evaluation: Upon tasting we determined that this was a pretty nice Saison de Mars (a French-style Belgian beer). Most

thought it was excellent and true to style if a bit too heavy on the crushed pepper—0.5 to 0.75 tsp would probably be plenty.

BJCP Judges' Evaluation: (Master) "Very clean. A well made beer. Nice spicy complexity that is well balanced with malt and fruit." (National) "Black pepper very evident, but OK balance. Smooth flavor with some coriander in the background. Very well made Belgian style beer." (Certified) "This [is] a wonderful Saison . . ."

Bob Genter's Ginger Porter

Recipe

- 8 lbs (two 4 lb. or 1.8 kg cans) Alexander's Pale Malt extract
- 1.5 lbs (0.68 kg) Crystal malt, 95 L
- 0.75 lb (340 gm) chocolate malt
- 4 oz (113 gm) black malt
- 2 oz (57 gm) Cascade whole hops—boiled 90 minutes
- 1 oz (28 gm). Cascade whole hops—boiled 45 minutes
- 1 oz (28 gm). Liberty whole hop plugs—boiled 3 minutes
- 2 oz (57 gm) fresh ginger—boiled 1 minute
- Wyeast liquid yeast 1098, British Ale

Brewing Procedure: Bob did a mini mash with the adjunct grains, added the

Alexanders malt extract, and added the finely ground fresh ginger in the final minute. He brought the total volume up to six gallons (22.7 l), and pitched the Wyeast from a 1.2 liter (1.25 qt) starter. His fermentation slowed prematurely, so the yeast was roused by swirling the fermenter. This did the trick.

- Fermentation: 9 days at 73° F (23° C)
- Original gravity: 1.052 (13° P)
- Final gravity: 1.014 (3.5° P)

Team Evaluation: The specific gravity was lower than planned because six gallons were made. We love Porters, and we love fresh ginger, so this didn't faze us at all considering how strong the ginger flavor was. It was a little thin in terms of body, though, and will improve with age. Brewed to five gallons and with maybe a half ounce of ginger, it should be wonderful.

BJCP Judges' Evaluation: (Master) "This would be a very nice beer if it were fattened up with another 10-15 points of gravity." (National) "Overwhelming ginger flavor—too thin for style." (Certified) "Ginger!! Maybe an OK beer if you can get past the ginger."

Ruth Miller's Scotch Ale

Recipe

- 1.5 cans (6 lb or 2.72 kg) Alexander's Pale malt extract
- 1 kicker (1.4 lb or 630 gm) Alexander's Amber malt extract
- 0.75 lb (340 gm) dark brown sugar
- 1 lb (0.45 kg) Crystal 60L
- 4 oz (113 gm) roasted barley
- 1 oz (28 gm) Stryrian Goldings leaf hops—boiled (60 min.)
- 1 oz (28 gm) Stryrian Goldings leaf hops—boiled (30 min.)
- 2 oz (56 gm) dried heather tips (60 min.)
- 0.25 tsp (1.25 ml) Irish moss—15 minutes
- Wyeast liquid yeast #1728 Scotch Ale

Brewing Procedure: Ruth brought two gallons filtered water to 170° F (77° C) in which she steeped the grain adjuncts for 20 min. in a bag before removing the grains.

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She then added all 7.4 pounds of Alexanders extract along with the dark brown sugar and brought the wort to a boil. Once at a roiling boil she added the heather tips and one ounce of the Styrian Goldings hops.

Thirty minutes later she added the remaining ounce of Styrian Goldings leaves and 15 minutes before the end, the Irish Moss. Ruth cooled the wort to 75° F (24° C) using a wort chiller, strained it into a plastic fermenter of filtered water and topped the volume off to 5 gallons.

- Fermentation: 7 days in primary, 5 days in secondary
- Original gravity: 1.057 (14° P)
- Final gravity: 1.011 (2.8° P)

Team Evaluation: Ruth decided on a Scotch Ale for her experimental brew since she's related to the Scottish poet Robert Burns. Her brewing schedule was delayed by a slow yeast starter. The final beer was not as malty and full-bodied as she'd hoped. Substitution of more crystal malt for the brown sugar would no doubt help this situation.

BJCP Judges' Evaluation: (Master) "An OK beer, generally true to style, but with some off fermentation characters that contributed to phenolic notes and thinness" (National) "Fairly nice beer with clean flavors but not full enough for the style." (Certified) "Great Beer. Not quite a Scotch Ale, but more than an export."

Dave Clark's ESB

Recipe

- 2 cans (8 lbs. or 3.6 kg) Alexanders Pale malt extract
- 1 lb (0.45 kg) Munton & Fison crystal malt
- 1 oz (28 gm) Fuggles hops—boiled 60 minutes
- 1 oz (28 gm) Northern Brewer hops—boiled 60 minutes
- 1 oz (28 gm) Fuggles hops—boiled 10 minutes
- 1 tsp (5 ml) Irish Moss—10 minutes
- Wyeast liquid yeast #1187 Ringwood Ale

Brewing Procedure: The adjunct crystal grain was crushed and put in a "tea" bag

in Dave's brew kettle until the liquid reached 200° F (93° C). The volume was raised to seven gallons (26.5 l), the extract added, and the wort was brought to a full boil. The first Fuggles and the Northern Brewers hops were added for a full hour, with the last ounce of Fuggles contributed in the last 10 minutes of the boil along with the Irish Moss. By this time the liquid had been reduced to 5.5 gallons (20.8 l). Dave pitched the Ringwood Ale yeast from a one quart starter.

- Fermentation: 21 days at 65° F
- Original gravity: 1.054 (13.5° P)
- Final gravity: 1.012 (3° P)

Team Evaluation: Very good and true to style, but a little on the thin side in terms of body.

BJCP Judges' Evaluation: (Master) "Not big enough for an ESB, more a Special Bitter or and Ordinary." (National) "Fairly clean and clear in most respects." (Certified) "Nice beer but would do better as a Special Bitter."

Jerry Gormley's English Pale Ale

Recipe

- 1 can (4 lb. or 1.8 kg) Alexanders Pale malt extract
- 0.75 lb (340 gm) corn syrup

- 8 oz (226 gm) Caramunich I 40 degree L ground malt
- 4 oz (113 gm) ground black malt
- 1 oz (28 gm) Fuggles leaf hops—boiled 45 minutes
- 0.5 oz (14 gm) Perle leaf hops—boiled 45 minutes
- 2 packages of dry Windsor Ale yeast

Brewing Procedure: Following the directions on the Alexanders can, Jerry boiled the extract and corn syrup in five gallons of water for 1.5 hours, adding the hops and adjunct grains after 30 minutes. He then cooled the wort, and aerated with an air stone and air pump before the dry yeast was pitched.

- Fermentation: 3 days in primary, 15 days in secondary
- Original gravity: 1.052 (13° P)
- Final gravity: 1.014 (3.5° P)

Team Evaluation: This combination of ingredients, procedures and yeast produced a beer that we found to be fairly dreadful—although fermentation may have been an issue.

BJCP Judges' Evaluation: (Master) "Oxidation, acetaldehyde detract seriously from quality of beer." (National) "Considering an off-the-can recipe...it somewhat passes as a beer." (Certified) "This beer would do better if it were an apple cider."



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**Jerry Gormley's Northern
German Pilsner**

Recipe

- 1 can (4 lb. or 1.8 kg) Alexanders
Pale malt extract
- 3 lb (1.4 kg) extra light dry malt
extract
- 0.75 lb (340 gm) caramalt
- 4 oz (113 gm) torrefied wheat
- 0.75 lb (340 gm). caramalt
- 0.5 oz (14 gm) Saaz leaf hops—boiled 60
minutes
- 1.25 oz (35 gm) Tettnanger leaf hops—
boiled 60 minutes
- 0.5 oz (14 gm) Saaz leaf hop—
1 minute
- 1.05 oz (30 gm) Saaz pellets—
dry hopped in secondary
Wyeast liquid yeast #2124
Bohemian Lager

Brewing Procedure: The caramalt and wheat adjuncts were mashed on the stove at 125° F (52° C) for 30 minutes in water treated with 0.5 tsp. Gypsum. Jerry

**Dennis [Alexander] collaborated with renowned Professor
of Brewing Sciences at the UC Davis, Dr. Michael Lewis, to
develop an improved malt extract using American grains.**

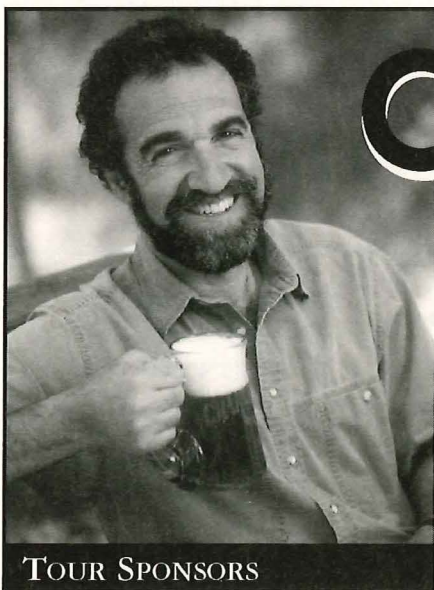
then raised the temperature to 158° F (70° C) for 35 minutes and mashed out at 170° F (77° C) for 10 minutes. After sparging into his brew kettle, he added the four pounds of Alexanders Pale malt extract and the light dry malt extract and brought the wort to a boil. After an hour's boil with the Saaz and Tettnanger hops, he added a final 0.5 oz (14 gm) of Saaz in the last minute for aroma. The wort was cooled and aerated with an air stone and air pump before yeast was pitched. Jerry dry hopped with 1.5 oz. Saaz pellets in the secondary fermenter.

- *Fermentation: 1 week in primary,
23 days in secondary*
- *Original gravity: 1.046 (11.5 °P)*
- *Final gravity: 1.010 (2.5° P)*

Team Evaluation: This recipe suffered a bit from lack of time—a pilsener needs a bit more lagering to come into its own. Still the ingredients seem to deliver good beer flavors overall.

BJCP Judges' Evaluation: (Master) "Sweetish, syrupy, lacks the dry refreshing character of a Northern German Pils." (National) "More ale-like. Becomes dry with some bittering but not enough to meld together." (Certified) "Not a bad beer, but more of an ale than a Pilsner."

Jay Ankeney has been a homebrewer since 1986 and has won over 70 awards in sanctioned homebrew competitions. He is a member of The Strand Brewers' Club and The Maltose Falcons Homebrewing Society, and the author of *Easy Beer* published by Anthem Enterprises.



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BY AMAHL TURCZYN

Old Peculier

While there tends to be a great variation in strength among those beers collectively termed “English Old Ale,” most versions of the style currently made are in or around the 1.050 to 1.060 range rather than the exceptionally high gravity seen in Thomas Hardy’s Ale. For American’s one of the best known of the lower gravity old ales is Theakston’s classic, *Old Peculier*. Apart from the unorthodox spelling, what makes this beer unusual even among its stylistic peers is its dark, fruity character, not unlike that of another beer made in Yorkshire: Samuel Smith’s Imperial Stout. While this rich, aromatic sweetness may be “peculier” to the region, Theakston’s famous old ale does not leave the palate with a warming alcoholic sensation, nor a coating sweetness thanks to the liberal use of the floral and aromatic Fuggle hop. The resulting beer is hearty and nourishing, but eminently drinkable. In short, a perfect ale for the typically cold, damp weather of the region.

If you can get Maris Otter malt, that’s the way to go, but domestic highly modified two row can be substituted. Torrefied wheat is basically wheat that’s been heated very quickly at high temperatures, so that it puffs up, making it more soluble in the mash. It contributes to mouthfeel and head retention. The combination of black malt, medium crystal, caramel and three grades of sugar create a full-bodied beer that is satisfying but not too heavy. The black malt adds color and a balancing dryness without being overtly roasty, while the caramel malts contribute to body, mouthfeel and sweetness. This is a beer that also works well as an extract brew, using the adjunct grains for flavor and light, dry malt extract as the base malt. An extract recipe conversion is also included below.

While Theakston’s uses darker brewing sugars and brewing caramels specifically

Old Peculier (Old Peculier Clone)

Recipe for 5 gallons (19 L)

- 9 lb Belgian Pils malt (4 kg)
- 12 oz 55° L crystal malt (340 g)
- 8 oz dextrose (227 g)
- 8 oz dark brown sugar (227 g)
- 6 oz torrefied wheat (170 g)
- 4 oz Lyle’s Golden Syrup (114 g)
- 4 oz black malt (114 g)
- 1 oz Northern Brewer hops, 8% alpha acid (28 g) (90 min)
- 0.5 oz Fuggle hops (14 g) (15 min)
- 0.5 oz Fuggle hops (14 g) (5 min)
- 1 oz Fuggle hops (28 g) (dry hop)
- Wyeast No 1099 Whitbread ale yeast or White Labs British ale yeast
- 0.75 c. corn sugar (180 mL), for priming

- Boiling time: 90 minutes
- Original gravity: 1.060
- Finishing gravity: 1.012
- IBUs: 29

Brewer’s specifics: Mash grains at 150° F (65° C) for 60 minutes. Sparge, boil 30 minutes, and add hops at indicated intervals. After a 90 minute boil, whirlpool and rack off of break material, then chill to 65° F (18.3° C), and pitch 1 qt. of active yeast culture. Add dry hops in secondary. Bottle with corn sugar and allow to mature at 70° F (21° C) for an additional two to four weeks.

Extract recipe: Omit pale malt. Steep specialty grains in 150° F (65° C) water for 20 minutes. Strain, add sugars and 6.6 lb (3 kg) light dry malt extract, and boil.

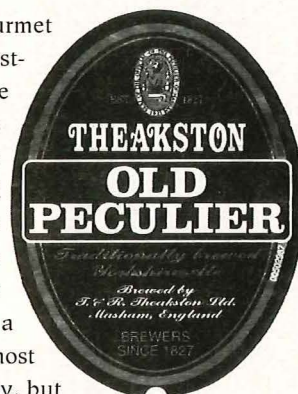
produced for the British brewing industry, homebrewers can approach the same qualities by substituting turbinado, treacle, and brown sugar. These first two may take a bit of hunting to track down, but specialty food stores are often good sources as well

as on-line gourmet shops. The best-known treacle in the UK is probably a brand called Lyle’s Golden Syrup, and is a treasure all by itself. It has a toffee-like, almost buttery quality, but as an invert sugar it is completely fermentable. Thus it fortifies the finished beer, adds a small amount of color, and contributes some unique flavors and aromas. (It’s great on pancakes, if you have any left.)

Theakston’ yeast, like that used by the Samuel Smith brewery in Yorkshire, tends to encourage ester production, and in conjunction with the darker malts used in Old Peculier, leaves the beer with a characteristic mix of raisins, prunes, malt and perhaps figs. Many of the available British ale strains may be “too clean” to really mimic the complexity of this beer, but Wyeast No. 1099 (the Whitbread Ale yeast), exhibits many of the same characteristics, as does White Labs British Ale yeast. A warm ferment 21.7° C (70–72° F) will encourage the fruitiness with both these strains, but maintaining a cooler ferment 19–20° C (65–68° F) seems to yield a maltier, more balanced ale.

Finally, hops in Old Peculier, while subtle, really add a lot to the unique profile of the beer. Fuggle is the flagship, and must be added for flavor and aroma, but your bittering hop can vary with good results: Challenger and Northern Brewer are both good choices.

Amahl Turczyn is the associate editor of *Zymurgy* magazine.



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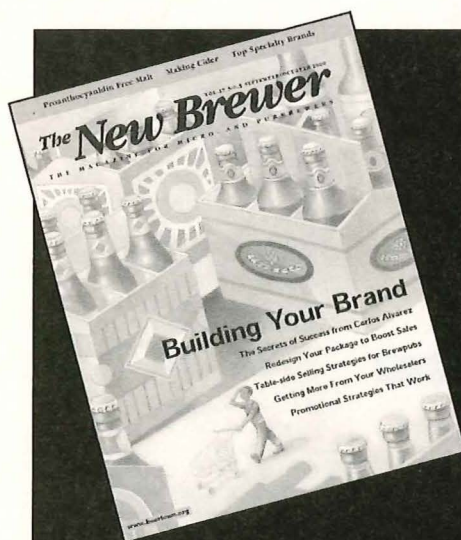
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White Labs and Wyeast Offer Advice

Dear Professor,

First of all, I'd like to let you know that your column is much appreciated. "Dear Professor" is always the first place I turn to when the latest issue of *Zymurgy* shows up in the mail. I enjoy reading real problems from real home brewers, many of which I've been able to avoid because of them asking and you answering. So thanks, and don't stop.

Here's my problem. I would like to find a relationship between the number of yeast cells that I believe is optimal to ferment my beer and an approximate idea of how many I might get from growing a series of starters from a smack pack or vial. The rule I've been trying to follow is one million cells per milliliter per degree Plato, but that is difficult to even approximate without some idea of what kind of numbers I'm growing.

Because I seldom have the opportunity to brew more than three or four times a year I never have yeast slurry from a previous brew available. I mention this because often an amount of slurry is given in reference books that corresponds with pitching rates. I realize there are many variables involved in how much yeast would be in say a one gallon starter made from a half-gallon starter made from a one pint starter, but is it possible to make an educated guess?

For example, if I wanted to brew 10 gallon of 12° Plato pale ale by the formula I mentioned above, I would like to have 454 billion cells. Anyway I've been looking at those new yeast tubes from Wyeast Laboratories. Last month's "Brew News" said Wyeast claims they have 40-60 billion cells per tube. If you figure 50 billion cells, what kind of a starter would be appropriate to use to get from 50 billion to 454 billion cells? Would the starter be as big as my 10-gallon batch? Is it worth it? Anyway there's my

question, and any information/help you can provide will be appreciated.

David Boice
Lancaster Ohio

Dear David,

It seems like you really do have a theoretical dilemma. Let's ask a couple of experts. Here are responses from Dave Logsdon of Wyeast Laboratories and Chris White of White Labs.

From Dave Logsdon of Wyeast:

The formula of one million (viable) cells per milliliter per degree Plato is the pitching rate most often recommended by professional brewers to provide a healthy fermentation. One of the factors is that this rate is specified for repitching yeast (from a previous brew), not a laboratory culture, which are typically brought in with an increase factor of 10 times as discussed below. This would

actually bring the tube in line with proper pitching rates. This may be a debatable approach, although this is exactly how we have done it, always successfully at the desired pitching rate, at the Full Sail Brewing Company in Oregon for the past 14 years. At that rate one Wyeast tube in a pint starter for 24 hours would yield the desirable results.

To produce the 454 billion cells would require approximately an eight-fold increase from 50 billion cells in a Wyeast tube. Depending on how much oxygen, nutrients and fermentables are provided, the volume required will be variable. During propagation, the standard scientific method is to increase volumes by 5-10 times and transfer on high krausen.

One method then, would be to increase the 50 billion cells in 1 liter of wort (aerated, OG 1.048) for 24 hours, then increase to 5 liters of the same for 24 hours, which could go directly or harvested into the 10-gallon batch of beer. This would be close to the counts you're looking for depending on the mentioned variables.

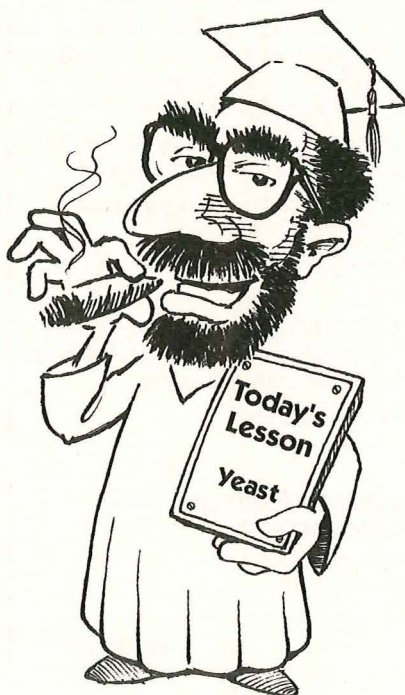
An alternative method would be to measure solids. 50 billion cells settles out to about 40 mls in 24 hours depending on the strain. Propagation could be used as described above, settled out and measured by volume to get 400 mls of solids.

