

Vol. 18 No. 2 Summer 1995 Published by the American Homebrewers Association

ZYMURGY

FOR THE HOME BREWER AND BEER LOVER



Kegging Basics

Confessions of Two Bitter Men
Brew by the Numbers

Homebrewers' Enthusiasm Sets Trends

14 Homebrew Recipes (Get Brewing!)

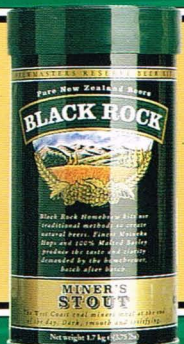
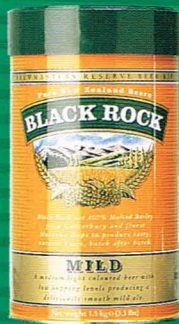
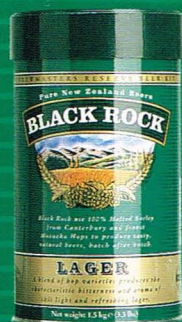
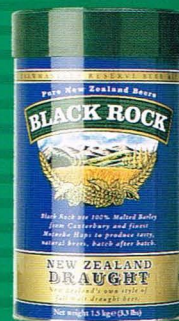
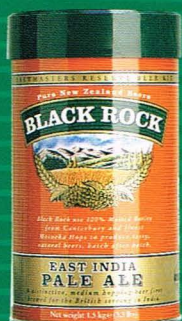
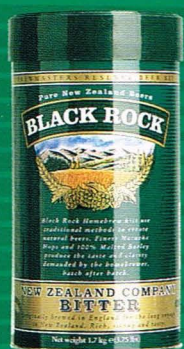


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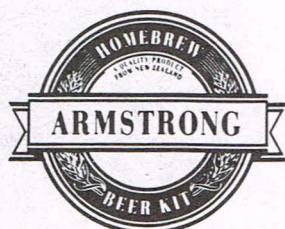
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FOR THE HOMEBREW AND BEER LOVER

Journal of the American Homebrewers Association®

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

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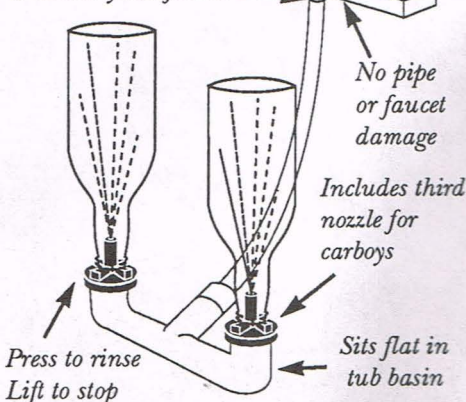
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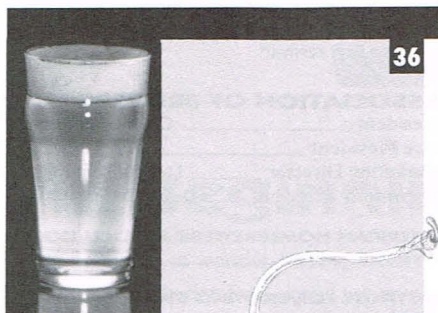
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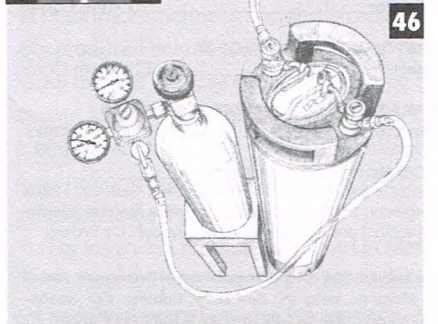


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zym18

EDITORIAL



Karen Barela

I'm Beginning to Wonder

I'm beginning to wonder if I'm spoiled, or perhaps just lucky. Do I expect too much from my homebrews and the professionally produced beers I consume? Or am I just lucky that the *seeming* chance happening of events affecting the quality and variety of craft-brewed beers, and the large number of quality homebrews have given me the opportunity to be a picky consumer.

For instance, I recently vacationed in Mexico and was surprised by how much I missed the variety of beers I am used to enjoying. At first it was quite pleasurable drinking clear, golden lagers with their refreshing taste. I looked for as many selections as I could find and tried them all. They were good, but there was something missing. I missed choices, I missed the wide variety of flavors, I missed styles. By the end of my week-long visit, I craved one of my own homebrews.

This got me thinking about how fortunate I am to live in Colorado, a state that is full of great beers. I thought about how being immersed in the beer industry has colored my view of beer around the world. It is shocking, really, that such places as Colorado exist and still so many people know nothing of the wonderful progress we've made as beer producing and consuming people. It's surprising to be somewhere, anywhere, where the people don't demand variety. It's astonishing to witness a beer market with so few alternatives.

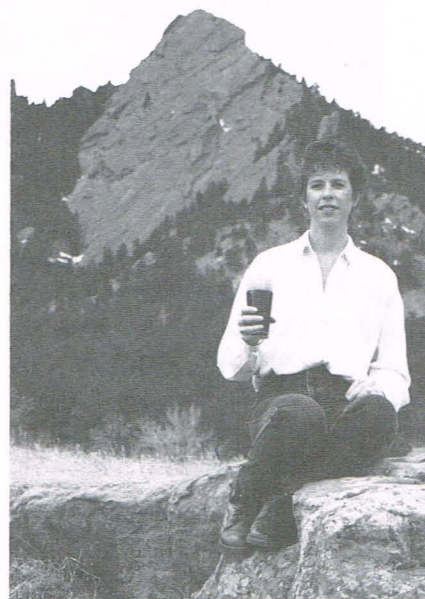
In *zymurgy* Fall 1987 (Vol. 10, No. 3) Charlie Papazian wrote about how the beer styles of the world are being created in America by brewers small and large. He mentioned that North American homebrewers are doing their darnedest to duplicate the flavor profiles of the classic beer styles of the world right here in the United States. And that, eventu-

ally, persistence in seeking a variety of styles will result in breweries brewing "classic Trappist-style ale, a brewery in Tennessee perhaps bottling gueuze and other styles of Belgian lambics, and even a brewery in Michigan making a Pilsener that would fool a Czech." Charlie continued, "Sound improbable? Stash this editorial away and read it in the fall of 1989, then drop me line."

Well, Charlie, it's now the summer of 1995 and I'm about six years past your deadline, but I'm dropping you a line anyway. It's been seven and one-half years since you wrote what you did and damned if you weren't close to predicting the future. We've come a long way in many parts of the United States and the world is starting to pay attention.

Award-winning European Pilseners are being produced by Stoudt Brewing Co. in Adamstown, Pa.; the Leavenworth Brewery in Leavenworth, Wash.; Irons Brewing Co. in Lakewood, Colo.; Sudwerk Privatbrauerei Hübisch in Davis, Calif.; and many others as well. As for breweries in Tennessee producing gueuze, well, not yet that I know of, but there are three brewpubs and one micro-brewery in Tennessee all producing fine craft-brewed beers. And a classic Trappist-style ale? You've gotta love the New Belgium Brewing Co. in Fort Collins, Colo., and Celis Brewery in Austin, Texas, each producing more than one fine example of Belgian-style beers.

Aha, so I'm not the only picky consumer out there. And I'm not the only homebrewer who digs a great brew, whether we brewed it ourselves or "demanded" it from the craft brewers because, after all, we are all spoiled and we're persistent. We've pushed ourselves and American brewers into brewing the ales of Scotland, the wits of Belgium, the weiss-



biers of Berlin, the ales in the spirit of Trappist/abbey styles, the stouts of Ireland and the Pilseners of Bohemia and, we've made them beers of the world. We no longer brew just an American version of a given style and no longer is a given style limited to its original location. Those of us who are spoiled and picky have broken through all of the boundaries that previously segregated beers by locale or nationality.

But we aren't done yet. Some work remains. We still need to educate the masses about all of the brewing we've been doing. We still need to spread the good news. We need to let the whole world know what's up. I'm beginning to wonder what things will look like internationally in another seven and one-half years.

We are on top of it, you and I and the homebrewers and craft brewers of the world. Luck, fate and good fortune have had something to do with our progress, but along the way we've created the necessary events and pursued the essential skills and information to bring us to this point in time.

We are on top of it — that's all.



Microbrewers should have nothing to hide from their customers.

That's why I believe all microbrewers should put a clear, easy-to-read freshness date in a prominent place on their labels.



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

The Institute for Brewing Studies, a non-profit organization, also supports the education of the brewing community on consumer legible freshness dating.

Our industry exists because we have such pride in the quality of our

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

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

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

beer. We use better ingredients, and take great care to make our beers. Don't we owe it to our customers to be honest about the freshness of our beers?

I believe all microbreweries should join the Boston Beer Company and the

other microbreweries listed here in insisting on freshness dating. Anything less would be incomprehensible.

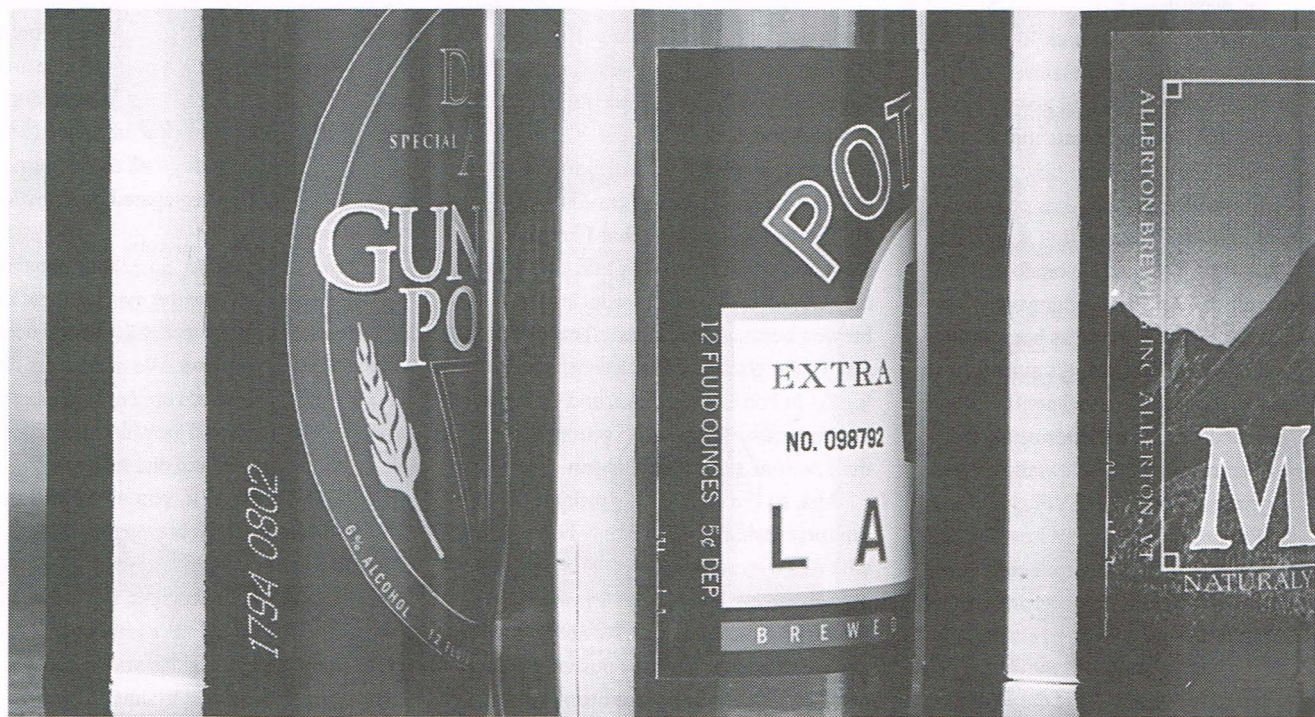


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James Koch

*Brewer/President
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DEAR Z Y M U R G Y

Our Readers

Elusive Ingredients

Dear *zymurgy*,

The 1994 Special Issue of *zymurgy* (Vol. 17, No. 4) contained several recipes for beer, many of which I would like to try. However, some recipes call for ingredients that I am unable to find on the open market. For example, juniper berries to brew sahti, sorghum to brew African sorghum beer and flowering heather tips to brew Scottish heather ale.

Could you please let us readers know where we can easily purchase the above items? I tried all the brew shops advertised in *zymurgy* looking for juniper berries, but had no luck.

Sincerely,
James Bauernschmidt
Severna Park, Maryland

Check your local natural foods stores or co-ops if you haven't already. No luck? Juniper berries are available through Alfalfa's Market, 1651 Broadway, Boulder, CO 80302, via mail order. (There is a \$10 mail-order charge.)

Unfortunately, sorghum is not available on the commercial level. If this situation changes, we'll let you know.

Flowering heather tips? Read on. -Ed.

Dear *zymurgy*,

Since the publication of my name and address in the 1994 Special Issue of *zymurgy* (Vol. 17, No. 4 "Leann Fraoch — Scottish Heather Ale" by Bruce Williams) I have been inundated with calls asking for sources of Scottish yeast, malt and heather tips.

There are few natural growths of heather in the United States, and I would not like to

advertise their location lest they be devastated. Those who grow heather usually prune them in the spring and might have small quantities of clippings available, but it would hardly seem enough for the needs of your readers.

I think the best way for them to obtain such cuttings would be to plant some heather. The best sources are Heather Acres, 1199 Monte-Elma Rd., Elma, WA 98541, on the West Coast. Their list of plants can be had for a stamped self-addressed long envelope. Rock Spray Nursery, PO Box 693, Truro, MA 02666, is the largest grower of heather on the East Coast. They will send their catalog for \$1.

Further sources and information about growing heather can be obtained by joining our organization. Dues are \$5 a year, and some of your members have already joined.

Sincerely yours,
Walter K. Wornick
Secretary/Treasurer
Northeast Heather Society
Alstead, New Hampshire

For a membership application to the Northeast Heather Society, write to Wornick at PO Box 101, Alstead, NH 03602-0101. He won't be able to help you with Scottish malt or yeast; contact your local homebrew supply shop for those ingredients. -Ed.

Dear *zymurgy*,

Regarding your inquiry about flowering purple heather tips for ale making, we could supply these on a commercial basis if we received advance orders before July 1. We can only harvest heather once a year, between mid-August and mid-September, when it is

in full bloom. The harvesting process is somewhat expensive because it is labor intensive. We cannot cut with combine harvesters because of the terrain, so all cutting is done by hand, then it is treated, dried, freeze-dried and stored. Heather shipped to the United States has to conform to legislation and therefore must be dried and shipped without roots or soil.

Presently a frozen bunch of heather (approximately 100 grams) costs £3.50 plus air-mail shipping and packaging. We hope this information is useful to your readers.

Kind regards,
Fran Rowley
Speyside Heather/Heather Craft
Dulnain Bridge
Inverness-shire, Scotland UK
PH26 3PA; FAX 0479 851396

Homebrew Freedom

Dear *zymurgy*,

I'd like to expand on Jack Schmidling's response ("Dear *zymurgy*," Winter 1994 Vol. 17, No. 5) to the grain mill article. He stated that a somewhat coarser grist than what commercial brewers use may be better for homebrewers. Sometimes the things that large brewers (anyone with a commercial brewery) do are not necessary for making great homebrew. Luckily homebrewing is a hobby, so everyone gets to do whatever they want. I used a coffee mill for a long time, and I was still able to make great beer. Many homebrewers like to try to duplicate professional brewers' techniques. That is one of the facets of the hobby, and that is fun. But I don't have to do that to make good

beer. In my brewing I try to shoot for what is best for my five gallons. And that is probably different from what a larger scale brewer would do.

As with your Winter 1994 (Vol. 17, No. 5) dedicated to extract brewing, please continue to address all aspects of the homebrewing community. Everyone makes good beer, but I don't have to do it any particular way to be a real and a good homebrewer.

Sincerely,
Kurt Froning
Lincolnwood, Illinois

Altbier Accolades

Dear *zymurgy*,

Your recent articles on Altbiers (Winter 1994 Vol. 17, No. 5) were a pleasure to read. My brother Rob and I founded Widmer Brewing Co. specifically to recreate the wonderful Altbiers that we found in Dusseldorf, Germany, in the 70s.

Regarding Roger Deschner's analysis of Widmer Alt, he is correct in pointing out that our current recipe is somewhat toned down from its earlier days. However, we are again brewing our original recipe, which may be enjoyed as a true representation of the Altbiers found in Dusseldorf. B. Moloch Ur-Alt ("Original Alt") is being brewed by Widmer Brewing Co. especially for B. Moloch/Heathman Bakery & Pub and the Heathman Hotel. When in Portland, we encourage you to visit either location and enjoy the distinctive taste of Widmer's original Altbier.

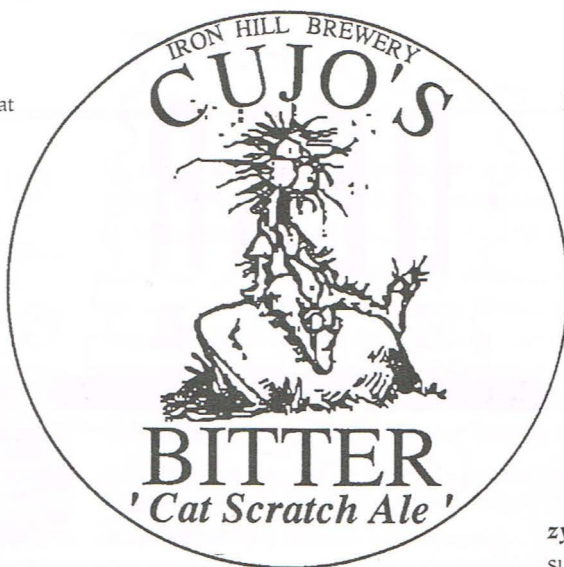
Thank you for drawing attention to this very unique style of beer.

Prost!
Kurt Widmer
President, Widmer Brewing Co.
Portland, Oregon

Crown Cap Questions

Dear *zymurgy*,

I read with interest your article "Crown Caps Absorb Oxygen" in "Brew News" (Winter 1995 Vol. 17, No. 5) and found the in-



formation disturbing. Does it mean that if you do not use oxygen absorbing caps you will have oxidized beer after a few months? This is important for those who brew and enter contests months away and also for those who make mead, saké and cider, beverages that often improve with aging.

My other question regards other types of containers and their caps. Grolsch-type bottles with wire closures, two-liter soda bottles with plastic caps, Champagne bottles with plastic corks, Cornelius soda kegs with rubber gaskets and Mason jars with canning lids are also used by *zymurgists* to contain their products. We need to know how long our brews will keep before deteriorating. Have there been any studies on the freshness life of homebrew using various containers?

Ralph Bucca
Huntingtown, Maryland

Beer will oxidize eventually. We don't know of any studies done to test how well various containers preserve homebrew. Sounds like a research project in the making. -Ed.

Mailing Messages

Hi AHA,

Yes! Please use plastic polybags to mail *zymurgy*. The U.S. Postal Service likes to damage my issues.

Thanks!

William Rusch
Menomonee Falls, Wisconsin

Dear *zymurgy*,

The plastic wrapper is much nicer than the old rough paper cover that you had been using.

Tanner Andrews
DeLand, Florida

More Feedback

Dear *zymurgy*,

I'm always excited to receive my newest *zymurgy*, and especially the Special Issues. But I am ecstatic about Volume 17, Number 4, and it's not just the hours of autumn reading and the new spiced holiday ale recipe I'm excited about. It's a very silly little thing. It is the fact that it arrived without that awful paper cover that I still haven't gotten around to cutting off the last three or four issues. In fact, I probably haven't even looked at them since for that reason alone.

I really like getting the magazine in the plastic bag with the label insert and the Beer Enthusiast catalog. And I really like being able to see the information on the binding edge.

Thanks a bunch,

Gary Henry
Mountain View, California

A Lone Voice?

Dear *zymurgy*,

As a lone voice in the wilderness sure to be hounded, I like the Beer Enthusiast catalog. There are some items within that are difficult or impossible to find elsewhere. I agree with most that it is OK for it to be separate from the magazine, but then newsstand copies don't contain the catalog like subscription copies do. I consider quite a bit of the value of *zymurgy* the fact that it is more or less a resource for materials (via advertising) as well as knowledge, news and techniques, especially for those who might be picking up an issue for the first time.

Jones Rutledge
via CompuServe

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M.W. Smith
President



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A S S O C I A T I O N

NEWS

← Karen Barela →

1994 in a Bottle Cap

The AHA is stronger than ever in 1995, with 23,733 members and a solid financial base upon which to build and conduct business in the future. The AHA strives to be at the forefront of the homebrewing industry while continuing to fulfill our mission statement: To promote public awareness and appreciation of the quality and variety of beer through education, research and the collection and dissemination of information; to serve as a forum for the technological and cross-cultural aspects of the art of brewing; and to encourage responsible use of beer as an alcohol-containing beverage.

Highlights of 1994

- Introduction of the AHA Research Department, with three projects completed — grain mill comparison, malt extract analysis and the mead and honey experiment.
- Successful campaign for two new homebrew-related laws in Colorado and Baltimore.
- 7,849 new AHA members, or 21.5 new members every day.
- 3,060 AHA National Homebrew Competition entries in 29 categories, assuming a five-gallon batch for each entry, that's about 15,300 gallons of homebrew or 493.5 barrels. (That's about the total annual capacity of beer for the Cherryland Brewing Co. in Sturgeon Bay, Wis.)
- 487 participants at the AHA National Homebrewers Conference in Denver, Colo., from 41 states and five countries.
- 132 AHA Sanctioned Competitions that judged about 18,228 entries from many five-gallon or so homebrew batches that requiring about 874,954 bottles and bottle caps, 91,000 gallons of homebrew or 2,935 barrels of beer. (That's about the total annual capacity for beer brewed by Kennebunkport Brewing Co. in Portland, Maine.)
- 2,000 AHA members attended the Members-Only Tasting at the Great American Beer Festival®, where we introduced a new membership service — Beer School. That's about 9,000 human hours spent tasting beer in one afternoon.
- 248 new BJCP judges for a year-end total of 1,491 participants. That's about 44,640 minutes of examination time, plus 992 hours of grading and processing time.
- 113 new AHA registered homebrew clubs, for a year-end total of 486 clubs. That's about one new club every 3.2 days.
- Tremendous attention from local and national media including mentions in the *Los Angeles Times*, *The Philadelphia Inquirer*, *The Philadelphia Daily News*, *The Denver Business Journal*, *Entrepreneur Magazine*, *CompuServe Magazine*, *Chicago Tribune*, *Baltimore Sun* and *Sacramento Bee*.
- *zymurgy* and more than 75 authors supplied 560 pages of homebrew information and 127 homebrew recipes in five issues.

Planet Beer! June 14-17, 1995



Intergalactic brews, star speakers and astronomical good times are just around the corner at the 17th Annual AHA National Homebrewers Conference. Where are you going to be June 14 through 17? We highly recommend zooming across whatever galaxy you're in and launching yourself and your friends to Baltimore, Md. Together we'll provide enough velocity to guarantee a good time. All planetary puns aside, the Conference is truly a great place to meet and enjoy the company of others who love beer and/or brewing as much as you do. There is no need to be shy or think that this event is beyond your scope. It's for anyone and everyone who likes drinking, talking about, brewing or enjoying beer. The atmosphere is casual, the information ranges from goofy to scientific and the people who attend are fantastic. It's so much fun we think we can send you into orbit! Details and registration information are available in *zymurgy* Spring 1995 (Vol. 18, No. 1) or by contacting Nancy Johnson, special events coordinator, (303) 447-0816, Ext 131; FAX (303) 447-2825; PO Box 1679, Boulder, CO 80306-1679; or Internet nancy@aob.org.

AHA 1995 National Homebrew Competition Volunteers

In each of seven locations across the country teams of people are truly dedicated to making the AHA Nationals a success. Your competition entries are cared for and organized by these volunteers who ensure that entries are handled consistently from site to site. With an estimated 2,000 volunteer hours from 17 volunteers over a three-to six-month period, your homebrewed competition entries are given the time and attention they deserve. On behalf of all competition participants, please join the AHA staff in saying thank you to each of these wonderful and dedicated volunteers.

Beer and Mead Sites

Fresno, Calif.

Julian Bencomo
Dan Hamilton
Harry Houck
Bill McCarty
Bert McNutt
Tom Pope



Fresno, Calif., site volunteers, from left to right: Harry Houck, Bert McNutt, Tom Pope, Julian Bencomo, Bill McCarty, Dan Hamilton. Photos of the other site volunteers were unavailable.

Denver, Colo.

Phil Fleming
Bob Kauffman
Caroline Taber

Austin, Texas

Sean McGaughey
Dave Bone
Chip McCalory
Brian Peters

Chicago, Ill.

Tony Babinec

Dennis Davison
Roger Deschner

Norwalk, Conn.

Keith Symonds
Bill Woodring
Gregg Glaser
Dave Gannon

Cider Site

Boston, Mass.
Paul Correnty

Saké Site

Portland, Ore.
Fred Eckhardt

New Orleans, Here We Come! June 4-8, 1996

The 1996 AHA National Homebrewers Conference will be at the Clarion Hotel in New Orleans, La., June 4 through 8. The AHA and the Crescent City Homebrewers, an AHA registered homebrew club, are already working on exciting opportunities in anticipation of you attending the Conference

AOB Company Profile



The American Homebrewers Association® is one of four divisions of the **Association of Brewers Inc.**, a non-profit corporation for literary and educational purposes to benefit brewers of beer and all those interested in the art of brewing. The Association of Brewers is exempt from federal income tax under Section 501(c)(3) of the Internal Revenue Code. All gifts, grants and contributions are tax-deductible.



American Homebrewers Association®

The AHA is an educational association dedicated to educating its members, the media and general public about the art and science of homebrewed beer, mead, cider and saké. **zymurgy®** is the journal published by the AHA five times each year.



Brewers Publications

Brewers Publications is the largest publisher of books on beer and brewing for beer enthusiasts, homebrewers and professional brewers.



Institute for Brewing Studies

The Institute is an educational association dedicated to the collection and dissemination of information on the craft-brewing industry for brewers and prospective brewers, the media and general public. *The New Brewer* is the journal of the IBS published six times each year.



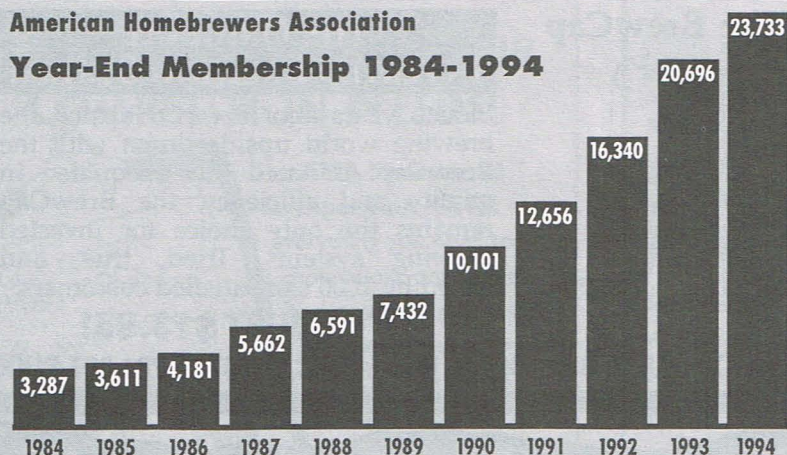
Great American Beer Festival®

North America's largest beer festival celebrates the quality and diversity of beer brewed in America. The Festival, open to the public, takes place every fall in Denver, Colo., and celebrates the achievements of brewers across America.

A listing of the AOB board of directors and division personnel can be found on page 4.

American Homebrewers Association

Year-End Membership 1984-1994



American Homebrewers Association A Division of the Association of Brewers Inc.

1994 Income and Expense Statement (unaudited)

1994 Revenues

Membership and Sponsorship	\$418,094	36.5%
<i>zymurgy</i> magazine sales	\$253,753	22.1%
<i>zymurgy</i> advertisement sales	\$276,961	24.1%
National Homebrewers Conference	\$74,853	6.5%
National Homebrew Competition	\$37,555	3.3%
Beer Judge Certification Program*	\$13,030	1.1%
AHA Registered Club Program	\$1,623	0.1%
Sanctioned Competition Program	\$3,739	0.3%
Miscellaneous	\$15,709	1.4%
Merchandise and Sales (special publications and AHA-related sales)	\$52,293	4.6%
Total	\$1,147,610	100.0%

1994 Expenses

Marketing and Public Relations	\$69,941	6.9%
<i>zymurgy</i> general	\$400,460	39.7%
<i>zymurgy</i> advertisement	\$66,757	6.6%
AHA Research Department	\$2,935	0.3%
National Homebrewers Conference	\$76,944	7.6%
National Homebrew Competition	\$26,138	2.6%
Beer Judge Certification Program*	\$9,972	1.0%
AHA Registered Club Program	\$9,626	1.0%
Sanctioned Competition Program	\$3,741	0.4%
CompuServe and Computer Networking	\$5,755	0.6%
Overhead	\$334,983	33.3%
Total	\$1,007,252	100.0%

(Includes salaries not attributed directly to specific programs above, merchandise sales and customer service, computer/information systems, rent, taxes, insurance, utilities, postage, travel, misc.)

Total **\$1,007,252** **100.0%**

Note: AHA liability: deferred membership \$396,860

*In 1994, the Beer Judge Certification Program was jointly sponsored by the AHA and the Home Wine and Beer Trade Association. All the money associated with the program was tracked through the AHA accounting system and is shown here.

If you have specific questions regarding this statement, please put them in writing and send a self-addressed stamped (55 cents) 9 x 12-inch envelope to the Association of Brewers. We will do our best to address your concerns.

and visiting the eclectic and charming city of New Orleans. Details will be announced in future issues of *zymurgy*. In the meantime, we would love to hear your ideas for a theme, speakers and/or topics. FAX, write or e-mail your ideas to Karen Barela, AHA president, PO Box 1679, Boulder, CO 80306-1679; FAX (303) 447-2825; CompuServe 75250,1350 or Internet karen@aob.org.

AHA Research Department



We hope you enjoyed the third installment in our new membership service, original research from the AHA Research Department, in *zymurgy* Spring 1995 (Vol. 18, No. 1). The

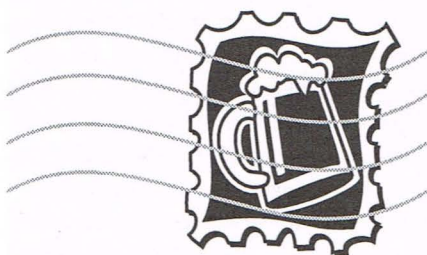
mead and honey research and experiments by Dan McConnell and Ken Schramm were specifically conducted for the 1994 AHA National Homebrew Conference and were described in great detail in the 1995 Spring Issue. Watch for research on counterpressure bottle fillers in the Fall Issue. The information produced by the AHA's Research Department should have a direct result in your choices of brewing methods, ingredients, techniques and procedures. We are committed to providing you with this membership service, where \$2,935 was spent on the first three projects and an additional \$3,500 to \$5,000 is budgeted for the next four projects. If you have an idea for the research department, contact Dena Nishek, *zymurgy* editor, at PO Box 1689, Boulder, CO 80306-1679; (303) 447-0816, Ext. 123; FAX (303) 447-2825; CompuServe 73252,3571; or Internet dena@aob.org.


New AHA Membership Rates

We will be reminding you for the next couple of issues that AHA membership dues will increase from \$29 to \$33 per year beginning March 1, 1996. Our last membership increase was June 1, 1993. AHA membership

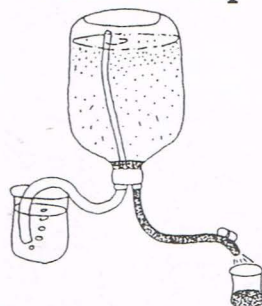
includes five issues of **zymurgy** that contain brewing tips, techniques, beer science, new product information, recipes, equipment reviews, brewing events, original research and more. Your membership dollars are put to work in the following membership services: **zymurgy**, National Homebrewers Conference, National Homebrew Competition, Sanctioned Competition Program, Homebrew Club Network, AHA's international beer evaluation program, six annual Club-Only Competitions, on-line communication through CompuServe and Internet, periodic discounts from Brewers Publications, free information, technical support, Members-Only Tasting and Beer School at the Great American Beer Festival®, compiling industry statistics, maintaining links within the beer industry at large, acting as a liaison with the media and supporting proactive homebrewing legislation. No other beer and brewing organization, association, magazine or periodical works for you the way we do. We support you and your beer and brewing hobby like no one else can. Anyone wishing to extend their membership at the current rate must do so before March 1, 1996.

How Are We Doing?



We enjoy hearing from you and, in fact, we rely on your feedback. Write, FAX, phone or stop by our office to let us know what you think, how we're doing and what homebrewing needs we can help you meet. Send media items to Lori Tullberg-Kelly, AOB marketing director; **zymurgy** proposals to Dena Nishek, **zymurgy** editor and send AHA comments to Karen Barela, AHA president, American Homebrewers Association, PO Box 1679, Boulder, CO 80306-1679; (303) 447-0816; FAX (303) 447-2825. 

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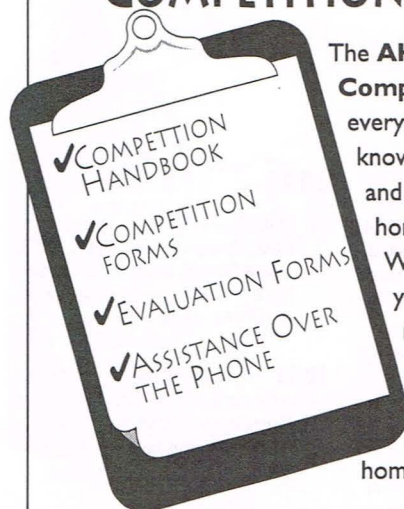

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Call Caroline Duncker for an application and information at (303) 447-0816, Ext. 116; FAX (303) 447-2825 or Internet: caroline@aob.org.

\$40 for AHA members, \$70 for non-members.

Two-month minimum notice required.

zym18



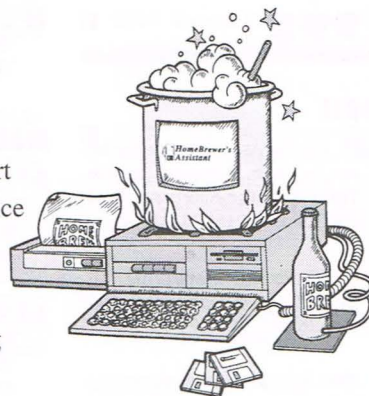
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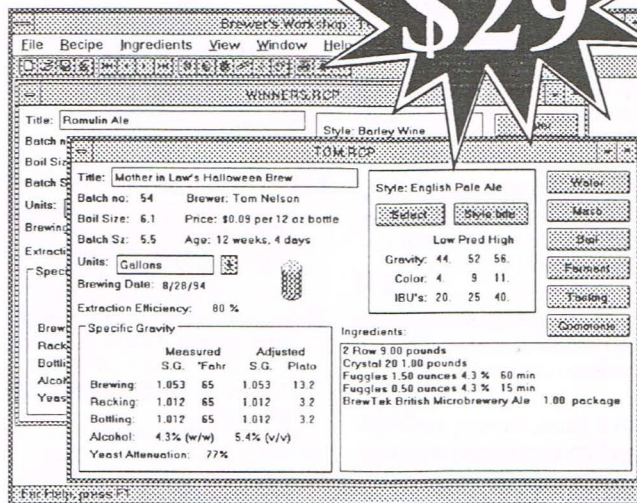
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- TKO Software, 423 Greenwood, Arroyo Grande CA 93420

CALENDAR



1995

APRIL

- 22-23** Quality Assurance for the Micro or Pub Brewery, Austin, Texas. Call the American Brewers Guild at (916) 753-0497.
- 23** BJCP Exam, Naperville, Ill. Contact Frank Dobner at (708) 892-3629.
- 23** Fifth Annual Dockstreet Homebrew Competition, AHA SCP, Philadelphia, Pa. Entries due April 22. Contact David Smith at (215) 844-6689.
- 23-26** Institute for Brewing Studies Microbrewers and Pubbrewers Conference and Trade Show, Austin, Texas. Contact Nancy Johnson at (303) 447-0816, ext. 131; nancy@aob.org.
- 24** Ninth Annual Gem State Homebrewers Competition, AHA SCP, Boise, Idaho. Entries due April 23. Contact Edward Matjeka at (208) 385-9206.
- 27-30** Home Wine and Beer Trade Association Conference. Contact Dee Roberson at (813) 685-4261.
- 28** Great Arizona Beer Festival, AHA SCP, Phoenix, Ariz. Entries due April 21. Contact Joe Bob Grisham at (602) 439-1653.
- 29** BJCP Exam in conjunction with the HWBTA Conference. Contact Pat Baker at (603) 355-3359.
- 29** BJCP Exam, Phoenix, Ariz. Contact Sam Scott at (602) 248-2477.
- 28-30** First-Round Judging, AHA National Homebrew Competition. Call the AHA at (303) 447-0816.
- 29** U.S. Open Competition, AHA SCP, Charlotte, N.C. Mail in entries due April 21. Walk-ins must pre-register. Contact Bruno Wichnoski at (704) 597-5782.

- 29** California Beer Festival at the San Diego Sports Arena. Contact John Thomas at (909) 676-2337.

MAY

- 5-7** First-Round Judging, AHA National Homebrew Competition. Call the AHA at (303) 447-0816.
- 5-7** St. Paul Brewing Celebration, AHA SCP, St. Paul, Minn. Entries due April 29. Call the Northern Brewer at (612) 291-8849.
- 6** National Homebrew Day. Call the AHA at (303) 447-0816.
- 6** Land of the Muddy Waters Homebrew Competition, AHA SCP, Rock Island, Ill. Entries due May 3. Contact Jeff Grillo at (800) 788-BREW.
- 6** BJCP Exam, Orlando, Fla. Contact Ronald Bach at (407) 696-2738.
- 7** Sixth Annual Central Florida Sunshine Challenge, AHA SCP, Orlando, Fla. Entries due May 1. Contact Tom Moench at (407) 952-4658.
- 8-11** Three-day Brewing Overview Course, Wauwatosa, Wis. Call the Master Brewers Association of the Americas at (414) 774-8558.
- 10** Seventh Annual Homebrewers' Extravaganza, AHA SCP, Memphis, Tenn. Entries due May 5. Contact Michael Lee at (901) 682-1293.
- 13** Oregon Homebrew Festival, AHA SCP, Corvallis, Ore. Entries due May 12. Contact Lee Smith at (503) 926-2286.
- 13** Ninth Annual Big and Huge Homebrew Competition, AHA SCP, Madison, Wis. Entries due May 6. Contact MHTG, Box 1365, Madison, WI 53701.

- 13** Canadian Amateur Brewer's Association's Great Canadian Homebrew Competition, AHA SCP, Toronto, Ontario, Canada. Entries due May 13. Contact Dennis Kinvig at (416) 536-1016.

- 13** Boston's Brewers Festival, World Trade Center, Boston, Mass. Call (617) 547-6311 for information, (617) 931-2000 for tickets.

- 15** James Page Open Invitational, AHA SCP, Minneapolis, Minn. Entries due April 3 - May 14. Contact Harvie Holmes at (612) 331-2833.

- 20** Great Alaska Third Annual Craft-beer and Homebrew Festival, AHA SCP, Haines, Alaska. Entries due May 18. Contact Jack Dillree at (907) 766-3131.

- 20** Fourth Annual Moon Madness Competition, AHA SCP, Douglassville, Pa. Entries due May 15. Contact Randy Martin at (610) 944-0500.

- 20** Fifth Annual Trash Homebrew Competition, AHA SCP, Pittsburgh, Pa. Entries due May 6. Contact Gregory Walz at (412) 331-5645.

- 20** Spirit of Free Beer, Washington, D.C. Entries due May 13. Contact Delano DuGarm at (703) 516-9659; adugarm@worldbank.org.

- 26-28** Fourth Annual Mazer Mead Competition, AHA SCP, Ann Arbor, Mich. Entries due May 8-19. Contact Dan McConnell at (313) 663-4845.

- 27** Ninth Annual California Festival of Beers, San Luis Obispo, Calif. Contact Marcy Villa at (805) 544-2266. Call (800) 549-1538 to order tickets.

- 29** Rauchbier Roundup Club-Only Competition, AHA SCP, Ithaca, N.Y. Entries due May 22. Contact James Spence at (303) 447-0816, ext. 121.

JUNE

- 10** Orange County Fair Homemade Beer Competition, AHA SCP, Costa Mesa, Calif. Entries due June 7. Contact Tim Higman at (714) 851-3274.

- 10-11** Canadian Amateur Brewer's Association's Great Canadian Homebrew Conference, Toronto, Ontario, Canada. Contact Dennis Kinvig at (416) 536-1016.

- 14-17** Planet Beer, AHA 1995 National Homebrewers Conference, Baltimore, Md. Contact Nancy Johnson at (303) 447-0816, ext. 131; nancy@aob.org.

- 14** San Joaquin County Fair, AHA SCP, Stockton, Calif. Entries due June 9. Contact Troy Bowers at (209) 466-5041.

- 17** Oregon Brew Crew Pilsener Competition, AHA SCP, Portland, Ore. Entries due June 13. Contact Tom Thompson at (503) 281-8732.

- 22** WBUR Radio Beer Tasting, Boston, Mass. Call (617) 353-3800.

- 22-25** Edmonton Homebrewers Guild Seventh Annual Open Beer Competition, AHA SCP, Edmonton, Alberta, Canada. Entries due June 19. Contact Geoff Kuziw at (403) 479-3771.

- 24** First Small and Tiny Homebrew Competition, HWBTA Sanc. Comp. Entries due June 10. Contact Spencer Thomas at (313) 994-0072; spencer@umich.edu.

- 25** Eighth Annual Southern California Regional Homebrew Competition, AHA SCP, San Bernardino, Calif. Entries due June 23. Contact John Eichman at (909) 797-6452.

- 25** Buzz-Off, AHA SCP, Wayne, Pa. Entries due June 19. Contact David Houseman at (610) 458-0743.



JULY

- 7 Fall Issue of *zymurgy* (Vol. 18, No. 3) mails. Please allow 4 to 6 weeks for delivery.
- 8 BJCP Exam, Brattleboro, Vt., Contact Pat Baker at (603) 355-3359.
- 9 Summer Cap-Off, AHA SCP, Ceres, Calif. Entries due July 1. Contact Wayne Baker at (209) 538-BREW.
- 15 Blues, Brews and Barbeque III, AHA SCP, Lexington, Ky. Entries due July 9. Contact Ira Proctor at (606) 277-9463.
- 22 Sierra Brewfest, Nevada City, Calif. Contact Judith Weld at (916) 265-6173.
- 23 Lunar RendezBrew, AHA SCP, Webster, Texas. Entries due July 15. Contact Mike Wiley at (713) 338-2241.
- 28-30 Oregon Brewers Festival, Waterfront Park, Portland, Ore. Call the festival information hotline at (503) 778-5917.

AUGUST

- 1-5 Great British Beer Festival, Olympia, London. Contact Campaign for Real Ale at 01727 867201; FAX 01727 867670
- 12 Josephine County Fair, AHA SCP Entries due Aug. 10. Contact Hubert Smith at (503) 597-2142.
- 12 Beer and Sweat '95 Keg-Only Competition, AHA SCP, Fort Mitchell, Ky. Entries due Aug. 12. Contact Tim Thomas at (606) 291-4843; tbird@iglou.com.
- 12 1995 Michigan State Fair, AHA SCP, Ann Arbor, Mich. Entries due July 21 - Aug. 11. Contact Hal Buttermore at (313) 665-1236.
- 12 Great Taste of the Midwest Craft Beer Festival, Madison, Wis. Tickets go on sale May 1. SASE to MHTG, Box 1365, Madison, WI 53701.

- 12 The Great Southern Brewers Festival, Atlanta, Ga. Contact Warren Scott at (617) 547-2233.

- 26 Weiss is Nice Club-Only Competition, AHA SCP, Boulder, Colo. Entries due Aug. 14. Contact James Spence at (303) 447-0816, ext. 121.

- 26 Second Annual Southern Brewers Festival, Chattanooga, Tenn. Contact Rob Gentry at (615) 267-2739.

- 27 Colorado State Fair, AHA SCP, Pueblo, Colo. Entries due Aug. 18. Contact Greg Kelley at (719) 689-3736.

SEPTEMBER

- 4 Ethnic Festival Homebrew Competition, AHA SCP, Springfield, Ill. Entries due Aug. 28. Contact Roger Meridith at (217) 428-7022.

- 8-20 Great Beers of Europe Beer Tour, Beer Lovers Travel, Redding, Calif. Call (916) 244-6945.

- 13 Special Issue of *zymurgy* (Vol. 18, No. 4) mails. Please allow 4 to 6 weeks for delivery.

- 15-17 First Annual Great Lakes Beer Extravaganza. Contact Rick Coates at (616) 938-3247.

- 23 Rhode Island International Beer Exposition, Providence, R.I. Contact Festivals of America, PO Box 40907, Providence, RI 02940-0907; (401) 274-3234.

- 30 TRUB Open, AHA SCP, Durham, N.C. Entries due Sept. 27. Contact Mike Lelivelt at (919) 408-0451.

- 30 The Colorado Springs Microbrewer's Exposition, Colorado Springs, Colo. Contact Jan Winkler at (719) 632-0553.

OCTOBER

- 5-7 Great American Beer Festival® XIV, Currihan Hall, Denver, Colo. Call the GABF™ information line at (303) 447-0126.

- 8-10 International Beer Marketers Symposium, Adam's Mark Hotel, Denver, Colo. Call the Association of Brewers at (303) 447-0816.

- 13-14 Real Ale Fest Conference, Chicago, Ill. For more information contact Dennis Davison (414) 545-9246; ddavison@earth.execpc.com.

- 14 Arizona State Fair, AHA SCP, Phoenix, Ariz. Entries due Sept. 22 - Oct. 9. Contact Sherry Pew at (602) 252-6771.

- 21-22 National Homebrew Competition and Trade Expo, Sydney, Australia. Contact Colin Penrose of the Amateur Brewers Association of Australia at (800) 637-072 phone/FAX.

- 28 Best of Fest Club-Only Competition, AHA SCP, Rolling Meadows, Ill. Entries due Oct. 23. Contact James Spence at (303) 447-0816, ext. 121.

NOVEMBER

- 4 1995 Capitol District Open, AHA SCP, Washington, D.C. Entries due Oct. 30. Contact Fred Hardy at (703) 378-0329.

- 11 November Classic, AHA SCP, Madison, Wis. Entries due Nov. 4. Contact MHTG, Box 1365, Madison, WI 53701.

- 11 Salt City Brew Club Third Annual Competition, AHA SCP, Syracuse, N.Y. Entries due Oct. 28. Contact Peter Garofalo at (315) 428-0952; garofalo@aol.com.

- 18 BJCP Exam, Brattleboro, Vt. Contact Pat Baker at (603) 355-3359.

- 18 1995 Thirsty Homebrew Competition, AHA SCP, Iowa City, Iowa. Entries due Nov. 10. Contact Dave Schinker at (319) 523-2314.

- 22 Winter Issue of *zymurgy* (Vol. 18, No. 5) mails. Please allow 4 to 6 weeks for delivery.

DECEMBER

- 9 Renowned Brown Club-Only Competition, AHA SCP, Fargo, N.D. Entries due Dec. 4. Contact James Spence at (303) 447-0816, ext. 121.

- 9 Happy Holidays, AHA SCP, St. Louis, Mo. Entries due Nov. 29. Contact Ginger Wotring at (314) 773-7867.

1996

APRIL

- 27-30 Institute for Brewing Studies Microbrewers and Pubbrewers Conference and Trade Show, Boston, Mass.

MAY

- 4 National Homebrew Day. Call the AHA at (303) 447-0816.

JUNE

- 5-7 AHA 1996 National Homebrewers Conference, New Orleans, La.

AHA SCP = American Homebrewers Association Sanctioned Competition Program

To list events, send information to *zymurgy* Calendar of Events. To be listed in *zymurgy* Fall 1995, information must be received by June 1, 1995. Competition organizers wishing to apply for AHA Sanctioning must do so at least two months before the event. Contact Caroline Duncker at (303) 447-0816, ext. 116; FAX (303) 447-2825; PO Box 1679, Boulder, CO 80306-1679; caroline@aob.org.

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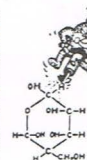
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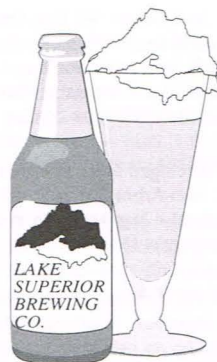
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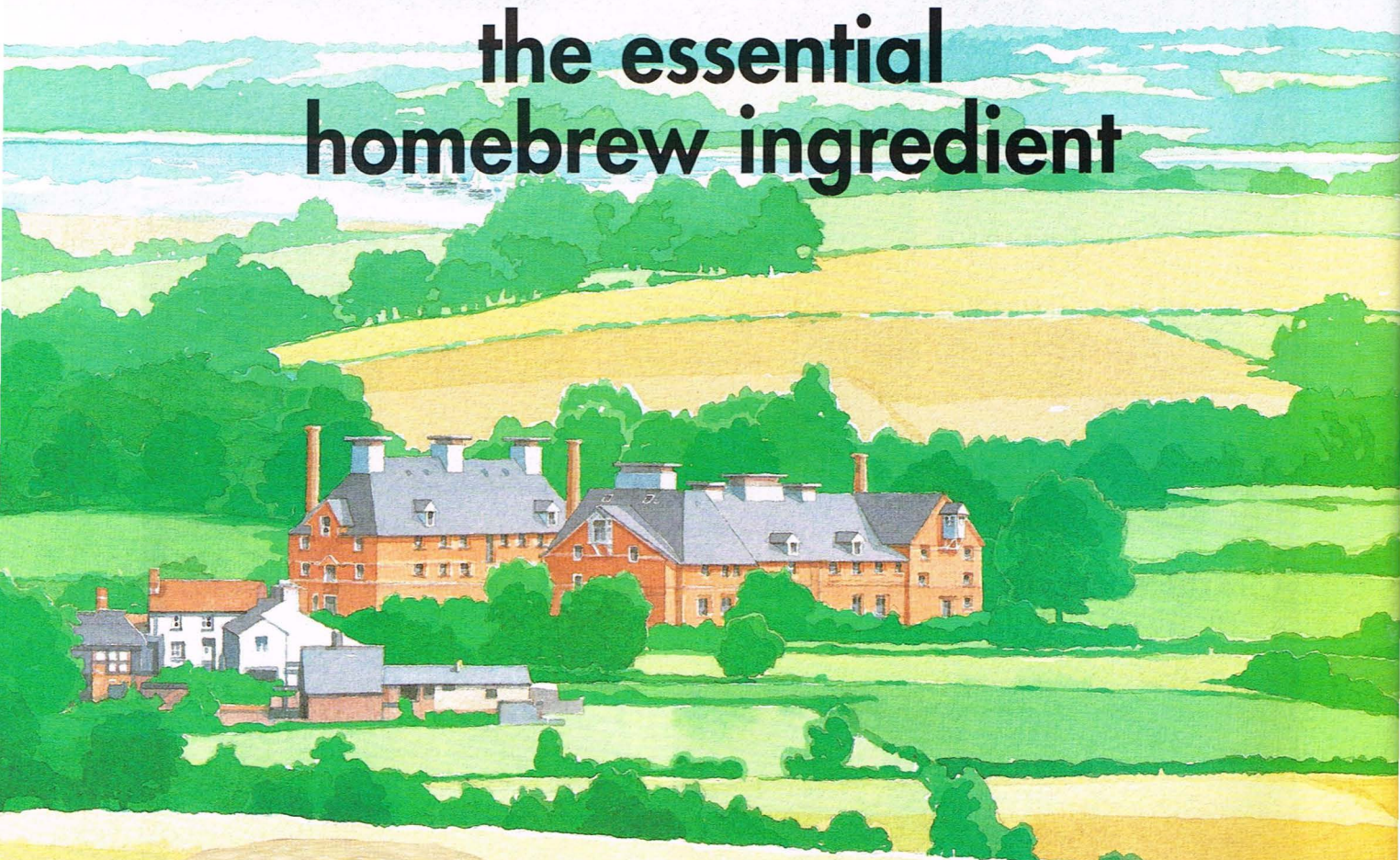


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BREW NEWS

James Spence

HEAD LINES

China Second in World Beer Production



With an output of 122.5 million hectoliters, China's breweries now produce more beer than every country except the United States. For the past 10 years, China has been the fastest growing beer producer. Consumption per person is about 10 liters per year, compared to a world average of 22 liters. China's 800 breweries produce beer costing about 25 U.S. cents per bottle. Average household income is about 150 U.S. dollars per month. (*Brewing and Beverage Industry International*, No. 3/1994)

Traditional Welsh Bragget to be Brewed Commercially

Beer historian Iain Turnbull plans to recreate a Welsh brew that hasn't been available commercially since the 17th century. Primary fermentation is carried out by *Brettanomyces* and other wild yeast, then the

beer is dosed with honey and spices for a secondary lactic fermentation. Turnbull compares the secondary fermentation process to that of the solera system used in sherry production. The resulting beer, called bragget, will be bottle conditioned and will contain about 8 percent alcohol. (*What's Brewing*, Nov. 1994)

More Health News

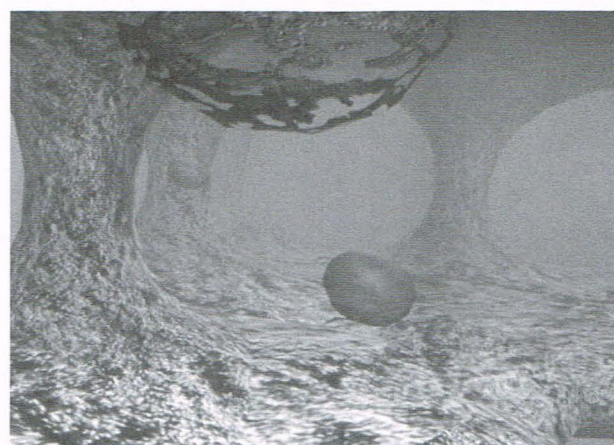
Several reports in the past two decades have shown that moderate drinking reduces the risk of dying from heart disease by about 40 percent. Some researchers, however, have believed that benefits to the heart from moderate drinking could be offset by increasing cancer risk and death by accidents. Harvard Medical School researchers examined the effects of drinking on all causes of death, not just heart disease. The 11-year study of 22,071 male doctors compared drinkers, moderate drinkers and non-drinkers. They found that men who had two to four drinks a week had the lowest death rate (22 percent). Men who consumed up to six drinks a week had a lower risk than non-drinkers. The risk of dying for those who averaged one drink a day, however, was the same as for non-drinkers. Consumption of two or more drinks a day boosted the death rate to 63 percent higher than nondrinkers. The study found that heavier consumption increased death

rates from throat, gastric, urinary tract and brain cancer, in spite of the reduced risk of dying from heart disease. (*Modern Brewery Age*, Nov. 28 1994)

Virtual Brewery Ferments in Tokyo



Sapporo Beer of Tokyo, Japan, and Telepresence Research of Portola Valley, Calif., have jointly developed a "Virtual Brewery Adventure" for the Sapporo Beer Visitor's Center in Tokyo. Virtual reality technology allows visitors to the multibillion dollar



At various points during the Virtual Brewery Adventure tourists are taken through the bottling line (top photo) or are provided with a yeast-cell view of fermentation.

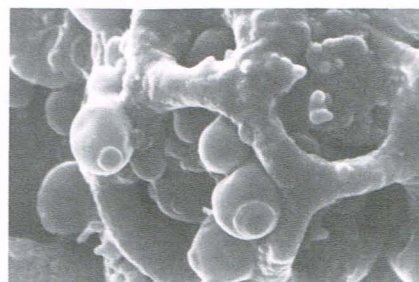
brewery complex to explore brewing operations through innovative interactive three-dimensional viewing stations and computer graphics technology. The "ride" begins outside the old defunct Sapporo building and takes the virtual tourist through brewing operations such as fermentation, filtration and bottling. At some points, the virtual scale shrinks the visitor to molecular size and takes a tour through the fermentation tank as hop particles and yeast cells whiz by. In the bottling stage, the visitor watches and hears bottles being filled and labels being adhered. Expected to draw 150,000 visitors its first year, the exhibit drew 70,000 virtual tourists to the brewery in the first three weeks of operation. (Telepresence Research press release)

Sonoma Finds Brewing Institute

Building on the exploding craft-brewing industry, a business sector that is experiencing 40 percent annual growth, Sonoma State University in Sonoma County, Calif., has established a business research institute focusing on the industry. The Sonoma State University Craft Brewing Business Research Institute will be a business and economics information resource for the past, present and future of the industry. The institute will collect, store and disseminate business and economic data, prepare reports independently or at the request of members or the public, and sponsor conferences and seminars dealing with the industry. (Sonoma State University press release)

TECHNOTES

Yeast Handling: Key to Optimal Performance



Immobilized yeast cells

In a report summarizing several methods of measuring yeast quantity as well as yeast quality, the following methods were discussed: viability staining, glycogen measurements, CO₂ measurements, the acidification power (AP) test and oxygen uptake rate (OUR). Viability staining with methylene blue (a cell is stained when the dye is able to pass through the cell membrane, and when the dye is not decolorized by enzymatic action within the cell) can give an indication of yeast viability (quantity of viable cells), as opposed to yeast vitality (quality of viable cells). Glycogen measurement is controversial, but can lend itself to use as a rejection criterion: when the glycogen content of the cells is too low, poor yeast quality is indicated, and fermentation problems are very likely to be encountered. Glycogen measurements and CO₂ evolution measurements can be considered complementary tests, because glycogen content can indicate fermentation performance and CO₂ evolution measurements can indicate the "present condition" of the yeast in the wort. The AP test gives an indication of glycogen content and fermentative power, as well as some information about the present condition of the yeast. Acid washing of yeast interferes with the test, however, and the test is not sensitive enough for yeast of very high vitality. The final test discussed is oxygen uptake rate, which gives a good indication of fermentation performance, but does not give a clear indication of yeast vitality. The author concludes by noting that yeast quality testing can be complex, and that several tests

MICROBREWERIES, BREWPUBS AND CONTRACT BREWERIES

Information provided by the Institute for Brewing Studies, Boulder, Colo. A complete state-by-state list of breweries and brewpubs in North America is updated quarterly and available from the Association of Brewers for \$5.

OPENINGS

(As of Jan. 6, 1995)

UNITED STATES

Microbreweries

Alaska: Midnight Sun Brewing Co., Anchorage
Colorado: Eldorado Canyon Brewing Co., Broomfield; Leadville Brewing Co., Leadville; Oasis Brewery II, Boulder
Hawaii: Hawaiian Style Brewing, Makawao
Maryland: Clipper City Brewing Co., Baltimore
Massachusetts: Wachusett Brewing Co., Wachusett
Michigan: Lake Superior Brewing Co., Duluth
Montana: Big Sky Brewing Co., Missoula; Great Northern Brewing Co., Whitefish
New Hampshire: New Hampshire Custom Brewers, Hollis; Old Nutfield Brewing Co., Derry
New Jersey: Thunder Bay Brewing Co., Englewood
North Carolina: Johnson Beer Co., Charlotte
Oregon: Peak Northwest Brewing Co., Milwaukie
Rhode Island: Emerald Isle Brew Works (opened 7/1/94), Kingston; Hope Brewing Corp., Providence
Texas: Live Oak Brewing Co., Austin
Washington: Hart Brewing Co., Seattle; Orchard Brewing Co., Bellingham

Brewpubs

Alabama: Magic City Brewery, Birmingham
California: Grizzly Bay Brewing Co., Suisun City; Sutter Brewing Co., Sacramento; Santa Monica Brewing Co., Santa Monica
Colorado: Dimmers Brewpub, Fort Collins; The Mercury Cafe, Denver; Tommyknocker Brewery & Pub, Idaho Springs
Florida: Hops Grille and Bar No. 10, Ocala; Hops Grille and Bar No. 11, Port Richey

Louisiana: Caddo Brewing Co., Shreveport
Maine: Sea Dog II, Camden
Maryland: Fordham Brewing Co./Ramshead Tavern, Annapolis
Massachusetts: Cape Cod Brew House, Hyannis; Pioneer Valley Brewpub, Springfield; Brew Moon, Boston
Michigan: Grizzly Peak Brewing Co., Ann Arbor
Missouri: Trailhead Brewing Co., St. Charles
Nevada: Milwaukee Brewing Co. & Restaurant, Carson City
New Hampshire: Star Mill Brewery & Restaurant, Manchester
New Jersey: Long Valley Pub & Brewery, Long Valley; Woodstock Brewing Co., Woodstock
Oregon: Old World Pub & Brewery, Inc., Portland
Tennessee: Bosco's Nashville Brewing Co., Nashville
Texas: Cafe on the Square and Brewpub, San Marcos; Hub City Brewery, Lubbock; Hubcap Brewery & Kitchen No. 3, Arlington; Bryan Brewing Co., Bryan; Brazos Brewing Co., College Station; Joey's, San Antonio; The Draught Horse Pub & Brewery, Austin
Utah: Rooster's 25th Street Brewery, Ogden
Virginia: Blue and Gold Brewing Co., Arlington
Washington: Boundary Bay Brewery & Ale House, Bellingham; McMenamin's on the Columbia, Vancouver

CANADA

Microbreweries

Alberta: Bow Valley Brewing Co., Canmore
British Columbia: Bear Brewing Co., Kamloops; Howe Sound Brewing Co., Squamish

Brewpubs

Alberta: Mission Bridge Brewing Co., Calgary

might be indicated when brewers attempt to assess their yeast. The OUR and AP tests were considered to be the most reliable. (D. Iserentant, *Cerevisia and Biotechnology*, No. 3, 1994, p. 35)

Exotherm and CO₂ Measurements in Fermentations

Researchers have devised accurate ways of measuring carbon dioxide and heat production during fermentations. Carbon dioxide evolution was measured with an ultrasonic flow meter. Heat production measurements used a computerized system to track increases in temperature during periods when the cooling valves of the fermenters were off. Measurements of CO₂ evolution and exotherm were taken simultaneously. Regression analysis of the data from the two measurements versus extract consumption resulted in excellent correlation between exotherm and carbon dioxide evolution, indicating that either could be used to monitor and control fermentations in breweries. Both parameters provide valid measurement of the rate and extent of fermentation, and could potentially replace manually measured procedures such as specific gravity or ethanol. (*Master Brewers Association of the Americas Technical Quarterly*, Vol. 31, 1994, pp. 95-100)

Outdevelopment of Pale Lager Beer

Ir. J.W.M. van Waesberghe in the *MBAA Technical Quarterly* notes that pale lager beers such as Pilsener developed at a time when dark Munchener lagers and British pale ales were booming beer styles. Several changes in malting processes produced malts low in color, almost free of roasty flavors, more highly enzymatic and reliably modified. These changes allowed the triple-decoction mash to be gradually deintensified toward upward infusion. This made pale lager beer a new and innovative beer upon its introduction. Van Waesberghe also notes that availability of ingredients and technology forced brewers to

make choices in the brewing process such as using husked barley malt; whereas, today filters and hammer mills can produce wort from dehusked barley. The outdevelopment of pale lager beer has meant that newer technology has lowered the cost of brewing, per hectoliter, far below that of the 19th century, but that the investment in that technology has increased considerably. In addition, flavor stability has become the watchword for pale lager beer — low kiln temperatures lead to off-flavors

and stability problems in finished beer. Van Waesberghe believes that there are still unexplored areas in brewing developments, including increased prevention of lipid oxidation (Lox) to aid in stability, integrated malt and wort production (including the use of "liquid malts" for continuous brewing operation vs. batch operation) and the introduction of tightly controlled operations that could lead to "designer wort" development. (*MBAA Technical Quarterly*, Vol. 31, 1994, pp. 101-110)

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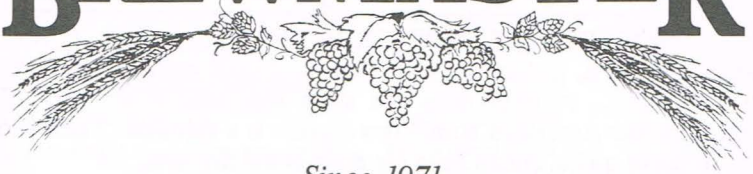
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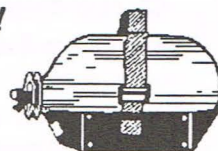
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JACKSON ON BEER

Michael Jackson

Some people look to France and see wineries. That is an unsophisticated view. We beer lovers see splendidly rustic breweries.

We barely need to cross the water and we are among them. The port of Boulogne itself has one brewery, and there are about 20 in the northwestern corner of France. Many of them make *bière de garde*, a spicy-tasting, alelike style, much more interesting than the lagers of Alsace.

I seem to be asked about *bière de garde* more than any other style. Now is a good time to consider them. They were originally produced in February and March to be laid down as provision for the summer, when the warm weather and airborne yeasts made brewing impossible, thus "beer to keep." In those days, the beers were dispensed into the customers' own bottles with the addition of primings. Wine bottles, and sometimes gin crocks or brandy flasks, would be used.

This area regards itself as being a part of the Low Countries, albeit definitely French, and its regional traditions include not only the brewing of beer but also the distilling of *genièvre* (gin). The culture is especially strong in the subregion that regards itself as Flemish France. In this area, many of the place names are clearly Flemish.

After the war, when breweries began to modernize, *bière de garde* almost vanished, but the odd brewery kept it alive, doing its own dispensing, often into Champagne bottles. In recent years, several breweries have reintroduced *bière de garde*.

The grist for these beers usually includes some very aromatic malts, sometimes made from local barleys. Typically, their gravities are in the range of 1.060 to 1.076, producing an alcohol content of 5.1 to 6.7 percent alcohol by weight (6.5 to 8.5 percent by volume). Some of the brewers boil their wort

intensely to achieve a degree of caramelization and to concentrate it by evaporation.

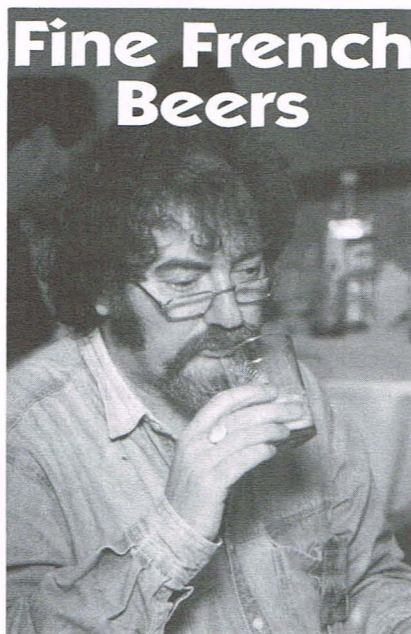
In aroma and flavor the emphasis tends to be on malt rather than hops, though they are also a local element. The Belgian hop-growing region of Poperinge is just across the border, and cultivation spreads into France as far as Hazebrouck (about halfway between Calais and Lille).

This is a very old hop-growing area, probably dating back to the early use of the plant in brewing. Several varieties are grown, especially Brewers Gold and Northern Brewer, and new ones are being introduced in an effort to slow the decline of the region.

A beer that contains more than 51 percent local hops is permitted to carry the regional appellation, *Nord-Pas de Calais*.

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Some of the breweries use top-fermenting yeasts, while others employ warm temperatures with lager strains. Several use different yeasts for products in broadly the same style.

Some of these beers have a maturation period from several weeks to a month or two in the tank, usually at cool temperatures, and one or two have a suggestion of "cellar character." Some people regard this character as a defect, suggesting mustiness. Others, myself included, feel that it sometimes adds complexity and charm.