Cheers!

Dave Logsdon
www.wyeastlab.com

From Chris White:

Here are my recommendations: To go from 40 billion to 450 billion cells, add the contents of the Wyeast tube or a White Labs vial into a 1 liter starter (1 liter of sanitized wort). Grow for 2 days, shaking occasionally. This will grow to about 150 billion cells. To get to 450, add the contents of the



1-liter starter to 4 liters, and let grow 2 days. This can either be added directly to the wort, or cooled for 1-2 days to drop the yeast. The liquid can then be separated from the yeast, if that is a concern. For 5 gallons, one package can be added to 2 liters of wort, resulting in ~250 billion cells.

Chris White
www.whitelabs.com

Welcome to the world of brewing science.
Contrary to what most of us think, the sci-

ence of science is not really a science. Chris and Dave have given you excellent viewpoints, all of which will result in a healthy fermentation of your Barley Wine. But as Dave pointed out, it all depends on the conditions. You can discover the perfect way to grow up your yeast, but if you've under-oxygenated the wort then you still may have a sluggish fermentation...so any scientific recommendation is always conditional. I'd choose one of the directions above and just be sure you provide your yeast the best wort

conditions possible. Good luck and happy fermentations.

I'm not a real doctor,
The Professor, Hb.D.

Life as a Bucket

Dear Professor,

I have been homebrewing for about a year now and typically use food-grade plastic buckets for the primary with good results. Are there any "rules of thumb" on how often you should replace your buckets or do I brew with abandon until problems arise?

Michael Lombardo

Dear Michael,

Brew with care and abandon. Don't get used to slow deteriorations in the quality of your beer. Listen to what your friends tell you about your beer. When it goes south (in other words: bad), splurge and get a new bucket. I recently replaced a siphon hose after years of use. Had a few batches go slowly south on me, and didn't realize the problem until it was too evident, but I haven't had a problem since.

If any doubts remain, splurge and get a new bucket. They are inexpensive compared to the value of your time and materials. Right?

Chuck it—The Bucket,
The Professor, Hb.D.

Pumpkin Porter

Hi,

I'm a member of AHA and I want to make a pumpkin-based ale for Thanksgiving. Can you help me find some recipes? I'm especially interested in a dark beer with pumpkin, if such a thing exists.

Thanks in advance,
Robert Schwartz

Hi Robert,

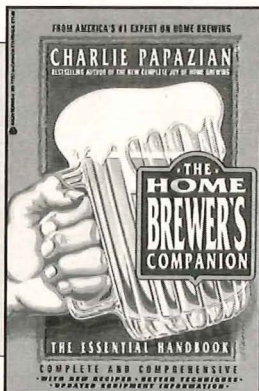
There is a pumpkin recipe in Charlie Papazian's book *The Home Brewers Companion*. It's as follows:

Ingredients for 5 gallons (19 l)

- 10 lb (4.54 kg) American 6-row pale lager malt
- 1 lb (0.45 kg) 20-40 lovibond crystal/caramel malt

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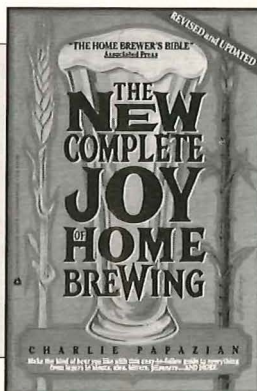


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- Ten easy lessons to making your first bubbling batch of beer
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- 7-10 lb (3.2-4.5 kg) pumpkin
 2 oz (56.8 gm) Williamette hops
 (boiling): 10 HBU
 0.5 oz (14.2 gm) Cascade hops
 (boiling): 2.5 HBU
 1 oz (28.4 gm) Mt. Hood hops
 (aroma)
 1 tsp (4 g) ground cinnamon
 1 tsp (4 g) vanilla bean, chopped
 0.5 tsp (2 g) freshly ground nutmeg
 0.25 tsp (1 g) ground allspice
 0.5 tsp (2 g) ground dried ginger
 0.25 tsp (1 g) powdered Irish moss
 Ale yeast
 0.75 C. (178 ml) corn sugar or 1 1/4 C.
 (296 ml) dried malt extract (for
 bottling)
- B.U.s: 45-50
 - Color: 6-12 (and tawny)
 - O.G.: 1.066-1.070 (16.5-17.5)
 - F.G.: 1.016 - 1.022 (4-5.5)

Just adapt the recipe with some roasted malts like chocolate malt and black malt...or perhaps use a porter recipe with pumpkin processing. You can always eliminate the spices (which are traditional in pumpkin pie). You can see that this recipe is at the higher end of gravities. Other pumpkin-like squash may be available earlier if you want to serve a well-aged brew. But brewing in late September with a healthy yeast starter and ale-like conditions should provide you a perfectly exquisite porter by Thanksgiving.

*Cucurbito Pepo,
 The Professor, Hb.D*

Convert to Invert

Dear Professor,

I was given a recipe for a clone of Victory Brewing Co.'s "Golden Monkey" that called for inverted sugar. What is this substance and where can I get it? Alternately, can regular cane sugar be converted? Help!

Mike Zohab
 Richmond Va.

Hi Mike,

Do you have the book, The New Complete Joy of Homebrewing? There's a description on page 85. You can invert cane or beet sugar by boiling it with water and a small amount of citric acid. So does the recipe

give any additional details? Know ye that there are different grades of invert sugar, like golden, brown and darker brown. {If you can find a product called Lyle & Tate's Golden Syrup in the supermarket, that is also invert sugar.—Ed.}

*Brew it up,
 The Professor, Hb.D.*

Cocoacocoacocoa

Hi,

I'm getting ready to brew some chocolate porter per the "Slantin' Annie's Chocolate Porter" recipe in Charlie Papazian's *The Home Brewers Companion*. There's a note of concern about using unsweetened baker's chocolate in bar form because of the cocoa butter, which forms a greasy layer which inhibits bubbling. Mentioned is the option of using cocoa in powder form to avoid this. It seems that the powder form would entail fewer problems, but do you lose anything (flavor) by not using the bar form? Are there any other considerations?


Dick Rogers

Hiya Dick,

Well, you're right, cocoa powder is a lot less hassle and will most definitely give you a great chocolate-like flavor, but I don't imagine there's a whole lot of consumer choice in the type of cocoa powder available. But as a brewer you can formulate a beer recipe to combine with the cocoa powder to give the desired chocolate-like results. Use crystal and aromatic malts for a sweeter impression and a fuller mouth feel. Use roasted malts for that dark chocolate roast character. Use fruity, ester-producing ale yeasts at higher temperatures for fruity chocolate character. Use more or less hops for balancing the bitterness you are seeking. Careful: cocoa powder will have some bitterness itself, so downsize your hop additions.

There's a wealth of possibilities that you can control as a brewer. Have fun go cocoa.

*Going cocoa,
 The Professor, Hb.D.*

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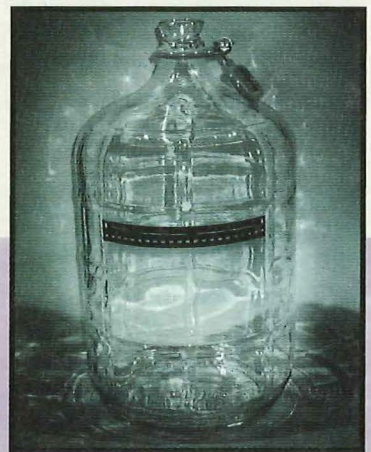
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WHAT HAVE you surrounded YOUR BEER WITH?

Homebrewers generally have access to three materials for fermenters: glass, plastic and stainless steel. The purpose of this article is to explain a little bit about the character of each material and what that implies for its use as a beer fermenting vessel. The accompanying chart summarizes the pros and cons of the most common fermenter options.



PLASTIC

Food-grade plastic buckets are made of a common polymer called high-density polyethylene or HDPE. You may recognize this as the “#2” plastic for recycling¹. It is formed by a process called Ziegler-Natta polymerization of the monomer ethylene



A Brief Look at Fermenter Raw Materials



($\text{CH}_2=\text{CH}_2$) with aluminum triethylene ($\text{Al}(\text{CH}_2\text{CH}_3)_3$) and titanium tetrachloride (TiCl_4), which creates an isotactic (or stereoregular) polymer. To put it simply, the side chains of the polymer are all in an identical position, which allows the many chains of the polymer to pack more tightly than if the side chains attached ran-

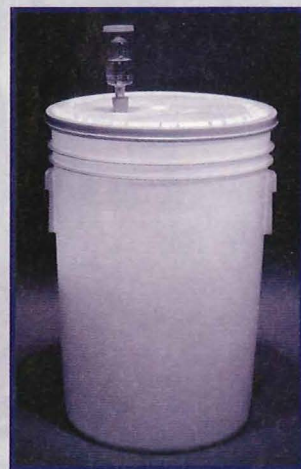
domly. Think of it as a molecular version of Legos. You can stack all of the polymers on top of each other in a regular, orderly manner and they will form a very dense "wall" of material. Alternately, you can stack them off-center and the polymer takes up much more space for the same amount of material.

HDPE has many advantages as a construction material. It is lightweight, shatter-proof, chemical-resistant and is easily molded into containers (like five gallon buckets!). It is also cheap. Cheap is good if you want to spend your money on beer ingredients rather than equipment or if you want to have many fermenters at a reasonable price. Of course, cheap usually means that there are compromises in other areas. Some disadvantages of the HDPE bucket arise from the same properties that provide its advantages. The lightweight qualities come

from the fact that, while tightly packed, there are still small pores between the individual ethylene monomers. This results in a flow of air, albeit restricted and small, both into and out of the bucket. For normal fermentations this is not a concern, but prolonged storage (several months) creates the possibility of oxidation.

HDPE is also soft, making it prone to scratches. These scratches, however small, create places for bacteria or beer-related deposits to hide. The organic materials in your beer—basically anything from malt, hops and yeast—can wedge into these cracks, leaving discoloration or a permanent odor behind. In fact, polyethylene is a solvent for fats (a yeast product) and oils (which we find in hops), both of which are found in varying concentrations in fermenting wort. Over time, these compounds literally migrate into the plastic and are impossible to remove². Bacteria have the uncanny ability to hide in these cracks and resist prolonged attempts at sanitization but seem to be easily coaxed out at the prospect of free food (your beer). Plastic fermenters should be replaced at the first sign of discoloration or lingering odor³. Given this fact, buckets are, by nature, a "disposable" fermenter and priced accordingly.

There are many choices for fermenting in plastic. The ubiquitous plastic bucket is probably the most common type of fermenter in all of homebrewing. But there are some more interesting choices.



BY MARC SEDAM

Some Common Fermentation Options*

CRITERIA

CONSTRUCTION MATERIAL

COST (TO FERMENT 5 GALLONS)

RECOMMENDED OPTIONS PROVIDED BY SUPPLIERS

DURABILITY

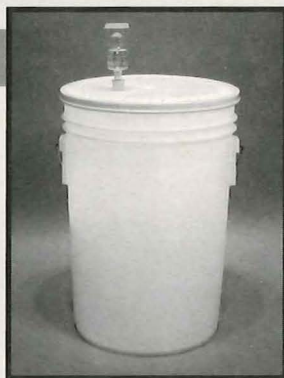
SIZE OPTIONS

CAN YOU VIEW FERMENTATION INSIDE CLOSED FERMENTER?

TUB AND YEAST REMOVAL DURING FERMENTATION

CLEANING & SANITATION

SUMMARY



PLASTIC BUCKET

Food-grade polyethylene.

\$8-15

Unbreakable, but degrades over time and may scratch if improperly handled.

For beer use, usually comes in 6-7 gallon (22.7-26.5 L) size.

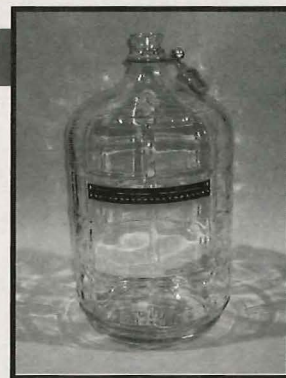
No.

No.

Easy to clean and sanitize. Except when scratched, all surfaces that contact beer are easily visible.

Cheap, easy and safe so long as you promptly replace at the first signs of discoloration or scratching.

POPULAR CHOICE



GLASS CARBOY

Glass — may be ribbed or smooth.

\$16-25

Carrying handle or harness.
Thermometer.

Subject to chips and breakage.
Dangerous if dropped.

Found in 3 (11.4 L), 5 (19 L) and 7 (26.5 L) gallon sizes.

Yes, completely.

Possible using special cap on inverted carboy.

Interior difficult to scrub, but can usually be easily cleaned and sanitized by filling it with suitable solutions. Very easy to inspect.

Strengths outweigh shortcomings especially if you buy oversized units for primary fermentation.

RESPECTED WORKHORSE

BOTTOM LINE



PLASTIC CONICAL¹

5/16 inch food-grade polyethylene.

\$180

Well thermometer.

Very durable, although degradation or damage of interior are possible.

Available in 8 (30.3 L), 15 (56.7 L) and 25 (94.7 L) gallon sizes.

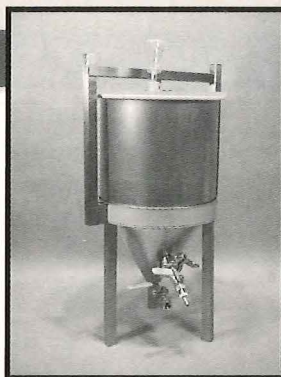
Not as delivered, clear acrylic lid would help.

May be accomplished using outlet on 60° cone.

Interior is easily scrubbed and inspected, but requires cleaning of related threads. Inspection of threads may be difficult. Unit can not be subjected to temperatures in excess of 160° F (71.1° C).

Professional functionality for those who give careful attention to cleaning and sanitation.

UNIQUE SOLUTION



STAINLESS STEEL CONICAL²

14 gauge, 304 stainless steel.

\$350 +

Stainless steel valves, acrylic lid, racking arm.

Highly durable. Only weakness: prolonged contact with chlorine sanitizer.

Available in 7.1 (26.9 L), 12.2 (46.2 L) and 27 (102.2 L) gallon sizes.

Top of brew can be viewed with optional acrylic lid.

May be accomplished using outlet on 60° cone.

Will withstand anything but chlorine. Direct scrubbing and inspection of all surfaces possible as valve threads are external. Inspect welds to ensure a smooth finish that will not harbor debris.

Professional look and function with few compromises when cost is not a consideration.

GOLD STANDARD: GOLD PRICE

¹ Plastic conicals are available from Hobby Beverage Equipment Company (www.minibrew.com)

² Stainless steel conicals for homebrewers are available from several vendors including Beer, Beer and More Beer (www.morebeer.com), Stainless Steel Specialists (www.stainlesssteelspec.com).

*Please note that many other fermentation alternatives exist; this is only a selection of some of the more widely available and commonly used solutions. In a future issue we'll try to do a feature that covers the options exhaustively so if you have some ideas for us, let us know by writing to ray@aob.org.

CRITERIA

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TUB AND YEAST REMOVAL DURING FERMENTATION

CLEANING & SANITATION

SUMMARY

BOTTOM LINE

Characteristics of HDPE versus Sodalime Glass

PHYSICAL CHARACTERISTIC	HDPE	GLASS
MONOMER	ethylene ($H_2C=CH_2$)	quartz (SiO_2)
CHEMICAL RESISTANCE	Good	Excellent
SCRATCH RESISTANCE	Poor	Good
SHATTER-PROOF	Yes	No
ORGANIC/ INORGANIC	organic	inorganic
UV-PROTECTIVE	Yes	No
LIGHTWEIGHT	Yes	No
OXIDATION RESISTANCE	Moderate	High

With some slight variations in shape, glass carboys or bottles come in various sizes. I have used one-gallon (11.8 L) apple juice jugs for small batches and starters, 2.5 (9.5 L) and 3 (11.4 L) gallon carboys for barleywines, and 5 (19 L), 6 (22.7 L), and 6.5 (24.6 L) gallon carboys for regular batches.

At least on supplier builds HDPE conical fermenters in various sizes. (See photo on page 24–25.)

GLASS

Glass is defined as a non-crystalline ceramic with a viscosity so high it's considered rigid. Strictly speaking, glass is a liquid. It is formed by heating crystalline quartz (silicon oxide, or SiO_2) to temperatures in excess of 1200° F (650° C). This heat dis-

rupts bonds holding the crystal formation together and allows the material to become molten, or begin to flow. Once molten, a modifier is added to the quartz to reduce the melting point of the mixture making it easier and safer to process. Common glass, which carboys are made of, is also called "sodalime" glass. The modifier used in sodalime glass (sodium oxide or Na_2O) helps decrease the melting point of the entire solution (remembering that glass is a

liquid) to around 800° F (425° C). This solution, when cooled, also has an improved shatter-resistance when compared with unmodified quartz glass. Other modifiers can be used to make even stronger glasses. Sodium borate (Na_3B_4) is used to create "borosilicate" glass, used in laboratories due to its ability to be heated and cooled repeatedly without cracking. In general, modifiers beyond those used in sodalime glass (which also includes calcium oxide or CaO) are too expensive for common use⁴.

Glass has many characteristics to make it an ideal fermenter. It is resistant to most chemicals and is therefore easy to clean. Glass is durable, resists scratches, is moderately inexpensive, and transparent. The latter is of particular interest to homebrewers because you can see the fermentation in action; the site of a bubbling cauldron of fermentation brings joy to the hearts of many a brewer. However, as with HDPE, the characteristics that provide advantages also result in some disadvantages. Sodalime glass is shatter-resistant when compared to pure quartz glass but is still easy to crack, chip or scratch (especially with the metal tip of a carboy brush).

The transparency, while allowing observation of fermentation, can allow skunking if the fermenter is exposed to sunlight or fluorescent light during fermentation. Thus, a light-blocking cover such as a pillowcase or garbage bag may be helpful when fermenting in glass.

Carboys are heavier than plastic and unwieldy to carry, resulting in a safety hazard without the use of carboy handles or carriers⁵. Glass carboys are more expensive than plastic buckets, but they are still quite reasonable and within the means of nearly all homebrewers.

STAINLESS STEEL

Ahhh, the homebrewer's dream. Sooner or later, every homebrewer's jaw hangs agape at the thought of an all-stainless steel brewery. Many may achieve this goal for the boiling kettle and occasionally as a mash tun, but rarely do you find a homebrewer with a stainless steel fermenter.

All stainless steel is an iron-alloy containing at least 10.5 percent chromium (Cr) and with a carbon content of less than one

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percent⁶. Various grades of stainless come from additions of other metals in the alloy, but the presence of chromium is what gives stainless steel its most valuable property: it doesn't rust or corrode. Chromium on the surface of the alloy reacts with oxygen in the air (or in water) to create a passivated coating of chromium oxide (CrO₂). This layer is only 130 Angstroms thick⁷ (one Angstrom equals 1x10⁻⁸ cm), yet it prevents highly acidic materials, like wort or fermenting beer, from reacting with the alloy and giving a metallic taste to your beer. The other advantage of the passivated coating is that it is replenished merely by letting the material sit exposed to air.

The stainless steel most common to brewing is graded either 304 or 316. The 304 grade contains chromium and nickel in the alloy, and is used for normal temperatures and acid conditions. The 316 stainless steel has chromium and nickel, but also a two to three percent addition of molybdenum, making it more corrosion resistant and therefore the common choice for brewing equipment⁸. While 304 would be acceptable, use of 316 allows for harsher cleaning and sterilizing chemicals to be used.

If you are looking at raw stainless steel, you may occasionally see "18/8" stainless on the market. This alloy includes 18 percent chromium and eight percent nickel. It is the most common form of stainless steel in general use but rarely is used in the brewing industry.

There are several producers of homebrew-sized stainless steel conical fermenters on the market. Beer, Beer, and More Beer, Pico Brewing Systems, and Larry's Brewing have versions ranging from five gallons (19 L) to one barrel (31.5 gallons or 119 L). These are mini versions of the typical brewpub cylindro-conical unitank. All provide outlet ports and valves similar to a professional setup as well as the option of a cooling system around the outside of the fermenter. Using these gadgets, you can achieve ultimate control over homebrew fermentation. Of course you pay for performance: prices start at \$300 for a basic unit and fully-equipped models can reach \$1000.