I enjoyed seeing the hop gardens that fringe the Trois Monts brewery in the hamlet of Saint Sylvestre Chapel, near Steenvorde, just north of Hazebrouck. It has been variously claimed that there was first a brewery on the site in the early 1500s, or from the French Revolution, but its documented history seems to begin in the 1860s, and some of the buildings probably date from that period. It is one of the most rustic breweries I saw with the added quirk that its laboratory is in the former Parish Hall, which is decorated with a statue of St. Philomene.

The present brewhouse dates at least from the 1920s and the steam boiler is coal-fired. The brewery is run by Pierre Ricour, who is in his sixties, with his wife and their two sons.

Local malts and hops are used in significant proportions, but I have never met a brewer with such a strong interest in the influence of yeast on the character of his beers. He uses three strains, all top-fermenting,



each for a different beer. The principal product, a *bière de garde* called simply Trois Monts (the name comes from three small hills in the area), is made exclusively with Pilsener-type malt and some sugar adjunct, to a gravity of 1.076. It is filtered, but not pasteurized.

Trois Monts has a full gold color, a slightly sour aroma (some cellar character?), a very dry palate with some yeast-bite, a rounded winyness and a hint of alcohol.

The brewery also has an unfiltered "abbey type," *Bière des Templiers*, again with a gravity of 1.076. This all-malt beer is superb.

Monsieur Ricour claims it is made entirely with Pilsener malts, in which case it must have a great deal of caramelization and evaporation. It has a rich, barley-sugar color, and is very complex.

In the old coal-field area, I visited the Castelain Brewery, at Bénifontaine, near Wingles, just north of Lens. This, too, is a family business, its utilitarian building bearing the legend Yves Castelain, Artisan Brasseur, Depuis 1926. Through a window, the gleaming mash tun and two copper kettles are visible. Part of the building has been turned into a shop.

Although there is nothing elaborate about this brewery, there is plenty of evidence of recent investment to keep it in good shape. The present Monsieur Castelain told me that he had gradually abandoned more conventional brews in favor of variations on the *bière de garde* style.

This direction began 12 years ago, when he launched Ch'ti, the name of which is local dialect for a Northerner. This beer now appears in blond (1.060), amber (1.056) and brown (1.060) versions.

All of the worts have glucose added to the kettle and are bottom fermented. In general, these are sweetish, fruity beers.

The *Blonde* also has some biscuity maltiness. The *Ambrée* has more complexity (five malts are used), and a depth of flavors. (This is available in Britain as Sainsbury's *Bière de Garde*). The *Brune* is beautifully balanced, with some portlike notes.

The brewery also has an extremely pale specialty made with organic malt, called Jade (1.048), which is delicately hoppy, clean

and refreshing. All of these beers are filtered.

A newer, more interesting specialty is St. Arnoldus. This is a 1.072 golden beer that is filtered then primed and reyeasted for bottle-conditioning. It is very fruity with some syrupy notes and a firm, dry finish. The brewery also has March and Christmas beers.

Between Lens and Lille is the village and brewery of Annoeullin. This tiny, rustic brewery, established in 1905, is run by a very keen young couple, Yolande and Bertrand Lepers.

The Lepers family trace a history of hop-growing and brewing through five generations back to 1880; Bertrand and his wife took over in the 1970s.

Annoeullin's *bière de garde*, which is bottom fermented, is a spicy-tasting, well-rounded product called Pator Ale (1.060), made entirely with pale malt. I had always found this name rather confusing until I was given the suddenly obvious explanation: it is a pastoral brew.



Nothing to do with pastors, or ales. "C'est une symphonie," says the slogan.

Annoeullin also has a spicy-fruity, very faintly syrupy golden wheat beer called L'Angelus. This is made with 30 percent unmalted wheat and has a gravity of 1.072. Both of these beers are filtered but not pasteurized.

One or two breweries in the north have begun to make wheat, or white, beers. In so doing, they are reviving a tradition. The handsome Flemish-French town of Cambrai was once famous for the style. *Plus ça change ... ?*

Reprinted with permission from What's Brewing, newspaper of the Campaign for Real Ale.

Michael Jackson is internationally the best-known writer on beer. His *Beer Companion* (Running Press, 1994) was awarded the 1994 Glen Fiddich Trophy, an honor never before bestowed to a book on beer.

His articles, books and documentary videos have introduced beer styles to countless drinkers and brewers outside their native lands. Jackson's use of taste descriptions and accounts of his travels introduced a new genre of writing on beer.



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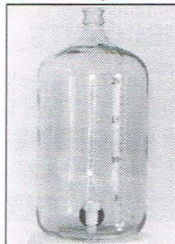
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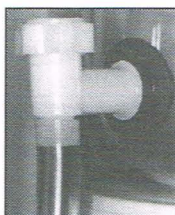
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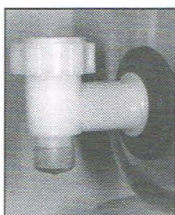
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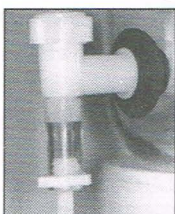
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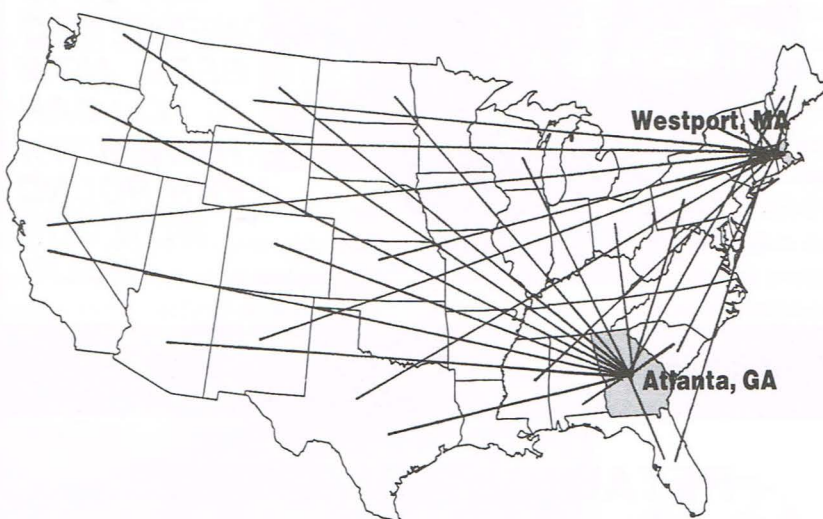
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Thank heavens the food was memorable.

After a climb to 7,000 feet in elevation on a questionable dirt road we were there. Naturally, prolonged drought had decimated the creeks,

flora and fauna, leaving only the scent of 110-degree scorched dirt. Undaunted, we set up camp, and saluted the construction of Arizona's newest city with cool bottles of bitter.

After a full 10 minutes of relaxation, I set about preparing dinner only to discover we had forgotten gas for the stove. One trip down the mountain, two bouts of heat exhaustion, one car-sick dog and a broken radiator hose later, we dined on scrumptious E-Z Beef Burritos and chilled lager.

Sliced peppers, onions and marinated meat are packed on ice in sealed plastic bags. Meat, vegetables and chilies are sautéed then nestled in soft tortillas leaving the cook with little cleanup.

For a cool-morning breakfast (down to 88 degrees), Scrambola is a favorite. Onions are sautéed and doused with beer before being combined with diced potatoes and ham. Eggs and cheese are added. This dish can be served in tortillas too.

You know, now that I think of it, it's a darn good thing the food and homebrew

were so memorable. Now, where did I put Holiday Inn's 800 number?

Empanadas

These travel well and are great eat-out-of-hand snacks.

Makes 6

Filling

- 4 tbsp butter or margarine (59 mL)
- 1 20-oz can pineapple chunks, drained or 2 cups fresh (566 g)
- 1/2 cup brown sugar (118 mL)
- 1 cup pale ale (237 mL)
- 12 ripe (or canned) apricots, quartered
- 1/2 cup orange marmalade (118 mL)

(1) Melt butter in a skillet. Add pineapple and sugar, stirring until sugar dissolves. Pour in ale and cook on medium-high until liquid is reduced by half.

(2) Add apricots and continue to reduce until liquid has evaporated and fruit is glazed. Remove from heat and stir in marmalade. Refrigerate.

Dough

- 2 1/2 cup flour (591 mL)
- 1/3 cup sugar (79 mL)
- 1 tsp salt (5 mL)
- 5 tbsp cold butter (74 mL)
- 5 tbsp cold margarine (74 mL)

With summer's arrival comes the anticipation of that most cherished vacation: the annual camping trip. You know, idyllic days breathing pine-scented air, relishing hearty camp fare and drinking homebrew by the campfire.

Reality is not always this picturesque. Take our last excursion, fondly dubbed the "camp trip from hell." August found us trekking two adult children, two dogs and an entire sporting goods store to the high mountains of Arizona. Add 10 days' worth of food, ice, beer, water and you have badly taxed the old Suburban; hence, the flat tire less than 50 miles from home.

Did I mention Arizona was experiencing a record heat wave? The weatherman says its only 122 degrees F, but the temperature just above the road reaches a blazing 160 before noon! Ever optimistic, we refreshed ourselves with empanadas (Southwestern turnovers) before changing the tire on asphalt so hot that the jack sank into it. It is fortunate we had

- 1 egg beaten with 1 tsp vanilla extract (5 mL)
water or pale ale
- 1 egg, beaten
parchment

(1) Combine the flour, sugar and salt. Using a food processor or a pastry cutter, cut in the butter and margarine until crumbly.

(2) Stir in the egg mixture. Add just enough water or ale to pull the dough into a ball. Knead gently exactly 20 times. Wrap in plastic and refrigerate one hour.

(3) Divide dough into six equal pieces. Roll each piece into a 1/4-inch thick circle. Fill each with equal portions of chilled filling. Fold in half, pinch and crimp the edges to seal.

(4) Slash the top of each turnover to allow steam to escape. Brush with a beaten egg and bake on parchment in a 375-degree-F (190-degree-C) oven until golden brown on top and bottom.

E-Z Beef Burritos

A great one-skillet meal.

Serves 4

- 2/3 cup A.1. Steak Sauce® (158 mL)
- 2/3 cup Vienna-style beer (158 mL)
- 5 cloves garlic, mashed
- 1 package taco seasoning
- 2 lb sliced sirloin (0.9 kg)
- juice of 1 lime (optional)
- 1 jalapeño, chopped (optional)
- 2 large onions, sliced
- 2 bell peppers, sliced
- 2 6-oz cans diced green chilies (340 g total)
- oil for sautéing

(1) Combine A.1., beer, garlic, seasoning, meat, lime and jalapeño in a large sealable plastic bag and refrigerate. If you aren't taking this camping, marinate overnight.

(2) When ready to cook, heat a large heavy skillet over high heat. Add about 1/4 cup (50 mL) of oil and sear onions and peppers. Remove from skillet.

(3) Cover bottom of hot skillet with oil and add drained meat. Cook on high, stirring constantly. When cooked, toss in vegetables and canned chilies and reheat. Serve burrito style in warm tortillas.

CAMP MENU

SNACK:

Fruit-filled Empanadas
served with nut brown ale

DINNER:

E-Z Beef Burritos
served with chilled lager

BREAKFAST:

Scrambola

Scrambola

Good for supper too!

Serves 4

- 2 tbsp butter or oil (30 mL)
- 2 onions, diced
- 1/2 cup brown ale (125 mL)
- 2 large baked potatoes, cubed
- 1 1/2 cups diced ham, cooked bacon or cooked sausage (355 mL)
- 8 eggs, beaten
- small dose of brown ale (3 tbsp or 45 mL)

few drops of pepper sauce,
salt and pepper
handful (1/2 cup or 118 mL) grated
cheddar, jack or colby cheese

Optional ingredients:

salsa, mushrooms, chopped green
onions to taste

(1) In a large skillet, melt butter over medium heat. Add diced onions and cook until translucent. Pour in 1/2 cup of beer and cook until onions are glazed and beer has almost evaporated.

(2) Add potatoes, meat and any optional ingredients. Mix eggs with remaining beer and pepper sauce. Pour into skillet and cook until soft and custard-like. Sprinkle with cheese and continue cooking until set. If desired, serve in warm tortillas to avoid dishes and cleanup.

Candy Schermerhorn is a culinary consultant and televised cooking personality in the Phoenix, Ariz., area. Candy takes great joy in educating the public about beer and its culinary potential through her classes. She is author of the award-winning *Great American Beer Cookbook* (Brewers Publications, 1993).



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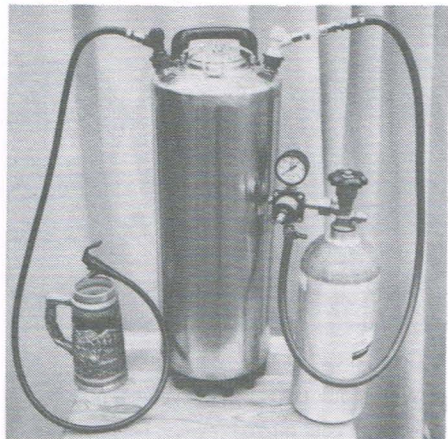
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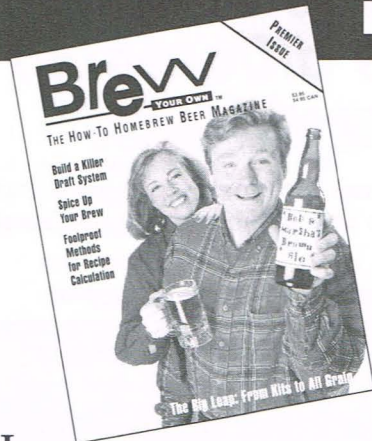
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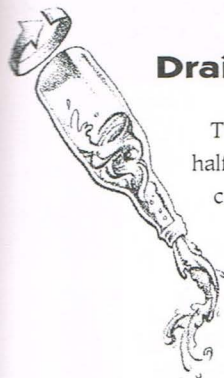
Our Members

Clean Kettle Bottoms



One of the little problems encountered by those of us who brew with propane burners is the soot deposited on the outside bottom of the kettle when the flame is turned down low. If you coat the bottom of the kettle with liquid dishwashing detergent before using it, the soot attaches to the soap and cleanup is a snap. If your kettle is already soot-covered, use oven cleaner to shine it up then use the soap trick after that. [Warning: Don't use oven cleaner on aluminum surfaces.] *Martin Manning in The Bloatarian Bulletin, Cincinnati, Ohio.*

Draining Bottles



To drain a bottle in about half the time, give it a quick circular swirl while it is inverted to create a vortex.

Steve Sikkenga, North Muskegon, Mich.

Dry-Hopper



An easy dry-hopping technique is to use a large stainless-steel tea ball. Usually mesh, tea balls are used to make large batches of tea in restaurants or institutional settings.

Just unscrew the top, drop in your favorite pellets or whole hops and put the tea ball in your Cornelius keg at racking.

John Farver in Fermentation Noise, Yakima, Wash.

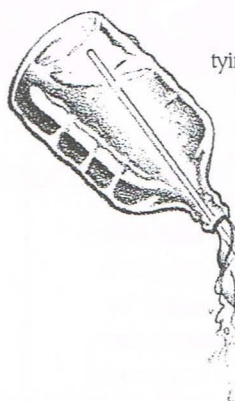
Easy Siphon Starting



If you are using a carboy cap, insert your racking cane into the upright opening and blow into the other opening until beer flows through the racking hose. Do not replace the cap on the second opening while beer is flowing.

AHA homebrew tip file.

Turbo Carboy Rinsing



To speed up emptying your carboy of sanitizing solution, take the plastic tip off your rigid racking tube or racking cane and insert the tube through the neck to the bottom of the carboy. As you tilt the carboy toward your

sink, hold the racking tube so one end is in the airspace and the other end is coming out the neck. Because no vacuum is present, the carboy empties quite quickly.

From 50 Great Homebrewing Tips (Lampman Brewing Publications, 1994) by David Weisberg.

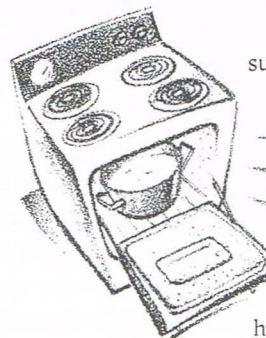
E-Z Bottling Chart

		Bottle Size			
		6 oz.	12 oz.	16 oz.	22 oz.
Gallons	1	21	11	8	5
	2	42	21	16	11
	3	64	32	24	17
	4	85	42	32	23
	5	106	53	40	29

How many bottles will you need to soak in preparation for bottling your latest batch? Find the number of gallons you brewed in the first column, follow that row over to the column corresponding to the size bottles you plan to use, that number is the quantity of bottles you'll be able to fill.

Tom Fuller in the Newsletter of the Kalamazoo Libation Organization of Brewers, Kalamazoo, Mich.

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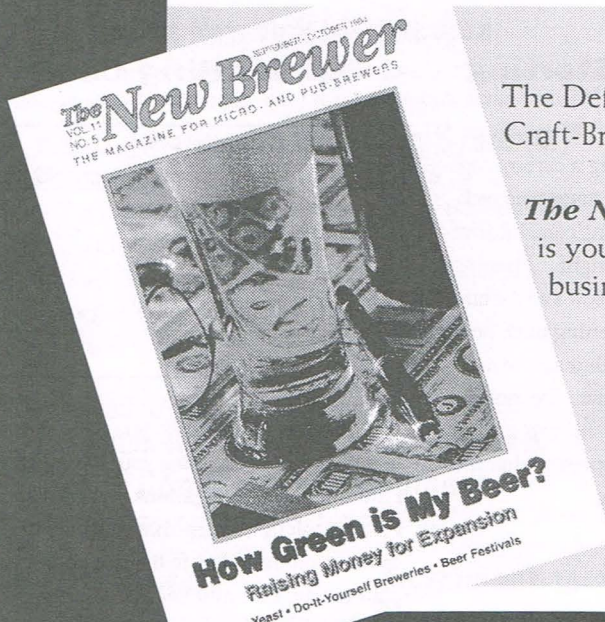
your oven temperature to its lowest setting to warm the interior while you prepare the mash. Put your mash kettle inside and turn the oven off.

AHA homebrew tip file.

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

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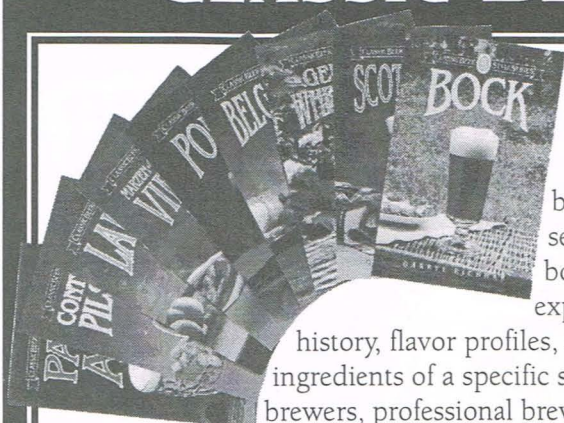
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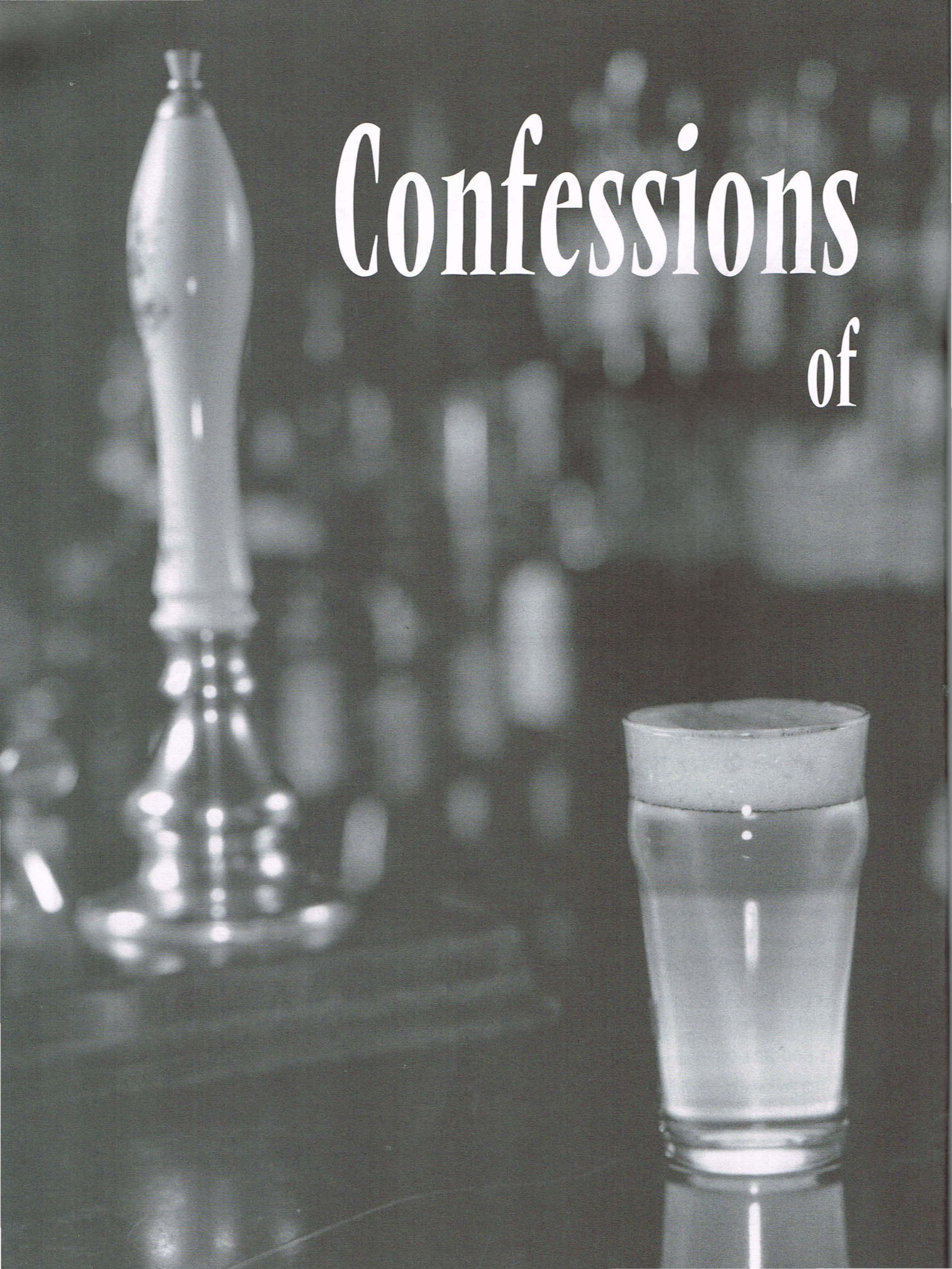
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Two Bitter Men



e're bitter.

All right, we confess. But can you really blame us? If your favorite style of beer were underappreciated, misunderstood and almost completely unheard of in your country, how would you feel? You see, our favorite style is cask-conditioned draft pale ale, known throughout Great Britain as "bitter." If you love beer and you've been lucky enough to spend time there — like us — you know that a pint of cask-conditioned bitter is one of the world's great drinking pleasures. Bitter is a wonderful social beverage, the perfect "session beer" packed with flavor yet low in gassiness and alcohol. Moreover, it is a testament to the wide range of flavors a brewer can evoke from the most basic ingredients of the craft.

Bitter is an inviting style for homebrewers of all stripes. Procedures are simple. Hop heads are naturally attracted because, as the name implies, bitter really is hopped well beyond the taste threshold. And because of its moderate gravity, those hops don't have to fight their way through massive maltiness. Malt lovers also can find something to like, because the style is broadly defined enough to allow a wide range of malt expression.

So like many homebrewers, we returned from our trips to the Sceptered Isle raring to make and serve authentic bitter. After much research, we arrived at our own style definition and a consistent brewing process. Problem was, it wasn't long before we learned that our best, most on-target efforts performed poorly in competitions. This wasn't because of poor judging. On the contrary, judges did a great job evaluating our beers according to the then-current AHA guidelines. The problem was the guidelines themselves. By analyzing these more closely, it was easy to understand why even talented brewers and beer judges misunderstood the style. The most widely distributed standards did not accurately reflect current brewing practice in Britain, particularly when it came to original gravity and International Bitterness Unit ranges.

That's when we ceased being mild-mannered homebrewers. We became missionaries, pledged to train fellow brewers and judges in the proper characteristics of our favorite style. The following is what we discovered — they are the confessions of two Bitter Men!



British or English?

Before we begin, let's be clear about our geography and language. The terms British and Britain encompass England, Scotland and Wales, while English more narrowly applies to England. In our research we looked at beers from England and Wales, where bitter predominates. Although you can find bitter in Scotland, the Scots have their own distinctive brewing tradition, preferring maltier styles.

Is it Bitter or Pale Ale?

Actually, it's both. The distinction between bitter and pale ale is quite fuzzy, and the styles overlap.

The term bitter is relatively modern in brewing parlance. It only shows up in the professional literature in the mid-20th century, in the Whitbread-published *The Brewer's Art* (1948). Here, for the first time, the distinction was made between bottled and draft pale ale. Clearly, bitter is the descendant of pale ale or, originally, India pale ale, Burton-upon-Trent's gift to the world. In Britain today, bitter remains the all-encompassing term for draft (draught) pale ale. A brewery might refer to its "premium" bitter as a pale ale or IPA, but when the beer is served in draft form, it's always bitter.

If pale ale and bitter are so inextricably linked, then why are they in separate competition categories? After all, if pale ale is simply bottled bitter, then there should be little or no difference between a bottled clas-

sic pale ale and bottled special bitter, right? We can only assume that bottled pale ale has taken on its own limited set of characteristics. Certainly there's higher carbonation in bottled pale ales, plus the color range (particularly for IPA) may be more narrowly defined and skewed toward lighter shades. But rather than worry about this, we prefer to relax and take comfort in the knowledge that there are more categories for more people to enter and win ribbons in.

Debunking Myths and Misconceptions

MYTH NO. 1

Bitter is served warm.

Bitter is not served warm, but at cellar temperature. It only *seems* warm if you're accustomed to icy-cold lagers. A bitter certainly should not be iced down before serving because low temperatures will adversely affect the perceived flavor balance. In practice, cellar temperature is roughly in the range of 50 to 60 degrees F (10 to 16 degrees C). The Campaign for Real Ale (CAMRA) recommends maintaining 55 to 57 degrees F (13 to 14 degrees C) at all times. A pub that really cares about its beer will use cooling or heating equipment as necessary to protect it from temperature extremes. This is true even though the English climate is relatively cool and cellars are often well-insulated.

MYTH NO. 2

Bitter is flat.

Bitter is not flat. It is simply not as fizzy or effervescent as most other styles. As conventionally prepared, most commercial and homebrewed beers in the United States have about 2.5 volumes of CO₂. In contrast, a proper draft bitter might have 1 volume. The lower carbonation is doubly beneficial: it allows the flavors to express themselves more and it makes for greater drinkability without the sensation of fullness, belching and the like. Swirl a glass of fine bitter and you'll always see a nice profusion of bubbles.

MYTH NO. 3

Bitter lacks a head.

The simple generalization is this: Beers in northern England are served with a head; southern beers are not. The differences are because of slightly dif-

ferent brewing and fermentation methods, but the engineering of the beer engine also plays a role. In the north, a beer engine will have a "sparkler" attachment on the nozzle. Most also feature a long-reach "swan-neck" spout. Together they bring out the characteristic tight, creamy head. Northern brewers formulate their recipes expecting this form of dispense. Southern beers, in contrast, are almost always served from an engine with a standard spout and no sparkler. Thus, little or no head is not a fault. The beer still expresses its balance of flavors and aromas quite well. For the American traveler to London and environs, the latter will be the more common sight, smell and taste. Gravity dispense reduces the distinction somewhat, but northern beers will still exhibit a more prominent collar of foam.

MYTH NO. 4

Every English brewery has three bitters: an ordinary, special and an extra special bitter (ESB).

Not so. Individual breweries have varying numbers of beers. Some are always available, some only seasonally. Although bitter is surely the dominant English style, brewers typically produce different versions as more suitably befit the occasion. Among these, some brews prove so popular that they, too, are served year-round. Fuller's ESB, deservedly renowned even here, actually originated as a strong winter specialty. It is definitely extra special, because few brewers serve anything comparable. Keep this in mind, because we'll return to this subject later.

MYTH NO. 5

Bitter is light to pale in color.

In fact, bitter varies in color quite a lot. At the extreme light end you can find examples like Boddington's Bitter, which is essentially straw colored. Bass Ale, at 10 °Lovibond, is a good reference point for amber color. On the dark end, bitter can be ruby colored, reflecting a relatively high proportion of crystal malt, or perhaps a touch of highly roasted malt in the grain bill. Terry Foster suggests a target color range of 8 to 20 °Lovibond, which is closer to the mark than even the latest AHA guidelines listing 8 to 14 °Lovibond as the range (Foster 1990).

Michael Jackson describes the range as "straw to chestnut" (Jackson 1993). And no wonder: there are multiple commercial examples at both ends of the spectrum.

Bitter as the English Brew It

We developed our own definition by studying how the English actually brew bitter. That's where the discrepancies in the old AHA guidelines really came to light.

Bitter roughly encompasses the starting gravity range of 1.034 to 1.046 (CAMRA). One end of this range admits Fuller's Chiswick Bitter; the high end includes Young's Special and Courage Directors Bitter. Beers with a gravity higher than 1.046 can be variously classified as strong bitter, pale ale, winter warmer, old ale or the like, depending on various stylistic considerations. Remember that the boundaries are not hard and fast. A point or two outside either end of the range is not much to haggle about.

The term bitter, lacking any modifying prefix, is an "ordinary." The terms best or special bitter typically signify a higher gravity "premium" bitter in the brewer's line. Note that these are ideal types. You'll find examples of commercial beers called best bitter that have an original gravity of less than 1.040. Similarly, you'll find so-called "IPAs" with gravities in the high 1.030s or low 1.040s. Brewers will use whatever name strikes their fancy.

What about extra special bitter? We contend that the AHA style Extra Special Bitter — at least through 1994 — has always been defined by one beer: Fuller's ESB. Few, if any, English brewers make a beer called an extra special bitter. In fact, they are so rare that Roger Protz's *The Real Ale Drinker's Almanac* includes only three ESBs among his 500 or so beer descriptions: Fuller's at 1.053, Mitchell's of Lancaster at 1.050 and Pitfield at 1.044 (Protz 1993). CAMRA's *Good Beer Guide* 1994 adds but two more: Big Lamp at 1.046 and Marston Moor at 1.050. There are, however, a fair number of original gravity 1.050+ English ales that don't use the ESB moniker. These can best be described as strong bitters. CAMRA calls them exactly that, even providing a separate category for them in the Great British Beer Festival.

PUMP IT UP — BEER ENGINES AND YOUR HOMEBREW

It's only natural that any homebrewer who loves real ale and classic English pubs would also want his or her own beer engine. To be sure, a stately row of porcelain and brass pump handles is a most inviting sight. And, although it's hard to beat a real ale served by gravity straight from the cask, a hand-pulled pint from a proper beer engine comes very close indeed.



I had not given much serious thought to buying a beer engine until one literally almost fell in my lap. While on vacation in England a couple years ago, the owner of the Town Hall Tavern (a free house in Chertsey, Surrey) overheard your Two Bitter Men chatting with the locals about the rarity of hand-pumped beers in the States. He knew us from our frequent visits, and also because I had stayed for a week in one of the bedrooms over his pub. In an extraordinary gesture, he asked if I wanted one of the extra beer engines he had in his garage. For nothing. Free. Gratis. It wasn't in prime condition, but it was fairly easy to refurbish once I got it home. The most important thing it needed was a very thorough cleaning.

My pump was stamped with the name, address and phone number of the manufacturer, Hi-Gene Beer Pumps Ltd. A couple of calls and faxes to Hi-Gene got me a complete product, parts and price list, along with colorful brochures and pump schematics.

Beer engines come in a variety of models. The most elaborate and expensive is built into a wood cabinet that drops permanently into the bar. Typically these can be purchased in sizes ranging from one to six pumps, with the price increasing with the number of handles. Figure on approximately \$400 for a single pull, and close to \$2,500 for six. A less-expensive permanent option is a flush-fitting model. This is attached to the bar top with the pump handle extending through a customized hole. Each pump would cost between \$325 and \$350 new. Finally, there is the clamp-on model, probably the best option for homebrewers because of its portability and low cost. Clamp-on pumps can also be broken down into vertical and horizontal models. In the former, the pump mechanism is in the traditional vertical position in the pump frame. The problem is that you often have limited space under your bar or table top. This is where the horizontal model is most advantageous. The only difficulty with horizontal pumps is they require a deeper shelf area. Both models cost almost the same amount. Expect to pay between \$300 and \$350 for a brand new clamp-on pump, not including shipping and handling. If this is much more than you're willing to pay, you may want to consider a second-hand pump refurbished by the manufacturer. I purchased a refurbished vertical pump for about 60 percent less than the price of a new model (about \$130 or £85).

Whether new or used, each manufacturer's model will have its own unique set of features, so make sure to ask for detailed product specifications and parts/price lists.

—Steve Hamburg

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A real ale drinker's paradise! Shown are some of the 297 hand-pulled real ales available at the 1994 Great British Beer Festival in London.

We should do likewise in our own competitions, defining the category with a gravity range of 1.046 to 1.060, IBUs between 30 and 50.

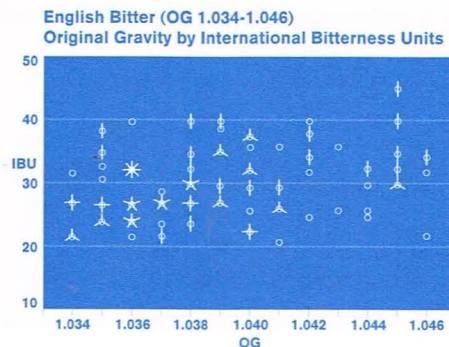
Anyone seriously interested in bitter and other British styles should have a copy of Protz's *The Real Ale Drinker's Almanac*. Through the years, he has obtained detailed information from commercial brewers, including ingredients, original gravity, alcohol by volume, color rating (using the European scale) and bittering units (in IBUs).

We created a data base of every English and Welsh beer in Protz's book for which there was information on both original gravity and IBUs. While this information was missing for many entries, our sense is that these beers are not qualitatively different from the ones where data are available. We excluded all milds, porters, stouts and old

ales, then applied an original-gravity-based selection filter to the remaining sample.

The result was 129 commercial bitters in the original gravity range 1.034 to 1.046,

Figure 1



with bitterness ranging from 19 to 45 IBUs. Figure 1 shows a sunflower scatterplot of IBU vs. original gravity for these beers.

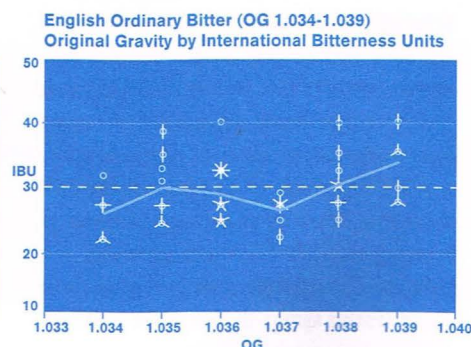
A problem with standard scatterplots is that they do not show multiple hits in the same space. The "sunflower" plot rectifies this problem, because the "petals" count the number of beers in the vicinity of each sunflower center. This plot shows a number of things:

- The average bitterness of the beers is quite high, especially given the gravities.
- At any given starting gravity, there is a range of bitterness in beers at that gravity.
- Some gravities have a lot more beers than some other gravities.
- While a higher gravity category (1.045) has on average some highly bitter beers, there is no simple linear trending up of bitterness as gravity increases.

Figure 2 shows a sunflower scatterplot of IBU vs. original gravity for ordinary bitter by our definition.

The dotted reference line at 30 IBUs shows how the beers fall around this level of bitterness. The angular line is a lowess (locally weighted estimate) fit line that shows how bitterness trends slightly upward as gravity increases. The histogram in Figure 3 shows the number of beers at each IBU level. Note that the mean (average) is

Figure 2



29. The standard deviation of 5 indicates that nearly 70 percent of all beers will fall in the range of 29 plus or minus 5 (24 to 34). Compare this with the best bitter data displayed in Figures 4 and 5.

For whatever reason, the original gravity 1.045 beers are noticeably more bitter than the others. Yet in general, the other best bitters are really no more bitter than ordinary bitters in the high 1.030s. Note the distribution in Figure 5. The average IBU level is 32, compared to 29 for ordinaries.

Compare these data with the old AHA guidelines. Ordinary bitter had a gravity range of 1.035 to 1.038, 20 to 25 IBUs; special bitter was 1.038 to 1.042 original gravity, 25 to 30 IBUs. Of the beers in our sample, 60 were within the old ordinary gravity range, 56 in the special. Of these, more than three-fourths of the ordinaries (46) and almost half (27) of the specials would have been considered too bitter. As we have seen, the average bitterness of our sample beers was greater than the maximum IBU level in both subcategories. By following these guidelines, U.S. homebrewers were routinely making beers that weren't as bitter as the average commercial versions in England.

Partly as a result of this research and our subsequent presentation at the AHA 1994 National Homebrewers Conference in Denver, Colo., the official guidelines were modified for 1995. They are now 1.033 to 1.038 original gravity, 20 to 35 IBU for ordinary; 1.038 to 1.045 original gravity, 28 to 46 IBU for special. Using the same data but the updated standards, now 65 of the 70 (93 percent) beers in the ordinary original gravity

range meet the new IBU criteria (the five that don't are slightly higher). In the special original gravity range, more than 75 percent (56 of 74) are within the new IBU specifications, and none exceeds them. This is a major improvement that will help us all brew and judge bitter more accurately.

Interestingly, almost one-fourth of the specials now fall below the new AHA IBU minimum. This would exclude such well-known English brands as Draught Bass, Badger Best Bitter and Everard's Tiger (all 26 IBU). That's why we think a more relaxed 20 to 40 IBU range for both ordinaries and specials makes more sense. This would include 100 percent of the sample beers in the ordinary original gravity range, 97 percent (72 of 74) in the special. But in general, this is a minor point. We're thrilled with the adjustments that have been made. We may be bitter, but in light of these changes, it's in a much more positive sense.

Properly Evaluating Bitter

With most any beer style you judge, it's nice to have a reference point. The problem with cask-conditioned bitter is that it is nearly impossible to find here. The commercial examples available from the United Kingdom are almost always premium bottled pale ales, bigger than your average bitter. Given this, and the old guidelines, it's not at all surprising that a spot-on ordinary bitter might be judged "too thin," "too bitter" or "poorly balanced." But now that we know better, what are the signature characteristics we should be looking for?

Aroma

A fruity aroma is quite typical. With many traditional English yeast strains, these can even be quite citrusy. One thing is clear: authentic bitter tends to have much more of a fruity yeast profile than we're used to in the United States. If you are accustomed to the neutral cleanliness you get with Wyeast No. 1056, be prepared for a bit of a shock. Diacetyl may be present, but only slightly. A buttery note is a characteristic of some Yorkshire examples, particularly Samuel Smith, but in most bitter, especially in the 1.030 to 1.040 range, there's not a lot else in the beer to counteract diacetyl's effect. Hop aroma is always pleasant, but not required. Rich malt aromas are rarer, but not unheard of. Finally, whiffs of grain can be common, even at the lowest gravities.

Appearance

The notion of clarity often seems foreign for a traditional ale. Yet, as anyone who has had a proper pint can tell you, cask-conditioned bitter pulls bright and clear from the cask. And this is nothing new. Isinglass finings have been used to clear beer for centuries (the oldest mention of this method was published in 1695!). When you evaluate a bitter, you can be tolerant of a slight haze, but it definitely shouldn't look like a *wit* or *hefeweizen*. As we've said, color can range widely, from straw gold to copper. And, given its low conditioning, it's not a flaw if it doesn't have much of a head.

Flavor and Balance

Remember that bitter is dry, with low-to-medium maltiness. The watchword is the

Figure 3

English Ordinary Bitter (OG 1.034-1.039)
Distribution by International Bitterness Units

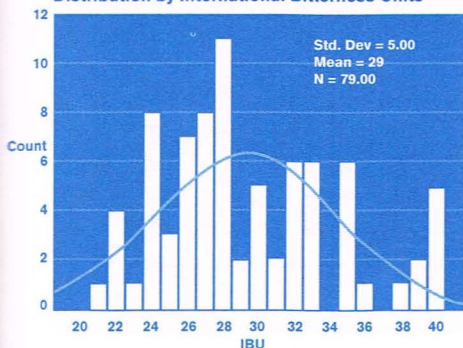


Figure 4

English Best Bitter (OG 1.040-1.046)
Original Gravity by International Bitterness Units

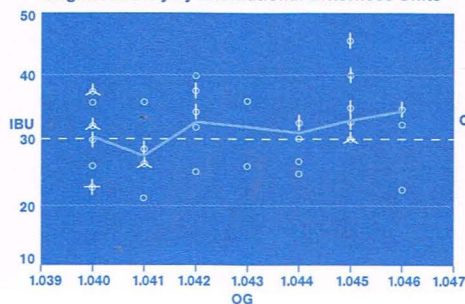
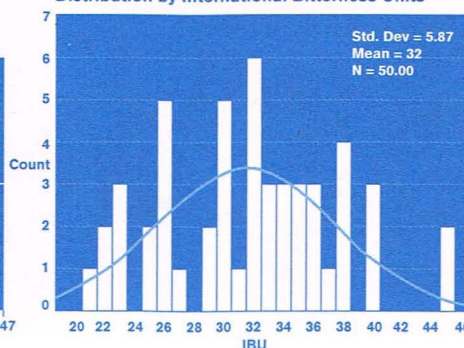


Figure 5

English Best Bitter (OG 1.040-1.046)
Distribution by International Bitterness Units



style's name: bitter. Yet until now, most American homebrewed versions have not been bitter enough. Especially in the lower gravity range, hop bitterness should be the dominant characteristic. Most ordinaries actually are more bitter than their stronger counterparts, with some examples more bitter than most pale ales. To quote Michael Jackson, "... the essential ingredient is the hearty smack of hops" (Jackson 1993). No proper bitter recipe ever skimps on the kettle hops. That is why, when evaluating the balance, you shouldn't base this on an equal perception of malt and hops. Within the target gravity range, beers at the high end will show more maltiness. But the expectation for balance should not be the same for an original gravity 1.035 ordinary and a 1.046 special. The differences between an ordinary and a 1.055 ESB will be even more pronounced.

Fight the temptation to judge every bitter as if it were Fuller's ESB. An ordinary or special just cannot compete with a beer of its complexity and "bigness." Other beers like Bateman's XXXB and Victory Ale, and Young's Special London Ale also are too big to be proper models. All is not lost, however. Fuller's London Pride is an excellent benchmark when fresh. It is astonishingly flavorful for a 1.040 beer. Young's Ramrod also is decent, although the version we get is somewhat maltier than the brewery's dry-hopped cask-conditioned special. The best example of the current crop of imports may be Brakspear's Special Bitter (original gravity 1.043). It is a close cousin to Brakspear's Ordinary (original gravity 1.035, 38 IBU),



The front bar at Ye Olde Cheshire Cheese (rebuilt in 1667) in London, where you can get Samuel Smith's Old Brewery Pale Ale and Museum Ale hand pulled from oak casks ("from the wood").

which has, in our minds, the definitive dryness and massive hop character that turned us into *Bitter Men* in the first place.

Now Brew It!

Now that you know more about the style, you should get out and start brewing it! We could easily do a separate article of equal length covering raw ingredients and brewing techniques, but we won't do it here. Besides the space limitations, why should we repeat what others have already said so well? Instead, we recommend you start with Terry Foster's *Pale Ale*, (Brewers Publications, 1990) from the Classic Beer Style Series.

There is little he doesn't cover, whether you're an extract or all-grain brewer. For more specific information from the British perspective, two CAMRA books — Graham Wheeler's *Home Brewing — The CAMRA Guide*, and Graham Wheeler and Roger Protz's *Brew Your Own Real Ale At Home* — are invaluable. The latter contains recipes that allow you to replicate many famous commercial cask-conditioned ales. Almost 70 bitter and pale ale recipes are included.

There has never been a better time to brew bitter. The highest quality, most authentic raw materials can be purchased from homebrew suppliers all over the country. Maris Otter, Hugh Baird and DeWolf-Cosyns pale ale and crystal malts are widely available. Traditional hop varieties like East Kent Goldings, Fuggles, Northern Brewer and Styrian Goldings (actually a Fuggle variant) can be procured most anywhere. Perhaps best, there are now more suppliers of pure culture liquid yeast offering a growing variety of British commercial strains. If you experiment with them as much as we have, you'll discover striking differences in the flavor and perceived bitterness of your brews.

Obviously, we hope you all will have the chance to go to England and savor bitter at the source. But until you do, a homebrewed version can come pretty close to the real stuff. Some say that bitter isn't for everybody. We think that is insane! In fact, we can't think of a better day-in day-out drink.



Steve Hamburg, author



Tony Babinec, author

Sure, the lower alcohol means you can keep your wits about you, but you're not sacrificing anything in flavor profile. In a time when hop-head beers like Sierra Nevada Pale Ale and Liberty Ale are more popular than ever, it's easy to see that there should be a little *bitter* in everyone's future. The world could be better if everyone was a little more bitter.

Here are a few bitter recipes that come out mighty tasty:

Ordinary Bitter

Ingredients for 5 gal (19 L)

- 5 1/2 lb pale ale malt (Hugh Baird, Maris Otter or DeWolf-Cosyns recommended) (2.5 kg)
- 1/2 lb 60 °L Maris Otter crystal malt (0.2 kg)
- 1/2 lb corn or cane sugar (0.2 kg)
- 1 oz DeWolf-Cosyns black malt (28 g)

- 1 oz Northern Brewer hops, 7% alpha acid (28 g) (60 min.)
- 1/2 oz East Kent Goldings hops, 5.2% alpha acid (14 g) (15 min.)
- 1/2 oz Styrian Goldings hops, 5% alpha acid (14 g) (five min.)
- Optional: dry-hop with 1/2 to 1 oz of Kent Goldings or Styrian Goldings (14 to 28 g)
- Yeast Lab YLA01 liquid Australian ale culture or a well-attenuating strain with good fruity notes. Pitch a good one-qt. (0.9 L) starter.

- Original specific gravity: about 1.036
- IBUs: 33 to 34

Single infusion mash 90 minutes at 150 to 151 degrees F (66 degrees C). Raise to 168 degrees F (76 degrees C) for mash-out. Sparge with 170- to 175-degree-F (77- to 79-degree-C) water. Boil 90 minutes. Burtonize your water (see side bar on "Burtonizing" brewing water).

Ferment at 65 to 68 degrees F (18 to 20 degrees C) at least seven days. Rack with priming sugar (1.5 to 2 ounces cane sugar as syrup) and optional finings to cask or keg.

Extract brewers can substitute 3 to 3.5 pounds (1.4 to 1.6 kg) dry malt extract for the pale ale malt and steep the specialty grains.

Flossmoor Best Bitter

Ingredients for 5 gal (19 L)

- 7 1/4 lb Hugh Baird pale ale malt (3.3 kg)
- 1/2 lb 60 °L crystal malt (0.2 kg)
- 1/4 lb flaked wheat (0.1 kg)
- 1 1/3 oz Northern Brewer hops, 7.1% alpha acid, (38 g) (60 min.)
- 1/2 oz Styrian Goldings hop plug, 5% alpha acid (14 g) (dry-hopped in keg)
- ale yeast (Wyeast No. 1968 and 1028, Brewer's Resource CL-160, Brewer's Resource CL-130 and Yeast Culture Kit Co. NCYC 1187 are good choices.)

WATER TREATMENT: "BURTONIZING"

MUCH IS SAID ABOUT THE MINERAL CONTENT OF WATER in Burton-upon-Trent and the desirability of some sulfates in your water to complement the hop bitterness. Here are levels of important minerals in Burton water:

Calcium.....	268 ppm	Chloride	36 ppm
Magnesium	62 ppm	Sulfate	638 ppm
Sodium	54 ppm	Alkalinity (CO ₃)	200 ppm

COMPARE AN ANALYSIS OF YOUR LOCAL BREWING WATER to the description above. If you have low levels of minerals in your water, there are two things you should consider doing. First, take steps to rid your water of chlorine. You can either preboil the water to drive off the chlorine, or use a filter on your water tap. Second, "Burtonize" your water by adding some mineral salts. For a five-gallon batch, use additions on the order of the following:

2 - 3	tsp gypsum (calcium sulfate) (10 - 15 mL)		
1/2	tsp Epsom salt (magnesium sulfate) (2.5 mL)	If your water is soft or has high levels of minerals, add:	
1/4	tsp non-iodized table salt (sodium chloride) (1.2 mL)	1 - 2	tsp calcium carbonate (chalk) (5 - 10 mL)

BITTER IN NORTH AMERICA

A SHORT LIST of Two Bitter Men's favorite commercial examples in North America:

GOOSE ISLAND BREWING, Chicago, Ill.: ordinary and best bitter, IPA, ESB, Yorkshire Bitter and standard pale ale	COOPERSMITH'S, Fort Collins, Colo.: Albert Damm Bitter and ESB
GREAT LAKES BREWING, Cleveland, Ohio: Moondog Ale	DESCHUTES, Bend, Ore.: Bachelor Bitter and Mirrorpond Pale Ale
SHERLOCK'S HOME, Minnetonka, Minn.: Bishop's Bitter	BRIDGEPORT, Portland, Ore.: Blue Heron Bitter Ale and Bridge Port Ale
COMMONWEALTH BREWING CO., Boston, Mass.: Best Burton Bitter	WELLINGTON COUNTY, Guelph, Ontario: Arkell Best Bitter

- Original specific gravity: 1.044

Burtonize your brewing water. Mash grains at 150 degrees F (66 degrees C) for 90 minutes. Mash out at 170 degrees F (77 degrees C). Sparge and collect wort. Boil for 90 minutes.

Bitter

Ingredients for 5 gal (19 L)

- 5 1/2 lb DeWolf-Cosyns pale ale malt (2.5 kg)
- 3.4 lb 72 'L CaraMunich malt (0.3 kg)
- 1 lb flaked maize (0.5 kg)
- 2 oz DeWolf-Cosyns Special "B" malt (57 g)
- 2/3 oz Northern Brewers hops, 7% alpha acid (19 g)
- 1/3 oz Fuggles hops, 4% alpha acid (9 g) (60 min.)
- 1/2 oz Kent Goldings hops, 5% alpha acid (14 g) (10 min.)
- 1/2 oz Kent Goldings hops, 5% alpha acid (14 g) (two min.)
- ale yeast (See Flossmore Best Bitter examples.)

- Original specific gravity: 1.039

Burtonize your brewing water. Mash grains at 152 degrees F (67 degrees C) for 90 minutes. Mash out at 170 degrees F (77 degrees C). Sparge and collect wort. Boil for 90 minutes.

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- Good Beer Guide 1994, Campaign for Real Ale, 1994.

Tony Babinec is an award-winning home-brewer, Certified BJCP judge and board member of the Chicago Beer Society. Originally from East Chicago, Ind., he lives in Flossmoor, Ill., with his attorney and their year-old daughter. The rest of the time Tony is the marketing director for a statistical software company. His e-mail address is tony@spss.com.

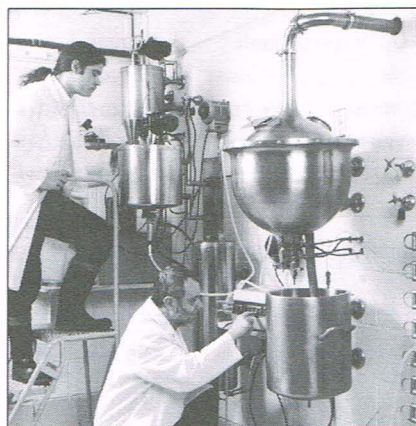
A native of Washington, D.C., Steve Hamburg is a National BJCP judge, home-brewer and Chicago Beer Society board

member. When not brewing, judging, drinking, traveling for beer or watching sports, he occasionally works as a software quality consultant. His e-mail address is shamburg@mcs.com.

Although Tony and Steve occasionally brew separately, they usually collaborate on their shared half-barrel pico-Brewing system as the Demented Brewers.

This article is available on Library, 13-AHA/zymurgy/Clubs on CompuServe's Beer and Wine Forum as BITTER.S95.

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1	tsp	Irish Moss
1/2	oz	Fuggle Hops (finishing hops)
3/4	cup	Priming Sugar (used at bottling)

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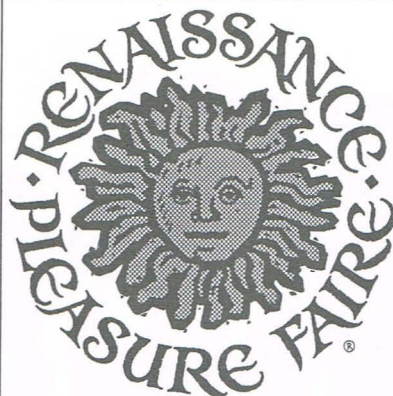
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A Bottler's Guide to Kegging

COLLECTING THE GEAR

Kegs

The standard homebrewer keg is a five-gallon (19-liter) container used by soft-drink bottlers for their pre- or post-mix syrups. They're also made in three- and 10-gallon (11- and 38-L) sizes, but those can be hard to find on the used market. They are made by several manufacturers, but have several features in common: all stainless-steel construction, inlet and outlet valves, a hatch cover for filling and (usually) a safety valve to vent excess pressure. Some feature hard rubber protectors around both top and bottom.

Beyond those basics, they come in two styles: ball lock or pin lock, depending on whether the fittings on top of the keg use shallow grooves where the ball bearings in the quick-disconnects fit, or protruding pins to secure the disconnects. The two types are used by competing bottlers and are designed to be incompatible with each other to make it difficult for a restaurant to experiment with the rival brand. There are two types of lids, oval and racetrack (which is a flattened oval). They are not interchangeable.

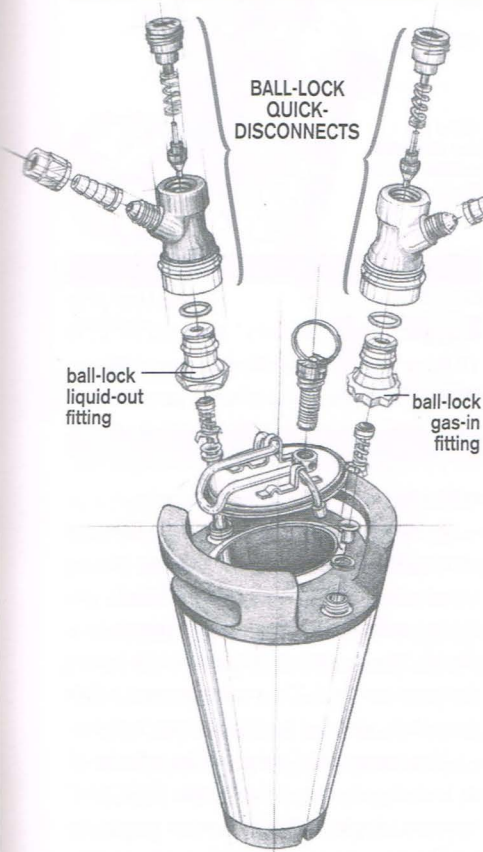
It really doesn't matter which you use, but it is easier to stick with only one type. If you happen to obtain a keg of the other type, you could buy a second set of quick-disconnects, or trade with a friend who's in the same position.

By Ed Westemeier

There's just something about fresh draft beer. It's not that the chore of bottling is such a big deal; after all, bottles are convenient to give to friends or send to competitions. It's great to be able to come home and grab a bottle of your own homebrew, but there's something even better about drawing a glass fresh from a keg.

You've probably admired those shiny cylinders many homebrewers use to "keg" their beers, but you may also have wondered how complicated it is to learn the techniques. In the words of a great homebrewer, relax. This article contains everything you need to know about dispensing your own beer from a keg. If you are a careful shopper you should be able to put a complete draft homebrew system together for \$150 or so. That may sound like a lot, but it's a lifetime investment that will give you many hours of pleasure and save many hours of bottling time.

BALL-LOCK KEG



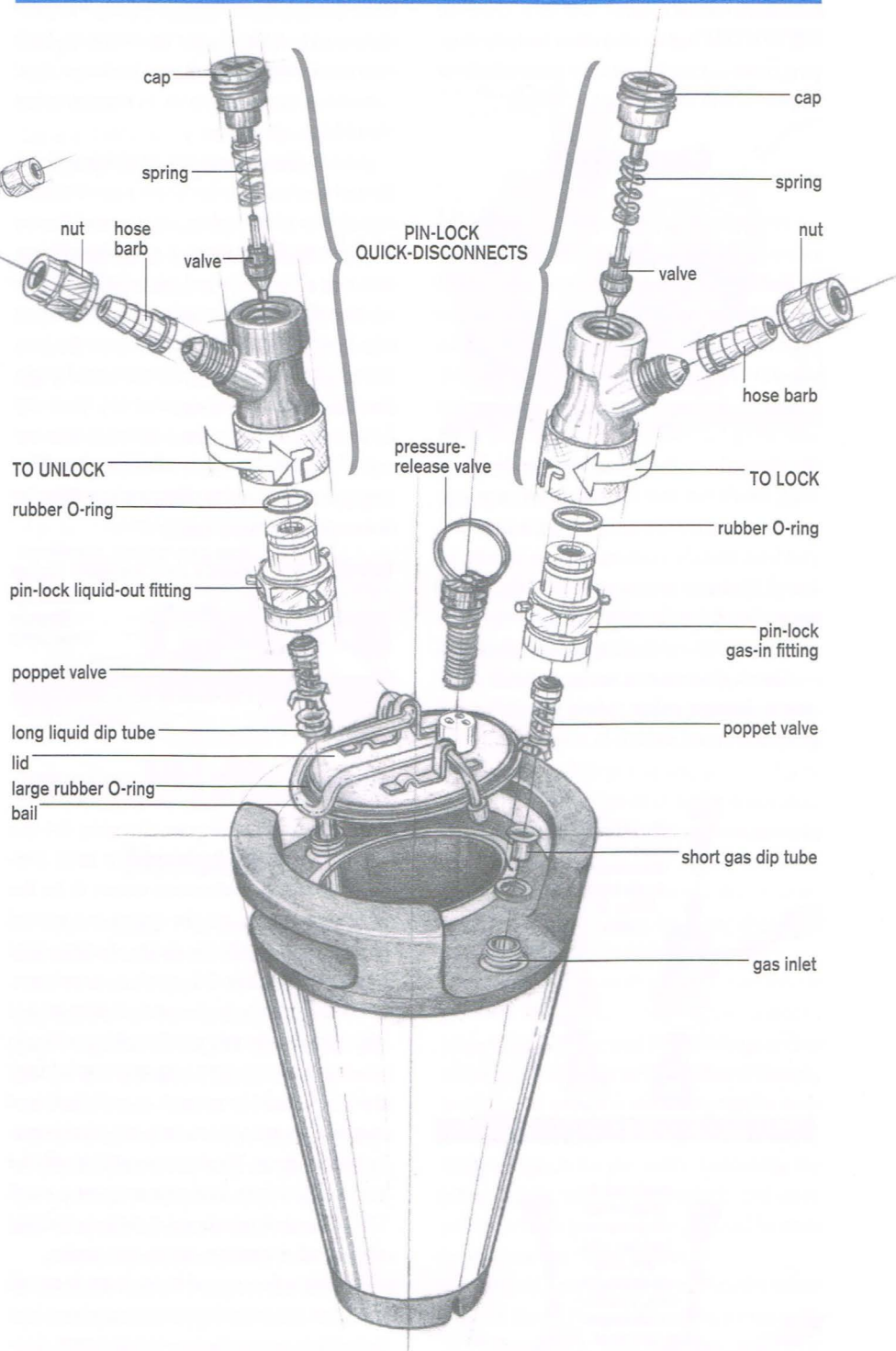
A variety of new plastic kegs is beginning to come on the market and I've heard many good reports about them, but 90 percent of the kegs used by homebrewers are the soda syrup kind.

The good news is that many bottlers are switching to a newer dispensing system, so used stainless-steel kegs are becoming available in large numbers. The bad news is that once they're gone, that's it. If you're even slightly interested in kegging homebrew, I'd advise buying some as soon as possible.

A few generalizations about kegs:

- Ball-lock kegs are usually easier to find.
- Ball-lock kegs are a little taller, so pin-lock kegs may fit more easily in your refrigerator.
- Ball-lock kegs are more likely to have a pressure-release valve in the lid.
- The standard ball-lock pressure-release valve is automatic, but can be used manually.
- The standard pin-lock pressure-release valve is only automatic (cannot be operated manually), and if it blows it reseats automatically (doesn't require replacement). Your keg may or may not have a manual pressure-release valve, but models with this feature are recommended.

PIN-LOCK KEG



- There are many different keg designs on the market. Your gear may not look exactly like the kegs illustrated.

New kegs typically cost between \$80 and \$100, but used kegs are normally available from many sources for half that price. Try your local soft-drink bottler. Our club found thousands of used ball-lock kegs in a local Pepsi® bottler's yard, and we were able to buy as many

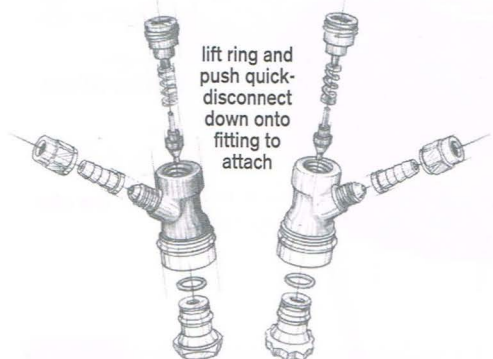
as we wanted for \$10 each. All had some syrup still in them and many were dented and unattractive, but they held pressure and the valves were in good condition. Cleaning them thoroughly and replacing the O-rings made them practically as good as new. Dealers in used restaurant equipment, scrap yards and restaurant auctions often have used kegs available. If none of these sources works out, several

homebrew suppliers carry used kegs. The price will be a little higher and often include shipping costs, but their kegs have generally been inspected and are quite a bit cleaner.

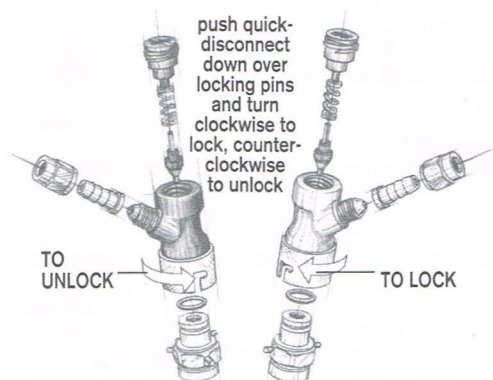
Connections

After acquiring your kegs (that's plural because you'll want a few), your next purchase probably will be some connectors, called quick-disconnects. There are two kinds for each style of keg: a gas-in connector and a liquid-out connector. If your kegs are the pin-lock style, it should come as no surprise that one fitting has two pins, the other has three. But if you have the more common ball-lock kegs, the fittings that the connectors attach to appear to be identical. If you look carefully, you'll see that their dimensions are slightly different. Trying to force a gas quick-disconnect onto a liquid keg fitting is a frustrating experience (that's the voice of experience speaking!).

Quick-disconnects are sometimes available in different colors to help you distinguish gas from liquid, which is a very good idea.



BALL-LOCK QUICK DISCONNECTS

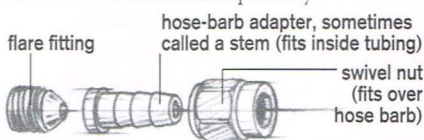


PIN-LOCK QUICK DISCONNECTS

These are some examples of gas and liquid connections. The base of the gas fittings for ball-lock kegs are usually indented with small notches.

Plastic quick-disconnects are fairly inexpensive at \$4 to \$7 each, but are prone to crack and break from frequent use. Stainless-steel versions generally are twice as expensive but should last a lifetime.

Quick-disconnects are available with either a hose barb to which you can clamp the end of your plastic tubing, or a threaded male flare fitting. Or by using a male flare fitting, you can attach a swivel nut and hose-barb adapter to the hose. A swivel nut that is part of a hose-barb adapter screws onto the flare fitting. Either method works well, but I prefer the male flare/swivel nut assembly. That way I can simply screw a keg connector onto the swivel nut and I'm ready to use my keg. This way it is also easier to clean and sanitize the hoses and connectors separately.



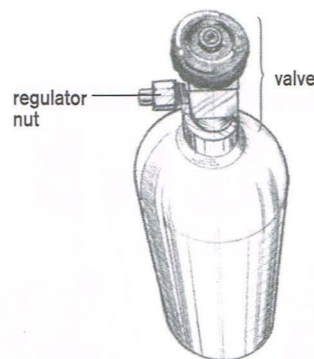
FLARE/HOSE BARB/SWIVEL NUT

CO₂ Tank

The next item on your shopping list is a carbon dioxide (CO₂) cylinder. The most common size for homebrewers seems to be the five-pound tank. It is the shape of a typical fire extinguisher and is made of either steel or aluminum. My CO₂ tank is aluminum, about five inches in diameter and 18 inches high. This is a handy size for taking with you when you travel with a keg, and one full tank this size should be enough to carbonate and dispense up to a year's worth of typical homebrewing output. The five-pound size sells for \$50 to \$100 new, half that amount if used. Check bar and restaurant suppliers, welding shops and fire extinguisher companies.

Filling a five-pound tank costs about \$9 to \$12 in my area, depending on where I go. Industrial gas suppliers, welding supply dealers, fire extinguisher companies and soft-drink bottlers are all good sources, so check your phone directory and call around. Not all are willing to bother with such small orders and some refuse to fill aluminum tanks.

When you buy a CO₂ tank, be sure it has a current certification. It is required by law to have a pressure test every five years, and to be stamped with the certification date. For



CO₂ TANK

example, mine has "5-91" stamped on it, so I'll have to get it recertified in May 1996 by taking it in to the place where I get it filled. If it fails the certification, which rarely happens, they'll drill a hole in the side, making it necessary to buy a new tank.

In many areas you can avoid the hassle of recertifying a tank by simply leasing one instead of buying it. With a leased tank, you merely exchange it for a full one when yours is empty. The supplier is responsible for having the tanks certified. The exchange costs a little more than a fill, but it may be worth it to you.

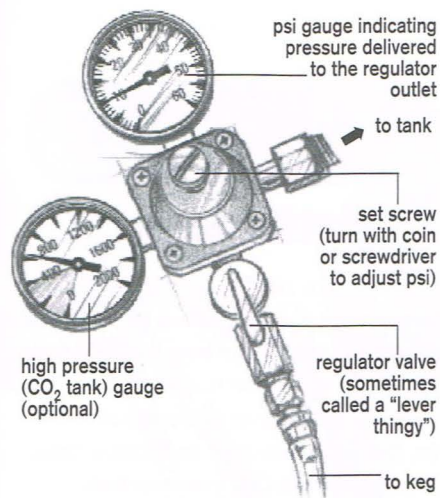
The empty (tare) weight of the cylinder also is stamped on it. For example, "TW 7.50" means it weighs 7.5 pounds when empty. After filling with five pounds of CO₂ it should weigh 12.5 pounds. Weigh your tank at home right after you get it filled so you'll be able to tell how much CO₂ is left in it by weighing it again.

If you don't plan to take your kegs to parties, or if your production of homebrew is starting to increase, you should consider a 20-pound CO₂ tank. My 20-pound tank is about eight inches in diameter, 27 inches high and weighs 50 pounds when full, including the regulator. The advantage of a 20-pound tank is that it only costs a few dollars more to fill it than a five pounder, but it holds four times as much. If you shop around, the 20-pound size can often be found for less than \$100 new or \$50 to \$60 used, but in any case shouldn't cost more than \$125.