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Introducing
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mead made with
malted barley

The one key issue in acquiring stainless fermenters is the quality of the welds that come into contact with the beer. Sanitary welding is a special art and is designed to ensure that the finished weld is perfectly smooth, even, and has no pockets, creases or bumps where bacteria or other organisms could hide. A poor welding job can spell doom for beer contained in even the most beautiful (and costly) fermenter.

A cheaper option for stainless steel fermentation is use of a keg—either a commercial version or a soda keg. Soda (or Cornelius) kegs can be used for smaller batches, and work well as a secondary fermenter for standard-sized batches. I do this frequently and simply leave the check valve open on top to let CO₂ vent. Half-barrel kegs (scrapped or even new) might also be converted to fermenters. Successful conversion of a scrapped keg would depend on being able to completely clean and inspect the inside to ensure sanitary conditions.

SUMMARY

There are a wide variety of choices for fermenters, in both size and materials. While plastic buckets are the cheapest alternative they are also the most easily damaged and should be replaced if a consistent odor exists. Glass carboys sit as a happy medium, with good chemical resistance but the chance of breakage presents a constant risk. Stainless steel is the fermenter of choice for brewers large and small but its cost is prohibitive for many home-

brewers. Of course all of these options will make perfectly wonderful beer if properly cleaned and sanitized. And in the end, good beer is what it's all about.

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Marc Sedam, a.k.a. The Alechemist, has a degree in Biochemistry from the University of New Hampshire and is completing an MBA from UNC-Chapel Hill. He has been homebrewing since 1992, been writing on the subject since 1998, and is a member of the North American Guild of Beer Writers. He lives in Chapel Hill, NC and is currently trying to perfect the ultimate German helles.

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PRINCIPLES OF CLEANING & By Dana Johnson SANITIZING

Keeping homebrew equipment clean and sanitized is one of the best ways homebrewers can ensure good, clean-tasting beer, batch after batch. Regardless of whether the beer is made from malt extract, grain, or a combination of the two, the equipment must be kept clean and sanitized or the beer will either have problems, or develop them later on. It only takes a few of the wrong type of microbes or the improper use of cleaning and/or sanitizing chemicals to impart off-flavors in beer.

There are a lot of ways to keep the equipment clean. Ask ten homebrewers how they clean a fermenter, for example, and you are likely to get ten slightly different answers. As long as the soil is removed and no chemical residues remain, there really aren't any right or wrong answers. There are, however, cleaning and sanitizing products available to homebrewers that can assist in making consistent, great tasting beer and maybe even save some elbow grease at the same time. This article looks at the chemistry of soils encountered in the brewing process and effective cleaning and sanitizing methods for homebrewing equipment from the mash tun to the keg or bottle and everything in between.

There are three main types of soil to contend with in the brewing process. They are: carbohydrates, proteins, and scale. Carbo-

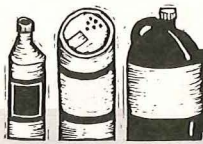
hydrates are made up of starches, cellulose and sugars. Proteins are complex, organic polymers with amino acids making up their basic structure. Scale comes primarily from the calcium found in hard water and in beer itself. The combination of carbohydrates, protein, hard water, plus heat (or cold) can create some difficult cleaning problems.

Cleaning vs. Sanitizing: What's the difference?

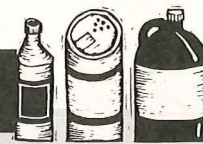
Although often used synonymously, there is a big difference between cleaning and sanitizing. Cleaning agents remove dirt, debris and scale from the surface of the vessel, hose or implement. While they make equipment *look* clean, they are not designed to sanitize your equipment. On the other hand, a sanitizer has specific bactericidal (bacteria-killing) properties. Let's review these two groups and give some examples, starting with cleaners.

In some cases, hot water and a little scrubbing can remove all visible dirt from homebrew equipment. In these cases, you don't need a dedicated cleaning agent. But some beer soils like krausen can be fairly hard to remove. And in other cases, you face the challenge of cleaning surfaces that you cannot visually inspect. In these and other situations, dedicated cleaning agents are recommended.





Homebrew Cleansers and Sanitizers



C L E A N S E R S

B-Brite (Crosby & Baker)

B-Brite is a proprietary sodium percarbonate-based cleanser suitable for removal of fermentation residues and organic deposits. A 30-minute soak in B-Brite cleans carboys and other-difficult-to-scrub items. Contains no chlorine or sulfite. Normal usage is one tablespoon per gallon of water.

Brewer's Edge Cleanser (William's Brewing Supply)

Brewer's Edge Cleanser is a dry concentrated chlorine-based cleanser that features scrubbing agents that lift deposits off soiled surfaces. A 24-hour soak in working solution removes paper labels and deposits from beer bottles. Buffered formulation allows contact with stainless steel for as long as 48 hours without corrosion. One 16 oz. package makes 32 gallons of working solution, with a chlorine level of 250 ppm.

CMC (Five-Star)

CMC (Chlorinated Manual Cleaner) is an industrial-strength general purpose cleaner. CMC contains more detergent and is specifically designed to act against beer protein soils. CMC offers significant performance advantages.

Straight-A Premium Cleanser (Logic, Inc.)

Cleans with oxygen and does not contain any chlorine, bisulphites, organic compounds or phosphates. Superior wetting power helps water penetrate and lift soils off surfaces. Removes labels with minimum soak time. Higher alkalinity dissolves and neutralizes acidic soils. Environmentally sound and biodegradable. (Use one tablespoon per gallon of water.)

PBW (Five-Star)

PBW is designed to act as a soak or manual cleaner. PBW can effectively clean items that can't be reached with a brush or sponge, and is strong enough to remove impossibly thick, difficult, baked-on soils. PBW is environmentally friendly, biodegradable, and will not harm the "friendly" bacteria in your septic system.

Most general cleaning agents are alkaline formulations, including caustic, as well as a number of non-caustic products. Professional breweries have long used caustic as a cleaner. Also known as lye, caustic is sodium hydroxide (NaOH). It is also extremely dangerous to skin and eyes and is corrosive to soft metals like brass and copper.

For homebrewers, I feel non-caustics are the only way to go. Non-caustics are safer to deal with and are generally safe for most metals. In addition, they perform as well as or better than caustic cleaners. The primary difference is that caustic hydrolyzes or emulsifies soil while the non-caustics use displacement chemistry to remove it.

A good example of displacement chemistry is automatic dishwashing detergent. In this case, you are not necessarily trying to totally dissolve soil but rather loosen it off of the surface so it can be suspended and then rinsed away. Caustic tends to saponify (make soap out of) soil, especially fatty acids.

Formulated alkaline non-caustic cleaners typically use sodium metasilicate, sodium carbonate, sodium percarbonate, and phosphates to provide alkalinity. An example of a formulated non-caustic cleaner for homebrewers is PBW by Five Star. As mentioned below, acids may also sometimes be used in a cleaning role, especially in the removal of mineral deposits or scale.

S A N I T I Z E R S

Brewer's Edge Iodophor (William's Brewing Supply)

A highly concentrated (3.6% iodine) iodophor sanitizer. One teaspoon in one gallon of water to make a 26 ppm working solution.

BTF Iodophor Sanitizer (National Chemicals)

Iodine based sanitizer. Requires two-minute contact time. Can cause staining. Use one tablespoon per five gallons of cold water.

IO Star (Five Star)

IO Star is a low foaming iodophor sanitizer that contains 1.6% available iodine. Ideal for internal sanitation. Non-hazardous.

One Step Cleanser (Logic, Inc.)

Oxygen based with a favorable cleaning power and sanitizes on contact. Environmentally friendly and non-toxic. No rinsing required. (Use one tablespoon per gallon of water.)

Star San (Five Star)

Star San is a flavorless, odorless, no-rinse food grade sanitizer. Star San acts quickly (five minutes), and foams to sanitize cracks, crevices and other 'impossible' places in your equipment. Has no flavor impact. Star San is environmentally friendly, biodegradable, and will not harm septic systems.

Saniclean (Five Star)

Saniclean is fundamentally the same as Star San, only without the foaming action. Perfect for circulation cleaning, spray bottles, or other applications where foam is not desired.

Once a surface is clean, it must be sanitized. Sanitizers must have specific bactericidal properties. In the United States, claims for bactericidal efficacy cannot be made unless or until the product carries a current EPA registration as a sanitizer. By the US Environmental Protection Agency (EPA) definition, an EPA registered sanitizer must be able to provide a five log (100,000-fold) reduction of bacteria. In other words, it must be able to kill over 99.999% of the original bacteria present to be approved as a sanitizer.

The sanitizer is tested at a prescribed dilution for specific amounts of time against selected types of pathogenic (disease causing) organisms, then re-tested the same way

a year later. If the sanitizing product passes both tests, it is granted an EPA registration number as a sanitizer but only after the label has been approved and the registration fee has been paid.

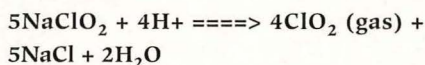
One term commonly used with regard to sanitizers is "post-rinse." Post-rinse sanitizing means that rinsing is not required after the sanitizing step (when the sanitizer is used at an appropriate concentration and then properly drained). In other words, the beer (or wort) can come in contact with equipment that has been sanitized without the sanitizer imparting a flavor profile to the finished product. The four best sanitizers I know of for post-rinse sanitizing are: chlorine dioxide, peracetic acid, iodophor, and phosphoric acid/anionic surfactant. Conversely, chlorine bleach is the worst, followed closely by quaternary ammonium compounds. Bleach imparts a chlorine flavor and quat (being cationic) will kill head retention in addition to giving the beer a medicine-like flavor. Here is a look at a few common sanitizers used by small brewers.

Bleach: Homebrewers are familiar with 5.25% sodium hypochlorite, commonly known as household bleach. For the money and performance, bleach is hard to beat. In *The Complete Joy of Homebrewing*, Charlie Papazian recommends using two ounces (59 mL) of bleach per five gallons of water (19 L) to sanitize corks, hoses, carboys, bottles, etc. This dilution provides about 200 parts per million (ppm) of available chlorine, and works fine as long as whatever is being sanitized is triple rinsed to remove the chlorine so as not to flavor the beer. Chlorine bleach is hard on stainless steel and the flavor is detectable at extremely low ppm levels in beer. For this reason, bleach does not qualify as a post-rinse sanitizer for brewing.

Iodophor: Iodophor is an iodine-based sanitizer used by many home and commercial brewers. Like bleach, iodophor is a halogen-type sanitizer. Unlike bleach, however, iodophor is a good post-rinse sanitizer when used at a concentration of 12-25 ppm active

iodine. (one oz [29.5 mL] of 1.75% titratable iodine sanitizer per five gallons water.) At this dilution, the iodine does a good job of destroying unwanted organisms but does not flavor beer if the equipment is drained properly. There are a couple of things to be aware of when using iodophor. One, the concentrate stains plastic, leaving an unsightly, rust colored appearance. Secondly, if measured improperly, iodophor can flavor beer, giving the beer a tinny, medicinal, Band-Aid like flavor.

Chlorine Dioxide: Chlorine dioxide (ClO₂) sanitizers are gaining a following in the brewing industry. Shipped as stabilized sodium chlorite (NaClO₂), chlorine dioxide is generated by adding food grade acid (phosphoric or citric, typically) to drop the pH to the acid side and form the ClO₂ gas in solution. The equation for this reaction is:



Chlorine dioxide has several advantages over other sanitizers used in brewing. Chlorine dioxide is an oxygen donor so it is more environmentally friendly than either bleach or iodophor, both of which can form trihalomethanes when they break down in wastewater. (Trihalomethanes are compounds that include formaldehyde and chloroform and are carcinogenic.) One reason Chlorine dioxide is used for drinking water chlorination is that it does not form trihalomethanes and does not have a chlorine-like flavor profile. This also makes it ideal for use as a post-rinse sanitizer. Another advantage of chlorine dioxide is that it is more forgiving if the amount is not accurately measured or drained. The normal concentration used for post-rinse sanitizing is 50-100 ppm active ClO₂ (1.5-3.0 oz [44-88.7 mL] of Chlorine dioxide per five gallons of water).

There are some disadvantages for chlorine dioxide sanitizers. The concentrate tends to be much more expensive than other

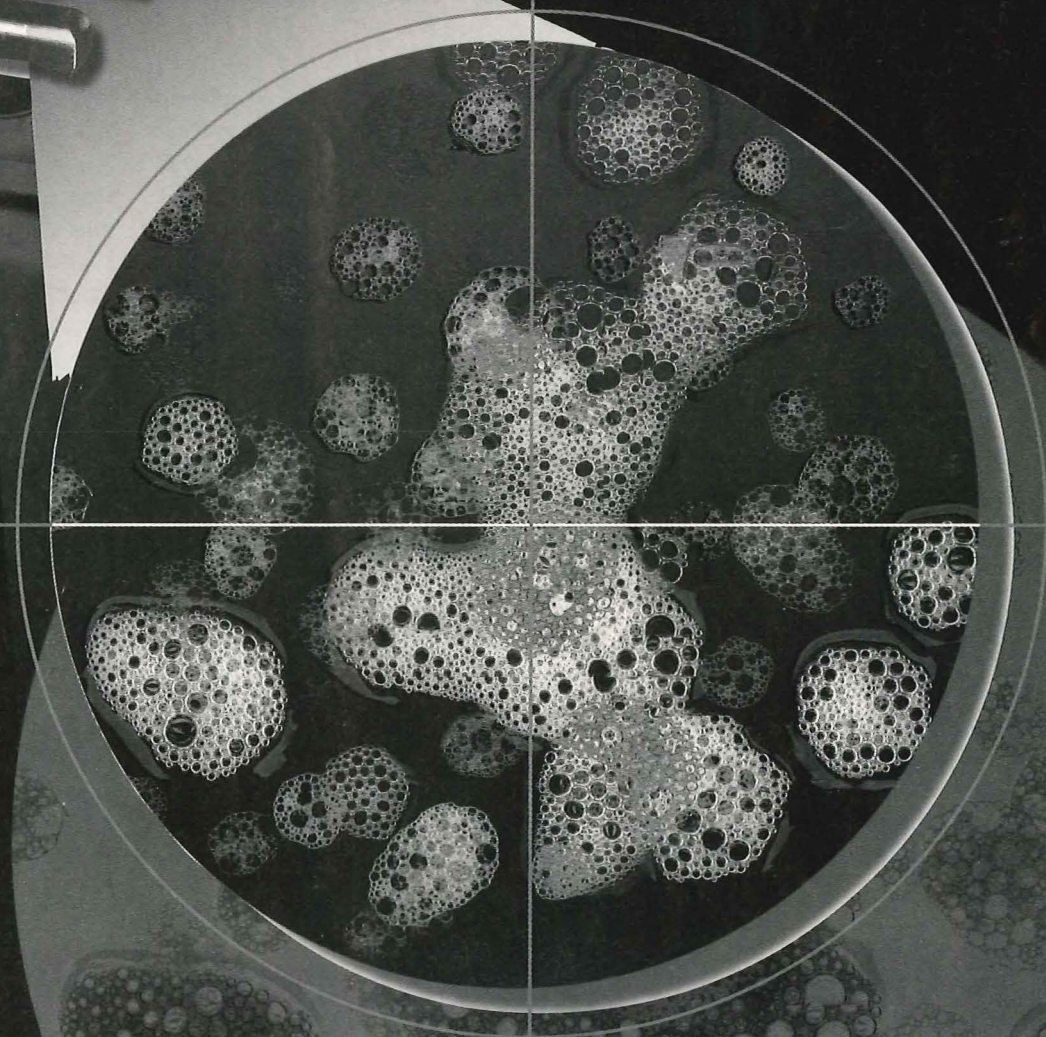
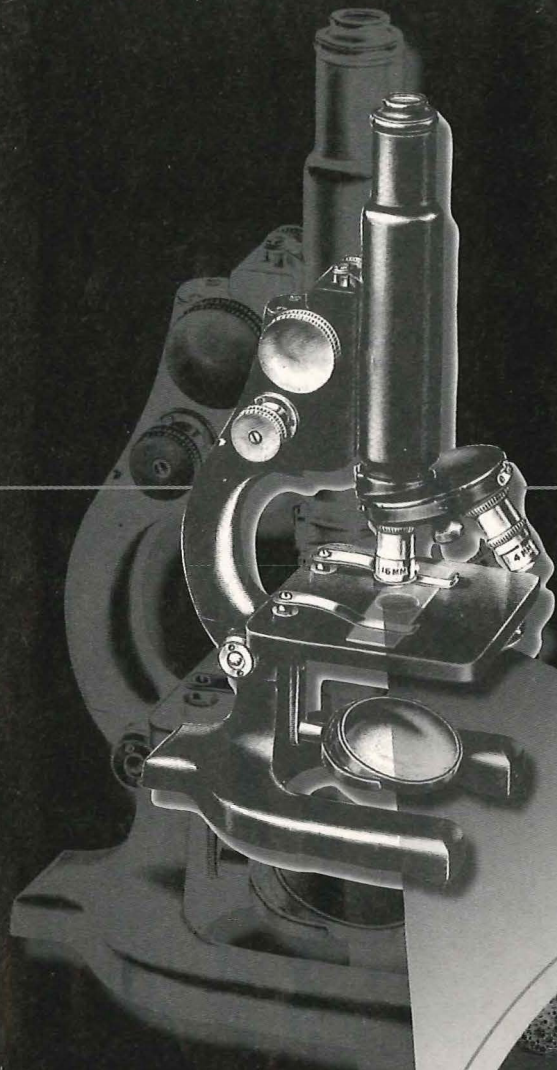
sanitizers and requires activation with acid to be effective. Chlorine dioxide is not a good residual sanitizer. In other words, if you want to store the activated solution for a long period of time, don't. The best advice with chlorine dioxide is: use it and lose it. (Discard the spent sanitizing solution down the drain after you are done using it and start with a freshly activated solution each time).

Anionic/Acid Sanitizers: The bactericidal properties of anionic surfactant/acid sanitizing products have been known for decades. These compounds typically contain about 50 percent active phosphoric acid, (H₃PO₄) and 15 percent active dodecylbenzene sulfonic acid (DDBSA). For the homebrewer, anionic/acid products make an excellent post rinse sanitizer. Used at a dilution of one oz (29.5 mL) of sanitizer per five gallons water, (200 ppm active anionic surfactant) this sanitizer does a good job of killing unwanted organisms and can also be used to remove scale buildups, too. About the only downside is that DDBSA is extremely foamy so keep the agitation to a minimum if you don't want to see a lot of foam. As long as fermenters, bottles, kegs, etc. are drained properly, this product will not flavor beer.

Specific Cleaning Challenges

Now that we have reviewed the different types of cleaning and sanitizing agents, let's look at specific portions of the brewery and their specific needs.

Mash Tun: For homebrewers making beer from all grain rather than malt extract, the mash tun is normally pretty easy to clean. Since the mash is generally not boiled, carbohydrates and proteins do not get "baked" on due to extremely high heat. Typically, rinsing the mash tun followed by cleaning with a general purpose cleaner is all that is necessary to keep the mash tun looking good. Using alkaline, oxygenated or chlorinated cleaners (see sidebar) do a good job of removing and keeping protein stains from the screen. (continued on page 54)





GERM WARFARE:

An Introduction To The Microbiology Of Beer Spoilage

By Paul Farnsworth, Ph.D.

The bad news: microbes—living things so small that you need a microscope to see them—are everywhere. Your world is full of these bacteria, yeasts and molds. The good news: this is a good thing! The living part of your world is known as the biosphere and in it there is a self-sustaining cycle of energy and materials which move through a succession of different life forms. (You need these things to survive.)

First there are the *Producers*. These life forms (mostly plants) capture energy from the sun, carbon dioxide from the atmosphere and water from wherever they can find it. In a process called photosynthesis they use these carbon, hydrogen and oxygen atoms to build organic molecules. One example is the sugar glucose which effectively has solar energy trapped inside it, now as chemical energy. It is these organic molecules and their trapped energy that provide the sustenance for all other life forms on the planet, hence the name, the *Producers*.

Next in the food chain are the *Consumers*, the animals of which there are two types. First are the herbivores that eat the

plants, digesting the plant sugars and starches to release energy to keep themselves alive and to provide the raw materials (the carbon, hydrogen and oxygen atoms) for them to make their own organic molecules. (This is a fancy way of saying beef is made of grass!) Second are the carnivorous *Consumers*, who eat the herbivores, again extracting energy and raw materials and transforming it into, well...themselves!

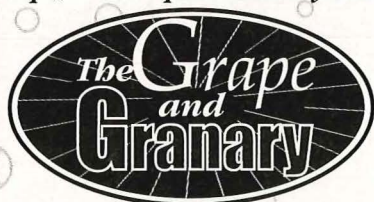
This process of consuming other organisms for energy and raw materials cannot, however, continue indefinitely. At each successive level of life form the energy diminishes as it is used to produce movement, heat, noise etc. The plants put money into the 'energy bank account', then all other life forms spend it. Ultimately the whole pyramid scheme collapses and the life form fails, the inevitable death that is the end for all. But this is not the end. Even though the dead body doesn't have enough energy left to keep going, it still has lots of good stuff in it: specifically, organic molecules with small amounts of energy. This is where the third level of life forms enters the picture. Here

we find nature's trash pick up squad, the *Decomposers*. These microbes, (the bacteria, yeasts and molds), breakdown the remains of all life forms, extracting the last of the energy by completely breaking down their organic molecules into carbon dioxide and water, the very materials we started with.

This completes the cycle of life: raw materials which first go into life forms as plants are transferred through various other life forms and are then recycled back into the atmosphere where the cycle begins again. Without this recycling there would be no life—there is not enough raw material on the planet to support much life without the recycling. Without it we would be miles deep in dinosaur bodies and there would not be enough carbon left to make any more life forms. So yes Virginia, there is reincarnation, at least at a chemical level, and you are made entirely of used parts from a chemical perspective. Every atom in your body has been in three other life forms over the history of the earth.

So the microbes—the *Decomposers*—are the good guys: they make all life possible. They are small because there is not

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much energy in what they eat and they are everywhere—in soil, air and water—just hanging out waiting for something to die so they can decompose it. One problem with this is that not all of them wait until you are dead! The reason humans are afraid of germs is that a very small percentage of these microbes are over-eager and invade and digest live organisms, causing disease. These are called *pathogens* and we manage them by public health efforts like ensuring clean food and water and separating live things from waste and dead things.

A second problem is that, in order to do their job, microbes are adept at hanging out for a long time with no food and then reproducing very quickly up to enormous numbers when food does come along. Then after this gluttonous orgy, they lay low and wait in the environment for the next good time meal. All they need to get going again is warmth, water and food.

As a general rule, what is food for us is food for the microbes—they eat what we eat. If we aren't careful, they'll do it before we

do and cause spoilage. This food spoilage is rarely a big problem for us except when the microbes that spoil the food are pathogens or poison-producers, in which case we get food-borne illness. Fortunately, few microbes are 'bad' ones like this and we have learned to be suspicious of odd-smelling food and meat that glows in the dark! Mostly it is no big deal, just spoiled milk, moldy bread and fruit. To be safe and to avoid wasting precious food we control this spoilage by making the food less hospitable to microbes by drying, salting, acidifying, (pickling) and refrigeration.

A long time ago we invented another way of coping with this microbial spoilage and the potential for food-borne illness. If we cannot stop it decaying we will let it 'go bad' on purpose, making sure that only good microbes grow in the food, thereby changing it into a stable food which is no longer spoilable. If you think about the hygienic arrangement of a cow you can see the potential for milk to be contaminated with intestinal microbes. To prevent these growing in the milk and causing disease to the consumer we deliberately add benign (harmless) bacteria or good germs. These *lactobacilli* use up the 'goodness' in the milk—they turn the milk sugar lactose into lactic acid, which makes the milk unsuitable for other potentially harmful microbes.

Similarly, plant juices and broths spoil very quickly but sometimes good microbes turn the sugars into alcohol and the juice becomes stabilized, with no sugars left for pathogens to grow on and alcohol to inhibit them and act as a preservative. Couple this with the psychoactive properties of the alcohol and we have a big winner in food processing: beverage alcohol fermentations.

MICROBES AND BEER

Your beer is grain that has been processed in this fashion to preserve it. The starch is turned into sugar by the mashing process and the sugar into alcohol during fermentation to produce a biologically stable food supply, full of nutrients and calories, that will last much longer than grain and be easier (and more pleasant!) to eat. So the essential step in brewing is to make sure that it is the brewer's yeasts that get to digest the wort sugars before any of the other microbes take hold. Mind you, every brewery is loaded

with other microbes that are lying in wait looking for a chance to have a little orgy in a bit of vulnerable wort. Many traditional brewery processes are geared toward preventing this: boiling the wort, pitching lots of yeast, and extracting antibacterial compounds from hops. All these procedures favor the desired yeast fermentation and discourage other unwanted fermentations.

One of the reasons beer has been around for so long is that it is almost impossible to make beer that contains pathogens—microbes that cause serious illness or death. The wort boiling and the alcohol produced by the yeast kill them off even in the world's filthiest brewery—so you are much safer drinking beer than water wherever you go. However, if conditions are not optimal, other microbes *will* grow in beer. When they do, they spoil it by producing undesirable flavors and odors as well as things like cloudiness and even slime—but never poison. Thus every brewer must battle with spoilage organisms on an ongoing basis.

As an amateur brewer, you do not really need to know the details of brewery microbiology, just the principles of what spoilage organisms are and how they get into the process. You can then figure out how to minimize their intrusion into your process. To help you with this, **Table I** lists beer faults and their likely causes and prevention. You can do a pretty good job of guessing who the culprit was by smelling and tasting and this may point to the part of the process that needs attention. Note however that in all cases the solution is the same: tip the balance more in favor of your brewery yeast. Maximize the numbers of brewery yeast by using lots of active, pure yeasts for pitching and minimize the numbers of other microbes by being clean, sanitary and quick.

For those seeking more detail, **Table II** shows the names and characteristics of the main beer spoilage organisms. Specific identification requires laboratory testing—although the procedures are readily available in the American Society of Brewing Chemists manual. They are not difficult and any local microbiology graduate student should be able to do them for you—and they may be willing to do them in exchange for beer!

Now in the remainder of this article, I'm going to provide you with some inside infor-

mation on the enemy so you can win almost all of your battles.

We know that large amounts of active, healthy brewers yeast will quickly turn the wort sugar into alcohol and acids. This deprives the spoilage organisms of food and inhibits the growth of those which are alcohol and acid sensitive, which is almost all of them. To ensure that the yeast win this battle, you need to give them all the help you can. If the entire process—the ingredients and the equipment—were sterile (no living things in there) you could, in theory, add one yeast cell to your sterile wort and make perfect beer. This is not possible either at home or commercially. (It is possible in the lab, but the beer tastes really bad!) If we know the enemy we can, however, tip the scales in favor of our yeast, even in a microbe-laden world. This procedure is called being sanitary and involves everything that touches the beer being clean and sanitized using chemicals (sanitizers) to inhibit or kill most of the competing microbes that might otherwise spoil the beer.

The strategy for successful brewing is to reduce to acceptable levels the total number of microbes that are in the ingredients, the equipment and the process. Note that determination of what constitutes “acceptable levels” of contaminating microbes comes from your results: if the beer looks, smells and tastes right, you did it right! The key steps to this strategy are:

(1) DO NOT PUT LOTS OF MICROBES INTO THE PROCESS TO START WITH

Clean unspoiled ingredients, clean water, clean equipment and a clean brewery environment all reduce the potential microbial population which has to be controlled and reduce the risk of spoilage. Grain, being a vegetable product, is covered with all types of bacteria, yeasts and fungi. Grinding the grain near the fermentation area puts them in position to potentially do battle with your yeast. It is the same with dust and dirt in the room. Anything that is not clean contains microbes and, if the dirt is organic material, it is a source

of food for them to grow on. Hence the requirement for cleanliness of all equipment: fermenters, hoses, air locks, spoons, pumps, hydrometers, funnels, sampling devices. These items and any others that touch the wort must be clean so you are not adding to the numbers of the opposing army.

A small speck of dirt can contain literally millions of microbes with the potential to spoil your product, so even “mostly clean” is not good enough. Nooks and crannies, scratches and chips and porous surfaces in brewing equipment all are potential breeding grounds. Everything should be cleaned as soon as it is used. Think of the potential microbial army growing in the bottom of that un-rinsed fermenter or the homebrew bottle with the hockey puck of mold growing in the dregs! Even when you wash and sanitize it later you have a much bigger army to fight than had it been rinsed clean immediately.

(2) REDUCE THE NUMBERS OF MICROBES THAT ARE IN THE PROCESS

Clean, rinsed, non-porous, unscratched equipment still has microbes in and on it. Anything that comes in contact with the process must have the number of microbes reduced to a level at which they will not affect the product. The wort can be sterilized by boiling, so stringent sanitation is not needed prior to this step. Mashing needs only to be done cleanly. Note however that if the mash equipment is left dirty between uses, microbes will grow in the residue and next time you do a mash they will be awakened and will begin to ferment your grain while it is mashing. This may do nothing other than reduce your yield slightly and they will be killed during the boil. However there can be taste and odor carry over from such action. Acids produced during mashing, especially long slow mashes or ones in dirty mash tuns or ones using wheat (which contains large numbers of lactobacilli), can produce enough acid that it is evident in the final product. If you do this on purpose, you are doing a sour mash.

(3) ONCE THE WORT IS STERILE, DO NOT LET MANY MICROBES GET BACK INTO IT

This is very tricky on a small scale. The wort is perfect microbe food and, remember, they are everywhere. Closed wort chillers, closed fermenters and closed wort-transfer systems are ideal for stopping them from getting into the cooled wort and starting their own fermentation party. To emulate this at the home brew level is tricky. Cooling the wort outside in an open pot and then pouring through a funnel is far from ideal! The best investment you can make as a serious home brewer is a sanitary wort chiller and enclosed wort transfer via hose and pump. Sucking on a siphon hose, even if you have just rinsed your mouth out with vodka, increases your risk of infection!

Whatever system you use, everything that comes in contact with the cooled wort must have had most of the microbes removed: it must be made sanitary. This is done by chemical treatment with one of the many sanitizers now available. (See “Principles of Cleaning and Sanitizing” on page 28 of this issue.) All have their pros and cons but all work well if the manufacturer’s instructions on concentration and contact time are followed. Note that these will only work if the equipment is VERY clean, with no hidden breeding grounds where millions of microbes can hide out under the dirt, protected from the sanitizer.

If the wort is kept sterile during cooling and is then transferred in a sanitary manner to a sanitized fermenter, you are a long way towards having your brewing yeast win the battle. There is another common way of introducing spoilage organisms. This is during the addition of the brewing yeast to the wort. It is essential to use yeast that is free from microbial contamination. In the past, this was not easy but now there are commercial sources of clean, healthy, pure yeast for small brewers. Adding yeast that has other spoilage organisms in it will always produce unintentional Belgian flavors! Be sure of (continued on page 56)

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A Baker's Dozen: Practical Tips On

As I began to write this piece, I found myself stumbling around the chaos of my kids and their cat. The irony of it all was not lost on me. At the moment it didn't seem that I should be the one to talk to anyone else about sanitation. But then I thought, "Hey, so far—knock on wood—I haven't had sanitation problems with my brewing, I must be doing something right."

And in fact, that's the case. Since my personal philosophy in life is one of moderation, I'm neither anal nor cavalier about sanitation. So perhaps my tips will be useful since they have stood the test of time and a couple hundred batches of beer—including lambics, mead and cider without becoming obsessive-compulsive.

First let be say that the first three things one must learn about homebrewing is sanitation, sanitation and sanitation. And sanitation does not mean sterile. Unless you have an autoclave, you won't create a sterile environment and even then most of what our beer will come in contact with cannot be autoclaved. So we settle for sanitary.

1 ♦ The first aspect of sanitation is that items must be clean. Clean of dirt, grime, old yeast, cat hair and other stuff that might harbor bacteria. Clean your bottles, hoses fermentation buckets or carboys, anything that will come in contact with your beer or wort. Scrub with green scrubbies (these won't mar plastic, glass or stainless steel), and a cleansing agent that will depend on what you are cleaning.

♦ It's easier to clean up immediately after use than immediately before use. Dried, caked-on gunk is harder to remove than the stuff that becomes that gunk. So when you're through emptying that beer bottle, rinse it out right away. When you finish siphoning, rinse out the siphon tube and hose well, run some sanitizer through it and hang it up to dry.

♦ While not necessary before or after every use, occasionally clean equipment with a specialty brewing cleanser. I prefer PBW for this since it does the job in a safe and affordable manor. I soak equipment in PBW, mixed per the instructions, in my brew kettle, thereby cleaning it at the same time. After the kettle is set, you can run this off into your mash/lauter tun or fermenter to then clean those as well. Also, while the manufacturer may not recommend saving and reusing PBW, I have found that I can make effective use of saved PBW for several cleanings over a couple week period by saving the solution in an extra carboy.

♦ You can use any number of agents to sanitize equipment. Chlorine bleach, StarSan, and various brands of iodophor are all available to homebrewers. (See the "Principles of Sanitation" article on page 28 of this issue.) While I cannot speak for or against StarSan, I did find that chlorine bleach was quite effective, but that it irritated my skin so much that I stopped using it. Also, you have to rinse items treated with bleach solutions to ensure that it doesn't produce off-flavors in your beer. Personally, I prefer iodophor since I've found that it is relatively cheap, easier on my hands and undetectable in beer at the recommended strength. Also, I can reuse iodophor repeatedly and rely on the color as an indicator that it's still good. I routinely keep a carboy of iodophor handy. When it comes time to sanitize a carboy, keg or other equipment, use your



2

4

Homebrew Sanitation

By David Houseman

siphon and hose to move the iodophor from the storage container and back; this sanitizes the siphon as well.

◆ Some may keep iodophor in their kegs, but iodophor has been reported to have adverse affects on stainless steel for long term storage. I prefer the glass carboy so that I can see the color. Keep the iodophor storage carboy capped or covered with saran

5 wrap secured with a rubber band and it will stay useful for weeks. Add additional iodophor when the color indicates that the iodophor is no longer at the proper strength. Use iodophor test strips (similar to pH strips) to determine what the proper color is for the strength (ppm) you wish to maintain. These are often available from restaurant supply outlets and from some homebrew stores including Williams Homebrewing Supplies.

◆ While I've soaked bottles in solutions of bleach or iodophor and have baked bottles in the oven, the one method I've found that was the most convenient and practical for me is to put bottles in the dishwasher. First I power rinse the bottles (previously rinsed after the last use) using a Jet Washer. Then put them inverted into the dishwasher (mine holds 52 bottles easily) without dishwasher detergent. Run the dishwasher on wash and heated drying. The steam and heat within the dishwasher provide the necessary sanitation for already-clean bottles. When the cycle is complete, I just open the door and fill the bottles from the rack.

◆ Open containers of beer and wort are an open invitation for dust bearing bacteria,

7 molds and yeasts to fall into. Keep items that you have sanitized and want to keep that way covered, even if loosely, at all times. Keep traffic, kids, pets and significant others temporarily away from open containers. Just having people moving about in a closed room generates air movement that will stir up dust and deposit this into open containers or onto sanitized equipment. Only leave things uncovered for the shortest time possible while they are being used.

◆ Saran wrap, or other plastic wrap, is an effective covering for carboys, fermenters and other equipment that



8 needs a temporary seal or to be protected from the open air. I have found the inner side of sheets of paper towel rolls are fairly sanitary.

Place a sheet on the counter, put your sanitized items, spoons, airlocks, tubing and the like, on the paper towel and cover with another paper towel, inside down. Pull the edges down to keep room airflow to a minimum. While I haven't tried to grow cultures from paper towels or plastic wrap just off the roll, in practice these have worked for me and have not been a source of infection.

◆ Soak bottle caps in an iodophor solution to sanitize. This is not advisable for oxygen absorbing caps since they are activated by contact with liquid, but it does work for all

other caps. Don't boil caps as the heat deforms the plastic liners. Simply take a cap out of the solution, shake off excess iodophor and cap the bottle. While a minor amount of iodophor may cling to the cap, it will not be sufficient to alter the flavor of your beer.



◆ To clean and sanitize your counter-flow chiller (CFC), run 5 gallons of boiling water through the chiller prior to use. Solid rubber stoppers can be purchased at the hardware store and partially drilled out with a drill bit to form end caps for the CFC. These caps can be boiled with the water and they then are sanitary and can be applied after the water has been run through the chiller. Save the water and reboil to run through the chiller again after use to clean and sanitize it before it's put away for another brewing day. As before, boil the rubber stopper end caps with the water you will run through the chiller and affix them to the chiller until the next brewing session. This will keep insects from crawling into the chiller during storage.

◆ Corny kegs can be sanitized with iodophor. Fill the keg to the brim, pushing the poppets on both "In" and "Out" connections to ensure that iodophor gets into the valves. Put the cover in place and after a 10 minute wait, invert to ensure that all crevices around the

10

11



top are sanitized. Apply CO2 and vent the "Out" and "In" (inverted) valves to be sure they are sanitized. The iodophor can be "pumped" out with CO2, leaving a keg of CO2 ready to take beer without fear of oxidizing it. If necessary, the kegs can be rinsed with boiled water; I've found that soaking the lid in the boiling water softens the large O-ring, making the top seal easier.

◆ Have your water in your house tested for bacteria. You can obtain a sterile container from your local health department into which you can run water from your tap, seal and have tested for bacteria. In my county this costs \$5. While I won't add this directly to wort or beer, once I knew that my water was safe, I didn't fear the contact of this water with some of my sanitary equipment. I rinse and fill my racking cane and siphon hose with water from my tap, placing my

12

(clean!) thumb over the end of the hose. I use this method of starting my siphons without extra equipment or resorting to sucking on the hose to start the siphon.



◆ Soaking larger or awkwardly shaped equipment in iodophor can be difficult. Purchase a plastic wallpaper trough from the hardware store and you can soak long objects as well as small ones easily. You can also build a vertical container by using a four foot section of four to six inch diameter PVC pipe with an end cap on one end. Fill with iodophor and you can place tubing and other objects in the pipe to sanitize.

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That's about it for real live sanitation tips based on my experience. But I will leave you with one other related thought. If you soak bottles to sanitize them, you may want to consider building a simple bottle drain that doesn't place anything inside the bottle to hold it. A two-foot by one-foot piece of half inch plywood is supported on its four corners by legs made of four-inch long dowels. The plywood can then be drilled with 24 1.5 inch holes. A case of sanitized/rinsed bottles can then drain inverted without anything touching the lip of the bottle or being inserted into the bottle to hold it in place. It may be a small thing, but then so are those bacteria and wild yeasts that want to ruin your beer. When it comes to making sure that that the homebrew I've labored so hard to make won't wind up as fertilizer for the garden, I'm ready, willing and happy to make every effort to keep things clean.

David Houseman has been an avid homebrewer since 1991 with a numerous beers winning ribbons at competitions across the country. David is also on the AHA Board of Advisors and the MidAtlantic Representative to the BJCP. He holds the rank of Grand Master in the Beer Judge Certification Program. In his real life, Dave is CTO of Unisys Corporation. When not brewing he's refereeing soccer or spending time with his family.



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Evaluation of Various Brewing Salt Additions in A Classic IPA

By Marc Sedam

For years homebrewers have argued about the need for adding water minerals in order to make beer appropriate to style. The pro: what you've created is historically consistent and best represents the style. The cons: adding mineral salts to water requires baseline knowledge of your water's chemistry and chemistry in general, an accurate scale, and non-trivial calculations of ion concentrations. On top of the logistical problems, there isn't a clear understanding as to whether it all makes a difference. After experimentation, I can tell you with certainty that it does and you may want to use it for that extra edge. This article reviews my experiences in exploring this dimension of brewing.

The Experiment

This concept is a continuation of an article I wrote in 1998 for *Brewing Techniques*, "Brewing the Perfect Pint". That article contained a fairly thorough explanation of water chemistry and what needs to be done in order to change the profile of your water to brew to style. The original article can still be viewed at www.unc.edu/~sedam/.