Always keep CO₂ cylinders secured in the upright position to avoid accidents and injury. Keeping the keg upright will keep liquid CO₂ out of the regulator, which could damage it.

Regulator

A full CO₂ tank holds a pressure of 800 pounds per square inch (psi) at room temperature. That's a bit more than the 10 to 30 psi I need to carbonate or dispense my beer,



REGULATOR

so a regulator is a must. The regulator screws onto the tank valve and reduces the pressure to safe levels. A set screw lets you adjust the regulator's output pressure with an ordinary screwdriver (or even a dime) and a gauge shows the working pressure coming out of it (you rarely need more than 25 to 30 pounds).

The CO₂ in the tank starts out as liquid, and the pressure of the gas in the head space of the tank will be between 700 and 800 psi depending only on the temperature of the cylinder. The high-pressure gauge on the regulator will only begin to fall when all the liquid is gone. Depending on your tank size, this could be enough CO₂ to dispense only part of a keg. The accurate way to estimate how much CO₂ is left in a tank is by weight, not by pressure.

The regulator may have a hose barb adapter to which you can clamp a piece of tubing. Otherwise, it has a flare fitting to which you can screw a hose barb attached to your tubing. Regulators come in many styles and cost anywhere from \$25 to \$75 new. You can generally find them at any place that sells CO₂ tanks.

Miscellaneous Parts

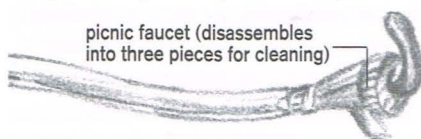
The faucet is the familiar plastic gizmo with a lever that you press to start the flow of beer. You'll find them at most homebrew suppliers, beer distributors or bar-supply dealers. It's inexpensive at \$4 to \$7 and works well provided you have the correct pressure behind it. It may not be obvious, but the typical faucet easily disassembles into three pieces for cleaning.

Flexible plastic tubing is used between the CO₂ tank and the keg's gas-in connection, and between the keg's liquid-out connection and the faucet. Your best bet is three-sixteenths-

inch ID (inside diameter) food-grade vinyl (not polyethylene) tubing. You can probably find this at a local hardware store for less than 50 cents per foot. Buy at least 10 feet to start. Cut it in half and use five feet for each line.

A gauge cage is a nice investment for \$10 to \$15. This is a steel wire frame that attaches to the regulator and protects the gauges from breakage in case the tank falls over.

Some regulators come with a one-way check valve that makes it impossible for beer to accidentally flow back into the regulator and ruin it. Check valves come in many shapes and sizes and can be difficult to spot. Check with the manufacturer to see if your equipment includes this feature. You can add it later to any regulator if you decide you want the extra peace of mind. Like the gauge cage, a check valve is not necessary, but I recommend getting both because a regulator is one of the most expensive parts to replace of your whole system.

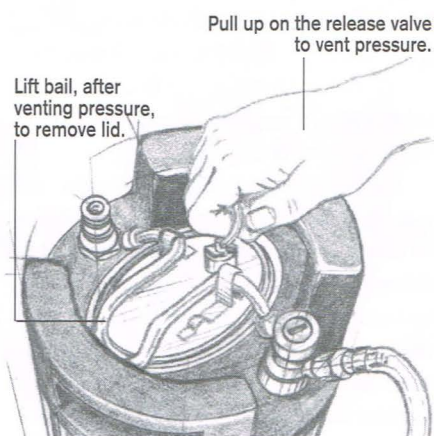


PICNIC FAUCET

Disassembly

When you get your used kegs home, the first order of business is a thorough cleaning. First, vent any pressure by lifting the tab or ring attached to the pressure-release valve. If there's no safety valve, press down on the poppet in the center part of the gas fitting (labeled "in") with a key or small screwdriver. If you vent the liquid or "out" fitting first, you will get an unpleasant shower. Kegs are almost always shipped with some pressure in them: be certain to release all of it for safety reasons.

With the pressure vented, you'll be able to open the hatch. Lift up on the bail. There are many different types, but you'll see a steel wire frame that obviously is meant to be lifted up. Using this bail as a handle, push the hatch cover down into the keg an inch or so (don't drop it). If you can't budge it, there is still pressure in the keg, so go back to the previous step and release the pressure. Caution: When new these kegs are rated to hold up to 130 psi of pressure so you could injure yourself if you try to force the lid open with pressure inside. After pushing the cover down a



REMOVING LID

little, rotate it a quarter turn and you'll be able to lift it right out.

Notice the large rubber O-ring on the lip of the cover. After years of contact with soft-drink syrup, the rubber is thoroughly impregnated with the stuff and I've never found an effective way to remove the aroma. You don't want that flavor in your beer, so it's best to replace the O-ring. Many homebrew suppliers carry them, and some even offer kits to replace all the O-rings in a keg. If you're lucky enough to have a well-stocked hardware store nearby you may be able to find them, but take an old one along to be sure you get the same size and one of food-grade quality. A complete set of new O-rings for a keg shouldn't cost more than \$5 to \$7 in most areas.

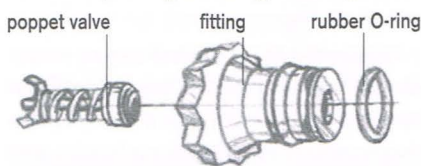
Using an open-end (your only option for pin-lock fittings) or deep-socket wrench, loosen both the gas and liquid fittings on top of the keg. There are several sizes of fittings, but the most common are seven-eighths-inch diameter for ball-lock kegs and thirteen-sixteenths-inch for pin locks. Loosening the fittings might take some strength, but once you have them loosened, they should be easy to unscrew with your fingers.

Remove both fittings as well as the tubes beneath them. The gas fitting has a short tube and the liquid fitting has a long tube that goes all the way to the bottom of the keg. Each tank fitting has a small O-ring around it on the outside, and each tube has an even smaller O-ring around it. All four of these O-rings should be replaced for the same reason as the large one. You may be able to find food-grade quality replacements at the local hardware store, but a homebrew supplier will be your best bet. Keep in mind that pin- and

ball-lock kegs use slightly different size O-rings. They are sometimes interchangeable.

Inside the fittings you'll find the actual valve, called a poppet, that may need to be replaced if you find out it leaks.

If either dip tube is plastic, try to replace it with a stainless-steel version. This can't always be done because some nylon dip tubes are a different size than their stainless counterparts, and are not interchangeable. Plastic will have absorbed soda smells — something you don't want. While you have the dip tubes disassembled for cleaning, trim the gas tube with a tubing cutter down to about one-half to three-quarters inch if it is longer. This will prevent beer from pushing into the gas tubing.



DISASSEMBLED FITTING

Cleaning

With the kegs disassembled, a thorough cleaning is a must. First, rinse the keg, fittings and tubes with hot water to remove obvious syrup residue. Then fill the keg with very hot water and one-quarter cup (59 mL) of a cleaning agent such as trisodium phosphate (TSP

is available as wall cleaner in bulk sizes at paint stores), washing soda or B-Brite. Drop in the small parts, including the hatch cover, and let it all soak for no more than a few hours. You may need to scrub the inside of the keg with a nylon bristle carboy brush or nylon scrubbing pad to remove stubborn residue. Don't worry about scratching the inside surface, just get it clean.

Replace the tubes and fittings (with their new O-rings) and tighten them securely. Be sure you have put the gas fitting on the "in" side of your keg, and the beer fitting on the "out" side. Fill the keg with very hot water and cleaning agent again, then replace the hatch cover with its new O-ring and secure it by tightening the bail. Now turn the keg upside down and let it soak for another few hours. This step cleans the inside top of the keg as well as the inside of the fittings. Rinse thoroughly with hot water several times when you're done, giving the keg a good shaking when you do.

Some people like to store their kegs filled with a sanitizing solution like one-half ounce (15 mL) of iodophor in five gallons (19 L) of water. Don't use hot water because it will reduce the effectiveness of the iodophor. Don't use chlorine bleach for this purpose because prolonged exposure can damage the stainless steel — even short exposure can pit the kegs at the bleach-water/air interface.

USING THE GEAR

Filling the Keg

Among the advantages of kegging your homebrew is no longer having to wait a couple of weeks until your beer is carbonated. Another is being able to completely forget about the sediment on the bottom of the bottle. The solution to both problems is forced carbonation with CO₂ from your tank.

As soon as your fermentation has completely finished and your beer is clear, you're ready to keg. Here's the procedure I use: To sanitize the keg thoroughly, I fill it with five gallons (19 L) of water and one-half ounce (15 mL) of iodophor, seal the hatch and let it sit for at least 10 to 20 minutes. Then I turn it upside down and let it sit for another 10 to 20 minutes. Finally, I turn it right side up, open the hatch and empty it. I leave it upside down in the sink while I prepare everything else. That allows it to air-dry, so rinsing isn't necessary. If you use a different sanitizer than iodophor, a final rinse with pre-boiled water would be advisable.

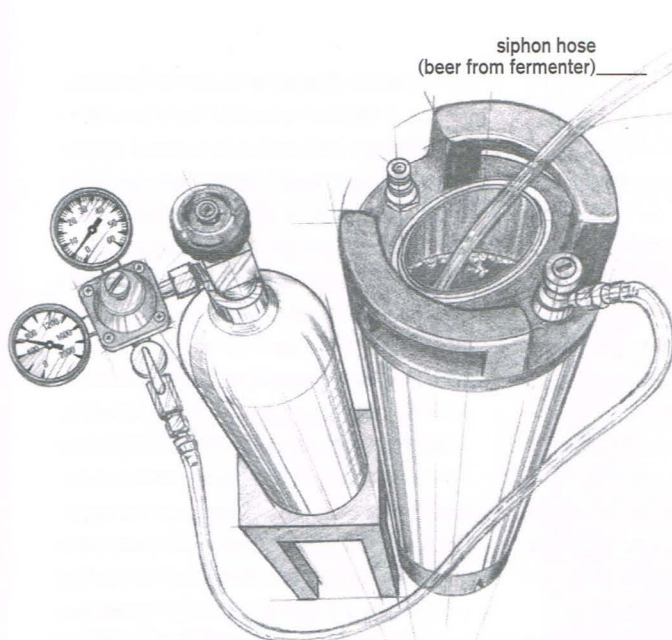
To connect the CO₂ tank to the keg, attach one end of a length of tubing to the regulator and the other end, with the gas-in quick-disconnect, to the gas fitting on the keg.

TABLE 1: Pressure Required for Desired Carbonation

DIRECTIONS: Look down the left column to find your keg temperature and read across to the number in the column corresponding to the desired carbonation level. That number is the CO₂ pressure to apply to the beer, in psi.

Temp (°F)	Volumes of CO ₂ desired													
	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
32	0.6	1.6	2.5	3.5	4.4	5.4	6.3	7.3	8.2	9.2	10.1	11.0	12.0	12.9
34	1.3	2.3	3.3	4.3	5.3	6.3	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.1
36	2.1	3.1	4.1	5.1	6.2	7.2	8.2	9.2	10.2	11.2	12.3	13.3	14.3	15.3
38	2.8	3.9	4.9	6.0	7.0	8.1	9.1	10.2	11.2	12.3	13.3	14.4	15.4	16.5
40	3.6	4.7	5.7	6.8	7.9	9.0	10.1	11.2	12.3	13.4	14.4	15.5	16.6	17.7
42	4.3	5.5	6.6	7.7	8.8	10.0	11.1	12.2	13.3	14.4	15.5	16.7	17.8	18.9
44	5.1	6.3	7.4	8.6	9.7	10.9	12.1	13.2	14.4	15.5	16.7	17.8	19.0	20.1
46	5.9	7.1	8.3	9.5	10.7	11.8	13.0	14.2	15.4	16.6	17.8	19.0	20.2	21.3
48	6.7	7.9	9.1	10.4	11.6	12.8	14.0	15.3	16.5	17.7	18.9	20.1	21.4	22.6
50	7.5	8.7	10.0	11.3	12.5	13.8	15.0	16.3	17.6	18.8	20.1	21.3	22.6	23.8
52	8.3	9.6	10.9	12.2	13.5	14.8	16.1	17.3	18.6	19.9	21.2	22.5	23.8	25.1
54	8.9	10.4	11.8	13.1	14.4	15.7	17.1	18.4	19.7	21.1	22.4	23.7	25.0	26.3
56	9.9	11.3	12.6	14.0	15.4	16.7	18.1	19.5	20.8	22.2	23.6	24.9	26.3	27.6
58	10.7	12.1	13.6	15.0	16.4	17.8	19.2	20.6	21.9	23.3	24.7	26.1	27.5	28.9
60	11.6	13.0	14.5	15.9	17.3	18.8	20.2	21.6	23.1	24.5	25.9	27.4	28.8	30.2
62	12.4	13.9	15.4	16.9	18.3	19.8	21.3	22.7	24.2	25.7	27.1	28.6	30.0	31.5
64	13.3	14.8	16.3	17.8	19.3	20.8	22.3	23.8	25.3	26.8	28.3	29.8	31.3	32.8
66	14.2	15.7	17.3	18.8	20.3	21.9	23.4	25.0	26.5	28.0	29.6	31.1	32.6	34.1
68	15.1	16.6	18.2	19.8	21.4	22.9	24.5	26.1	27.6	29.2	30.8	32.4	33.9	35.5
70	15.9	17.6	19.2	20.8	22.4	24.0	25.6	27.2	28.8	30.4	32.0	33.6	35.2	36.8
72	16.8	18.5	20.1	21.8	23.4	25.1	26.7	28.4	30.0	31.6	33.3	34.9	36.5	38.2
74	17.8	19.4	21.1	22.8	24.5	26.2	27.8	29.5	31.2	32.9	34.5	36.2	37.9	39.5
76	18.7	20.4	22.1	23.8	25.5	27.2	29.0	30.7	32.4	34.1	35.8	37.5	39.2	40.9
78	19.6	21.4	23.1	24.9	26.6	28.4	30.1	31.8	33.6	35.3	37.1	38.8	40.5	42.3
80	20.5	22.3	24.1	25.9	27.7	29.5	31.2	33.0	34.8	36.6	38.3	40.1	41.9	43.7

(Table developed by Alan Edwards, ale@cisco.com. Used here with permission.)



FILLING THE KEG FROM FERMENTER

You can leave the gas tubing attached to the regulator for future use.

To avoid oxidation, purge the air from the keg by turning on the CO₂ for 10 seconds or so at 5 psi. CO₂ will enter the keg, sink to the bottom and push the air out the open top. Do this just before racking the beer into the keg because the CO₂ and air will mix together after a while.

Turn the regulator off and rack the beer from the fermenter to the bottom of the keg to avoid splashing. As the beer fills the keg, the CO₂ is gradually pushed out, leaving a blanket of carbon dioxide to protect the surface of the beer from the air.

Replace the hatch cover. The gas-in line is still connected to the keg, so set the regulator to about 5 psi and fill the head space of keg with CO₂ (listen for the gas to stop flowing). Turn off the CO₂. Open the safety valve to let almost all the pressure out, then fill the keg with CO₂ again. Do this three times to purge any remaining air from the head space in the keg. Now you're ready to carbonate the beer.

Carbonation

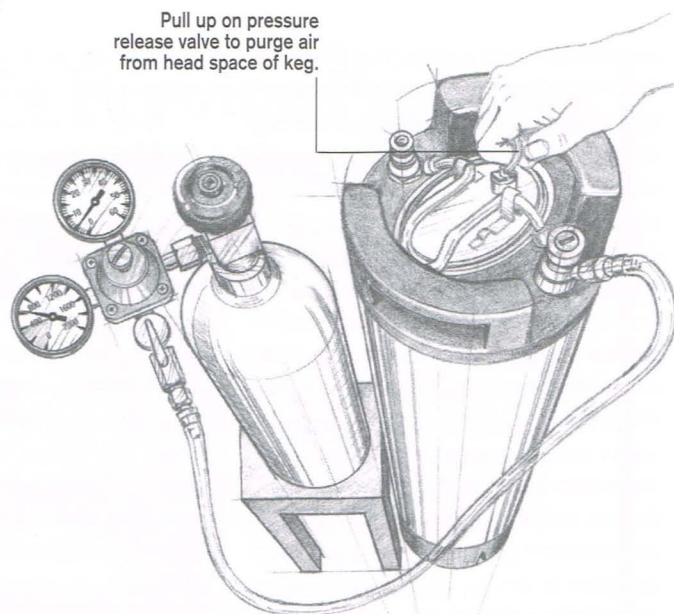
The first step is to determine how much carbonation you want. The dial gauge on your regulator is calibrated in pounds per square inch but carbonation is generally measured in volumes of CO₂ (for the quantity of gas that is actually dissolved in the beer). For English styles like bitter, about 1.5 to 1.8 volumes of

CO₂ are about right. For effervescent styles like German weizens, 2.8 to 3.0 volumes can be used. For most other beers, something in the 2.4 to 2.6 range seems to work best.

The colder the beer, the more easily CO₂ can be dissolved in it, so it's important to know the temperature of the beer in your keg before you begin. Let's assume the beer you just kegged is 42 degrees F (6 degrees C). With most beers, you want carbonation to be in the range of 2.2 to 2.6 volumes of CO₂. By using Table 1, you learn you'll need about 10 psi at 42 degrees F (6 degrees C) for 2.2 volumes of CO₂. For this style at this temperature, you want to apply 10 psi of CO₂ pressure until as much CO₂ as possible is dissolved in the beer. The colder your beer is, the less pressure it will take to carbonate it.

So you are ready to carbonate. Your CO₂ tank is hooked up to the gas-in connection, hatch cover is on and air is purged from the keg's head space. Now turn on the CO₂. Turn the screw on the regulator to set it for (in this example) 10 pounds. Now listen to the CO₂ flow. As the pressure reaches equilibrium, the flow will slow down and eventually stop (this won't take more than a few minutes). The reason it stopped so soon is that when the keg is upright there is only a small surface area where the gas can dissolve into the beer.

Shaking the keg will agitate the surface and start the flow again. To make this process more efficient, I like to roll the keg on its side back and forth on the floor with my foot while



"BURPING" THE KEG

listening to the gas flow. Don't try this unless you have a check valve in the system, though, otherwise there is a chance that beer will back up the gas line. If beer gets into the regulator the regulator could be ruined. The more vigorously I agitate the keg, the more gas flows. Eventually, it stops flowing no matter how much I shake the keg. That means my beer is fully carbonated. This process can take up to 15 minutes at 42 degrees F (6 degrees C), with faster results at lower temperatures.

Even though carbonation is complete, I know the beer will be foamy because of all the agitation, so I set the keg back upright and disconnect it. After a few hours the beer settles and is ready to serve.

An alternate method if you don't have a check valve or you don't have time to shake the keg is to simply leave the keg standing upright with the CO₂ connected and the pressure set at 10 psi (if you can't keep the keg at 42 degrees F, check Table 1 for the psi you should apply). The potential drawback with this method is that unless all the connections in the system are very tight you may lose some of your CO₂ to leakage. It can take a few days to carbonate the beer if the keg is standing upright at 42 degrees F, but you can reduce that time if you give the keg a bit of a shake every time you pass by.

If you plan to cool the keg to an even lower temperature, put a few more pounds of pressure on it first. The gas in the head space of the keg will dissolve quickly when the beer

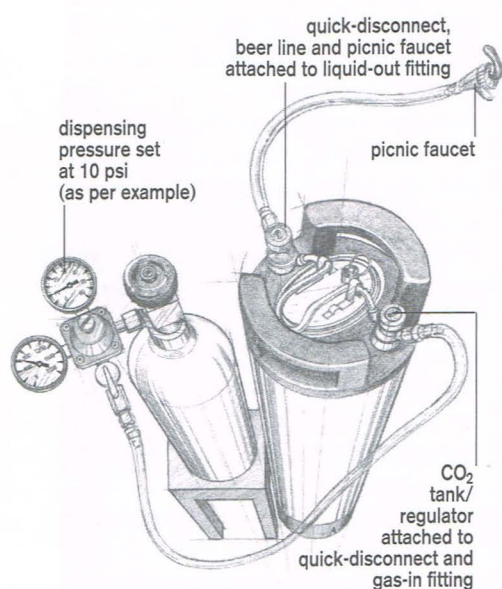
cools down and it's possible that this will let the O-ring leak on an old keg. If the seal isn't tight (from the internal pressure of the keg) all the gas can come back out of solution and escape through the leaky O-ring leaving you with flat beer.

The third way to carbonate beer in a keg is to simply treat it as a giant bottle, using one-half cup (118 mL) of corn sugar to prime. This method works as well as any other, but with two possible drawbacks. First, there's the problem of sediment on the bottom of the keg. That can be avoided to some extent by cutting off the bottom half inch of the liquid dip tube. Second, the large O-ring in some older kegs may not form a perfectly tight seal, and as carbonation is developed it could leak out through the seal, leaving you with flat beer.

Regardless of which method you use, you'll notice that the carbonation level improves with time. After a few days, the bubbles will seem finer and the head on your beer will probably be longer lasting. After a week or two, the carbonation will be so perfect you may never go back to bottling. Science still hasn't completely explained this effect, but it's clear that something wonderful is happening to the carbonation quality as the beer matures.

Dispensing Basics

So you are ready to sample a glass of your freshly kegged and carbonated homebrew —



DISPENSING

what do you do now? The simplest way involves a little trial and error, but don't worry.

Attach the beer-out quick-disconnect to the flexible dispensing hose and beer faucet then attach this assembly to the beer-out fitting of the keg. The pressure on your regulator should be at 10 psi (the carbonating pressure from our example). Depress the lever on the faucet completely and fill your beer glass. If your glass fills with foam, turn the pressure on the regulator down one or two psi and try again. If no beer comes out, double check to make sure the gas is turned on. If the beer just trickles out or seems undercarbonated or flat, increase the pressure one or two psi and try again. Believe it or not, this is the easiest way to dispense for the first time.

In reality, proper dispensing depends on several variables including length and diameter of the dispensing line and the material it is made of.

ID Material	3/16" vinyl	3/16" poly	1/4" vinyl	1/4" poly
Restriction factor	3	2.2	0.85	0.5

As a general rule you want to wind up with 0.5 psi at the picnic faucet. To do this, multiply the length of your dispensing line by its restriction factor from Table 2 and set your regulator 1 or 2 psi above the resulting number. The pressure will drop as the beer travels up the keg's dip tube, through the length of line and into your glass. For fine tuning, you can raise and lower the level of the faucet and glass to make minor pressure changes. By raising the glass you lower the dispensing pressure slightly, by lowering the glass you raise the pressure slightly. Proper dispensing also depends on the temperature of your beer and dispensing line. You may need to adjust your pressure to perfect your pour. For more information see Dave Miller's chapter, "Setting Up Your Home Draft System" in *Just Brew It!* (Brewers Publications, 1992).

Storage

When you are done serving you can turn off the CO₂ tank and remove the gas quick-disconnect and beer line. Now store your beer in a cool location until next time. In the winter it may be enough to simply put a plastic bag over the top of the keg to protect it

from dust and store it outdoors or in the garage. If that isn't possible, keep it at room temperature and dispense it into a frozen mug. Once you start kegging you may want to pick up a used refrigerator. Many keggers store their kegged beer in a spare refrigerator to keep it at serving temperature. Others like to keep the refrigerator even colder for lagering. Some even keep the beer they're currently serving standing next to the fridge, with the beer line running through one wall of the fridge, into a cold plate stored inside with the lagering tanks, and then out the other side to a beer tap mounted on the opposite wall of the fridge. (Caution: if you do this be absolutely certain there are no cooling coils inside the wall of the fridge where you make the holes, and seal the holes with silicone caulk so the insulation does not get wet from condensation, ruining the efficiency of the refrigerator.) Even if you don't have the luxury of a brewing refrigerator (although the freezer compartment makes a great place to store your hops!), you can still enjoy your own draft beer. A cold plate or jockeybox (coiled copper tubing packed with ice in a picnic cooler) will do the job nicely. See *zymurgy* Fall 1991 (Vol. 14, No. 3) for a great article by Teri Fahrendorf on building and using a jockeybox.

There's a lot of information here and you'll probably discover your own tricks and techniques for working with kegs. I could discuss many more things like counterpressure bottle filling and transporting kegs for parties, but there's enough here to get you started. In addition to what you've learned here, find a local club of homebrewers and ask them for ideas. If you have any lingering doubts, they'll put them to rest immediately. Homebrewers who begin kegging their beer rarely look back. There's just something about fresh draft beer.

Further Reading

Other articles that discuss draft systems: "Closed System Pressurized Fermentation" by Teri Fahrendorf, *zymurgy* Special Issue 1992 (Vol. 15, No. 4). "Counterpressure Bottling" by Dan Fink, *zymurgy* Special Issue 1992 (Vol. 15, No. 4). "A Great System for Draft Beers" by Byron

Burch, *Beer and Brewing* Vol. 10, pp. 177-189, Brewers Publications, 1990.

"Kegging Basics and A Buyer's Guide to Kegging Equipment" by Dan Fink, *zymurgy* Special Issue 1992 (Vol. 15, No. 4).

"Kraeusening and Cold-Hopping Soda Kegs" by Cy Martin, *zymurgy* Winter 1989 (Vol. 12, No. 5).

"Racking from Carboys to Soda Kegs" by Cy Martin, *zymurgy* Winter 1989 (Vol. 12, No. 5).

"Setting Up Your Home Draft System" by Dave Miller, *Just Brew It! Beer and Brewing* Vol. 12, pp. 201-214, Brewers Publications, 1992.

"A Simple Keg System" by Malt Disney, *zymurgy* Winter 1986 (Vol. 9, No. 5).

"Soda Keg Draft Systems — Better than Bottles?" by Jackie Rager, *zymurgy* Winter 1989 (Vol. 12, No. 5).

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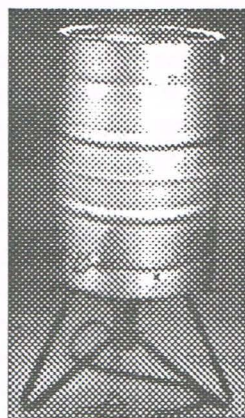
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BREW BY THE

Have you ever wondered just how much wallop your favorite homemade

NUMBERS —

beverage packs, alcoholwise and caloriewise? Have you ever heard your

ADD UP WHAT'S

brewing buddies talk about apparent extract and real attenuation and wondered

IN YOUR BEER

what all the hubbub was about? It's not as hard to understand as you might think.

IN THE FOLLOWING ARTICLE I WILL DEVELOP EQUATIONS TO DESCRIBE MANY DIFFERENT FACETS OF HOMEBREWING. In each section, I first give an equation that is as accurate as possible, including the effects of all of the important parameters. This equation is sometimes rather complicated, but the idea is to program it into a computer spreadsheet and never look at it again. Then, where possible, I simplify the equations using appropriate assumptions so that calculations can be made on the fly in the brewery or kitchen.

One thing I should explain at the outset is curve fitting. There are many occasions when a functional relationship for a set of data is needed but not available. Curve fitting (also called regression or least-squares fitting) is nothing more than a mathematical way to draw the best curve through a set of experimental data points. In this article I use quadratic ($a + bx + cx^2$) and cubic ($a + bx + cx^2 + dx^3$) functions to draw the curves.

SPECIFIC GRAVITY

Specific gravity is defined as the density of a substance relative to the density of water. This is not quite sufficient as a definition because the density of water varies with temperature. Above 39 degrees F, water expands as it heats up, making it necessary to specify the temperature when indicating a specific gravity.

The most common way for a homebrewer to measure specific gravity is to use a hydrometer. A hydrometer measures the density of a fluid in units of the density of water at some reference temperature (the temperature at which the hydrometer is calibrated). In other words, the measurement you get from your hydrometer is really

$$\text{Measured SG} = \frac{\text{density of wort at temperature } T}{\text{density of water at reference temperature}} \quad (1)$$



BY
MICHAEL L.
HALL, PH.D.

For most of the hydrometers available to homebrewers the reference temperature is 60 degrees F, which is the value that will be used in the rest of this section.

The measured specific gravity value must be temperature corrected before it is meaningful. The ideal way to do this would be to convert the density of the wort to the reference temperature, like this:

$$\text{Ideal SG} = \frac{\text{density of wort at } 60^{\circ}\text{F}}{\text{density of water at } 60^{\circ}\text{F}} \quad (2)$$

Modifying the wort density to account for temperature is not that easy, however, because we don't have tabulated data for the variation of wort density with temperature for every possible wort composition. Fortunately, the temperature coefficients of expansion for wort and water are practically the same, making the density ratio roughly invariant to temperature. Making this assumption leads us to this equation:

$$\text{Corrected SG} = \frac{\text{density of wort at } T}{\text{density of water at } T} \quad (3)$$

$$= \left(\frac{\text{density of wort at } T}{\text{density of water at } 60^{\circ}\text{F}} \right) \left(\frac{\text{density of water at } 60^{\circ}\text{F}}{\text{density of water at } T} \right)$$

$$= (\text{Measured SG at } T) (\text{SG correction factor})$$

This correction factor is solely a function of the density of water at various temperatures, which is well-known. I made a curve fit to some data from a couple of sources (De Clerck, Weast) that yielded the SG correction factor as a function of measuring temperature (T in Fahrenheit):

$$\text{SG correction factor} = 1.00130346 - 1.34722124 \times 10^{-4} T + 2.04052596 \times 10^{-6} T^2 - 2.32820948 \times 10^{-9} T^3 \quad (4)$$

This equation is accurate over the entire region from 32 degrees F to 212 degrees F.

If you're putting this equation in a spreadsheet, the most accurate way to do it would be to multiply your measured specific gravity by the correction factor evaluated at the temperature at which the SG measurement was made, as shown in Equation 4. However, for the times when it is easier to just add or subtract a point or two, we can make the following approximation. Both the measured SG and the correction factor are numerically very close to one. If we represent them by one plus a small number (e_{SG} or e_{CF}), then

$$\begin{aligned}\text{Corrected SG} &= (\text{Measured SG at } T) (\text{SG correction factor}) \\ &= (1 + e_{SG}) (1 + e_{CF}) \\ &= 1 + e_{SG} + e_{CF} + e_{SG} e_{CF}\end{aligned}\quad (5)$$

Because both e terms represent small quantities, multiplying them together makes a number that is very small with respect to the other terms and can be neglected. This yields

$$\begin{aligned}\text{Corrected SG} &\cong 1 + e_{SG} + e_{CF} \\ &= (\text{Measured SG at } T) + (\text{SG correction factor} - 1)\end{aligned}\quad (6)$$

So, instead of multiplying by the correction factor, you can just add the correction factor minus one. Table 1 gives the additive correction factors (in points, see SG in glossary for explanation) as a function of the measuring temperature. Using an additive correction factor is not as accurate as the multiplicative correction factor, but it is easier and is adequate for most circumstances.

EXTRACT

Since the early days of brewing, brewers (and drinkers) have been concerned about the strength of their concoctions. One measure of wort strength is how much material has been extracted from the malted grains into solution by the mashing and lautering processes. The term "extract" refers to the weight percent of dissolved materials in the wort. Weight percent is percent by weight. For example, if you have five pounds of sugar in a solution that weighs 100 pounds total, the solution is 5 weight percent sugar. (Incidentally, this is also 5 °Plato.)

The only difficulty with this is that there is not a good way to measure the amount of dissolved materials, short of evaporating your wort until you have dry malt extract, measuring the weight of the powder and then dividing by the weight of the original solution. One thing that you can measure is the specific gravity, which is the density of the solution relative to the density of water. But there is still a problem: the dissolved materials are made up of fermentable sugars, non-fermentable sugars, proteins and other goodies, with proportions that vary from wort to wort. How can the relationship between weight percent of solids and specific gravity be determined if the identity of the solids isn't even known?

In 1843, Carl Joseph Napoleon Balling determined a way around this problem. He noticed that the specific gravity of a wort increased with the weight percent of dissolved materials in almost the same

TABLE 1: SPECIFIC GRAVITY TEMPERATURE CORRECTION

Measuring Temperature (F)	Addition to Specific Gravity in points	Measuring Temperature (F)	Addition to Specific Gravity in points
32	-0.83	105	6.96
40	-0.97	110	8.08
45	-0.84	115	9.26
50	-0.69	120	10.50
55	-0.38	125	11.80
60	0.00	130	13.16
65	0.53	140	16.07
70	1.05	150	19.15
75	1.69	160	22.45
80	2.39	170	25.93
85	3.17	180	29.59
90	4.01	190	33.40
95	5.01	200	37.35
100	5.91	212	42.42

NOTE: Subjecting a room-temperature hydrometer to 212-degree-F temperatures can result in a broken hydrometer.

manner as if the dissolved materials were entirely sucrose. He could do all of his experiments with pure sucrose and water, and they would be a good approximation to beer worts. After making up sugar solutions, Balling developed a table relating the density of the solution (at 17.5 degrees C) to the weight percent of sugar. He measured the weight percent in degrees Balling (°B), defined as the number of grams of sugar per 100 grams of wort. Several years later, around 1900, Dr. Fritz Plato corrected some slight mistakes and developed his own set of tables, calling the corrected unit a degree Plato (°P). To convert back and forth between extract (E) in degrees Plato and specific gravity (SG), you can use these equations:

$$E = -668.962 + 1262.45 \text{ SG} - 776.43 \text{ SG}^2 + 182.94 \text{ SG}^3 \quad (7)$$

$$\text{SG} = 1.00001 + 0.0038661 E + 1.3488 \times 10^{-5} E^2 + 4.3074 \times 10^{-8} E^3 \quad (8)$$

These equations are accurate cubic fits that I did to Plato's data (Timmermans) over the range of 0 to 33 °P, which covers specific gravities between 1.000 and 1.144. A simpler formula that is good for most applications is:

$$E = 1000 (\text{SG} - 1) / 4 \quad (9)$$

In other words, just take the number of specific gravity points and divide by four to get the extract value in degrees Plato. For example, if you measured the specific gravity of your wort to be 1.065, then the simple formula (Equation 9) gives an extract of 16.25 °P, while the cubic formula (Equation 7) gives an answer of 15.88 °P.