The design of this experiment was simple: brew different IPAs keeping everything

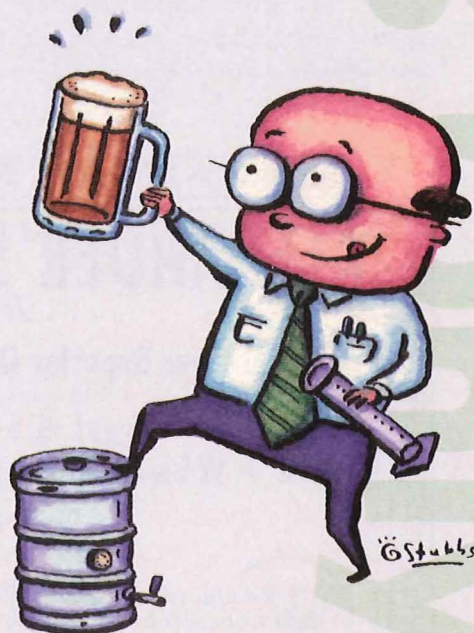
the same except the water chemistries, then ferment and taste. For the purposes of this study, all-grain formulations were used. While water chemistry no doubt impacts the flavor of extract beers, the added minerals also have effects during mashing. In addition, the extracts themselves contain minerals found in the water used for mashing during extract production. To assure validity of the test, these beers had to be brewed from scratch. The grist profile used is shown in Table I. (Note: this recipe was also a hot seller at BrewBetter in its extract version [replace the pale malt with two, 3.3 lb boxes of Nor'west liquid malt extract].)

Every effort was made to keep everything consistent between batches. First, the grist composition had to be identical. That was simple. Thanks to serendipitous employment at a homebrew shop (BrewBetter Supply in Morrisville, NC) a bag of Maris Otter pale malt, all the needed specialty malts, yeast, and hops were donated. I was certain that the raw materials all came from the same batch.

Next, the mashes needed to be the same. Thanks to the generosity of John and Mary Jo Ciccirelli, the owners of BrewBetter Supply, I was able to control the experiment

using their wonderful HERMS system built by PBS Brewing—a thing of beauty and brewing envy. The mashes could each be controlled perfectly.

The next job was to create water profiles that would be best suited to the experiment. I chose the water chemistries of Chapel Hill, NC (soft), Dortmund (carbonate), Munich (hard), and Burton-on-Trent (sulfate, and the progenitor of the style). Mineral contents of these waters are shown in Table II. The minerals themselves were purchased at BrewBetter Supply, except for the calcium chloride, which was donated by Five Star Chemicals. Ten gallons of each water type were made the evening prior to the brew day, and all were pH adjusted with 75% H_3PO_4 to begin at 7.1. The pH calibration



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Table I. Recipe for Alechemist IPA

Grains	Amount
Maris Otter ale malt	10 lb
Victory	1 lb
20° L crystal	12 oz.
CaraPils	8 oz
Malted wheat	8 oz
Munich malt	8 oz

Hops (Total IBUs = 65)	Amount
Northern Brewer (7.5% aa), 90 minutes	1.0 oz
East Kent Goldings (6.5% a.a.), 60 minutes	0.5 oz
Northern Brewer (8.1% aa), 40 minutes	1.0 oz
East Kent Goldings (4.3% a.a.), 40 minutes	0.5 oz
East Kent Goldings (6.5% a.a.), 15 minutes	0.75 oz
East Kent Goldings (6.5% a.a.), 0 minutes	0.75 oz

Yeast	Amount
Wyeast 1275 (Thames Valley)	1 cup/ 5 gallons

was done using an Omega pH meter, accurate to 0.02 units.

For yeast, I made a five-gallon starter for the yeast (Wyeast No. 1275), which made a nice bitter. The fermentation was quick and clean, and I dropped the fermentation temperature to 32° F (0° C) for a few days to floc out the yeast. The bitter was transferred to a keg and nearly four cups of yeast slurry were collected into a two-liter swing-top bottle.

Table II. Water Chemistry Additions

Minerals	1 Dublin	2 Chapel Hill	3 Burton-on-Trent	4 Dortmund
Gypsum (CaSO ₄)	0.5 tsp	0	4.25 tsp	1.5 tsp
Epsom Salts (MgSO ₄)	0	0	3.5 tsp	0.5 tsp
Calcium Chloride (CaCl ₂)	0.5 tsp	0	1 tsp	2 tsp
Table Salt (NaCl)	0	0	0	0
Chalk (CaCO ₃)	4.25 tsp	0	7 tsp	6 tsp
Baking Soda (NaHCO ₃)	0	0	1 tsp	0.5

Table III. Mineral Content of Brewing Water

Minerals (in ppm)	1 Dublin	2 Chapel Hill	3 Burton-on-Trent	4 Dortmund
Ca ⁺²	120	16	278	216
Mg ⁺²	2	2	43	7.9
Na ⁺	4	4	36	20
CO ₃ ⁻²	131	12	253	203
SO ₄ ⁻²	55	25	437	136
Cl ⁻	31	9	52	95.6
Hardness (as CaCO ₃)	309	48.2	872	572
Alkalinity (as CaCO ₃)	219	20	422	339
pH (adjusted with 75% H ₃ PO ₄)	7.1	7.1	7.1	7.1

Tasting and Results

The tasting of these beers was planned, cancelled, planned, cancelled, and then cancelled some more. By the time I could gather a group of tasters with suitable palates it was over 14 months since the beer was brewed. Not the ideal situation, but in some respects it better mimicked the treatment of IPAs on their voyage from England to India. The tasters gathered in a private

room at the Carolina Brewery, a brewpub in Chapel Hill, NC for the big event. The participants were myself, Jon Connolly (head brewer of the Carolina Brewery), his assistant brewer Frank and Thomas Thorne (beer purchaser for the Carolina Inn). No one was an official beer judge, but we all shared a love of beer. I was the only one who didn't deal with beer professionally. Each taster was given a bottle of all four beers, four clean pint glasses, water, official Beer Judge Certification Program score sheets, and style guidelines. We tasted, s'vished, drank, wrote, and tasted some more.

After everyone had their fill, the beer "key" was opened and the identity of each beer was revealed. The numbering of each beer is consistent with their appearance in the tables within this article. Table V below gives the average rating of each beer, and the minimum and maximum scores.

One unfortunate issue with the tasting is that the fresh hop aroma disappeared over the course of the year. The differences in scoring can be attributed to a few possibilities. There was no beer given as a style "standard" and, therefore, no baseline from which to judge. Given that the Carolina Brewery has a tasty IPA of its own as a regular beer, this was not seen as a great impediment. But the comments on the scor-

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Table IV. Data from the Brews

Mash Conditions	1 Dublin	2 Chapel Hill	3 Burton-on-Trent	4 Dortmund
Mash Temperature	152° F	152° F	152° F	151° F
Sparge Temperature	172° F	172° F	172° F	172° F ¹
Initial mash pH	5.8	5.4	5.8	5.7
Adjusted mash pH	5.4	5.4	5.4	5.4
Final wort pH	5.3	5.3	5.3	5.3
Wort Volume	5.25 gal	4.3 gal	5.25 gal	5.25 gal
Original Gravity	1.061	1.065	1.060	1.060
Adjusted OG at 5.5 gal	1.056	1.055 ²	1.056	1.056
Efficiency (pt/lb/gal)				
Final Gravity	1.010	1.012	1.009	1.012

¹sparge temperature reached 181° F for 10 minutes and was immediately cooled via ice water

²only five gallons was collected to keep the gravity similar

Table V. Scoring Results

Scoring	1 Dublin	2 Chapel Hill	3 Burton-on-Trent	4 Dortmund
Average	35.75	39.5	38.25	28.25
Minimum	28	36	30	13
Maximum	46	43	48	42
Standard Deviation	8.3	2.9	7.9	11.3

ers' sheets underscored the differing sensitivities to flavors and aromas. The Dortmund brew is a good example. I gave this beer it's highest ranking and my comments are very favorable, but every other taster's comments were that something was "off" with this beer and that it seemed treated. One taster even suggested DMS, but I was oblivious to these flavors.

The beer brewed with ultra-soft Chapel Hill water was generally preferred by everyone, as evidenced by the tight standard deviation of test scores. One scorer who felt the beer was way too sulfury and chemical tasting dragged down the Burton-on-Trent beer. But the rest preferred its flavor and one taster described it as one of the best examples of the style that he ever had. Clearly the drift in objective scores would have been mitigated through the use of trained BJCP judges, but the subjective comments proved the experiment worthwhile.

Summary

One certainty came out of this experiment—water chemistry absolutely makes a difference to the final taste



and perception of your beer. Was the Burton-on-Trent beer superior to the Chapel Hill beer? I cannot say. But both beers did far better than either of the other brews. The high concentration of sulfate in the Burton-on-Trent beer did appear to give some favorable properties to the overall flavor, while the highly carbonate waters of Dublin and Dortmund took something away. So adding minerals to your brewing practice may not be as important as adding the "right" minerals.

I am certain after this experiment that some beers could get an added boost from a careful look at water chemistry but, more importantly, your current beers may suffer from a mineral profile which is not appropriate for the style. History shows that many classic beer styles gained popularity in specific areas of the world that provided a certain flavor that could not be reproduced. Often the missing ingredient was the proper water chemistry. If you are fortunate to have a source of extremely soft water, you can make good quality beers of any kind. Otherwise a peek at the water chemistry may be able to give your favorite beer that certain something which changes it from being simply good to simply wonderful.

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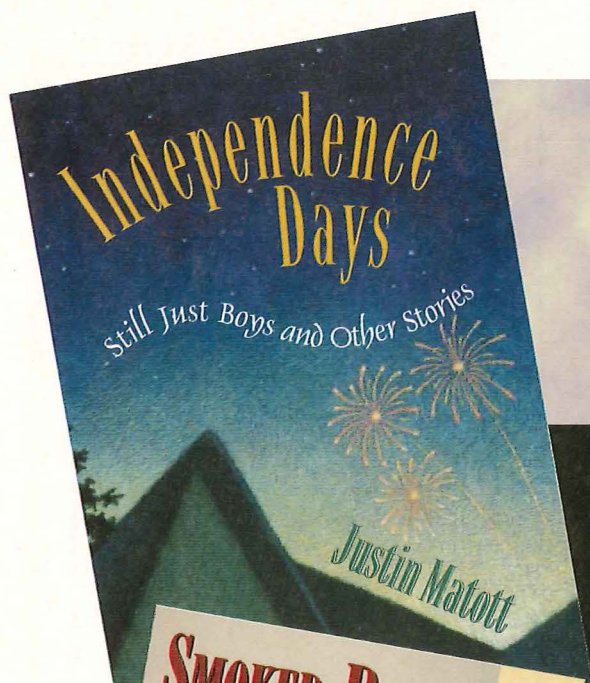
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Acknowledgements

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Marc Sedam, a.k.a. **The Alechemist**, has a degree in Biochemistry from the University of New Hampshire and is completing an MBA from UNC-Chapel Hill. He has been homebrewing since 1992, been writing on the subject since 1998, and is a member of the North American Guild of Beer Writers. He lives in Chapel Hill, NC and is currently trying to perfect the ultimate German helles.





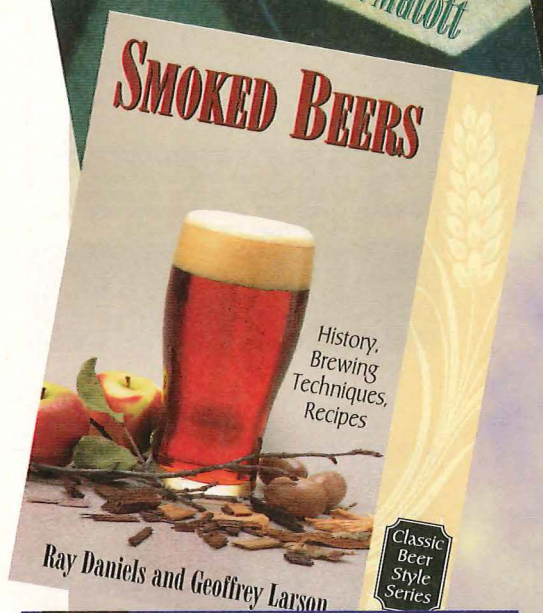
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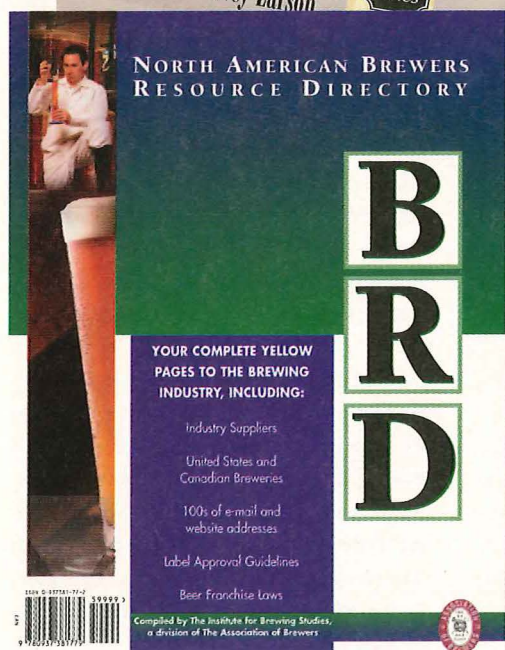
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BY CHARLIE PAPA ZIAN

The Secret Life of Beer

Einstein said, "There are two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle."

I was casually drawn to beer and brewing 31 years ago as a college student. Now in the year 2001 I continue to embrace this wonderful odyssey called beer. There are so many facets of beer and brewing that go far beyond the art and science. They are the mysteries and miracles. They intrigue me the most. I enjoy being able to appreciate them, even though I don't fully understand them.

When I brew I still "feel" the beer and I am absolutely certain the beer knows that I care. So many times I am asked, what is the difference between homebrewed beer and mass produced beer? I am dead serious when I say the difference has something to do with the caring spirit that a homebrewer or craft brewer is able to transmit to the very nature of the wort and the care of yeast and fermentation. I'm not talking about scientific care. It is a frame of mind which is transmitted. Who can deny that "attitude of mind" affects humans and their performance? And what about other living organisms? It is quite common knowledge that living organisms respond to a variety of stimuli. Brewing scientists measure the effect of heat, time, pressure, motion and other forms of production stress on yeast. The production stream of activities is adjusted accordingly to produce beer as efficiently as possible with desired qualities. This is what most professional brewers do to earn a living.

Homebrewers do not earn a living from making beer. Beer is simply a matter of pride and caring. Money and its impact on efficiency are less relevant. Though we consider the science of brewing, homebrewers are closer to and more accepting of the mysteries of brewing.



Music to my Beers? Ken Allen stands between fermenters with giant head-phones at La Baladin, Piozzo, Italy.

There is an Italian brewer who brews craft beers in the tiny hilltop village of Piozzo (see *Zymurgy*, Sept/Oct 2000). On a recent visit to Teo Musso's brewhouse and fermentation area a small group of American craft brewers and I marveled at Teo's latest project. He had fitted his fermentation tanks with giant head-phones. Piping in music for several hours a day, Teo had recently embarked on a two year experiment attempting to discover some of "the secret life of beer."

First impressions may elicit your preposterous reaction. Teo is serious. He is not alone. There are scientists and healers throughout the world who would recognize that Teo might be on to something. Music is of a powerful essence not only in the lives of people, but it has also been a proven factor in the health of plants and other living organisms.

Just before I sat down to write of my experience and thoughts of the little village of Piozzo, I remembered a book which author and acquaintance Don Campbell had given me three years ago, called *The Mozart Effect* (Avon Books, 1997). It was about music, but I had never read it and now I wasn't about to tackle its 350+ pages. I took it off my shelf for a quick look. I did not thumb through its pages. I magically opened directly to page 82 and a heading entitled "Sonic Bloom." A brief introduction explored the use of music to enhance plant growth.

My fingers anticipated there must be more background and support for the experiment in Piozzo. I then magically turned exactly to page 64. There is the heading "How Music Affects Us: A Medley." "Music sets up a certain vibration which unquestionably results in a physical reaction. Eventually the proper vibration for every person will be found and utilized."—George Gershwin.

Music masks unpleasant sound and feelings
Music can slow down and equalize brain waves

Music affects respiration

Music affects the heartbeat, pulse rate, and blood pressure

Music reduces muscle tension and improves body movement and coordination

Music affects body temperature

Music can increase endorphin levels

Music can regulate stress-related hormones

Music and sound can boost the immune function

Music changes our perception of space

Music changes our perception of time

Music can strengthen memory and learning

Yeast is a living animal. Why shouldn't they be affected by music as other living organisms are? —Teo Musso

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HOMEBREW 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: $(2 \times 9) + (3 \times 5) = 18 + 15$. 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.

Music can boost productivity
Music enhances romance and sexuality
Music stimulates digestion
Music fosters endurance

Don Campbell elaborates upon these sixteen points and others in his book *The Mozart Effect*.

In the tiny village of Piozzo, Teo Musso has embarked on an experiment no brewing scientist would dare risk his reputation on. "Yeast is a living animal. Why shouldn't they be affected by music as other living organisms are?" Teo explains quite emphatically, nurturing the legitimacy of what at first appears to be a preposterous exercise in brewing insanity. But then with contemplation...

There are significant implications to Teo's ideas. In two years we may know more. Perhaps his experiments and measurements will be inconclusive. Perhaps they will be enlightening. Whatever the results of the Piozzo Experiment, I hope it inspires an ongoing appreciation of yeast. I hope it inspires a variety of perspectives. Yeast is a sensitive living organism that we know very little about. I appreciate the guidance brewing science has given to me as a brewer. It has helped improve my beer. But without appreciation of the mysteries of yeast and the life processes involving beer, all the science in the world is a bunch of phooey.

Will it be Indian sitar music, Hootie and The Blowfish, Mozart or Tina Turner? May

I leave you with your passion reinforced and your thoughts provoked?

Piozzo India Pale Ale

While the secret life of beer will forever remain mysterious, there is nothing mysterious about the simplicity and greatness of this India Pale Ale. Might I suggest exposing this beer to Indian Sitar music throughout fermentation and cellaring? At the very least perhaps savor its flavor, while listening to music—and your beer.


Ingredients and recipe for 5 U.S. gallons (19 L)

- 2 3.3 lb cans (3 kg) Munton's light malt extract syrup
- 1 lb (.45 kg) English crystal malt (80-Lovibond)
- 0.5 tbs gypsum as necessary for water lacking calcium and sulfate ions (optional)
- 1 oz (28 g) Centennial (10 HBU/280 MBU) whole hops—60 minutes boiling
- 1 oz (28 g) Santiam (5 HBU/140 MBU) whole hops or pellets—30 minutes boiling
- 1 oz (28 g) Cascade (5 HBU/140 MBU) whole hops or pellets—3 minutes boiling
- 0.5 oz (14 g) Santiam hop pellets—dry hop
- 0.25 tsp (1 g) powdered Irish moss
- 0.75 cup (180 ml measure) corn sugar

(priming bottles) or 0.33 cups (80 ml) corn sugar for kegging
 Wyeast Thames Valley Ale Yeast
 1275 or White Labs English Ale Yeast

- Target original gravity: 1.052 (13° B)
- Approximate final gravity: 1.016 (4° B)
- IBUs: about 47
- Approximate color: 15 SRM (30 EBC)
- Alcohol: 5.5% by volume
- Apparent Attenuation: about 75%

Add the crushed crystal malt to one and a half gallons (5.4 L) of 160° F (71° C) water. Let steep for 30 minutes. Afterward strain out the spent grains, sparge with hot water and collect the liquid extract. Add 1 gallon (4 L) additional water, the malt extract syrup, gypsum (optional) and one ounce (28 g) Centennial hops. Bring to a boil and continue to boil for 30 minutes. Then add one ounce Santiam hops. When 10 minutes remain add the Irish moss. When 3 minutes remain add the remaining one ounce (28 g) of Cascade hops. After a total wort boil of 60 minutes turn off the heat. Then strain out and sparge hops and direct the hot wort into a sanitized fermenter to which 1.5 gallons (6 L) of cold water have been added. If necessary add additional cold water to achieve a 5 gallon (19 L) batch size. Add a starter culture of yeast when temperature of wort is about 70° F (21° C). Preferably ferment at 70-72° F (21-22° C) for about 4-6 days or until fermentation is complete and appears to clear and darken. At this point rack (transfer) the beer into a secondary fermenter and add the 0.5 ounce (14 gm) Santiam hop pellets. Secondary for 7 days. For best results secondary "cellar" or age at 50° F (10° C) to help drop yeast out of suspension (but this is not at all crucial to the quality). Bottle with corn sugar. Age and carbonate/condition at 50° F (10° C).

World traveler Charlie Papazian is the founding president of the Association of Brewers and the author of numerous bestselling books on homebrewing. His most recent books are *Home Brewers Gold* (Avon, 1997) and *The Best of Zymurgy* (Avon, 1998). 

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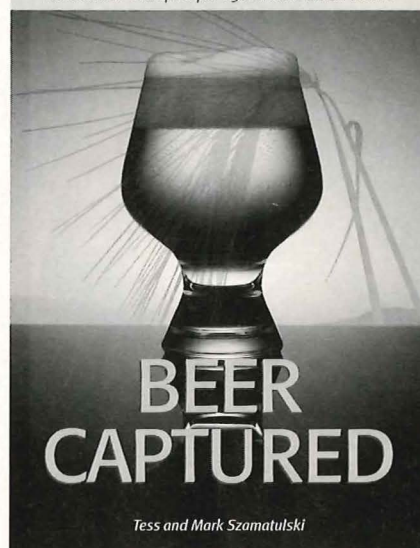
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Many of the judges at the 2000 National Homebrew Competition commented on how the quality of entries just seems to keep getting better. The number of infected or poorly-made beers is rapidly approaching zero, while the quality of the top entries is approaching—and very often surpassing—that of any commercially available product. While this says a lot about the maturity of the hobby, it certainly doesn't make it easier for the judges. They're drinking much better beer at the competitions, but trying to find the best entries out of a lot of superior beers is challenging to say the least. So homebrewers who enter the event are really pulling out all the stops trying to give their entries that little extra something that will make them stand out from the crowd. This edition of Winner's Circle provides some examples of that tendency toward complexity. Think some of these recipes look like a lot of work to brew? You'd better believe it. But these days, that's what it takes to win.

Herb and Spice Mead/Braggott



BRONZE MEDAL

AHA 2000 NATIONAL HOMEBREW COMPETITION

Jeff Gladish and John Nanci, Tampa, FL

"World's Only Smoked Braggot"

Still Smoked Braggot

Ingredients for 11.5 U.S. gal (43.5 L)

- 6.75 lb smoked malt (3.06 kg)
- 5 lb Pilsener malt (2.27 kg)
- 2 lb Cara-Pils malt (0.91 kg)
- 1 lb 10L crystal malt (0.45 kg)
- 24 lb wildflower honey (10.8 kg)
- Wyeast No. 2112 California Common lager yeast

- Original specific gravity: 1.115
- Final specific gravity: 1.030
- Boiling time: 15 minutes
- Primary fermentation: 15 days at 55° F (13° C) in glass
- Secondary fermentation: 6 months at 65-70° F (19-21° C) in glass

Brewers' Specifics

Employ a triple-decoction mash schedule with rests at 105° F (41° C), 131° F (55° C), 140° F (60° C), and 155° F (68° C).

Judges' Comments

"Quite a nice combination—this works amazingly well. Nice balances. Well thought-out and made."

"A very nice mead, very well-balanced, very drinkable."

Oktoberfest/Marzen



BRONZE MEDAL

AHA 2000 NATIONAL HOMEBREW COMPETITION

Susan Ruud, Harwood, ND

[Untitled]

Oktoberfest

Ingredients for 5.5 U.S. gal (20.8 L)

- 4 lb Munich malt (1.8 kg)
- 2 lb Vienna malt (0.91 kg)
- 3.25 lb Pilsener malt (1.47 kg)
- 0.5 lb Cara-Munich malt (0.23 kg)
- 1.25 lb caramel malt (0.57 kg)
- 0.5 oz Saaz pellet hops, 3.1% alpha acid (14 g) (90 min.)
- 1 oz Hallertau pellet hops, 4.1% alpha acid (28 g) (90 min.)
- 0.4 oz Hallertau pellet hops, 4.1% alpha acid (11.3 g) (30 min.)
- Wyeast No. 2124 Bohemian lager yeast
- 1.25 cup corn sugar (to prime)

- Original specific gravity: 1.055
- Final specific gravity: 1.016
- Boiling time: 90 min.
- Primary fermentation: 60 days at 47° F (8° C) in glass
- Secondary fermentation: 60 days at 42° F (6° C) in glass

Brewer's Specifics

Mash grains at 130° F (54° C) for 30 minutes. Raise mash temperature to 152° F (67° C) and hold for 60 minutes. Mash out at 170° F (77° C) for 10 minutes.

Judges' Comments

"Good balance between hops and bitterness for the style. Smooth."

"A well-done effort. The malt flavors and hop bitterness balance nicely."

English & Scottish Strong Ale



SILVER MEDAL

AHA 2000 NATIONAL HOMEBREW COMPETITION

Noel Blake, Portland, OR

"Old Persnickety"

Old Ale

Ingredients for 4.5 U.S. gal (17 L)

- 4.5 lb Baird pale malt (2.04 kg)
- 5 lb Pilsener malt (2.27 kg)
- 0.5 lb flaked barley (0.23 kg)
- 0.5 Beeston's amber malt (0.23 kg)
- 0.5 lb DWC biscuit malt (0.23 kg)
- 1.5 lb Beeston's caramel (0.68 kg)
- 0.5 lb carastan malt (0.23)
- 3 lb light dry malt extract (1.36 kg)
- 2 oz N. Brewer whole hops, 7.1% alpha acid (57 g) (60 min.)
- 0.5 oz Challenger whole hops, 7% alpha acid (14 g) (30 min.)
- 0.5 oz Styrian Golding whole hops, 5% alpha acid (14 g) (20 min.)
- 1 oz Kent Golding whole hops, 5% alpha acid (28 g) (4 min.)
- Wyeast No. 1728 Scottish ale yeast
- 2.5 oz corn sugar (70 g) (to prime)

- Original specific gravity: 1.101
- Final specific gravity: 1.032
- Boiling time: 100 min.
- Primary fermentation: 2 days at 73° F (23° C) in glass
- Secondary fermentation: 7 days at 66° F (19° C) in glass

Brewer's Specifics

Mash all grains except carastan malt at 127° F (53° C) for 20 minutes. Raise to 153° F (67° C) and hold for another 60 minutes. Steep carastan malt and caramel for 15 minutes at 162° F (72° C). Add malt extract and bring to a boil.

Judges' Comments

"Very sweet—some nice fruity character. Does seem recipe lacks some complexity, but very good."

"Good beer. Good malt & hop balance. Cut back a bit on carbonation."

Bitter and English Pale Ale



BRONZE MEDAL

AHA 2000 NATIONAL HOMEBREW COMPETITION

Bruce Stott, Rockville, CT

[Untitled]

Special or Best Bitter

Ingredients for 10 U.S. gal (19 L)

- 13.1 lb DWC Pilsener malt (6 kg)
- 3 lb Vienna malt (1.36 kg)
- 2.5 lb torrefied barley (1.13 kg)
- 1 lb 60L crystal malt (0.45 kg)
- 0.6 lb Cara-pils malt (0.27 kg)
- 0.8 lb wheat malt (0.36 kg)
- 0.6 oz Centennial pellet hops, 9.8% alpha acid (17 g) (75 min.)
- 1.8 oz Crystal pellet hops, 4% alpha acid (51 g) (75 min.)
- 3 oz Cascade pellet hops, 4.6% alpha acid (85 g) (75 min.)
- 0.5 oz Fuggle pellet hops, 3.4% alpha acid (14 g) (30 min.)
- 1 oz Crystal pellet hops, 4% alpha acid (28 g) (1 min.)
- 1 oz Fuggle pellet hops, 3.4% alpha acid (28 g) (1 min.)
- Wyeast No. 1099 Whitbread ale yeast
- 0.66 cup corn sugar (0.15 L) (to prime)

- Original specific gravity: 1.043
- Final specific gravity: 1.012
- Boiling time: 90 min.
- Primary fermentation: 9 days at 68° F (20° C) in glass
- Secondary fermentation: 18 days at 68° F (20° C) in glass

Brewer's Specifics

Mash grains at 152° F (67° C) for 60 minutes. Put boiled, cooled wort into two 6.5 gallon (24.6 L) fermenters, one of which already has two gallons (7.57 L) of water in it. Full strength fermenter becomes an IPA, the diluted one becomes a best bitter.

Judges' Comments

"Very refreshing beer. Nice on a hot day."

"Well made beer, nice hop/malt balance, just toward the bitter side. Good restraint with regard to body."

Specialty/Experimental/Historical Beer



SILVER MEDAL

AHA 2000 NATIONAL HOMEBREW COMPETITION

Al Rose, Brighton, MI

"Saison-Style Stout"

Classic Style Specialty Beer

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

- 0.54 lb Belgian Cara-Vienne malt (0.24 kg)
- 0.54 lb Cara-Munich malt (0.24 kg)
- 0.8 lb black patent malt (0.36 kg)
- 1.07 lb 40L crystal malt (0.49 kg)
- 0.54 lb roast barley (0.24 kg)
- 1.61 lb amber dry malt extract (0.73 kg)
- 1.88 lb dark dry malt extract (0.85 kg)
- 1.61 lb wheat dry malt extract (0.73 kg)
- 0.55 lb dextrose (0.25 kg)
- 0.5 oz Yakima Magnum whole hops, 16.4% alpha acid (14 g) (60 min.)
- 0.26 oz N. Brewer whole hops, 7.5% alpha acid (7.4 g) (10 min.)
- 0.26 oz Cascade whole hops, 6.6% alpha acid (7.4 g) (10 min.)
- 0.18 oz N. Brewer whole hops, 7.5% alpha acid (5.1 g) (steep)
- 0.18 oz Cascade whole hops, 6.6% alpha acid (5.1 g) (steep)
- 0.63 oz coriander (17.8 g) (steep)
- Yeast Lab A08 Trappist ale yeast
- 4 oz dextrose (114 g) (to prime)

- Original specific gravity: 1.071
- Final specific gravity: 1.018
- Boiling time: 90 min.
- Primary fermentation: 12 days at 65° F (18° C) in glass

Brewer's Specifics

Steep grains at 165° F (74° C) for 30 minutes. Add extract and boil.

Judges' Comments

"Quite a nice Saison. Not sure how it can be this dark without more roast malt flavor. But it works. Good concept."

"Wonderful combination of classic Saison traits—very nice dry stout. Very approachable and drinkable."

Bock



SILVER MEDAL

AHA 2000 NATIONAL HOMEBREW COMPETITION

Joe Formanek, Bolingbrook, IL

"Bockasaurus Rex"

Traditional Bock

Ingredients for 5 US. gal (19 L)

- 7 lb DWC Munich malt (3.18 kg)
- 2 lb DWC pale two row malt (0.91 kg)
- 1 lb Special pale malt (0.45 kg)
- 1 lb DWC aromatic malt (0.45 kg)
- 1 lb DWC Cara-Vienne malt (0.45 kg)
- 8 oz DWC wheat malt (0.45 kg)
- 8 oz DWC Cara-Munich malt (0.45 kg)
- 4 oz DWC Cara-Pils malt (113 g)
- 4 oz DWC chocolate malt (113 g)
- 2 oz DWC roast barley (57 g)
- 2 oz Hallertau whole hops, 5.7% alpha acid (57 g) (60 min.)
- 1 oz Hallertau whole hops, 5.7% alpha acid (28 g) (10 min.)
- Wyeast No. 2308 Munich lager yeast
- 0.5 cup corn sugar (118 mL) to prime

- Original specific gravity: 1.074
- Final specific gravity: 1.028
- Boiling time: 120 min.
- Primary fermentation: nine days at 65° F (18° C) in glass
- Secondary fermentation: 30 days at 50° F (10° C) in glass
- Tertiary fermentation: 30 days at 38° F (3° C) in glass

Brewer's Specifics

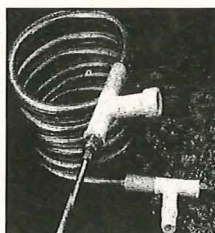
Mash grains using a standard double decoction mash schedule.

Judges' Comments

"It's difficult to offer improvement. There could be a bit more malt character to back up the roast—perhaps cut the roast by 25%."

"Seems a little light on alcohol, but very smooth and pleasant."

Amaul Turczyn is the associate editor of *Zymurgy* magazine.

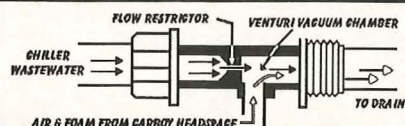


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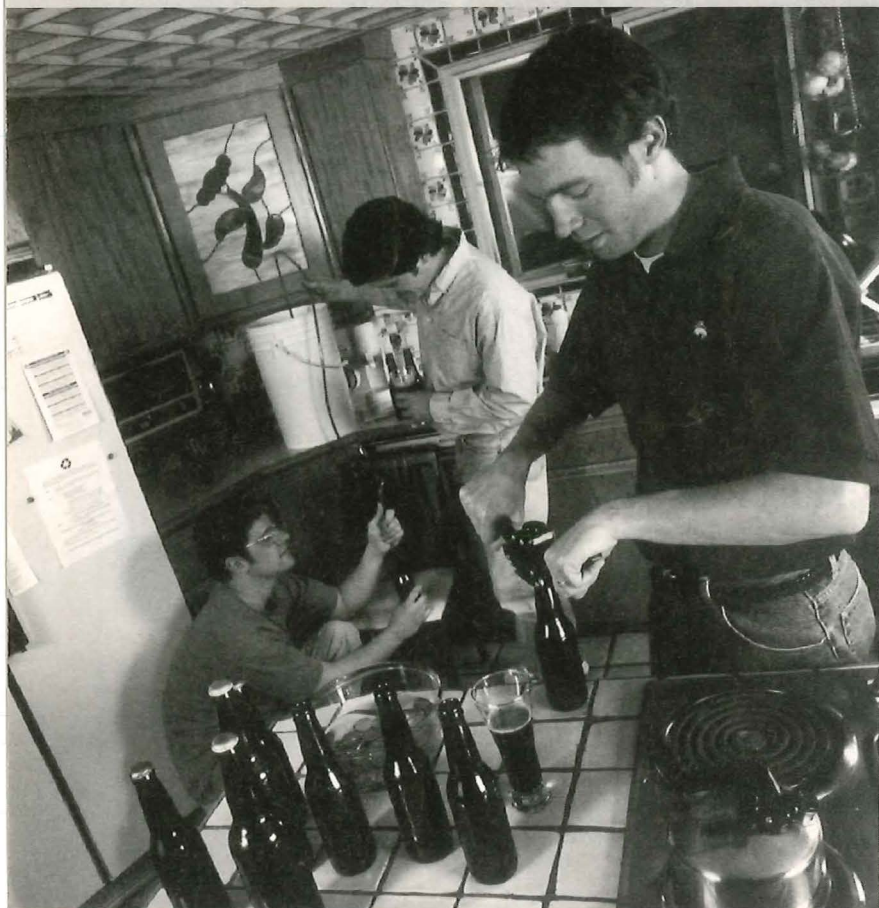
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extract kit (1.8 kg)
- 4 lb Briess amber malt extract (1.8 kg)
- 0.75 oz Chinook hops optional
(bittering) (21 g)
- 1 oz Willamette hops (flavor) (28 g)
- 1 oz Willamette hops (aroma) (28 g)
- Wyeast 1056 American liquid ale
yeast (28 g)

**AHA National Homebrewers
Conference**

The 23rd annual AHA National Homebrewers Conference presented by Rogue Ales is planned for June 21 to 23, 2001 at the Sheraton Four Points LAX, a place that is also known as the "beer hotel." During my site visit to the Sheraton, I was impressed to find a Russian Imperial Stout on tap in the hotel bar and dozens of interesting beers on the menu. It was not your typical hotel bar selection. The hotel staff loves beer and caters to the quality beer lover. There is a registration form in this issue of *Zymurgy*. Register by May 15 and save.

The conference will build on the successful model of the last two AHA conferences in Michigan and Kansas. Local Southern California-area club members have again formed a coalition that has planned and organized a great event that should again be a blast for all attendees. As I write this column six months out from the conference, the planning is kicking into high gear as the speaker's list is being refined, the second round of the National Homebrew Competition is being coordinated, and the nighttime activity planning is being expanded. The theme for the national homebrewers conference is 2001: A Brewers Odyssey. That theme is the title of the club night that kicks off the first evening of the conference. Club night, sometimes called Beers Without Borders, has turned out to be a community-building highlight of past conferences, with clubs setting up hospitality stations of food and beer around the ballroom. Friday night will take us outside into the beautiful L.A. climate for the L.A. Brewers Open, a big party focused on real ales in which we invite our microbrethren in the Southern California



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brewing community to show us the quality of California brewing, where the quakes of the land naturally resuspend the yeast to keep those real ales lively. Saturday night will again be the annual awards dinner, this year hosted by our title sponsor, Rogue Ales. The head brewer at Rogue, John Maier, learned his skills as a member of the 26-year-old Los Angeles-area club the Maltose Falcons. John is a former Homebrewer of the Year, which brings us full circle with the title sponsorship for the Rogue Ales Grand Banquet, where we will present the winners of the...

AHA National Homebrew Competition

...and crown the next Homebrewer of the Year. This issue of *Zymurgy* contains the first-round site map with information on where to send your entries for the first round. The early word from a few clubs is that they are really gunning for the traveling trophy for the Homebrew Club of the Year. Brewers earn points for their club by placing first, second or third in the two rounds of the NHC and the six AHA club-only competitions. We anticipate that this year we may have up to 3,000 entries in what will again be the largest beer competition in the world. The entry window closes April 13th, so get those lagers, meads and ciders bottled and those ales brewed soon.

Coming Next Issue—AHA Board of Advisor Elections

The May/June issue of *Zymurgy* is the one where you the members get to choose the representatives for the AHA Board of Advisors. We will have candidate statements and ballots in the next issue. The fifteen members

of the AHA board of advisors chart the course of the AHA and review and improve our programs through suggestions and hard work. The members are spread around the country in an effort to give a regional voice to all AHA members and serve as a conduit for member ideas or membership problems. The board functions both as a whole on major issues and in committees in their areas of expertise. The present committee lineup deals with issues related to clubs, competitions, awards, the cyber world, the conference, the business side of our hobby, membership, publications and bylaws. Anyone who votes (who is eligible) will automatically receive an extra entry in the...

AHA-Lallemand Scholarship

Yes, AHA Board member Rob Moline has once again received a commitment from Lallemand to award a scholarship to an AHA member who indicates a desire to attend the short course in brewing at the Siebel Institute of Technology in Chicago. Lallemand also throws in \$1,000 to help with expenses. You can register online at www.beertown.org or shoot an email (or regular mail to our office) to Gary Glass at gary@aob.org with your name, member number (call membership services if you need your number), address and phone with the words "AHA Lallemand Scholarship Entry" in the message. The lucky winner will be drawn at random during the AHA National Homebrewers Conference.

Well, the second mug of IPA has reached its last sip, I hope to see you at one of the AHA events coming up this spring and summer.

Homebrewer and former homebrew shop owner Paul Gatza is the director of the AHA.

Although often used synonymously, there is a big difference between cleaning and sanitizing.

Principles (from page 31) If a hard water scale develops in the mash tun, using citric acid, phosphoric acid, or even household vinegar (acetic acid) will typically pull the scale out fairly easily. If there are soft metals (i.e. copper, brass) in the mash tun using these same acids will also remove tarnish, too. Sanitizing the mash tun after cleaning is unnecessary. The temperatures used in mashing and in the brew kettle are sufficient to destroy the undesirable microbes that infect beer. Be extremely careful when using caustic (lye) based products. If you have soft metals in your brewing equipment, caustic will corrode copper, brass, aluminum and galvanized metal very easily and is hazardous to the skin and eyes.