But there's still a little more to extract than this. If you measure the specific gravity before fermentation starts and convert

that number to degrees Plato, that's called the original extract (OE). If you take a measurement after fermentation is finished, that's called the apparent extract (AE). The reason it isn't the real extract is that your beer is no longer just a solution of solids and water. Now you have alcohol in there too, and alcohol is less dense than water (specific gravity of 0.794 at 15 degrees C) so it changes all the neat equations that we've just come up with. Just as before, the hard way to determine the real extract (RE) of your beer would be to boil it until all of the alcohol is boiled off, replace the volume with water and then measure the specific gravity. Fortunately, Balling once again comes to the rescue with an empirical relationship between the real extract, the apparent extract and the original extract (De Clerck):

$$\begin{aligned} q &= 0.22 + 0.001 \text{ OE} \\ \text{RE} &= (q \text{ OE} + \text{AE}) / (1 + q) \end{aligned} \quad (10)$$

The variable q is called the attenuation coefficient, but you can just think of it as an intermediate value. Many sources quote this equation in the form $\text{RE} = 0.8192 \text{ AE} + 0.1808 \text{ OE}$, but this form assumes that q is calculated at an OE of zero, which is not very accurate. For our simplified version, we'll calculate q assuming a reasonable OE of 12.5 °P, which gives us

$$\text{RE} = 0.8114 \text{ AE} + 0.1886 \text{ OE} \quad (11)$$

Let's say our beer has finished fermenting and we have measured the specific gravity to be 1.014. The cubic formula for extract (Equation 7) gives an apparent extract of 3.57 °P, but the simple formula does very well and gives a value of 3.50 °P. Calculating the real extract using the most accurate RE formula (Equation 10) and the cubic extract formula gives 5.92 °P. Making the same calculation with the simple version of both formulas (Equations 9 and 11) gives 5.90 °P. The difference in real extract calculated by these two methods is small, but the two methods show greater differences in subsequent calculations. If you're not interested in extreme accuracy, then the simple formulas are probably adequate. This is especially true of beers with original gravities less than 1.070, because the two formulas only diverge significantly for high specific gravities. You might want to go through all the complicated calculations for a barleywine or a mead (or if you're putting all of this in a spreadsheet), but for regular beers the simple divide-by-four rule is all you need.

The simple formulas will be used in the rest of the examples, with the results from the more accurate formulas in parentheses for comparison.

ATTENUATION

A closely related term that is often used to describe a yeast strain or the dryness of a beer is attenuation. Attenuation is simply the percentage of sugar that has been converted to alcohol. Attenuation comes in two forms, just like the final extract value. Apparent attenuation (AA) is calculated using the apparent extract value:

$$\text{AA} = \frac{(\text{OE} - \text{AE})}{\text{OE}} \times 100\% \quad (12)$$

Real attenuation (RA) is calculated using the real extract value:

$$\text{RA} = \frac{(\text{OE} - \text{RE})}{\text{OE}} \times 100\% \quad (13)$$

For our sample beer, the apparent attenuation is 78.5 percent (77.5 percent) and the real attenuation is 63.7 percent (62.7 percent). Most beers will have a real attenuation that falls in the 60 to 80 percent range.

ALCOHOL CONTENT

One might think that the alcohol percentage of the final beer would be directly proportional to the difference in the original and final (real) extract values. After all, the chemical equation for the conversion of a monosaccharide to ethanol is



so the weight of the sugar molecule (180 amu) should be converted into the weight of two ethanol molecules (92 amu) and two carbon dioxide molecules (88 amu). This would give us an equation for the alcohol percent by weight (A%w) of:

$$\text{A\%w} = (\text{OE} - \text{RE}) \frac{92}{180} = \frac{(\text{OE} - \text{RE})}{1.9565} \quad (15)$$

The fly in the ointment here is that fermentation is not that simple. It's a biological process with all kinds of intermediate products and side reactions that don't lead to our desired result. Balling comes through for us again with an empirical formula for the alcohol content (De Clerck):

$$\text{A\%w} = \frac{\text{OE} - \text{RE}}{2.0665 - 0.010665 \text{ OE}} \quad (16)$$

If we insert the simple extract equation (Equation 9) and the simplified version of Balling's equation for real extract (Equation 11), we can derive a relationship for the alcohol content as a function of the original and final specific gravities:

$$\text{A\%w} = \frac{76.08 (\text{OG} - \text{FG})}{1.775 - \text{OG}} \quad (17)$$

Either of these equations can be converted to alcohol percent by volume (A%v) by the following formula:

$$\text{A\%v} = \text{A\%w} (\text{FG} / 0.794) \quad (18)$$

where 0.794 is the specific gravity of ethanol. For our sample brew, the alcohol percentages are 5.46 percent (5.25 percent) by weight

TABLE 2: ALCOHOL PERCENT BY WEIGHT (USING MOST ACCURATE EQUATIONS)

Original Specific Gravity	Final Specific Gravity												
	0.990	0.995	1.000	1.005	1.010	1.015	1.020	1.025	1.030	1.035	1.040	1.045	1.050
1.030	4.17	3.63	3.10	2.57	2.05	1.53	1.01	0.51	0.00	—	—	—	—
1.035	4.69	4.15	3.62	3.09	2.56	2.04	1.52	1.01	0.50	0.00	—	—	—
1.040	5.22	4.68	4.14	3.61	3.08	2.55	2.03	1.52	1.01	0.50	0.00	—	—
1.045	5.75	5.21	4.67	4.13	3.60	3.07	2.55	2.03	1.51	1.01	0.50	0.00	—
1.050	6.28	5.73	5.19	4.65	4.12	3.59	3.06	2.54	2.02	1.51	1.00	0.50	0.00
1.055	6.82	6.26	5.72	5.17	4.64	4.10	3.58	3.05	2.53	2.02	1.51	1.00	0.50
1.060	7.35	6.80	6.25	5.70	5.16	4.62	4.09	3.56	3.04	2.52	2.01	1.50	1.00
1.065	7.89	7.33	6.78	6.23	5.68	5.14	4.61	4.08	3.55	3.03	2.52	2.01	1.50
1.070	8.42	7.86	7.31	6.75	6.21	5.67	5.13	4.60	4.07	3.54	3.02	2.51	2.00
1.075	8.96	8.40	7.84	7.28	6.73	6.19	5.65	5.11	4.58	4.06	3.53	3.02	2.50
1.080	9.50	8.94	8.37	7.82	7.26	6.72	6.17	5.63	5.10	4.57	4.04	3.52	3.01
1.085	10.05	9.48	8.91	8.35	7.79	7.24	6.70	6.15	5.62	5.08	4.56	4.03	3.51
1.090	10.59	10.02	9.45	8.88	8.33	7.77	7.22	6.68	6.14	5.60	5.07	4.54	4.02
1.095	11.14	10.56	9.99	9.42	8.86	8.30	7.75	7.20	6.66	6.12	5.59	5.06	4.53
1.100	11.69	11.11	10.53	9.96	9.39	8.83	8.28	7.73	7.18	6.64	6.10	5.57	5.04
1.105	12.24	11.65	11.07	10.50	9.93	9.37	8.81	8.26	7.71	7.16	6.62	6.09	5.56
1.110	12.79	12.20	11.62	11.04	10.47	9.90	9.34	8.78	8.23	7.69	7.14	6.60	6.07

TABLE 3: CALORIES PER 12-OUNCE BOTTLE OF BEER (USING MOST ACCURATE EQUATIONS)

Original Specific Gravity	Final Specific Gravity												
	0.990	0.995	1.000	1.005	1.010	1.015	1.020	1.025	1.030	1.035	1.040	1.045	1.050
1.030	93.6	96.0	98.3	100.7	103.1	105.5	107.9	110.2	112.6	—	—	—	—
1.035	110.1	112.5	114.8	117.2	119.6	122.0	124.3	126.7	129.1	131.5	—	—	—
1.040	126.7	129.0	131.4	133.8	136.1	138.5	140.9	143.2	145.6	148.0	150.4	—	—
1.045	143.3	145.6	148.0	150.3	152.7	155.0	157.4	159.8	162.1	164.5	166.9	169.3	—
1.050	159.9	162.2	164.6	166.9	169.3	171.6	174.0	176.4	178.7	181.1	183.4	185.8	188.2
1.055	176.6	178.9	181.2	183.6	185.9	188.3	190.6	193.0	195.3	197.7	200.0	202.4	204.7
1.060	193.3	195.6	197.9	200.3	202.6	204.9	207.3	209.6	212.0	214.3	216.6	219.0	221.3
1.065	210.0	212.3	214.7	217.0	219.3	221.6	224.0	226.3	228.6	231.0	233.3	235.6	238.0
1.070	226.8	229.1	231.4	233.7	236.1	238.4	240.7	243.0	245.3	247.7	250.0	252.3	254.7
1.075	243.6	245.9	248.2	250.5	252.8	255.2	257.5	259.8	262.1	264.4	266.7	269.1	271.4
1.080	260.5	262.8	265.1	267.4	269.7	272.0	274.3	276.6	278.9	281.2	283.5	285.8	288.1
1.085	277.3	279.6	281.9	284.2	286.5	288.8	291.1	293.4	295.7	298.0	300.3	302.6	304.9
1.090	294.3	296.6	298.8	301.1	303.4	305.7	308.0	310.3	312.6	314.9	317.2	319.5	321.7
1.095	311.2	313.5	315.8	318.1	320.4	322.6	324.9	327.2	329.5	331.8	334.0	336.3	338.6
1.100	328.3	330.5	332.8	335.1	337.3	339.6	341.9	344.2	346.4	348.7	351.0	353.3	355.5
1.105	345.3	347.6	349.8	352.1	354.4	356.6	358.9	361.1	363.4	365.7	367.9	370.2	372.5
1.110	362.4	364.7	366.9	369.2	371.4	373.7	375.9	378.2	380.4	382.7	385.0	387.2	389.5

and 6.98 percent (6.71 percent) by volume. Table 2 shows the alcohol percent by weight as a function of original and final specific gravities calculated with the most accurate equations (Equations 7, 10 and 16) above.

CALORIE CONTENT

Before all that alcohol goes to your head, let's calculate how your homebrew adds to your beer belly. The following equations all give calories (C) per one 12-ounce bottle of beer. First, there's a contribution due to the residual sugar (extract) in the beer:

$$C_{\text{ext}} = 3.55 \text{ FG (3.8) RE} \quad (19)$$

The 3.8 factor is the number of calories per gram of sugar, the final specific gravity converts from grams of solution to grams of water, and the factor of 3.55 is the number of grams of water in a 12-ounce bottle, divided by 100 to cancel with the implicit percent of the real extract. There's also a contribution because of the alcohol present:

$$C_{\text{alc}} = 3.55 \text{ FG (7.1) A\%w} \quad (20)$$

The 7.1 factor here is indicative of alcohol's higher number of calories per gram. Finally, there's a small contribution because of the protein in the beer:

$$C_{\text{pro}} = 3.55 \text{ FG (4.0) (0.07) RE} \quad (21)$$

The 4.0 factor represents the calories per gram of protein, and the percentage of protein has been estimated at 7 percent of the percentage of sugar. This estimate is a median value for protein estimates I have seen in the literature, which range from 5 to 10 percent of the real extract value. The calorie per gram values are from De Clerck. The total number of calories in your homebrew is then:

$$\begin{aligned} C &= C_{\text{ext}} + C_{\text{alc}} + C_{\text{pro}} \\ &= 3.55 \text{ FG [3.8 RE + 7.1 A\%w + (4.0) (0.07) RE]} \\ &= 3.55 \text{ FG (4.08 RE + 7.1 A\%w)} \end{aligned} \quad (22)$$

If we convert the calorie equation to a function of specific gravities using both of Balling's approximations and the simple equation for extract (Equations 9, 11 and 17) we get:

$$C = 3621 \text{ FG} \left[(0.8114 \text{ FG} + 0.1886 \text{ OG} - 1) + 0.53 \frac{\text{OG} - \text{FG}}{1.775 - \text{OG}} \right] \quad (23)$$

For our example beer this gives us a calorie count of 226.5 (221.2) per 12-ounce bottle. Table 3 shows the calorie content as a function of original and final specific gravities calculated with the most accurate equations (Equations 7, 10, 16 and 22) above.

Okay, now, hang on tight for some fast and furious approximations. First, note that a gram of sugar gives 3.8 calories, but when it converts to alcohol it gives roughly $7.1 (92 / 180) = 3.63$ calories.

This means that the sugar doesn't lose a lot of calories by converting to alcohol, and therefore the calorie count is primarily a function of the original specific gravity. We can take advantage of this fact by calculating the calories of the unfermented wort (setting the $\text{FG} = \text{OG}$), and realizing that our estimate will be a little high. Better yet, we can make an educated guess about the final specific gravity, setting it equal to one-fourth of the point value of the original specific gravity:

$$\text{FG} = \frac{\text{OG} - 1}{4} + 1 \quad (24)$$

Second, that $(1.775 - \text{OG})$ term in the denominator of Equation 23 is going to give us trouble, so let's set that particular OG to a mid-range value of 1.050. Making those approximations and fiddling around with the numbers a bit yields:

$$C = 851 (\text{OG} - 1) (\text{OG} + 3) \quad (25)$$

For our example beer this gives a calorie count of 224.8 (221.2) per 12-ounce bottle. For most beers, this equation will be a reasonable approximation of the number of calories.

CARBONATION LEVEL

If you are a homebrew bottler instead of a homebrew kegger, you're probably a little bit jealous of all the control that a kegger has over carbonation levels. If you're a kegger, it's relatively easy: you just put your beer (whether or not it has finished fermenting) into a keg and adjust the temperature to the desired serving temperature and adjust your pressure so that the carbonation level is what you want. You determine the desired carbonation level by reading the "volumes of CO_2 " off a chart as a function of the temperature and pressure. You can always readjust things if they are not to your liking. (Okay, it's not really that simple, but you get my point.)

A bottler has a more difficult life when it comes to carbonation. Once the cap is on, everything is fixed. If you overcarbonate you have to chill all your bottles down and drink them as fast as you can. If you undercarbonate, your beer suffers from a lack of aroma, lack of tingly mouthfeel and overall aesthetics suffer. Clearly, this situation could benefit from a little more control.

First, what exactly is a "volume of CO_2 "? The number of volumes of CO_2 is a measure of the amount of dissolved carbon dioxide. It is equal to the volume occupied by the carbon dioxide if it were taken out of solution and put at standard temperature and pressure (STP = 32°F or 0°C and 1 atmosphere) divided by the volume of the beer. In other words, if you took all the carbon dioxide out of your five-gallon batch of beer, changed it to STP and got 10 gallons of gas, the CO_2 level in the original beer was 2 volumes. The amount of carbon dioxide that will dissolve is a fixed quantity which depends on temperature and pressure (and also the other things in solution, but that effect is negligible for our purposes).

**TABLE 4: CARBON DIOXIDE
EQUILIBRIUM CONCENTRATION**

Temperature (F)	Volumes of CO ₂ in Solution	Temperature (F)	Volumes of CO ₂ in Solution
32	1.71	60	0.99
35	1.61	65	0.91
40	1.46	70	0.83
45	1.32	75	0.78
50	1.20	80	0.73
55	1.09		

A desirable carbonation level for most beers is 2.2 to 2.6 volumes of CO₂. Miller recommends 1.8 to 2.2 volumes for British ales, 2.5 volumes for lagers and German ales, 2.6 to 2.8 volumes for American beers and 3.0 volumes for wheat beers and fruit ales.

Now that our target carbonation level is set, we need to determine our starting point. If your beer has been bubbling away in a carboy since the last time you racked it, it has an overpressure of carbon dioxide at one atmosphere. This means that a considerable amount of carbon dioxide is already in solution in your beer. The amount that is in solution (CD_{init} in volumes) is a function of temperature (T, in Fahrenheit). I fit a function to some empirical data (Linke) to give this relationship:

$$CD_{init} = 3.0378 - 5.0062 \times 10^{-2} T + 2.6555 \times 10^{-4} T^2 \quad (26)$$

Table 4 shows that this function varies from 1.71 to 0.73 volumes over the range of possible bottling temperatures, which indicates that determining the amount of dissolved CO₂ at the start of bottling is crucial.

The next step is calculating how much sugar is necessary to get from the initial carbon dioxide level to the target level. I want to point out here that measuring your priming sugar by volume (the old three-fourths cup per five-gallon batch rule) is not very accurate. We're going to need a certain mass of sugar to get the desired mass of CO₂, so if you measure by volume you'll need to know the density to determine the mass. I've seen density estimates for corn sugar that varied between 133 and 193 grams per cup. I measured it myself to be 151 grams per cup. In the calculations that follow, it is assumed that the sugar is measured by weight instead of volume, and I strongly recommend that you measure it that way too.

Given a weight of priming sugar (PS) in grams and the volume of beer (VB) in gallons, we can estimate the amount of carbon dioxide generated through fermentation (CD_{gen}):

$$CD_{gen} = PS \left(\frac{88g \text{ CO}_2}{180g \text{ C}_6\text{H}_{12}\text{O}_6} \right) \left(\frac{1}{7.4287g \text{ CO}_2 / \text{gallon at STP}} \right) \left(\frac{1}{VB} \right)$$

$$= 6.5811 \times 10^{-2} \frac{PS}{VB} \text{ volumes} \quad (27)$$

This formula makes use of the simplistic chemical equation of fermentation (Equation 14) and assumes that 100 percent of the sugar is fermented. This assumption is valid for corn sugar and table sugar, but if you're priming with something else, like honey or dry malt extract, you should include a factor for the fraction of the priming substance that is fermentable, and increase your priming rate accordingly.

The total amount of carbon dioxide in our primed and conditioned beer is then:

$$CD = CD_{gen} + CD_{init} \quad (28)$$

$$= 6.5811 \times 10^{-2} \left(\frac{PS}{VB} \right) + 3.0378 - 5.0062 \times 10^{-2} T + 2.6555 \times 10^{-4} T^2$$

Inverting this formula we can get an equation for the weight of priming sugar:

$$PS = 15.195 VB (CD - 3.0378 + 5.0062 \times 10^{-2} T - 2.6555 \times 10^{-4} T^2) \quad (29)$$

So there's the complicated formula. Table 5 gives values from this formula for various combinations of carbonation level and temperature. What would an "average" case look like? Let's assume that you have five gallons of fully fermented beer at 65 degrees F and you want to have 2.5 volumes of CO₂ in the final product. Running the numbers gives a priming sugar weight of 121 grams. If you insist on having a volume of priming sugar to work with, this comes out to 0.8 cups (using the density for corn sugar that I measured). Let's say you think that it always comes out close to three-quarters of a cup, here's another example: This time we'll assume that you've been making a lager and your beer is waiting to be primed at 40 degrees F, with everything else the same. The result for this case is 79 grams of priming sugar, considerably less than before.

I should mention here the caveat that if your beer hasn't finished fermenting, none of this analysis is accurate and you may have significant amounts of sugar left that will create large amounts of carbon dioxide. The amount of priming sugar that is normally used will only raise the specific gravity by 0.002, so you can see that it is imperative that there is not an extra bit of fermentable sugar hanging around. In practice, termination of fermentation is easy to discern by watching your fermentation lock or taking specific gravity readings.

CONCLUSION

I hope that these explanations have made the confusing world of real extracts and apparent attenuations a little bit clearer. Using the equations in this article (and keeping good records) should enable you to duplicate your beer successes and to avoid reinventing your beer duds. And now that you've been armed with information about how your homebrew affects your head and body, you will be able to make a better decision about whether or not to have that next beer.

TABLE 5: PRIMING SUGAR WEIGHT (IN GRAMS) FOR A FIVE-GALLON BATCH OF BEER

Temp. of beer	Desired Carbonation Level (Volumes of CO ₂)										
	1.8	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	3.0
32	7.0	22.2	29.8	37.4	45.0	52.6	60.2	67.8	75.4	83.0	98.2
35	14.4	29.6	37.2	44.8	52.4	60.0	67.6	75.1	82.7	90.3	105.5
40	25.8	41.0	48.6	56.2	63.8	71.4	79.0	86.6	94.2	101.8	117.0
45	36.3	51.5	59.1	66.7	74.3	81.9	89.4	97.0	104.6	112.2	127.4
50	45.7	60.9	68.5	76.1	83.7	91.3	98.9	106.5	114.1	121.7	136.9
55	54.1	69.3	76.9	84.5	92.1	99.7	107.3	114.9	122.5	130.1	145.3
60	61.5	76.7	84.3	91.9	99.5	107.1	114.7	122.3	129.9	137.5	152.7
65	68.0	83.2	90.8	98.3	105.9	113.5	121.1	128.7	136.3	143.9	159.1
70	73.4	88.6	96.2	103.8	111.3	118.9	126.5	134.1	141.7	149.3	164.5
75	77.8	92.9	100.5	108.1	115.7	123.3	130.9	138.5	146.1	153.7	168.9
80	81.1	96.3	103.9	111.5	119.1	126.7	134.3	141.9	149.5	157.1	172.3

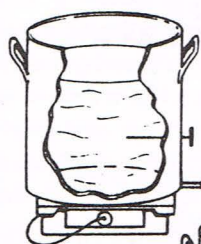
NOMENCLATURE / GLOSSARY

- A%w** – Alcohol percent by weight.
A%v – Alcohol percent by volume.
AA – Apparent attenuation (%), apparent percentage of sugar that converted to alcohol.
AE – Apparent extract (degrees Plato), the apparent weight percent of dissolved solids in the beer, before correcting for the lower density of the alcohol.
amu – Atomic mass unit.
C – Calories in a single 12-ounce beer.
C_{alc} – Calories in a single 12-ounce beer attributed to alcohol.
C_{ext} – Calories in a single 12-ounce beer attributed to extract (residual sugar).
C_{pro} – Calories in a single 12-ounce beer attributed to protein.
CD – Total carbon dioxide concentration in the conditioned beer (volumes).
CD_{init} – Initial carbon dioxide concentration in the beer before priming (volumes).
CD_{gen} – Incremental carbon dioxide concentration caused by the fermentation of the priming sugar (in volumes).
C₂H₅OH – Chemical formula for ethanol, the primary alcohol in beer.
C₆H₁₂O₆ – Chemical formula for a monosaccharide sugar (glucose).
CO₂ – Chemical formula for carbon dioxide.
E – Extract (degrees Plato), the weight percent of dissolved materials in the wort.
FG – Final specific gravity.
OE – Original extract (degrees Plato).
OG – Original specific gravity.
PS – Weight of the priming sugar (grams).

- RA** – Real attenuation (%), real percentage of sugar that is converted to alcohol.
RE – Real extract (degrees Plato), the real weight percent of dissolved solids in the beer, after correcting for the lower density of the alcohol.
SG – Specific gravity (density relative to water). Specific gravity in points is equal to 1000 (SG - 1).
STP – Standard temperature (0 degrees C or 32 degrees F) and pressure (1 atmosphere).
T – Temperature of the beer (Fahrenheit).
VB – Volume of the beer (gallons).

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Michael L. Hall, Ph.D., is a computational physicist at Los Alamos National Laboratory in New Mexico. Mike has been brewing for five years and is a Certified judge in the BJCP. He was one of the founding members of the Los Alamos Atom Mashers and has worn many hats in the club (newsletter editor, treasurer, librarian, organizer). Mike can be reached via the Internet at: hall@lanl.gov.



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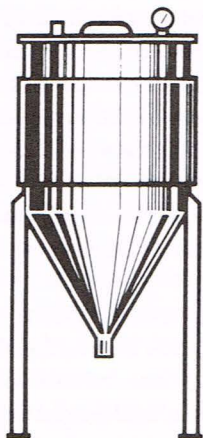
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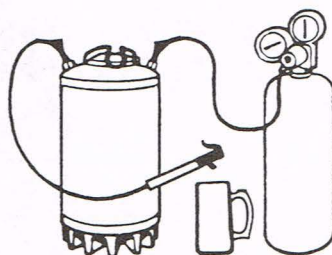
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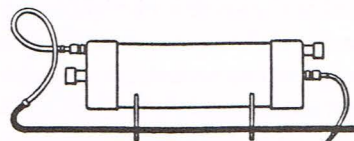
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The Experimental Homebrewers: Creators of a Revolution

By Jim Neighbors

R

uss Schehrer, the 1985 American Homebrewers Association Homebrewer of the Year and now veteran professional brewer and co-owner of the successful Wynkoop and Broadway Brewing companies in Denver, Colo., is sitting at the corner table in a local pub that has more than 40 different micro tap handles. He's describing his favorite beer — one of the hand-pulled ales at the Wynkoop. "It's a beautiful beer. Gorgeous." He sort of shakes his head, pauses and continues rhythmically, "Beauty is first, it has to be. The making of a good beer, using the best stuff, over and over again, is an artistic creation. It's beautiful."

Beer an artistic creation? Beer! There are many in this country, and others, who would call such a notion laughable.

However, there are many in this country who agree with him, and their numbers are growing daily. The number of brewpubs and microbreweries in the United States now tops 580. The total dollar amount for craft-brewed beers in 1994 exceeded one billion, total production in barrels for 1994 was more than two million, and festivals, specialty beer conferences and trade shows are selling out consistently. In some areas you can walk along a side street, look down and find a Sam Adams bottle cap. Empty Bud bottles in recycling bins are being replaced with Redhook, Pete's and empty 22-ounce bombers from local micros. But, again, is this new experience in malt beverages rooted in an idea of artistic beauty? Isn't that a little much? How do you account for such a phenomenon?

"It's a quality revolution," says Byron Burch, avid homebrewer for more than 20 years and author of *Brewing Quality Beers* (Joby Books, 1986). Burch asserts that the countrywide movement that has been taking place for at least 10 years where people are tired of "factory-made" products and want localized, personally made products with fresh ingredients is just getting started. Coffee, ice cream, bread and beer, to name a few, will continue to transform product availability from industrial commodities to neighborhood expressions of hand-crafted quality well into the next millennium. "For anyone who is interested in beer, the last 20 years and probably the next 10 to 20 years are the best time to be alive — probably in history," said Burch.

So the specialty beer market is in the midst of and is contributing to a national consumer revolution. But what drives microbreweries and brewpubs? What is the mobilizing force? The creative energy?

"The genesis of the whole (specialty beer) category is from homebrewing," says Pete Slosberg, president of Pete's Brewing Co., Palo Alto, Calif. Homebrewers, according to Slosberg, have in them one supreme and essential ingredient that, when you distill the craft-brewing revolution, emerges as its fundamental matrix: the willingness to experiment. "People like to experiment, and one thing about homebrewers that continues to be true — they know no bounds."



1983

Great American Beer Festival®

45 beer brands
24 breweries represented

AHA Membership
2,648 AHA members

1984

Great American Beer Festival®

74 beer brands
50 breweries represented

AHA Membership
3,287 AHA members

1985

Great American Beer Festival®

90 beer brands
44 breweries represented

AHA Membership
3,611 AHA members

1986

Great American Beer Festival®

100 beer brands
60 breweries represented

AHA Membership
4,181 AHA members

1987

Great American Beer Festival®

120 beer brands
70 breweries represented

AHA Membership
5,662 AHA members

1988

Great American Beer Festival®

160 beer brands
70 breweries represented

AHA Membership
6,591 AHA members

"It started with people dreaming," says Jim Koch, president of the Boston Beer Co., Boston, Mass. "It's bringing together a sense of brewing history with an understanding of the brewer's art and a desire to build on what's already been done." This is a familiar pattern in the circles of visual artists, sculptors and writers: knowledge of ancestry, a full proficiency of craft and inspiration. Could it really be possible to insert "painter" or "sculptor" for "brewer" in Koch's idea? Perhaps it is possible. The AHA lists more than 70 different beer styles for their National Homebrew Competition, more than a million people in the United States are homebrewers, and more importantly, the result of a homebrewer's efforts — like a painter's — can be incredible, even life changing for the appreciator.

Nat Collins, owner of the Woodstock Brewing Co. in Kingston, N.Y., sheds additional light on the homebrewer's influence on the specialty beer market. "Before I opened Woodstock I was a homebrewer for 22 years. The recipes I made as a homebrewer are the recipes, with some conversions, that I now make as a pro. I know in my mind what I want something to taste like, and I developed that from homebrewing."

Slosberg believes that Collins and Schehrer are the rule, not the exception: "I'd guess that at least 80 percent of the pros were homebrewers."

And Koch remembers the Association of Brewers Microbrewery Conference and Trade Shows in the early 1980s. "There was no distinction between homebrewers and microbrewers at the conferences then. Just about everybody was a homebrewer."

Not only do former homebrewers constitute the majority of professional brewers, but they also make up a significant portion of the consumer base. As stated earlier, there are more than one million active homebrewers in the United States, not to mention friends and acquaintances who no doubt are



given opportunities to sample the latest incarnation. And as Collins says, "Once you try homebrew, you can never go back."

One illustration of Collins' philosophy is the Great American Beer Festival®. This past October Currigan Hall in Denver filled with more than 265 breweries offering more than 1,200 different beers to almost 20,000 people. From the triple bock of the Boston Beer Co. and the Alaskan Brewing and Bottling Co.'s smoked ale to the popular Ju-Ju Ginger Beer from Left Hand Brewing Co. in Longmont, Colo., there is no other more apparent display of the professional craft-brewing industry's proliferation of styles. In fact, in only one other national gathering of beer lovers would you be able to find an even greater beer style diversity: the American Homebrewers Association National Homebrewers Conference. The conferences for homebrewers and pro brewers are separat-

ed now because of each niche's extraordinary expansion, but the connection is still easy to see. Homebrewers, to a large degree, create what the specialty beer drinker will eventually consume.

Michael Byers of Santa Cruz, Calif., winner of the AHA 1994 Ninkasi Award, acknowledges the craft-brewing industry's accomplishment. "It's a beautiful part of life to have (the current diversity of styles) available. Even at our local Safeway grocery stores you can find Belgian beer products. As a consumer who appreciates this, you can go out and find a beer for any occasion."

In fact, the tremendous availability of unique beers might have taken the necessity out of homebrewing. Randy Mosher, longtime homebrewer and author of *The Brewer's Companion* (Alephenalia Press, 1994) says, "The aspect of just plain old necessity is not the issue any longer."

1989
Great American Beer Festival®
284 beer brands
101 breweries represented
AHA Membership
7,432 AHA members
Homebrew Clubs
140

1990
Great American Beer Festival®
481 beer brands
150 breweries represented
AHA Membership
10,101 AHA members
AHA Conference
419 attendees

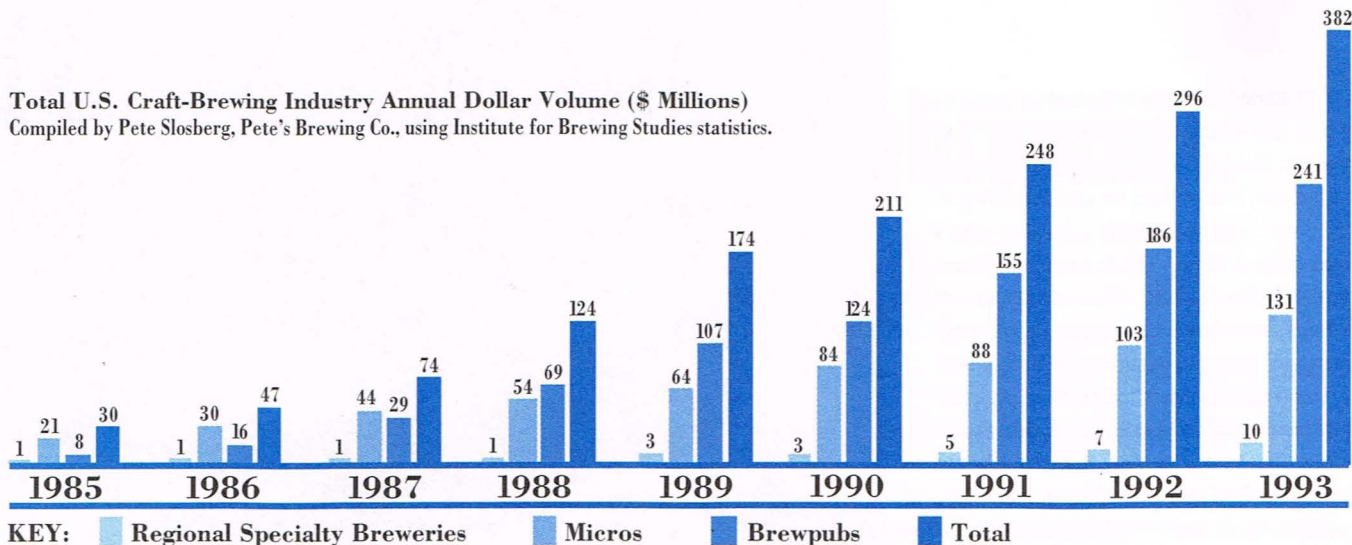
1991
Great American Beer Festival®
550 beer brands
175 breweries represented
AHA Membership
12,656 AHA members
Homebrew Clubs
230
AHA Conference
408 attendees

1992
Great American Beer Festival®
750 beer brands
168 breweries represented
AHA Membership
16,340 AHA members
Homebrew Clubs
311
AHA Conference
431 attendees

1993
Great American Beer Festival®
954 beer brands
208 breweries represented
AHA Membership
20,696 AHA members
Homebrew Clubs
381
AHA Conference
597 attendees

1994
Great American Beer Festival®
1,240 beer brands
265 breweries represented
AHA Membership
23,733 AHA members
Homebrew Clubs
486
AHA Conference
430 attendees

Total U.S. Craft-Brewing Industry Annual Dollar Volume (\$ Millions)
Compiled by Pete Slosberg, Pete's Brewing Co., using Institute for Brewing Studies statistics.



So why still homebrew? Byers says, "The joy of the process. On a small scale, it has the potential of being very spiritual. Somehow magical. You can smell and taste and feel all the raw ingredients of the beer as part of its development. It's sort of becoming the beer as you make it."

Mosher confirms Byers' experience. "It's the directness of it. You make it, you drink it."

"Sometimes it is real difficult to see what it is you're doing with your life," Mosher continues. "People don't get any real personal satisfaction by just keeping the wheels turning. It's not that gratifying. Homebrewing has a lot of elements: history, biology, chemistry, art, mechanics. It has a lot to offer someone."

Consequently, says Mosher, "Homebrewers care. That's the deal. They really, really, really care about the stuff."