Brew kettle: Due to the amount of heat required to boil wort, the brew kettle is harder to clean than the mash tun. This is espe-

cially true if the soil in the kettle has been allowed to accumulate over a long period of time. The best way to keep the soil from building up in the kettle is to clean it after each brew, not simply rinsing it out and putting it away until next time. Cleaning on a regular basis with one of the alkaline non-caustic cleaners available at homebrew shops does a good job of removing carbohydrate and proteinaceous soil from the kettle with a minimum amount of scrubbing.

If the kettle has baked-on soil, it more than likely is going to require some fairly aggressive chemistry and elbow grease (scrubbing) to remove it. Here is a nifty trick that commercial brewers use that will save you a lot of time, too:

Start with 1-2 oz (29.5-59 mL) of phosphoric acid cleaning solution per gallon of water. This will drop the pH of the water to

below pH 1.5, even with extremely hard water. Heat the solution to about 140° F (60° C) and allow it to soak for at least 15-30 minutes.

Drain the cleaning solution and refill the kettle with hot water again and immediately add 1-2 oz (28-57 g) of non-caustic alkaline cleaner per gallon of hot water used. Dissolve the cleaner by mixing well, then allow the solution to soak for 15 to 30 minutes, keeping the cleaning solution at a minimum of 140° F (60° C) the whole time.

Towards the end of the soak, put on rubber gloves and eye protection and give the kettle a good scrubbing with a green pad. The remaining attached soil should be very soft by this point and will come off very easily with a minimum amount of effort. Then, simply rinse with warm potable water, drain, and put the kettle away until your next brew day.

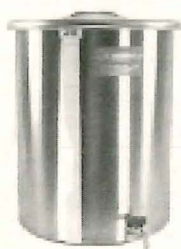
Hot Liquor Tank: If a dedicated vat or keg is used for heating water for sparging or cleaning, it may require an acid wash from time to time to remove hard water scale. Calcium hardness, especially calcium carbonate, CaCO_3 (chalk) and calcium hydroxide, Ca(OH)_2 (lime) are virtually insoluble in hot water. The quickest way to dissolve calcium-based scale is by using an acid/surfactant cleaner. Hydrochloric acid (HCl) is extremely efficient in removing calcium, but is very corrosive to stainless steel. As with the mash tun, using citric or phosphoric acid or even vinegar should pull the scale in a homebrewing hot liquor tank quite easily. Follow the acid cleaner with a good rinse and then clean with an alkaline cleaner to neutralize and condition the metal. Rinse, drain, then put away until the next brew day.

Fermenters: The soil in the primary fermenter is primarily proteinaceous in nature, so the best cleaning approach is going to be on the alkaline side to remove the krausen and hop resins. Here again, non-caustic alkaline cleaners work exceptionally well for this type of soil and leave glass carboys looking great. For best results, rinse out yeast and krausen as quickly as possible after the fermenter is emptied. If the soil is allowed to dry, it is much more difficult to clean than cleaning right away. Immediate cleaning requires less time, chemical and scrubbing than letting the soil dry. Should the soil dry on, soaking over-night with the non-caustic cleaner (0.5 to 1 oz [14.7-29.5 mL] per gallon of

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water) works well to loosen soil. The fermenter then will typically just need a good, high-pressure hot water spray to remove any remaining attached soil.

For five-gallon glass carboys with narrow mouths, it is a good idea to have a good, long handled, stiff bristle brush (available at homebrew supply shops) to scrub the krausen layer off of the dome of the carboy. This is the most difficult part of the fermenter to clean. The yeast sediment in the bottom of the fermenter normally rinses out quite easily. After rinsing the soil and cleaner out, sanitizing the fermenter is not necessary if it is not going to be used right away again. Simply drain as much of the rinse water out as possible and store until next time. To optimize the bacterial killing properties of the sanitizer, the sanitizing step should be done just prior to filling with beer. (More on sanitizers later).

Kegs, bottles: Proper cleaning of kegs and bottles is critical to the shelf life of the beer. If the keg or bottle is not clean, the beer will pick up organisms deleterious to both flavor and shelf life. Kegs can develop beer stone (calcium oxalate) if not properly cleaned after each use. This scale precipitates like layers of paint inside of the keg. If not remedied in time, beer stone forms a sand paper like feeling to the touch.

Beer stone removal can be one of the most difficult cleaning problems encountered in brewing. In addition to containing calcium hardness, beer stone also contains amino acids (protein). The amino acids enable beer stone to bind to surfaces, making it a tenacious scale. Because beer stone is not a straight inorganic scale, the acids mentioned earlier that work on removing hard water scale may not be up to the task of removing beer stone. Oxidizing chemistry helps break up the amino acid groups in beer stone. Phosphoric acid with nitric acid is used in the brewing and dairy industry to aid in the removal and prevention of beer stone and milk stone deposits. Hydrogen peroxide is also being incorporated in some acid cleaners for this purpose as well. Sulfamic acid cleaners also work well on removing beer stone deposits.

The same cleaning procedure detailed for removing the soil in the kettle also works for removing beer stone, with one exception.

Soaking with acid alone may not be enough to remove beer stone, especially if the deposit is severe. Brushing or scrubbing is usually required. Try this:

Wet a rag, sponge or green pad with warm water. Using gloves and eye protection, pour the concentrated acid cleaner on it and lightly scrub the beer stone deposit. Don't use too much force, you don't want to scratch the surface, just wet the stone with the acid/surfactant mixture.

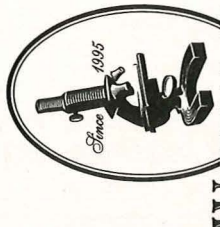
Let the acid work for 10-15 minutes or so. **DO NOT RINSE!** Follow the acid step with a 1-2 oz (29.5-59 mL) non-caustic cleaner per gallon of hot water. Don't get discouraged if this doesn't work on the first pass. Depending on the severity of the beer stone formation, it may take a couple of times to completely remove the deposit.

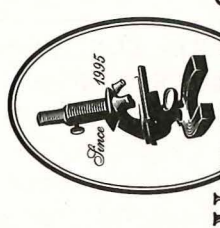
A question often asked is, Why skip rinsing between the acid and alkaline step? Skipping the rinse creates a pH swing that works well to get beer stone to come off the surface. A cold rinse after the acid step can "reset" the protein in the beer stone. Protein is insoluble at a pH of 4.5, so that's why you want to avoid the rinse. Try it! The non-caustic cleaners do a good job of leaving the stainless steel surface with an electrically neutral charge so beer stone will not be able to attach as easily as with an acidic finish. Once clean, the sanitizer will be to do its job much more effectively.

Conclusion

Cleaning and sanitizing equipment is the least glamorous part of the homebrewing experience. The best cleaning regime is one that is safe and requires the least amount of time, money and effort to accomplish the goal at hand without sacrificing the quality of the final product. Many brewers tend to get in a rut once an acceptable cleaning and sanitizing method is achieved. It sometimes takes a leap of faith to try something new, especially if you are not having any problems. If you want to make professional-quality, fantastic tasting beer, you also have to clean and sanitize like a pro.

Dana Johnson has been with Birko Corporation R&D since 1979 and home brewing since 1989. He is a member of The Unfermentables Homebrew Club in Denver and the Keg Ran Out Club, (KROC) in Broomfield, CO.





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Germ Warfare (from page 35)

your yeast—it makes the beer, not you.

(4) ARRANGE FERMENTATION CONDITIONS TO FAVOR THE BREWERY YEAST

One thing you should pay attention to is *The Danger Zone*. This begins when the wort is cooled below 100° F (37.8° C) and is over once the fermentation gets going well as indicated by active bubbling in the air lock and gravity reduction. It is important to monitor this period because no matter how careful you are, other microbes *will* find their way into your fermentation. The better job you do of reducing time in the Danger Zone, the less chance that you will have for spoiled beer. Of course the first step is rapid chilling. Make sure your chilling system gets your beer to

pitching temperature quickly so that you do not leave it lingering in the Danger Zone.

Next you'll want to pitch large numbers of healthy yeasts. They will quickly populate the wort and out-compete the smaller number of spoilers by removing their food (the sugar) and producing inhibitors (alcohol and acid). Good fermentations start rapidly with little delay (lag time). This is accomplished by pitching an adequate amount of healthy, active yeast and aerating the wort at pitching to give the yeast a further boost.

Now even if you do all this, there are some microbes which will grow even in the acidic, alcoholic beer, so sanitation must be practiced through the rest of the beer handling process. For example, repeated sampling from the fermenter (or pouring the sample back in!) is risky, as is moving the young

fermenting beer to a secondary fermenter, especially early in fermentation. Weigh the risks carefully before following this commercial practice at home. Aging, filtration, packaging and serving equipment are all potential points of contamination and must follow the same rules of cleaning and sanitizing and minimizing exposure to the air.

At this point, a second strategy for the retardation of spoilage is useful: reduction of temperature. Most normal-world microbes grow very slowly or stop growing in the cold. Keeping beer cold during maturation, packaging and storage can postpone the detectable effects of spoilage microbes for months. Many of you will have noticed this in the many commercial micro brews that now sit warm on overstocked retailers shelves or in poorly run multi-tap bars that

TABLE I: Beer Defect Analysis

DEFECT	LIKELY CAUSE	LIKELY STAGE OF CONTAMINATION	CURE
Beer is sour. Tastes/smells like sour milk	<i>Lactobacillus</i>	Early or late fermentation or Packaging/Serving	Better cleaning and sanitizing or Use clean yeast culture
Beer tastes like sour milk	<i>Pediococcus</i>	Same as above	Same as above
Beer is sour and buttery	<i>Pediococcus</i>	Same as above	Same as above
Beer tastes/smells like vinegar	<i>Acetobacter</i>	Late fermentation, Packaging / Serving	Same as above
Beer is: Medicinal, Phenolic, Smokey, Thin & overcarbonated, Very bitter, Very fruity	Wild yeasts	Fermentation or Maturation	Clean/sanitize fermenter. New yeast culture. Avoid airborne contamination of wort
Beer smells/tastes like apples and bad eggs	<i>Zymomonas</i>	Maturation, Storage, Draft dispense	Clean/sanitize Tanks/Lines / Bottles/Kegs/ Casks
Beer smells like: Corn, Cabbage, Root Vegetables, Celery, Smokey, Phenolic/Medicinal, Buttery	Wort Spoilage Bacteria	Mashing/Wort Cooling/Early Fermentation	Clean Mashing. Shorter Mash Time. Rapid Wort Cooling. Sanitize Wort Chiller. More Pitching Yeast. Boil Local Water Supply if Untreated.
Excessive foaming not due to over-priming. Moldy/cellar, earthy taste.	Molds	Contaminated Barley/Wooden Fermenter or Casks	Try Again!
Cloudiness/haze/turbidity that does not go away with age. Film on beer surface. Ring on bottle at head-space line.	Any microbe that is not brewers yeast. May or may not give flavor change	Any/All	Clean and sanitize. Use clean yeast.

TABLE II: Microbiology Of Brewery Contaminants

Lactic Acid Beer Spoilage Bacteria

(I) **Lactobacillus**: Gram positive rods. Are tolerant of hops, alcohol and acidity. Most common brewery contaminant. Produce lactic and acetic acids, diacetyl, turbidity and gas.

(II) **Pediococcus**: Gram positive cocci. Sensitive to hops but will grow in the cold. Produce turbidity, lactic acid only, and often lots of diacetyl!

Acetic Acid Beer Spoilage Bacteria

(I) **Acetobacter**

(II) **Gluconbacter**

Both of these are long Gram negative rods that tolerate alcohol and hops. They turn alcohol into acetic acid and produce films, rings and viscous "rope" in beer. Common in spilled beer, and uncleaned tanks, taps and beer lines.

Other Beer Spoilage Bacteria

(I) **Zymomonas**: A fat Gram negative rod that produces acetaldehyde and hydrogen sulfide in finished beer. A common problem in cask ales — used to be called the "Burton Stench."

(II) **Pectinatus**: Gram negative curved rod that grows in cold beer, often spoiling lagers. It produces acetic and propionic acids and hydrogen sulfide.

Wort Spoilage Bacteria

(I) **Enterobacter**

(II) **Escherichia**

(III) **Klebsiella**

(IV) **Citrobacter**

(V) **Obesumbacterium**

A variety of gram negative rods that do not tolerate acidity or alcohol but will grow in wort, especially if left to stand for a long time, or in early fermentation, especially if slow. Even if bacteria grow before the boil and are killed at this stage, a variety of flavors they produce can be carried into finished product. A range of sulfur compounds like DMS, celery, cabbage, parsnip are often seen as are diacetyl and medicinal off-flavors.

Beer Spoilage Yeasts

Any yeast that is not deliberately used and not under the brewer's full control is a "wild" yeast. This includes species of *Brettanomyces*, *Hansenula* and *Pichia*. Many produce hazes, cloudiness, films. They can super-attenuate wort to give thin fizzy beer. They can produce excessive amounts of one particular ester (e.g. banana). Very often they produce phenolic, medicinal guaiol compounds. They are often airborne contaminants or are introduced is repitched.

do not have well-refrigerated tap lines or do not clean all of their lines weekly.

CONCLUSION

So worry, but don't worry a lot. Be clean and sanitary at all stages and very careful with cool wort before it has begun fermenting. Choose your yeast wisely and the world full of microbes can keep the cycle going but the beer can pass through you before they get to it!

FURTHER READING

— *Beer Spoilage Microorganisms* by C. Rainbow in *Brewing Science*, Vol 2, Edited by J. Pollock, Academic Press.

— *Methods of Analysis*, American Society of Brewing Chemists, ASBC St. Paul, Minn.

— *Brewing Microbiology*, Priest and Campbell, Chapman and Hall, 1996.

A cool Website with pictures of microbes: www.pbrc.hawaii.edu/~2Kunkel/gallery/

Paul is a fermentation scientist who has helped brewers around the world produce better beer for the last 30 years. He currently teaches Fermentation Science at the University of Texas in San Antonio.

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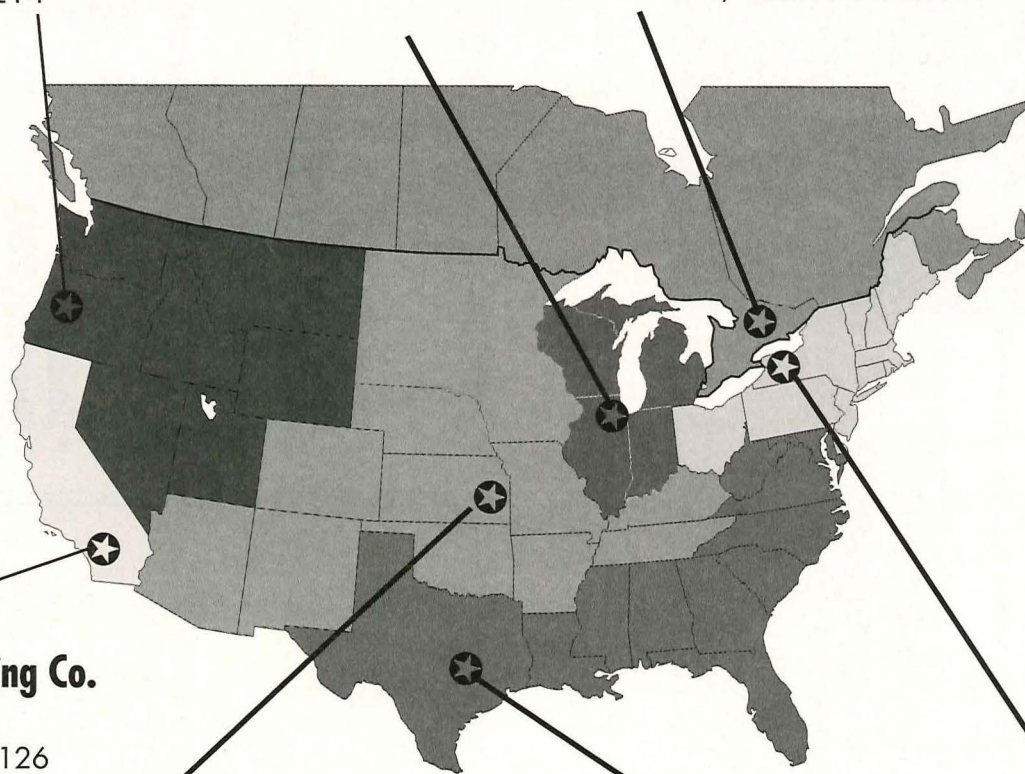
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NHC 2001 Custom Brewcrafters

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Honeoye Falls, NY 14472



MARCH

- 2-3** 8th Annual America's Finest City Homebrew Competition, **AHA SCP**, San Diego, CA. Entries due 2/5/01-2/23/01. Contact Peter Zien at 858-546-7824, pz.jdzinc@worldnet.att.net, www.softbrew.com/afchbc/.
- 4** Greater Montreal Annual Homebrew Competition, **AHA SCP**, Montreal, Quebec. Entries due 1/10/01-1/25/01. Contact Nathan McNutt at 514-484-6306, nuttykindl@yahoo.com.
- 10-11** Heartland Homebrew 2001, **AHA SCP**, Des Moines, IA. Entries due by 3/4/01. Contact Bill VanZante at 515-270-6785, vanzantewm@philbred.com, www.IowaHomebrew.com.
- 10-11** 5th Annual St. Patrick's Cascadia Cup Homebrew Competition, **AHA SCP**, Seattle, WA. Entries due 2/17/01-3/4/01. Contact Alan Hord at 425-844-8473, Alan@HordsOfFun.Com, www.cascadebrewersguild.org/default.asp.
- 10-24** March Mashness, **AHA SCP**, St. Cloud, MN. Entries due 2/20/01-3/9/01. Contact Erik Nelson at 320-230-9236, heimbrauer@astound.net, www.astound.net/heimbrauer.
- 11** 4th Annual Eastern Connecticut Homebrew Competition, **AHA SCP**, Willimantic, CT. Pre-approved entries due 3/1/01. Contact Paul Zocco at 860-486-7704, zoks.homebrewing@snet.net.
- 17** 12th Annual Reggale and Dred-hop Homebrew Competition, **AHA SCP**, Denver, CO. Entries due by 3/9/01. Contact Bob Kaufman at 303-828-1237, dredhop@hopbarley.org, http://hopbarley.org. This is an MCAB qualifying event.
- 17** Shamrock 2001, Raleigh, NC. Contact Larry Matthews at 919-362-9407, lmatt@ipass.net, www.hbd.org/carboy.

- 17** Stout AHA Club-Only Competition, **AHA SCP**, Tonawanda, NY. Hosted by the Niagara Association of Homebrewers. Categories 16 & 12c of the BJCP style guidelines. Entries due 2/26/01-3/9/01. Contact Keith Curtachio at 716-691-6371, goodbeer@niagarabrewers.org, www.beertown.org/AHA/clubcomp.htm.
- 17-24** World Cup of Beer, **AHA SCP**, Berkeley, CA. Entries due by 3/10/01. Contact Lee Shepard at 510-336-1546 or 510-923-6986, lshephard@earthlink.net, http://bayareamashers.org.
- 23-24** 15th Annual Bluebonnet Brew-Off, **AHA SCP**, Irving, TX. Entries due 2/10/01-3/2/01. Contact Dave Dixon at 817-318-1495 or 817-931-1768, ddreaded@home.com, http://welcome.to/bluebonnet.
- 23-25** Great Arizona Homebrew Competition, **AHA SCP**, Phoenix, AZ. Entries due by 3/19/01. Contact Gregory Naff at 623-386-0656 or gregnaff@uswest.net, http://brewarizona.org.
- 24** The Drunk Monk Challenge Y2K+1, **AHA SCP**, Warrenville, IL. Entries due 3/5/01-3/17/01. Contact Joe Formanek at 630-378-4694, jformanek@griffithlabs.com, http://home.earthlink.net/~mckennst/ukg.html.
- 24** Hudson Valley Homebrewers Competition, **AHA SCP**, Hyde Park, NY. Entries due 3/1/01-3/17/01. Contact David Sherley at 845-987-1617, sherl@warwick.net.
- 24** NetWort VI Cyber Challenge, **AHA SCP**, Throughout U.S. Entries due 2/13/01-3/3/01. Contact Stephen Gale at 973-347-7479 or 908-879-9565 x 22, steveg@cmg.net, www.cmg.net/belgium/clubhub/.
- 30-31** Slurp & Burp Open, **AHA SCP**, McMinnville, OR. Entries due 3/15/01-3/27/01. Contact Ted Hausotter at 503-538-9501, tednjodie@msn.com.

AMERICAN HOMEBREWERS ASSOCIATION • KUDOS • SANCTIONED COMPETITION PROGRAM

• MAY 2000 •

A.L.E.S Homebrew Open

Regina, SK, Canada 72 entries — Russ Temple of Regina, SK won best of show.

• JULY 2000 •

Southern California Regional Homebrew Competition

Corona, CA, 204 entries — Gary Gultmann of Perris, CA won best of show.

Mt. Brewer Open 2000

Huntington, WV, 90 entries — Gordon Strong of Beaver Creek, OH won best of show.

• SEPTEMBER 2000 •

ASH 2000 Oktoberfest Competition

Phoenix, AZ, 89 entries — Pete Ricks of Glendale, AZ won best of show.

• NOVEMBER 2000 •

Brews Brothers NOVEMBERFEST 2000

Kent, WA, 133 entries — Curt Hausam of Salem, OR won best of show.

Derby Brew Club 7th Annual Homebrew Competition

Wichita, KS, 124 entries — Frank Marsh of Bristol, CT won best of show.

Mar 28-April 3 AHA On The Road Featuring Charlie Papazian, Pacific Coast Tour 3/28 at the Chico Brewhouse, Chico, CA. 3/29 at the Tied House Brewpub, Mountain View, CA. 3/30 at the Marin Brewing Co., Larkspur, CA. 3/31 at Anderson Valley Brewing Co., Boonville, CA and Lost Coast Brewery, Eureka, CA, 4/2 at the McMenamin's Roseberg Station Brewpub, Roseberg, OR and the Wild Duck Brewery, Eugene, OR, 4/3 at Homebrew Heaven & McMenamins, Salem, OR and at Lucky Labrador Brewpub, Portland, OR. Contact Mark Snyder at 888-UI-CAN-BREW or mark@aob.org for details.

19-21 10th Annual Crescent City Competition and Crawfish Boil, **AHA SCP**, New Orleans, LA. Entries due 3/19/01-4/6/01. Contact Warren A. Chigoy, Jr. at 504-914-8836, wacjr@ix.netcom.com, http://members.nbci.com/wacjr/competition_2001.htm. Part of the Gulf Coast Homebrewer of the Year circuit.

20-21 14th Annual Bluff City Brewers Homebrewers' Extravaganza, **AHA SCP**, Memphis, TN. Entries due 4/2/01-4/13/01. Contact Jay Grabowski at 662-449-0493, jgrabowski@aol.com, www.memphisbrews.com.

20-29 AHA National Homebrew Competition—First Round, **AHA SCP**, 8 regional sites in the U.S. and Canada. Entries due 4/4/01-4/13/01. See www.beertown.org for Rules & Regulations and Entry Forms or contact Gary Glass at 1-888-UCANBREW, gary@aob.org. Site map appears in this issue of *Zymurgy*.

21 D.E.A. Challenge, **AHA SCP**, Greenville, NC. Entries due 2/1/01-4/14/01. Contact Brian Mentzer at 252-758-2474, stinkeee@yahoo.com.

27-28 MCAB3 3rd Annual Masters Championship of Amateur Brewing Competition and Technical Conference, Berkeley, CA. Contact Mike Riddle at 707-259-1421, riddle@sonic.net, http://hbd.org/mcab/mcab3.

APRIL

- 7** 10th Annual Chicago Cup Challenge, **AHA SCP**, Blue Island, IL. Entries due 3/19/01-3/30/01. Contact Jerry Sadowski at 708-758-6045, jsadow1@email.msn.com, www.megsinet.net/~bethke/boss/index.html.
- 7** 6th Annual Knickerbocker Battle of the Brews, **AHA SCP**, Albany, NY. Contact Jim Raimo at 518-884-8689, jraimo@nycap.rr.com, www.moonbrew.com/kbotb.
- 7** Maltose Falcons' Mayfaire, **AHA SCP**, Woodland Hills, CA. Entries due 3/1/01-3/20/01. Contact John Aitchison at 818-886-3568, john.aitchison@homebeer.com, http://maltosefalcons.com.

AHA SCP = American Homebrewers Association Sanctioned Competition Program

For a complete listing of events, see www.beertown.org.

To list events, send information to *Zymurgy* Calendar of Events. To be listed in the May/June Issue (Vol. 24, No. 3), information should be received by March 12, 2001. Competition organizers wishing to apply for AHA Sanctioning must do so at least two months prior to the event. Contact Gary Glass at gary@aob.org; (303) 447-0816 ext. 121; FAX (303) 447-2825; PO Box 1679, Boulder, CO 80306-1679.

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Japanese Study Confirms Age-Old College Student Theory: Beer Makes You Smarter

According to a recent Japanese study, moderate amounts of alcohol consumed on a regular basis is good for the brain cells, and moderate drinking can even improve intelligence. A team from the National Institute for Longevity Sciences tested the IQs of 2,000 people aged from 40 to 79. They found that on average men who drank moderately had an IQ 3.3 points higher than those who did not drink. Women drinkers scored 2.5 points higher than females who did not drink.



The Japanese scientists defined moderate drinking as less than 540 ml (18.3 oz) of sake or wine a day. They said the type of alcohol did not influence the results. Volunteers drank beer, whisky,

wine and sake. The scientists also concluded that drinking alcohol excessively impaired intellectual ability. But the team said the findings had to be treated with caution. It might be that people who drank were brighter in the first place and the alcohol still impaired their intelligence, but not to the level of those who abstained completely from drinking. Hiroshi Shimokata, the chief researcher, said: "It's very difficult to show a cause-effect relationship. We screened subjects for factors such as income and education but there may be other factors such as lifestyle and nutritional intake."

Clinton Visits Guinness, Forgets To Pay British Pub Tab

Finishing off a recent tour of Ireland late last year, then-President Bill Clinton stopped by the Guinness Brewery in Dublin. After having a pint of Guinness in a North Dublin pub he finished his trip with some local Christmas shopping with his wife, Hillary, and daughter, Chelsea. Clinton was allowed a rare tour of the Guinness Gravity Bar, a glass walled bar atop the brewery visitor center. He had another pint of stout there, to dispel rumors that he avoided Guinness on his last visit. Clinton, a confirmed Bass ale fan, drank half a pint of Ahern light ale at Fagan's pub in Drumcondra after his Guinness brewery tour. Clinton's peacemaking efforts have Irish citizens calling him the "Jedi Master of peace" with local headlines reading "Blessed is Bill the Peacemaker."

"Besides consigning violence to the past, President Clinton's legacy has been to foster a climate where equality of opportunity will give the divided people of Northern Ireland the chance of a decent life," a *Northern Ireland Examiner* editorial read. "Ireland owes him a big debt of gratitude."

Later in England, however, the Clintons

stopped by the Portobello Gold pub in London's Notting Hill area for a pub lunch and left without paying. "They bloody well did not pay the bill," pub owner Mike Bell was quoted as saying in London's *Guardian*. Clinton drank a half-pint of organic ale during the lunch, according to the reports. Britain's mass circulation tabloid *Mirror* picked up the tab.

Beer Found to be Potent Source of Anti-Oxidants

According to research presented at the 2000 International Chemical Congress of Pacific Basin Societies, beer, especially dark beer, was found to provide high levels of anti-oxidants. These compounds have been found to not only reduce the risk of heart disease, but also play an important role in preventing cataracts. The weeklong scientific meeting, held once every five years, is hosted by the American Chemical Society, in conjunction with its counterparts in Australia, Canada, Japan and New Zealand. Researchers in Canada and the United States presented results of animal studies showing that porters, stouts, and other beers containing roast or black malts may reduce the incidence of atherosclerosis and cataracts by as much as 50 percent.

Darker beers have more antioxidants than the lighter lager beers, according to Canadian researchers John Trevithick, Ph.D., and Maurice Hirst, Ph.D., of the University of Western Ontario, and Joe Vinson, Ph.D., of the University of Scranton in Pennsylvania. The Canadian team focused on determining why antioxidants in beer seem to help reduce the risk of cataracts, especially in diabetics. Vinson investigated beer's beneficial effect in reducing the risk of heart disease.



In tests with rat lenses, Trevithick's laboratory found that antioxidants that act similarly to those in beer protect mitochondria in the cells of the eyes. Mitochondria are responsible for converting glucose to energy, and damaged mitochondria can lead to an increased incidence of cataracts. The scientists discovered that putting the eye's lens under high glucose stress—similar to what happens to diabetics when their glucose levels rise—damages mitochondria in the lens' outer cells.

"What often happens with diabetes is that the people don't get diagnosed until they've had one or two episodes of really high blood glucose for a period of time, like a day or two," Trevithick said. "That may be enough to damage the lens." "Antioxidants protect the mitochondria against this damage," according to Trevithick. "We think that may be one of the factors that's contributing to the lower risk of cataracts in people who have one drink a day." The cost-benefit aspect of antioxidants and cataracts is very important, Trevithick believes. He says cataract operations cost the U.S. Medicare program about \$4 billion a year. "If you could cut that by 50 percent, you're saving over \$2 billion a year. And that's just in the states."

Trevithick's daughter, Colleen Trevithick, now pursuing a Ph.D. at the University of California, Los Angeles, is also involved in the beer antioxidant studies. She is investigating the question of whether there is a specific part of the brewing process which contributes to a higher level of antioxidants in beer.

As for the benefits of beer in fighting heart disease, University of Scranton professor Joe Vinson found that giving hamsters the human equivalent of two beers a day halved their rate of atherosclerosis. "This is a significant effect," he noted. "Beer has a fair amount of antioxidants compared to other beverages," Vinson said. "There is a definite benefit from the antioxidants in the beer." Previous research by others has shown similar health benefits from antioxidants in wine. Likewise, the alcohol in beer and wine has been shown to have beneficial effects against heart disease. But Vinson believes his study is the first to specifically show that antioxidants in beer can add to

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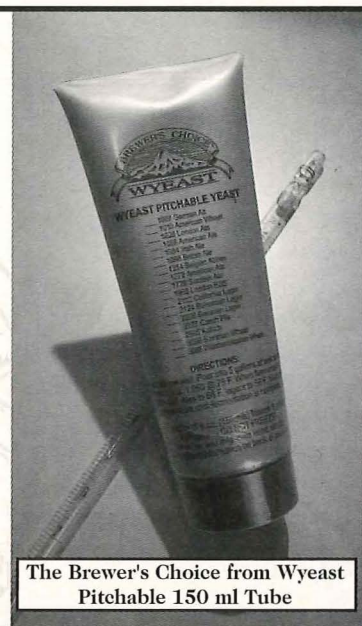


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the alcohol benefit. "If you have an antioxidant in a beverage, like beer, then you're getting an added benefit, in my opinion, at least from the animal model." Vinson also is presenting the results of several other studies at the meeting that show antioxidants in tea and grape juice can help reduce atherosclerosis. More than 8,000 research papers will be presented during this year's International Chemical Congress, which is sponsored jointly by the American Chemical Society, the Chemical Society of Japan, the Canadian Society of Chemistry, the Royal Australian Chemical Institute and the New Zealand Institute of Chemistry. *Source:* The American Chemical Society.

Beer Temperature Continues to Fall in Britain

Much to the dismay of real ale advocates, the average temperature of beer served in the United Kingdom continues to gradually fall. Once served from cellar storage, ales were traditionally consumed at or around 55° F (12.78° C), but the younger generation of drinkers are spurning this practice, demanding colder and colder products. In answer, ale brewers are succumbing to this demand, for fear of losing business, by ensuring their products are available at lager temperatures, and some producers are even altering the



formulation of their beers to taste better at colder temperatures. British drinkers are also continuing their change in preference from ale to lager; market share for lager has risen from 1% in 1960 to 62% this year.

Two New Polish Meads Available

In Poland, meadmaking is serious stuff. Now, available through Stanley Stawski Distributing Co., Inc. come two examples of traditional Polish honey wine. Kurpiowski is a "Dwojniak Miod Pitny," comprised of honey diluted by only 50%. It is aged for a minimum of five years, some in oak casks, and some in the bottle. It is subtly flavored with currants and herbs, more for aromatics than flavor, and has a deep amber hue. The second mead, Jadwiga, is a "Poltorak Miod Pitny," comprised of a whopping 75% honey and 25% water. It is aged for approximately 25 years, also in a combination of oak and bottle. Jordan Liebman of Stanley Stawski distributing comments, "It is the richest mead I have ever tried with incredible intensity, aroma, depth of flavor, balance, length and sweetness. It is most definitely for dessert or by itself. Really incredible stuff."

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Amahl Turczyn is the associate editor of
Zymurgy magazine.



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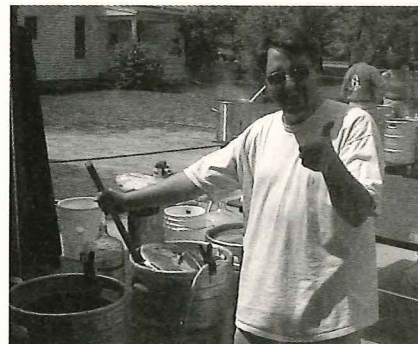
*Cover 2 is the inside front cover. Cover 3 is the inside back cover. Cover 4 is the outside back cover.

Last Drop (from page 64) on our journey of homebrew education, we find that there are so many resources.

And of course we discuss the carriers of the Big Brew flame, the organization that represents us, the AHA. After reading Charlie's primer on homebrewing NCJOHB*, I joined the AHA and immediately would look to the back of the magazine for award winning recipes to emulate or use as a base for a beer style I had yet to brew. I found a plethora of information within *Zymurgy* and became familiar with who's who within this hobby.

Of course, what Big Brew would be complete without a taste of the elixir itself? While several people have peered into the kettles and asked, "When can I drink some?" and expressed disappointment when I explained the time involved for fermentation, they always perk up as I pour a taster of a previous batch. And it constantly amazes me that during the following months, as the various participants open their results at one of my club meetings, how many shades of the same recipe come out.

So this coming Big Brew Day, take the opportunity to celebrate what this event is



Thumbs up brewing is what it is all about on National Homebrew Day, May 5, 2001.

all about. Expand the knowledge base, meet new friends, recruit new devotees and celebrate the act. To quote the late, great Bill Pfeiffer, "Man, I love this hobby!"

Chris Frey has been homebrewing for the last six years, most recently at his Barr House Brewery. His Sierra Nevada Pale Ale recipe, "Nearly Nirvana Pale Ale", was used as the Big Brew 2000 recipe. He can be reached at crispy275@aol.com.

* NCJOHB = New Complete Joy of Homebrewing, by Charlie Papazian

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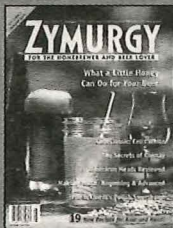
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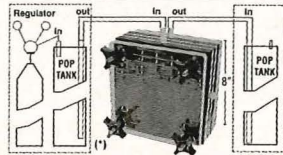
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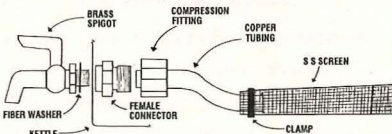
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The Passion for Big Brew

May 5 is National Homebrew Day.

How will you celebrate?



Big brew is more than just a phrase at the Frey household as this photo overview of preparations for last year's event shows.

I guess you can call me the poster child for National Homebrew Day and Big Brew. Each year, I take the first Saturday in May and make it into the biggest, most fun brewing event I can. To me, as it is with many of my fellow homebrewers, the hobby offers a terrific balance of geekiness, science and art with elements that are really cool (wow, beer!). And Big Brew is a reason to invite those who haven't brewed, or want to learn more to one place on one day and show them what we know (or learn from those who have ideas we haven't heard of before).

For the last several years I have beaten the drum, both within the clubs that I am a member of (The Ann Arbor Brewers Guild and the Fermental Order of Renaissance Draughtsman, or F.O.R.D.) and throughout my circle of friends to come out and join in the festivities. We always set up a variety of brewing systems, from the simple but effective extract brew to the more complex and time consuming all grain set up. Now, maybe I go a little overboard, but this last Big Brew Day I had 27 brewers over and we brewed 165 (624 L) gallons. Then I had another 75

people come over and share 10 kegs of homebrews, a 200 lb. (45.3 kg) pig picking, along with a good band to top off the night.

Of course, for the uninitiated among these folks, their first reaction is "I didn't know it was National Homebrew Day." I have even had a co-worker flip his calendar to the date, to see if it was listed like Ground Hog Day. They ask me what it is about and I tell them from my perspective what Big Brew and National Homebrew Day means to me.

First, it is an opportunity to gather my fellow homebrewing friends and share the experience of a mass brewing session together. In various cultures there are countless examples of members getting together to accomplish a task. Whether it is salting the catch for the winter, threshing the grains from harvest or building a home for a couple, there is always an element of both accomplishment and celebration in these tribal gatherings. And I love to celebrate with my brewing tribes!

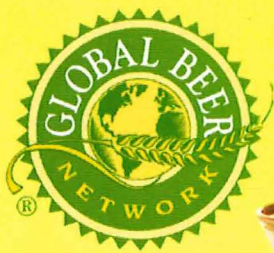
Next, it is an opportunity for me to invite friends to witness the process. Every year in

the fall I brew ever growing batches to share for the holiday season. I actually bottled forty-five gallons this last year to pass out to my ever growing circle of devotees who wait anxiously for my next creations. This year it was a three pack with an American Ale (hoppy), Belgian Triple (spicy) and a Strong Scotch Ale (malty) to display the spectrum of flavors. This primes the pump so come Big Brew Day I encourage them to come over and watch as we take ingredients from scratch and make the brew!

And during Big Brew, I like to educate them on the history of beer and brewing. We all know about the reason why the Mayflower pulled over (beer run!), but tales of Trappists Monks, the rise and fall and back up again history of American micro-breweries, and the various expressions that come from beer usually amuse and delight the audience—that, or I am a bit tipsy and believe that I am more fascinating than I actually am. (Nah, couldn't be!)

I also use Big Brew to encourage novices to join a homebrew club. Both clubs that I am a member of have terrific benefits and even better people. I am blessed with having met not only some nationally recognized brewers within these clubs, but I am proud to call many of them my friends. When I moved three years ago from Canton, MI to nearby Saline, MI, I only had to put an e-mail out to my buddies and a dozen of them showed up with trucks and vans to help. OK, I had to offer beer, but that was my pleasure.

During the Big Brew festivities, I mention the various resources where they can learn more. How many of us have told someone new to the hobby that they had to get Charlie's NCJOHB*, or to go to the Homebrew Digest (www.hbd.org) or Cats Meow, or where they can find the nearest homebrew shop. When we start (*continued on page 62*)

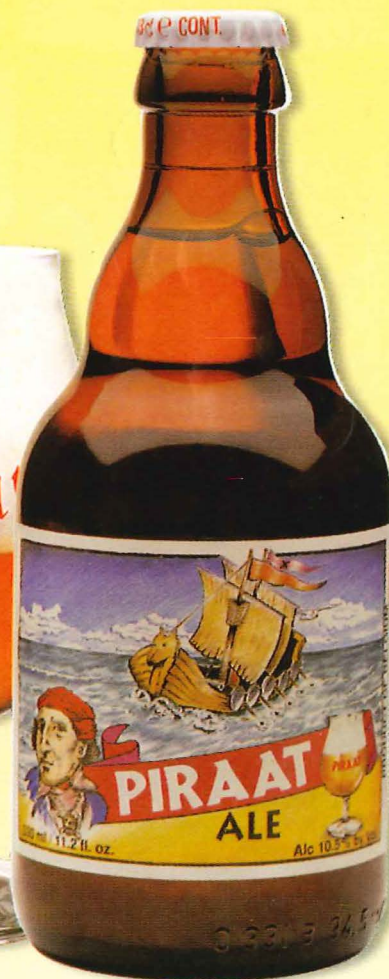


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