According to Bill Murphy, award-winning

homebrewer of 14 years and National BJCP judge, this remarkable devotion to the beer itself is what drives the "true brewer." True brewers educate the public in a number of ways, the basis of which is the consistent production of high-quality all-malt beers, the ultimate result of which is the "sophisticated consumer." From the delight and concern of the homebrewer to the dedication and consistency of the craft brewer and the compounding education of the consumer, it is, as Koch points out, "a continuum."

Byers mirrors Murphy's vision about the continued development of a better quality product from the craft-brewing industry when he says *both* homebrewers and professional craft brewers "have the goal of creating the best they possibly can." Mosher adds that a type of cyclical movement occurs between homebrewers and craft brew-

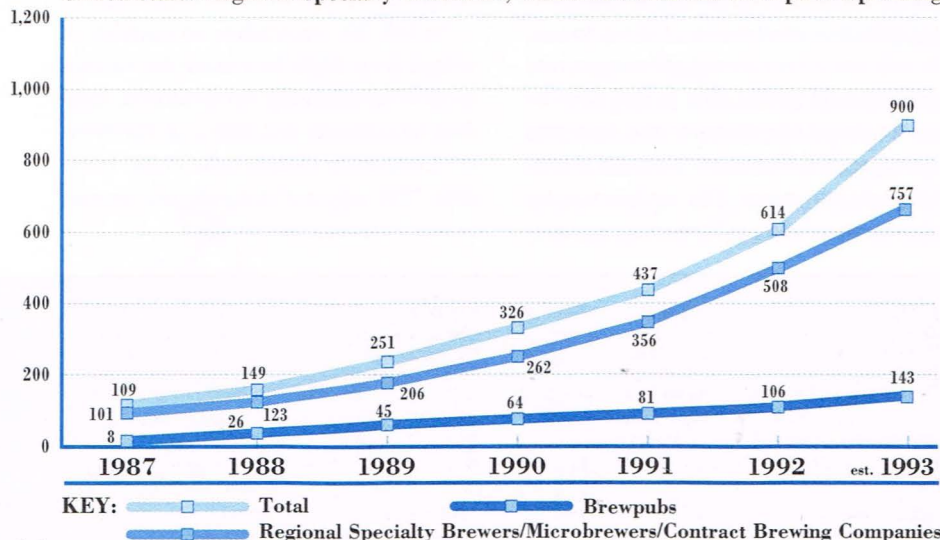
ers. A micro- or pubbrewer will get hold of a homebrewer's recipe and incorporate it into his or her business. Similarly, a homebrewer will taste a fantastic microbrew and spend the next few batches trying to emulate it. The development of new styles, says Mosher, "absolutely comes out of homebrewing, but also feeds homebrewing."

Which brings us back to the role of the homebrewer. It is here where the creative genius at the stove and the recipe pad is most valuable. If a culture of consumers is switching to more character in many ways — taste, color, texture, uniqueness — then it is crucial for the creative and willing palates of these consumers to have the opportunity to make an unusual choice, a choice that exercises individuality and experimentation. For the movement to carry on, it seems homebrewers must continue to develop their characteristically unique recipes, and they must keep demanding that the local brewpub answer their desire for newness and quality.

Innovation. Creativity. Experimentation. These, then, are the driving forces behind an entire revolution in the way people are spending their money and deriving their meaning. And creativity, like any other craft capable of massaging the boundlessness of human imagination, is found in the art of brewing. Collins sums it up nicely: "What I really like is making beer. That's what I do. I make beer. I am a brewer. And I hope that I will have the opportunity to continue for a long time."

Jim Neighbors, the administrator for the Institute of Brewing Studies, is an avid hiker and a stout connoisseur.

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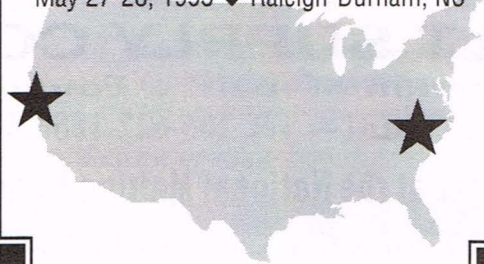
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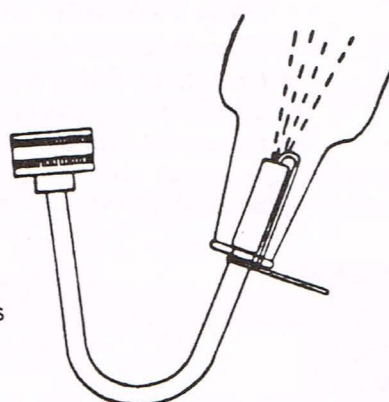
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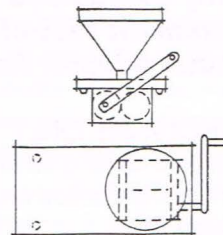
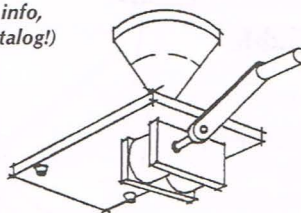
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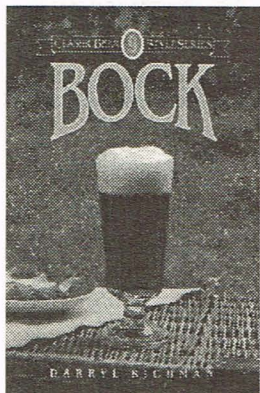
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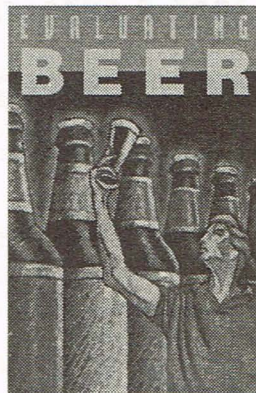


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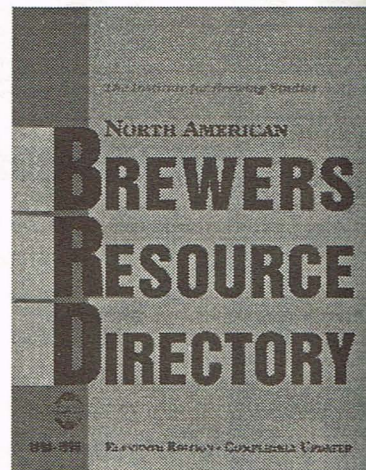


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FOR THE BEGINNER

Fred Hardy

Can We Talk? A Beginner's Vocabulary

People with a common interest typically share a common vocabulary. Their conversations will usually be sprinkled with terms only an insider fully comprehends. Homebrewers need to have a special vocabulary so we can learn and communicate ideas and techniques to improve our brews.

Probably the first term every homebrewer learns is **wort** (pronounced wert). This is the bittersweet solution obtained by mashing malted grain, or in the case of extract brewers by mixing malt extract with water. Wort is beer before fermentation.

The following are some other terms essential to a homebrewer or beer enthusiast's vocabulary.

Malt is grain that has been germinated (sprouted), then dried under controlled conditions. This process releases enzymes and makes the starches in the grain kernel more soluble. The process by which crushed malt is soaked in hot water to allow the enzymes to convert starches into sugars and large proteins into small proteins and amino acids is called **mashing**. The reason we need sugars instead of starches is because yeast consumes sugar during fermentation and produces alcohol and carbon dioxide (CO₂). **Conversion** is achieved when the starches are converted to sugar. At this point, it is time to **sparge**.

Sparging is the process of trickling hot water slowly through the grain and leaching the soluble sugars from the grain husks. Simply pouring hot water over hops or unmashed grains is **rinsing**, not sparging.

Lautering, from the German word **lauter** which means to clarify, is the process of separating the spent grains from the sweet wort with a straining apparatus, typically called a **false bottom**.

Steeping is soaking crushed grains in hot water much like tea is steeped. The grains are then rinsed to more fully extract the color and flavor. Typically, grains used primarily for their color and/or flavor are called **specialty grains**.

Specialty grains are types of barley with little or no enzymatic power. Some specialty grains, such as roasted barley, are not malted. Most, however, are the result of the maltster drying the sprouted grain under special heat and temperature conditions. Caramel, crystal, chocolate and black patent malts are in this category.

After the mash is sparged and lautered, or the specialty grains are steeped and rinsed, the wort is boiled with hops.

If you are using malt extract in your brews instead of the grain procedures briefly defined above, you should know that malt extract is the result of first making sweet wort (bitter wort in the case of hopped extract), then vacuum evaporating it into a syrup or spray-drying it into a powder. The dried or powdered malt extract version often is referred to simply as DME. Occasionally, diastatic malt extract will also be called DME, even though they are not the same. Diastatic malt extract is extract that still has enzymes, and can be used to convert starches to sugars in adjuncts.

Hops, the female flower of a perennial climbing vine (*Humulus lupulus*), are added to make bitter wort. You see hops sold in pellet form or as whole flowers. Either form works fine in homebrewing. To put it simply, the hops add bitterness when the soft resins from the hop flower are dissolved in the wort. There are several compounds in the resins that contribute bitterness, but most significant are the **alpha acids**.

The bitterness in the beer is proportional to the amount of alpha acids in the hop flower (expressed as a percentage of the flower's

weight), the amount of hops added to the wort, duration of boiling time with hops and inversely proportional to the thickness of the wort (also called **boil gravity**).

Bitterness is often described in terms of **IBUs**, or international bitterness units, a term that expresses bitterness in a beer as roughly the amount of isomerized alpha-acid content in parts per million. This is what is actually in the finished beer, not what was put in.

The amount of alpha acid used in brewing often is expressed in **HBUs** (homebrew bittering units) or **AAUs** (alpha acid units). These are equivalent, and are simply a product of alpha-acid percentage of the hops times the weight in ounces of hops used. For example, 1 1/2 ounces of 5.0 percent alpha-acid hops equals 1 1/2 x 5.0, or 7 1/2 HBU. Because some types of hops can be substituted for others in recipes, and because the alpha acid percentage may vary from crop to crop in a particular hop type, these terms are useful when trying to repeat the amount of bitterness from batch to batch.

Hops are categorized as **bittering**, **flavor** or **aroma** hops, depending on when they are added to the boil. Bittering hops are added at the start. Boiling will drive off most of the hop flavor and all of the **volatile oils** that provide the aroma.

Hops added in the last 30 to 15 minutes of the boil are generally considered flavor hops because much of their flavor will be retained while most of their aromatic volatile oils will be lost. Aroma is imparted by adding hops within 15 minutes of the end of the boil. Aroma hops, or **finishing** hops, are often added when the heat is turned off and are allowed to steep for 15 minutes or so before cooling the wort.

Use a grain mill to crush grains then mash, sparge and lauter



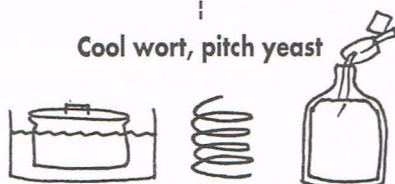
Add extract to water



Boil wort with hops



Cool wort, pitch yeast



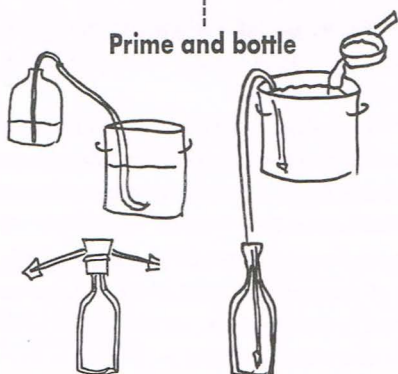
Ferment 5 gallons in 5-gallon carboy with blow off tube



Ferment 5-gallon in 6-7 gallon carboy with airlock



Prime and bottle



After boiling, we cool the wort so we can *pitch* the yeast. In brewing context, pitch simply means to add the yeast to the cooled wort to initiate fermentation.

If you are using dry yeast, you should *re-hydrate* it. Simply allow it to reabsorb water by letting the yeast rest for 15 to 30 minutes in sanitized 90- to 100-degree-F (32- to 38-degree-C) water (not wort) before pitching. If you use liquid yeast, you should use a *starter*, basically a minibatch of beer, to build up the volume of yeast you pitch. Follow the directions that came with your yeast package to prepare a starter.

Fermentation is the process of converting the sugars in the wort to alcohols — it is how wort becomes beer. Yeast consumes sugar and produces alcohol and carbon dioxide (CO₂).

Five gallons of beer in a 6 1/2 gallon carboy can be fermented by affixing an *airlock*. This is a one-way valve that uses liquid to prevent external air from entering the fermentation vessel while allowing the CO₂ that is produced during fermentation to escape. The *head space* in the carboy permits the head to form and then fall back into the beer after it has fermented to completion.

The same five gallons in a five-gallon carboy will leave no room for the head. This calls for a *blowoff*, sometimes called *blow-by*, tube which will allow the head and CO₂ to blow off into a second vessel containing clean water. The rocky head is known as *krausen* (pronounced kroyzen).

Dry hopping is used to impart hop aroma by adding hops to the fermenter. This procedure will result in a more distinctive hop character in the finished beer.

The vessel that you put your wort and yeast in to ferment is the *primary fermenter*. Glass bottles of three, five, six or more gallons are called *carboys*. If you transfer the beer to a second fermenter to rest, clear or wait until you can bottle it, the second vessel is the *secondary fermenter*. Also note that *racking* is the process of moving the liquid from one container or vessel to another.

When fermentation has ceased the yeast has consumed all the available sugar, and it is time to carbonate the beer, the brewer *primes* the *green beer*. Green beer is newly fermented beer before it has matured. Priming is simply adding more fermentable

sugars (usually corn sugar) to the beer to carbonate it. Once the sugars are added, the yeast goes back to work. After priming, the beer is racked into a bottle and capped (or kegged) so the carbon dioxide is absorbed in the liquid and the beer becomes naturally carbonated.

Hydrometers are measuring devices graduated for determining specific gravity (SG) of liquids. Water at 60 degrees F (16 degrees C) has an SG of 1.000 on a hydrometer calibrated for use at that temperature. Don't worry, most hydrometers are calibrated for use at 60 degrees F (16 degrees C). We increase density by adding sugars in the form of malt or extract to the wort.

If we know the *original gravity* (OG) of the wort and the *final gravity* (FG) after fermentation, a simple calculation gives the approximate amount of alcohol in the finished brew. Subtract the decimal portion of the final gravity from the decimal portion of the original gravity. Multiply the difference by 105 and you will have the approximate percentage of *alcohol by weight* (ABW) in the beer. An OG of 1.048 and FG of 1.009 gives ABW of 4.095 percent (0.048 - 0.009 = 0.039; 0.039 x 105 = 4.095).

Alcohol is lighter than water, so the percentage of *alcohol by volume* (ABV is not the same as ABW). ABV can be estimated as 1.25 times ABW, or 5.12 percent (1.25 x 4.095 = 5.12) in our example.

This column just skims the surface of terms you will use when talking to fellow brewers. These terms and procedures are discussed in detail in other *zymurgy* articles. Check the *zymurgy* mini index for back issue contents. Expand your vocabulary by reading brewing publications, scanning the Internet (try NewsGroup rec.crafts.brewing), CompuServe (wine and beer forum), joining a homebrew club or other endeavors that put you in contact with other brewers. A good start on building your own brewing library is a copy of the *Dictionary of Beer and Brewing* (Brewers Publications, 1988) by Carl Forget.

Can we talk? Of course, as long as we use the same language.

A 30-year computer industry veteran, Fred Hardy (fcmhb@access.digex.net) is founder of the Dulles Regional Brewing Society (DREBS), a Certified BJCP judge and has won several ribbons with his homebrews.



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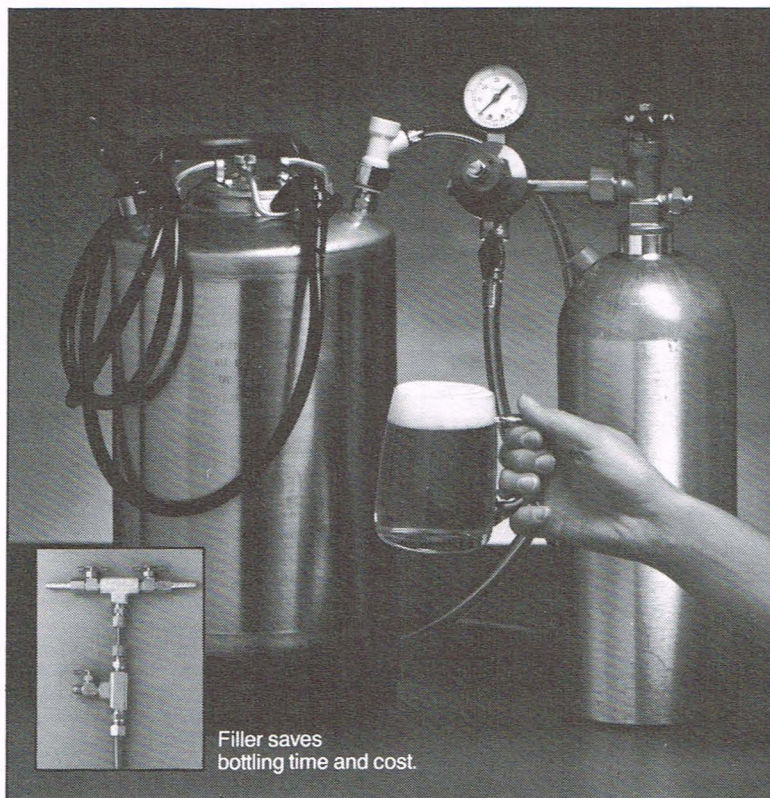
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WINNERS

C I R C L E

James Spence



In many parts of the United States, summer temperatures tend to be too warm for homebrewing. That's why we've presented these recipes for some unusual brews. Some of these beverages tend to do well at higher fermentation temperatures, where fruity esters and fermentation byproducts are not necessarily inappropriate. Mead in particular will withstand fermentation temperatures of 75 to 80 degrees F (24 to 27 degrees C) without adverse effects, and by early winter you'll have some well-aged nectar to share. So, give these brews a shot and, as always, remember that your results may vary.

SPECIALTY BEER



SILVER MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Grant Johnston

Woodacre, California

"Hazelnut Brown Ale"

Classic-style Specialty Beer

Ingredients for 5 gal (19 L)

- 11 lb Hugh Baird pale malt (5 kg)
- 1 lb Hugh Baird 70 to 80 °L crystal malt (0.5 kg)
- 2/5 oz Chinook hops, 11.3% alpha acid (11 g) (60 min.)
- 1 1/2 oz Styrian Goldings hops, 5.3% alpha acid (42 g) (steep 30 min. at end of boil)
- 4 oz dextrose (113 g) (to prime)
- English ale yeast culture
- 1 1/4 oz hazelnut extract (37 mL)

- Original specific gravity: 1.055
- Final specific gravity: 1.014
- Boiling time: 60 minutes
- Primary fermentation: five days at 70 degrees F (21 degrees C) in glass
- Secondary fermentation: 10 days at 70 degrees F (21 degrees C) in glass
- Age when judged (since bottling): 4 1/2 months

Brewer's specifics

Roast crystal malt in oven. Mash all grains at 152 degrees F (67 degrees C) for 30 minutes. Add hazelnut extract at bottling.

Judges' comments

"Definitely nutty aroma. Very low hop aroma. Low bitterness, nutty, sweet."

"Strong hazelnut flavor. Malt is there but subdued. Some medicinal flavors are present. Bitterness is subdued and appropriate."

FRUIT BEER



SILVER MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Mike and Jan Sternick

Denver, Colorado

"Fillmore Pêche"

Fruit Beer

Ingredients for 5 gal (19 L)

- 6 lb wheat extract (2.7 kg)
- 3/4 lb dry wheat extract (0.3 kg)
- 1 oz Willamette hops, 3.5% alpha acid (28 g) (60 min.)
Great Fermentations peach flavoring
- 7 tsp lactic acid (34.5 mL)
- 3/4 cup corn sugar (13 g) (to prime)
Wyeast No. 1056 liquid yeast culture

- Original specific gravity: 1.040
- Final specific gravity: 1.014
- Boiling time: 60 minutes
- Primary fermentation: 14 days at 66 degrees F (19 degrees C) in glass
- Secondary fermentation: 14 days at 58 degrees F (14 degrees C) in glass
- Age when judged (since bottling): three months

Brewers' specifics

Boil extracts for 60 minutes. Add eight to 10 drops peach flavoring per bottle at bottling.

Judges' comments

"Very peachy aroma and flavor. Little hop-malt character."

"Peachy. Not too bitter. Could use more dextrins for mouthfeel. Very good beer."

"Powerful peach flavor. Very little malt or hop character evident. Really good blend of flavors. Fruit character is strong but balanced."



BROWN ALE



BRONZE MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Charlie Wiemann

Carol Stream, Illinois

"Satchmo"

American Brown Ale

Ingredients for 5 gal (19 L)

- 6 2/3 lb Northwestern Gold malt extract (3 kg)
- 1/2 lb light dry malt extract (0.2 kg)
- 1 1/2 lb Belgian CaraMunich malt (0.7 kg)
- 1/4 lb English dextrin malt (0.1 kg)
- 1/4 lb English chocolate malt (0.1 kg)
- 3/4 oz Chinook hops, 8.3% alpha acid (21 g) (60 min.)
- 1/4 oz homegrown Eroica hops (7 g) (60 min.)
- 1/2 oz Kent Goldings hops, 5.2% alpha acid (14 g) (35 min.)
- 1/2 oz Willamette hops, 4.2% alpha acid (14 g) (35 min.)
- 1/2 oz Cascade hops, 4.0% alpha acid (14 g) (three min.)
- 3/4 oz Cascade hops, 4.0% alpha acid (21 g) (dry)
- Wyeast American ale No. 1056 liquid yeast culture
- 1 cup dextrose (150 g) (to prime)

- Original specific gravity: 1.052
- Final specific gravity: 1.010
- Boiling time: 60 minutes
- Primary fermentation: 12 days at 65 degrees F (18 degrees C) in glass
- Secondary fermentation: 35 days at 65 degrees F (18 degrees C) in glass
- Age when judged (since bottling): three months

Brewer's specifics

Mash grains at 153 degrees F (67 degrees C) for 60 minutes.

Judges' comments

"Hop flavor is lacking, but bitterness is evident. Slight astringency — maybe a bit too much carbonation. Could use a little more malty sweetness. Tastes old."

"Quick cloying sweetness up front. Assertive hop bitterness. Bitter, astringent aftertaste. Hop flavor and balance off to the bitter side. Needs more malt to balance. Watch age and handling for oxidation."

"Malty sweetness in middle. Slight roastiness, with some astringency in finish. Needs more maltiness to balance bitterness."

TRADITIONAL MEAD



SILVER MEDAL
AHA 1994 NATIONAL HOMEBREW COMPETITION
David Suda
Toronto, Ontario
"Mary Ann's Mead"
Traditional Still Sweet Mead

Ingredients for 5 gal (19 L)

- 17 lb alfalfa honey (7.7 kg)
- Red Star Pasteur dried Champagne yeast (no starter)
- 1 packet Green Mountain mead yeast nutrient

- Original specific gravity: not given
- Final specific gravity: 1.038
- Boiling time: no boil
- Primary fermentation: three months at 70 degrees F (21 degrees C) in glass
- Secondary fermentation: two months at 70 degrees F (21 degrees C) in glass
- Age when judged (since bottling): 10 months

Brewer's specifics

Heat must (honey) to 160 degrees F (71 degrees C). Hold for 15 minutes.

Judges' comments

"Good balance, alcohol."

"Good expression of honey in flavor. Slight spicy character to honey. Good balance of sweetness and acidity. Slight tartness. Finish is slightly tart."



MEAD



SILVER MEDAL
AHA 1994 NATIONAL HOMEBREW COMPETITION
Robert Grossman
Haddonfield, New Jersey
"Dixie"
Sparkling Metheglin

Ingredients for 6 gal (23 L)

- 6 lb alfalfa honey (2.7 kg)
- 8 1/2 lb clover honey (3.9 kg)
- 3 oz chopped fresh ginger (85 g) (five min.)
- 1 oz Hallertauer hops, 2.9% alpha acid (28 g) (finish)
- 1/2 oz Saaz hops, 3.2% alpha acid (14 g) (finish)
- Wyeast American ale No. 1056 liquid yeast culture
- 4 tsp Beverage People™ mead yeast nutrient (19.7 mL)
- 1 tsp Beverage People™ acid blend (4.9 mL)
- force carbonated in keg

- Original specific gravity: 1.085
- Final specific gravity: 1.035
- Boiling time: five minutes
- Primary fermentation: four weeks at 65 to 70 degrees F (18 to 21 degrees C) in glass
- Secondary fermentation: one year at 60 to 70 degrees F (16 to 21 degrees C) in glass
- Age when judged (since bottling): two months

Brewer's specifics

Ginger added to boil. Hops added at end of boil.

Judges' comments

"This explodes from carbonation onto the palate with sweetness (more sugary than honeylike) and ginger. The finish dries enough so this isn't cloying. I'd try to enhance the honey notes."

"Sweet! Honey and ginger evident. Floral-ginger balance is great. Fascinating and well-made."

"Candy sweetness, not cloying. Very clean yeast. Ginger was done just right. Don't boil must next time."

BEST OF FEST CLUB-ONLY COMPETITION WINNER



Bob Allen
Poulsbo, Washington
West Sound Brewers
"Cure for the Mouth"
Märzen

Ingredients for 5 gal (19 L)

- 10 lb Munich malt (4.5 kg)
- 1 1/2 lb Vienna malt (0.7 kg)
- 2 3/4 oz Tettnanger whole hops, 3.6% alpha acid (78 g) (45 min.)
- Wyeast No. 2206 Bavarian Lager liquid yeast culture force carbonated in keg

- Original specific gravity: 1.058
- Final specific gravity: 1.014
- Boiling time: 45 minutes
- Primary fermentation: 10 days at about 40 degrees F (4 degrees C) in plastic
- Secondary fermentation: 55 days at 32 degrees F (0 degrees C) in glass
- Tertiary fermentation: 10 days at 32 degrees F (0 degrees C) in keg
- Age when judged (since bottling): one month

Brewer's specifics

Mash grains at 150 to 143 degrees F (66 to 62 degrees C) for two hours and 15 minutes.

Judges' comments

"Hoppy flavor, slight oxidation. Long hoppy aftertaste. Should be more balanced towards the malt flavor. Too hoppy and thin for style."

"Aftertaste is kind of prickly and bitter. Hop flavor and aroma just a bit too high. Nice and drinkable."

"Too hoppy. Tone down bitterness. Astringent after taste."

"Astringent, dry, bitter in the finish. Malt is masked — category demands malty sweetness. Quite drinkable. Watch sparging conditions and mash pH."



Every gold-medal winning recipe from the AHA 1994 National Homebrew Competition was printed in *zymurgy* Special Issue 1994 (Vol. 17, No. 4) "Winners Circle."

SPECIALTY QUEST CLUB-ONLY COMPETITION WINNER



Kirk Olsen
Erie, Pennsylvania
Brewing Excellence in the Erie
Region (BEER)
"Loki's Hallowed Mischief"
Specialty Beer

Ingredients for 5 gal (19 L)

- 3 1/3 lb John Barley Corn nut brown ale extract (1.5 kg)
- 3 1/3 lb Premium American rice extract (1.5 kg)
- 1/2 lb 10 °L crystal malt (0.2 kg)
- 1/2 lb wheat malt (0.2 kg)
- 1 1/2 cup flaked barley (355 mL)
- 1/2 oz Fuggles hops (14 g) (45 min.)
- 3/4 oz Fuggles hops (21 g) (15 min.)
- 1/2 oz Saaz hops (14 g) (three min.)
- 1 1/2 lb light honey (0.7 kg)
- 1/2 cup Log Cabin syrup (118 mL)
- 1/2 cup real maple syrup (118 mL)
- 5 oz molasses (148 mL)
- 8 cloves (45 min.)
- 13 coriander seeds (45 min.)
- 4 whole allspice berries (45 min.)
- 2 horehound candies (45 min.)
- 1/2 oz candied ginger (14 g) (45 min.)
- 3/4 tsp cinnamon (3.7 mL) (15 min.)
- 1/2 tsp cloves (2.5 mL) (15 min.)
- 1/2 tsp nutmeg (2.5 mL) (15 min.)
- 1/2 tsp coriander (2.5 mL) (15 min.)
- 1/2 tsp allspice (2.5 mL) (15 min.)
- 1/2 tsp pumpkin pie spice (2.5 mL) (15 min.)
- 2 pinches cardamom (dry)
- Classic British CL170 liquid yeast culture force carbonated in keg

- Original specific gravity: not given
- Final specific gravity: not given
- Boiling time: 45 minutes
- Primary fermentation: 4 1/2 days at 63 degrees F (17 degrees C) in glass
- Secondary fermentation: seven days at 63 degrees F (17 degrees C) in glass
- Age when judged (since bottling): two weeks

Brewer's specifics

Steep grains at 155 degrees F (68 degrees C) for 30 minutes.

Judges' comments

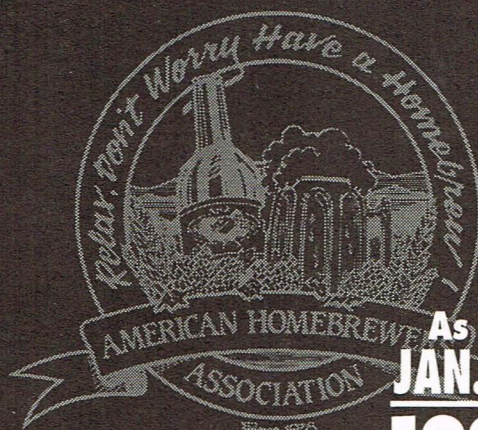
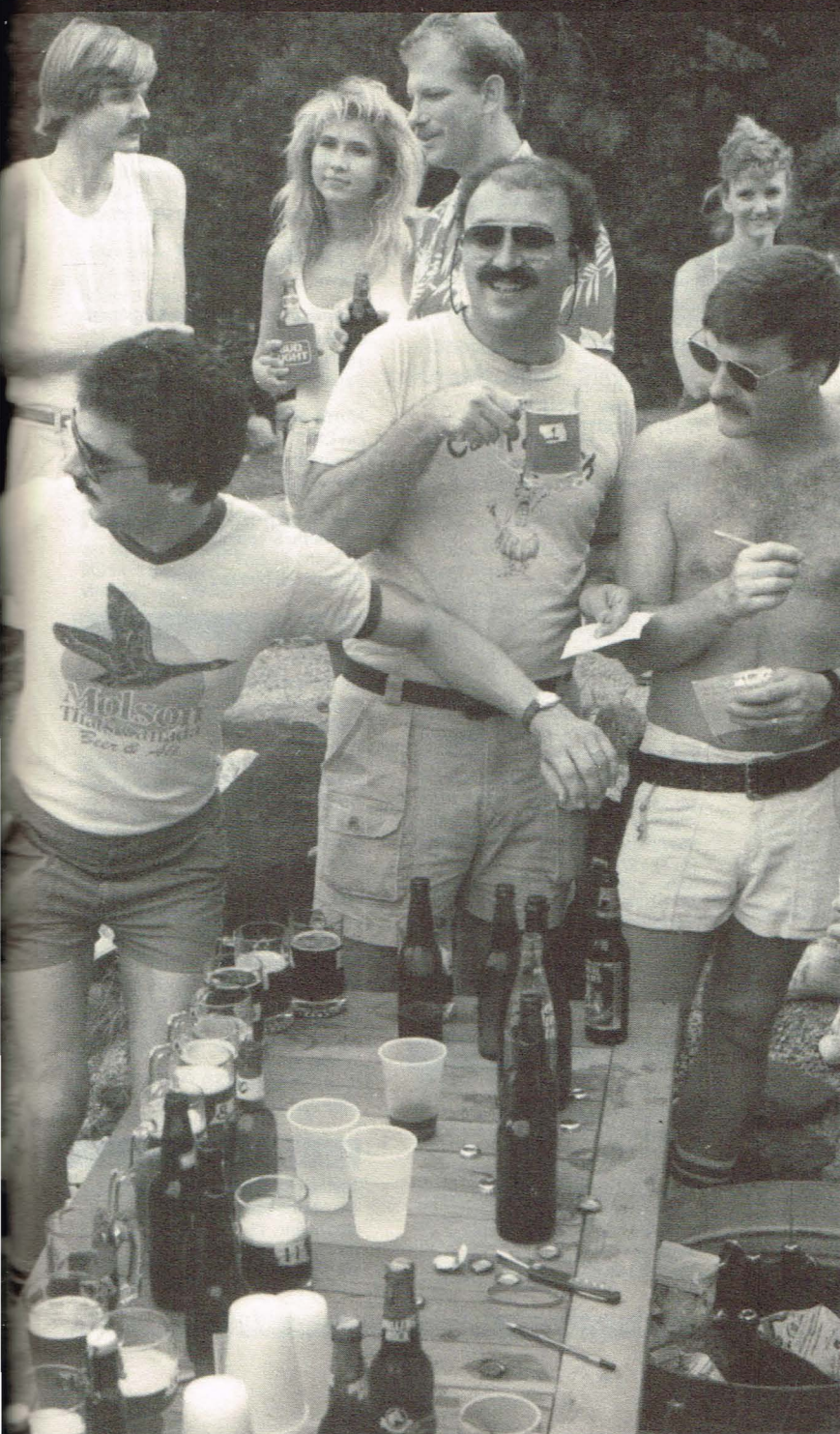
"Dark malty aftertaste. All spices are there! Beautifully balanced. Wonderful aroma. Melange of spices."

"Malty and chocolatey. Has lots of spiciness, maple syrup most obvious. Perhaps a bit overspiced, but no off-flavors detected. Has a bit of hop flavor that's slightly astringent. This will be awesome in about a month."



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ONTARIO

Amateur Winemakers of Ontario

c/o Paul Jean, Jr.
28 Otten Dr.
Nepean, ON K2J 1J2
(613) 825-3229

Brewers Or Zymurgists Only Society (BOZOS)

c/o Mike Aylward
79 Grath Crescent
Whitby, ON L1N 6N7
(905) 433-1784

CABA - Canadian Amateur Brewers Association

c/o Paul Dickey
19 Cheshire Dr.
Islington, ON M9B 2N7
(416) 237-9130

Canadian Association for Better Ale and Lager (CABAL)

c/o B. Peter Holland
PO Box 631
Toronto, ON M5C 2J8
(416) 287-0195

The Chartwell Brewers Union

c/o Glenn Anderson
12 Chartwell Crescent
Keswick, ON
(905) 476-9658 /
gramps@interlog.com

Cochrane Homebrewers Club

c/o Adrian J. Cantin
PO Box 1185
Cochrane, ON P0L 1C0
(705) 272-5335

Collingwood Brewing Club

c/o Joanne Anderson
Box 3068, RR3
Collingwood, ON L9Y 3Z2
(705) 445-1087

East Enders

c/o Erich Mann
67 Brockman Crescent
Ajax, ON L1T 2L2
(416) 427-9324

Golden Horseshoe Amateur Brewer's Association (GHABA)

c/o Craig Pinhey
351 Charlton Ave. W.
Hamilton, ON L8P 2E6
CPINHEY@DHC.DOFASCO. CA

Thunder Bay Home Brewers Association

c/o Bruce Holm
160 Iris Crescent
Thunder Bay, ON P7A 8A1
(807) 767-5077

Timmins and Sudbury Homebrewers Association

c/o Susan Lomas
PO Box 2241
South Porcupine, ON P0N 1H0
(705) 235-2382

Toronto Regional Association of Specialty Homebrewers (TRASH)

c/o Dave Kimber
1534 King St. W. #3
Toronto, ON M6K 1J8
(416) 538-2479

QUEBEC

Bootlegger's Homebrew Club

c/o Mike Mathison
53a Rue Ste-Anne
Ste-Anne-De-Bellevue, PQ H9X 1L5
(514) 457-1455

Montreal Association of Serious Homebrewers (MASH)

c/o Scott Vitus
1385 Garneau St.
Bruno, PQ J3V 2V5
(514) 441-9529

JAPAN

Far East Brewers

c/o Norman Fewell
Nakagusuku son, Kita Hama
381 Ban Chi, Okinawa

Foreign Fermentations

c/o Randy Ulland
343 Nikaldo, Kamakura-shi
Kanagawa-Ken, 248
0467-23-5187

Japan Homebrewing Promotion Association

c/o Miyanaga-Biru 301
Motoakasaka 1-5-1 Minato-Ku
Tokyo

NETHERLANDS

"Triple-W"

c/o Steven van den Berg
Willemsweg 110
6531 DN Nijmegen
080-562952

NEW ZEALAND

Auckland Guild of Winemakers

c/o Hec Denniston
426 Sandringham Rd.
Auckland 3

Far North Brewers & Vintners

c/o Nancy Barden
PO Box 214
Mangonui, Northland

Hamilton Brewers & Winemakers Club

c/o Barry G. Whiteley
45 Radiata St.
Hamilton
64-7-8559653

Hibiscus Winemakers & Brewers

c/o Jessie Evans
111 Whangaparaoa Rd.
Orewa, Auckland

Manukau Winemakers & Apiarists

c/o Basil Dempsey
18 Picton St.
Papatoetoe

North Shore Fermenters Club

c/o I.M.T. Ansin
13 Sundown Ave.
Whangaparaoa, Auckland

Waimea Amateur Brewers Society

c/o Marie Stephens
4 Churchill Ave.
Richmond, Nelson 7001

SWEDEN

Amylase

c/o Tommy Sandstrom
Tomrosvägen 29
Molnlycke, 43531
031-882371

Fermentation Army

c/o Patrick Holmqvist
Tullingebergsvägen 19 bv
S-146 45 Tullinge
46 8 778 46 80

Heimbrewed

c/o Anders Jonasson
Rådhusgatan 60
83134 Östersund
(063) 131463

Vörtens Vänner

c/o Patrik Sjöberg
Lomvägen 643
S-19157 Sollentuna
(08) 758 16 35

SWITZERLAND

Swiss Homebrewing Society

c/o Marco Sängler
Rütihofstr. 15
8049 Zürich
01 342 48 28

UNITED KINGDOM

Campaign For Real Ale (CAMRA)

c/o I.W. Dobson, Company Secretary
34 Alma Rd.
St. Albans, Herts., AL1 3BW
0727 867201

UNITED STATES

Homebrew SIG (MENSA)

c/o Ross Goeres
AIRCENT RUF UNIT 23625
APO AE, 09189

ALABAMA

Birmingham Brewmasters

c/o Kim Thomson
2208 2nd Place N.E.
Birmingham, AL 35215
(205) 854-4884

Lower Alabama Lagers

c/o Maarten van der Giessen
366 Michigan Ave.
Mobile, AL 36604
(205) 649-9436

Madison Sobriety Club

c/o David Wiley
123 Harpers Hop Rd.
Madison, AL 35758
(205) 722-9544

Wiregrass Brewers Clubs

c/o John Sartwell
Route 3 Box 107
Ozark, AL 36360
(205) 299-3472

ALASKA

Great Northern Brewers

c/o James S. Roberts
3605 Arctic Blvd. #1204
Anchorage, AK 99503
(907) 337-9360

Matanuska Thunder Brewers

c/o Lowell S. Burgett
PO Box 874554
Wasilla, AK 99687
(907) 373-0885

Q & Q Brewers Guild

c/o Laurence Livingston
PO Box 2433
Homer, AK 99603-2433
(907) 235-2874

Zymurgists Borealis — the Homebrewers of the North!

c/o Roger P. Penrod
939 High Grade Way
Fairbanks, AK 99712-2017
(907) 479-8795

ARIZONA

Arizona Brewers and Vintners Association

c/o Bruce E. Dahlgren
3713 West Gelding Dr.
Phoenix, AZ 85023
(602) 843-4337

Brewmeisters Anonymous

c/o Lynn McLuty
9163 W. Crocus Dr.
Peoria, AZ 85281-3786
(602) 974-8928

Old Pueblo Homebrewers

c/o James Liddil
2332 E. Adams
Tucson, AZ 85719
(602) 881-8768



Representatives of the Prairie Homebrewing Companions and the Minnesota Brewers Association at the Second Annual Minnesota Homebrew Club Fest and Camp Out. Lake Osakis, Minn., July 1993.

Suds of the Pioneers

c/o Slim Tighe
PO Box 144
Bisbee, AZ 85603
(602) 432-5242

Wort First!

c/o Perry Davidson
930 N. San Francisco St. #14
Flagstaff, AZ 86001-3255
(602) 774-7513

ARKANSAS

Arkansas Home Wine and Beer Makers Association

c/o Dr. Martin Ronis
7214 Apache Dr.
Little Rock, AR 72205
(501) 664-2774

Fayetteville Lovers of Pure Suds (FLOPS)

c/o John Griffiths
625 West Dickson #9
Fayetteville, AR 72701
(501) 521-0456

Hell on the Border Homebrewers

c/o Tim Chilcott
PO Box 3
Fort Smith, AR 72902
(501) 783-5404

CALIFORNIA

Anderson Master Brewer's Association (AMBA)

c/o Jeff Lulenski
1252 Barry Ave. #5
Los Angeles, CA 90025

Barley Bandits

c/o Dick Reese
218 S. Alice Way
Anaheim, CA 92806-4033
(714) 630-6527

Barley Literates

c/o Beer Crafts
950 W. San Marcos Blvd., Suite 1
San Marcos, CA 92069
(619) 788-7696

Bay Area Mashers (BAM)

c/o Doug Ashcraft
5998 Alhambra Ave.
Oakland, CA 94611
(510) 339-1816

Big Dog Homebrewing Club

c/o Gordon Ponce
3333 Madeira Way
Livermore, CA 94550-3310
(510) 449-5118

Big Ring Brew Club

c/o Scott Parr
1223 Carmel Court
Walnut Creek, CA 94596
(510) 939-1605

Bonita Avenue Brewers

c/o R. Graham Jones
1624 Bonita Ave.
Berkeley, CA 94709

Brew Angels

c/o Richard Wong
201 Erma Ave.
Stockton, CA 95207
(209) 477-7748

Brewbirds of Hoppiness

c/o Kelly Dunham
1229 Lerida Way
Pacifica, CA 94044
(415) 355-7143

Brewers Guild of the Green Dragon

c/o Tom Messenger
1424 Bayoaks Dr.
Los Osos, CA 93402

Brewers of the Central Coast (B.O.C.C.)

c/o Sean Portwood
470 Price St. #A2
Pismo Beach, CA 93449

Clan de Stein

c/o Scott Smith
118 Placer Ave.
Ventura, CA 94003
(805) 687-0996

Crown of the Valley Brewing Society

c/o Tom Estudillo
1616 Orangetree Lane
La Canada, CA 91011
(818) 952-1386

Culinary Brewing Arts Association — Sacramento

c/o David Avalos/Lederwolff
Culinary Academy
3300 Stockton Blvd.
Sacramento, CA 95820
(916) 446-9426

Culinary Brewing Arts Association — San Francisco

c/o Mark Davis
5340 Paso Del Rio Way
Concord, CA 94521
(510) 672-6471

Delta Brewing Club

c/o Gordon L. Brimhall
3137 Almondridge Dr.
Antioch, CA 94509
(510) 778-8359

Diablo Valley Homebrewers Guild

c/o Leo Smith
342 Ridgeview Dr.
Pleasant Hill, CA 94523
(510) 372-8060

Draught Board Home Brew Club

c/o Charles Webster
33039 Lake Wawasee St.
Fremont, CA 94555
(510) 487-4274

The Fermenters

c/o O'Shea Brewing Co.
27324 Camino Capistrano #114
Laguna Niguel, CA 92677
(714) 582-BREW

Foam on the Brain

c/o John DeGrazia
1487 Arthur Neal Court
Lemon Grove, CA 91945
(619) 697-4933

Foothill Fermenters

c/o Dan Bell
10556 Combie Rd. #106409
Auburn, CA 95602-8908

Gold Country Brewers Association

c/o Donna Bettencourt
PO Box 160854
Sacramento, CA 95816
(916) 381-1300

Hangtown Association of Zymurgy Enthusiasts (HAZE)

c/o Elizabeth and Craig Zangari
3226 Naomi
Placerville, CA 95667
(916) 626-7733

Hetch Hetchy Hopheads

c/o Bucket of Suds
317 Old County Rd.
Belmont, CA 94002
(415) 637-9844

High Desert Barley Hoppers

c/o Don Miller
8755 Devon Ave.
Hesperia, CA 92345
(619) 947-7944

High Desert TRUBlemakers

c/o Glen Chandler
3400 15th St. W. #82
Rosamond, CA 93560
(805) 277-2208

Humboldt Brewers Guild

c/o Brew Mart
1630 F St.
Eureka, CA 95501
(707) 445-4677

Inland Empire Brewers

c/o Carl Starkey
2365 Palermo Ave.
Upland, CA 91784

Lagerheads Homebrewing Guild

c/o Bruce Garlinger
PO Box 651
Inyokern, CA 93527
(619) 378-4BRU

Long Beach Homebrewers

c/o Richard Lynn
5120 Faust Ave.
Lakewood, CA 90713-1924
(310) 867-8412,
CompuServe 73767,2212

MAD BREWERS — Bakersfield

c/o Mike Shue
3408 Wrenwood St.
Bakersfield, CA 93309
(805) 831-3719

MAD BREWERS —**Napa/Sonoma**

c/o Dan Sullivan
3167 Laurel St.
Napa, CA 94558
(707) 258-9369

Maltose Falcons Homebrewing Society

c/o Jerry Macala
22836 Ventura Blvd. #2
Woodland Hills, CA 91364
(818) 884-8586

Marin Home Brewers Club

c/o Scott McMartin
1809 Larkspur Landing Circle
Larkspur, CA 94939
(415) 332-8804

Marin Society of Homebrewers (MASH)

c/o Mike Riddle
2 Mt. Rainier Dr.
San Rafael, CA 94903
(415) 472-3390

Monterey Beer Nuts

c/o Jim Morrison
511 Grand Ave.
Pacific Grove, CA 93950
(408) 375-0950

Old Capitol Brewing Club

c/o Christopher Howley
418 Mills Dr.
Benicia, CA 94510
(707) 644-5517

Quality Ale & Fermentation Fraternity (QUAFF)

c/o Rich Link - Beer & Wine Crafts
460 Fletcher Pkwy.
El Cajon, CA 92020
(619) 447-9191

Redwood Coast Brewers Association

c/o Michael Byers
707 Pelton Ave. #108
Santa Cruz, CA 95060
(408) 426-3005

San Andreas Malts

c/o Russ Wigglesworth
PO Box 884661
San Francisco, CA 94188-4661
(415) 885-1878

San Joaquin Worthogs

c/o Tom Pope
5702 W. Wathen
Fresno, CA 93722

San Luis Obispo Brewing Society (SLOBS)

c/o Howard Gootkin
1568 Frambuesa Dr.
San Luis Obispo, CA 93405
(805) 541-0713

Santa Barbara Co. Home Brewers Association

c/o Kyle Carrell
PO Box 597
Los Olivos, CA 93441-0597
(805) 686-0730; 73160,1441

Santa Clara Valley Brewers Association

c/o Bob Hight
433 California St.
Santa Clara, CA 95050
(408) 247-6853

Shasta County Sudsers

c/o Raymond Ault
4621 Balls Ferry Rd.
Anderson, CA 96007
(916) 365-6284

Society of Barley Engineers

c/o Andy Gamelin
1218 Melrose Way
Vista, CA 92083
(619) 631-8210

Some of Upland's Diversified Zymurgists (SUDZ)

c/o Scott Donaghe
29500 Mira Loma Dr. A-202
Temecula, CA 92592-2255
(909) 625-0126

Sonoma Beerocrats

c/o Nancy Vineyard
840 Piner Rd. #14
Santa Rosa, CA 95403
(707) 544-2520

South San Diego Brewers and Vintners Club

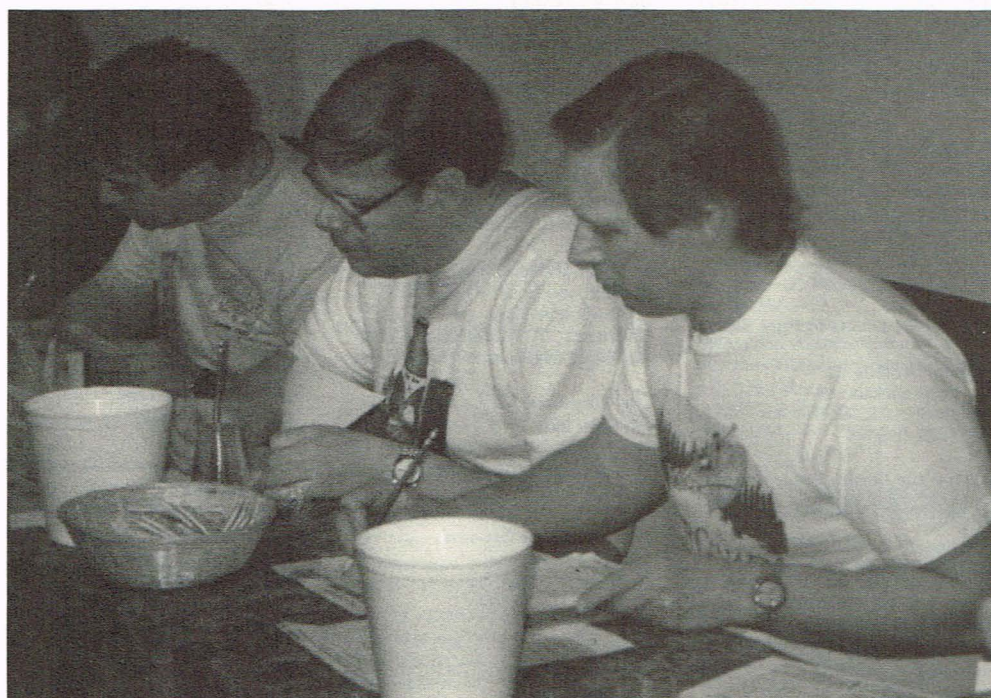
c/o Jarrod Bell
661 Gretchen Rd.
Chula Vista, CA 91910
(619) 427-2474

Stanislaus Area Association of Zymurgists

c/o Micah Millspaw
309 S. 6th Ave.
Oakdale, CA 95361-4032
(209) 847-9706

Stanislaus Hoppy Cappers

c/o Wayne Baker
1907 Central Ave.
Ceres, CA 95307
(209) 538-2739



Strand Brewers Club
c/o Peter A. Chin-Sang
3436 N. Studebaker Rd.
Long Beach, CA 90808-3047
(310) 425-8700

Susanville Homebrew Institute of Technology
c/o Larry Anthony
284 Caballos Court
Oakdale, CA 95361-4158

Tahoe Homebrewer's Club (THC)
PO Box 624337
South Lake Tahoe, CA 96154-4337

Temecula Valley Homebrewers Association
c/o Vinnie Cilurzo
41220 Calle Contento
Temecula, CA 92592
(714) 676-5250

Underground Spirits Association (USA)
c/o The Coddish
8343 Quartz Ave.
Winnetka, CA 91306
(818) 998-1637

Wild Yeast Culture
c/o Gareth Gordon
641 Paloma Ave.
Oakland, CA 94612
(510) 893-0385

Worts of Wisdom
c/o Richard Allen
3389 Creighton Place
Santa Clara, CA 95051-1501
(408) 247-6010

Yolo County Homebrewers
c/o Vern Wolff
PO Box 538
Esparto, CA 95627
(916) 787-3615

COLORADO
Bierewolves of Loveland
c/o Bob Green
PO Box 411
Loveland, CO 80537
FAX (303) 663-1557

Brownion Colony
c/o Beth D. @Brew Ha Ha
708 8th St.
Greeley, CO 80631
(303) 356-1566

Colorado Beer Club
c/o John Myers
5500 S. Forest Lane
Greenwood Village, CO 80121

Crested Butte Brewskiers
c/o Graham Ullrich
PO Box 2045
Crested Butte, CO 81224-2045
(303) 349-5969

Deep Wort Brew Club
c/o John Landreman
550 Gillcrest Rd.
Colorado Springs, CO 80906
(719) 579-6977

Fermentations of Aurora Mashers (FOAM)
c/o Doug Collins
221 Zion St.
Aurora, CO 80011
(303) 366-5957

Foam on the Range
c/o Joe Pardee
7588 S. Quay Court
Littleton, CO 80123
(303) 973-9860

Grateful Head Homebrew Club
c/o West Slope Homebrewing
111 S. 6th St.
Grand Junction, CO 81501
(303) 244-8947

Hop Barley & The Ale's
PO Box 17935
Boulder, CO 80308-0935
(303) 244-8947

Hops Around the Rock
c/o Bob Burns
45587 Summit Rd.
Parker, CO 80134
(303) 841-8853

Mash Tongues
c/o Brian J. Walter
618 Tyler St.
Fort Collins, CO 80521-3129
(303) 493-2586

One Brew Over the Cuckoos Nest (O.B.O.C.N.)
c/o Dave Liptz
1614 E. Orman
Pueblo, CO 81004
(719) 564-1611

Rainbrewers
c/o Russ Staska
433 E. Baylor St.
Fort Collins, CO 98525

Unfermentables
c/o Chris Galvin, Wine and Hop Shop
705 E. 6th Ave.
Denver, CO 80203
(303) 831-7229

CONNECTICUT
Beer Brewers of Central Connecticut
c/o Judy Lawrence
1550 Randolph Rd.
Middletown, CT 06457
(203) 346-5440

Connecticut Beernutts
c/o Steve Henry
14 Waverly Ave. #2
Portland, CT 06480-1842

Hop River Brewers
c/o Richard Rosen
265 Route 6
Andover, CT 06232
(203) 742-5465

UConn Zymurgy Club
c/o Robert Vieth, Box U-139
University of Connecticut
Storrs, CT 06269

Underground Brewers of Connecticut
c/o Victor Gubinski
44 Lalley Blvd.
Fairfield, CT 06430
(203) 259-8693

Whale of an Ale Brewers Association
c/o Samira Hakki
68 Ridge Hill Rd.
Oakdale, CT 06370

DELAWARE
First State Brewers
c/o Scott Bieber
407 Pheasant Circle
Bear, DE 19701
(302) 834-8747



Upstate New York Homebrewers Association (UNYHA) Beer Judging Contest, June 1994

FLORIDA
2 Dudes That Brew
c/o Peter Coleman
317 Citrus Dr.
Nokomis, FL 34275
(912) 876-0556

Bradenton Brewski's
c/o Chet Kedzierski
PO Box 51
Bradenton, FL 34206
(813) 747-2437

Caloosa Hop Heads
c/o Gary Coutcher
826 S.E. 41st St.
Cape Coral, FL 33904
(813) 549-7567

Central Florida Homebrewers
c/o Ronald C. Bach
1190 Trotwood Blvd.
Winter Springs, FL 32708
(407) 696-2738

Escambia Bay Brewers
c/o Tom Walpole
2240 Riddle Rd.
Cantonment, FL 32533

Florida Suncoast ThunderBrewers
c/o Matthew Wiseman
211 60th Ave. S.
St. Petersburg, FL 33705
(813) 867-3693;
CompuServe 71543,763

HBu (HomeBrewers Underground)
c/o Gary Essex
206 Walton Ave.
Niceville, FL 32578
(904) 678-6186

Hogtowne Brewers
c/o Ray Badowski
21 S.W. 2nd St.
Gainesville, FL 32601-6237
(904) 375-7949

The Home Brewery Firehouse Brewers
c/o The Home Brewery
1313 E. 8th Ave.
Tampa, FL 33605
(813) 241-2739

Malt Aficionados Society of Hernando (MASH)
c/o Joe Johnston
416 S. Broad St.
Brooksville, FL 34601
(904) 799-3004

North Florida Brewers League
c/o Sarah Bridegroom
1801 B Fairlane Rd.
Tallahassee, FL 32303

Northeast Florida Society of Brewers
c/o Bob Davis
7 Park Terrace Dr.
St. Augustine, FL 32084
(904) 824-5252

Nude Brewers
c/o The Hogtown Brewer
21 S.W. 2nd St.
Gainesville, FL 32601
(904) 375-3772

Palm Beach Draughtsmen
c/o Stephan Vernet
4734 Okeechobee Blvd., Bldg. F5
West Palm Beach, FL 33417-4626
(407) 686-4019

South Florida Homebrewers
c/o Lauren or Bryan Hemedinger
441 S. State Rd. 7
Margate, FL 33068-1934
(305) 968-3709; FAX (305) 968-3591

Spacecoast Associates for the Advancement of Zymurgy (SAAZ)
c/o Billy (Gizmo) Kendrick
6450 Banks Ave.
Cocoa, FL 32927-3178

Tampa Bay BEERS (Beer Enthusiasts Enjoying Real Suds)
c/o Mark Stober
PO Box 24691
Tampa, FL 33623-4691
(813) 977-0141

Treasure Coast Brewmasters
c/o Ron Polzin
11760 S.E. Dixie Hwy.
Hobe Sound, FL 33455
(407) 546-9108

GEORGIA

Ale Atlanta

c/o Coby Glass
1852 Aaron Court
Powder Springs, GA 30073
(404) 943-5583

Brew-52's

c/o Robert Hall
450 Ruth St.
Athens, GA 30601
(404) 369-1285

Chicken City Ale Raisers

c/o Rick Foote
6252 Brookfield Dr.
Murrayville, GA 30564
(404) 983-1135

Clergy of Zymurgy of the Golden Isles

c/o Victor Ross
3225 Altama Cir.
Brunswick, GA 31520
(912) 267-6911

Covert Hops Society

c/o Rick Lubrant
PO Box 15256
Atlanta, GA 30333
(404) 377-3024

Lagerheads von Atlanta (LAVA)

c/o Heather Alonso
5010 Centerhill Church Rd.
Loganville, GA 30249
(404) 466-0378

Savannah Brewers' League

c/o Klugh Kennedy
105 Lagoon View Crossing
Savannah, GA 31410
(912) 897-3619

HAWAII

Deja Brews Homebrewing Club of Kaua'i

4915 Nonou Rd.
Kapaa, HI 96746
(808) 823-8929

Hawaiian Homebrewers Association

PO Box 852
Hauula, HI 96717
(808) 293-2229

IDAHO

Hell's Canyon Homebrewers

PO Box 931
Lewiston, ID 83501
(509) 243-4593

Homebrewers Of the Palouse

c/o James Ray
1274B Rothfork Rd.
Moscow, ID 83843
(208) 882-4976

Ida-Quaffer Homebrewers Association

c/o Editor
3894 W. State St.
Boise, ID 83703
(208) 344-5141

S.E.I.Z.U.R.E.

c/o Tim Hill
1240 Alameda Ave.
Idaho Falls, ID 83401-2153
(208) 523-2674

ILLINOIS

Association of Bloomington/Normal Brewers (ABNORMAL)

c/o Tony McCauley
RR 9, Box 42
Normal, IL 61761
(309) 452-1084

Beer Nuts

c/o Eric Dallman
4516 Stonewall Ave.
Downers Grove, IL 60515
(708) 271-0843; ericd@prairienet.org

Boneyard Union of Zymurgical Zealots (BUZZ)

c/o Joe Formanek
512 Dogwood
Champaign, IL 61821
(217) 328-6858

Brewers of South Suburbia (BOSS)

c/o Steve Kamp
PO Box 461
Monee, IL 60449
(708) KEG-BEER

Brewers On the Bluff

c/o Lake Bluff Park Dist./
Steve Howard
PO Box 95
Lake Bluff, IL 60044
(708) 234-4150

Central Illinois Brewer's Association

c/o Mark Kellums
335 N. Main
Mt. Zion, IL 62549
(217) 864-4216

Chicago Beer Society

c/o Steve Paeschke
769 Laurel Ave.
Des Plaines, IL 60016
(708) 391-3289

Club Wort

c/o Jim Thommes
5504 Deerfield Lane
Rolling Meadows, IL 60008
(708) 397-7648

Egyptian Zymotic (EZ) Brewers

c/o Doug Diggie
514 S. Illinois Ave.
Carbondale, IL 62901
(618) 457-3513

Forest City Brewers

c/o George Tauscher
5301 Orchard Ave.
Rockford, IL 61108
(815) 227-4677

Headhunters Brewing Club

c/o Greg Lawrence
4 S. 245 Wiltshire Lane
Sugar Grove, IL 60554
(708) 557-2523

Home Beers Racketeers

c/o Gary Burns
PO Box 203
Kansas, IL 61933
(217) 948-5365

Lagerhead Brew Club

c/o Chuck Aleshire
102 Yale Court
Shorewood, IL 60436
(815) 729-2295

Mississippi Unquenchable Grail Zymurgists (MUGZ)

c/o Jeff Grillo
1422 32nd St.
Rock Island, IL 61201
(309) 786-2546;
72064.1256@compuserve.com

Northern Illinois Better Brewers

c/o Jon Huettel
2316 Oak St.
Northbrook, IL 60062-5220
(708) 498-6154

Northwest Amateur Wine and Beermakers Guild

c/o Roy J. Horton
1419 Redwood Dr.
Mt. Prospect, IL 60056
(708) 439-4525

Prairie Schooners

c/o Karl Menninger
PO Box 10082
Springfield, IL 62791-0082
(217) 522-1906

Urban Knives of Grain (UKG)

c/o Mike Montgomery
13446 Golden Meadow Dr.
Plainfield, IL 60544
(815) 439-2149;
mlm01@intgpl.ih.att.com

Weinkeller Beer Enthusiasts

c/o Bob Ward
9114 W. 140th St. Suite 3NE
Orland Park, IL 60462
(708) 403-6666

The Weisse Guys

c/o Samantha Lynn's
117 W. Washington St.
Washington, IL 60450
(815) 941-0366

Wort-Mongers of Eastern Illinois

c/o Ken Knoop/
The Grape N Grain Gourmet
623 Monroe St.
Charleston, IL 61920
(217) 348-8077

INDIANA

Bull and Stump Brew Club

c/o Rob Reed
1420 W. 350 North
Kokomo, IN 46901
(317) 452-6371

Fermenters Of Special Southern Indiana Libations Society (FOSSILS)

c/o Roger Baylor
PO Box 6880
New Albany, IN 47151-6880

Foam Blowers of Indiana (FBI)

c/o Ron Smith
4561 Brentwood Court
Zionsville, IN 46077

Lafayette Brewing Bovinophiles

c/o Russel H. Stwalley
512 Main St.
Lafayette, IN 47901
(317) 742-2696



Tippecanoe Homebrewers Circle

c/o Richard Fudge
Box 59
Battle Ground, IN 47920
(317) 567-2478

Wabash Valley Vintners' & Homebrewers' Club

c/o Neil Flatter
913 7th Ave.
Terre Haute, IN 47807-1109
(812) 235-2682;
Neil.Flatter@Rose-Hulman.Edu

Wells County Homebrewers Club (WELCOME)

c/o Jim Craig, Sec./Treas.
1121 Honeysuckle
Bluffton, IN 46714
(219) 824-0387

IOWA

Cedar Rapids Association of Zymurgy, Yeastology and Homebrewers (CRAZY Homebrewers)

c/o Mike Snyder
PO Box 5922
Cedar Rapids, IA 52406-5922
(319) 378-1453

Central Iowa Homebrew Club

c/o Dan A. Morey
4008 Bruce Rd.
Marion, IA 52302-5925
(515) 292-8207

Heartland Homebrew Club

c/o Gary Porter
RR 4 Box 112
Grinnell, IA 50112-9143
(515) 236-7487

The Honorable Iowa River Society of Talented Yeastmasters (THIRSTY)

c/o Pete Hanson
950 23rd Ave. Place
Coralville, IA 52241
(319) 354-0198

M.U.G.Z.

c/o Jan Van Ommen
200 W. Spring St.
Eldritch, IA 52748

North Iowa Wine Club

c/o Laurence Fredricksen
24 Bayside Ave., Route 1 Box 174E
Clear Lake, IA 50428
(515) 357-2290

Raccoon River Brewers Association

c/o Mark Opsal
400 Jordan Dr.
West Des Moines, IA 50265

KANSAS

Derby Brew Club

c/o Roger Clark
942 Morrison
Derby, KS 67037
(316) 788-5327

Greater Topeka Hall of Foamers

c/o Bryce Benedict
1273 S.W. Oakley
Topeka, KS 66604
(913) 233-6717

Kansas City Beer Meisters

c/o Alberta Rager
8206 Bell Rd.
Lenexa, KS 66219-1631
(913) 894-9131

Krausen Boys

c/o Patrick Lehnerr
6915 Millridge Rd.
Shawnee, KS 66218
(913) 441-0353

Little Apple Brew Crew

c/o Brent L. Benkelman
3202 Willowpond Lane
Manhattan, KS 66502
(913) 539-4762

The Musty Worthogs

c/o Cliff Wyrick
539 E. Santa Fe
Olathe, KS 66061
(913) 764-5717

Rapscallions of Wichita

c/o Kerry Clinkenbeard
1320 Bitting
Wichita, KS 67203
(316) 263-6871

S.E. Kansas Homebrewers Association

c/o Ben Fox
611 N. Mulberry
Eureka, KS 67045
(316) 583-7256

KENTUCKY

Kentucky Brewers Association

c/o Ira Proctor
451 Southland Dr.
Lexington, KY 40503

LAGERS Ltd.

PO Box 5384
Louisville, KY 40255-0384

Lone Wolf Brewers

c/o Michael Berheide
120 Delwood Ave.
Berea, KY 40403
(606) 986-2647

LOUISIANA

Baton Rouge Enzyme Wrights (BREW)

c/o Jim Waits
1818 Wooddale Blvd. #18
Baton Rouge, LA 70806
(504) 926-BEER

Crescent City Homebrewers

c/o Wayne Rodrigue
4233 Alabama Ave.
Kenner, LA 70065
(504) 468-9273

Dead Yeast Society

c/o Jim Boudreaux
204 Montrose Ave.
Lafayette, LA 70503-3822
(318) 981-4072

No name nO Blame homebrew Society (No B.S.)

c/o Karl Menzer
574 Goode St.
Thibodaux, LA 70301
(504) 446-6774

Redstick Brewmasters

c/o Erick Swenson
628 Centenary St.
Baton Rouge, LA 70808
(504) 769-2177

Shreveport Urban Diastatic Spargers (SUDS)

c/o Bob Carbone
3956 Fire Tower Rd.
Grand Cane, LA 71032
(318) 858-2219

MAINE

BrewSpeak

c/o Stephen Hodgdon
297 Route 236
Berwick, ME 03901
(207) 384-3278

Maine Ale & Lager Tasters (MALT)

c/o Ron Bouffard
PO Box 464
Topsham, ME 04086-0464
(207) 666-8888

Worthog Homebrewing Club

c/o Greg Blanchette
Box 4255
Dresden, ME 04342
(207) 737-8174

MARYLAND

Bay Country Brewers

c/o Reid Woolford
243 Bynum Ridge Rd.
Forest Hill, MD 21050
(410) 485-4854

Chesapeake Real Ale Brewers (CRABS)

c/o David Nesbitt
5408 White Mane
Columbia, MD 21045
(410) 997-0983

Cross Street Irregulars

c/o Hugh Sisson
36 E. Cross St.
Baltimore, MD 21230
(410) 539-2093

Libation Association of Northern Maryland

c/o Jason Hardebeck
1214 Brighton Lane
Bel Air, MD 21014
(410) 893-5916

Midnight Homebrewers' League

c/o Stephen M. Kranz
741 Windsor Dr.
Westminster, MD 21158
(410) 857-1833

Powder Keg Brew Club

c/o Steve Gianacopolos
Naval Surface Warfare Center —
Indian Head Division
Indian Head, MD 20640

Suds & Ciphers

c/o Eric Marzewski
1463 Graham Farm Circle
Severn, MD 21144

Summer Hill Brewers

c/o Bert Belote
222 Little New York Rd.
Rising Sun, MD 21911
(410) 658-2865

Terrapin Brewers Association

RR2 Lot 5B
La Plata, MD 20646-9802
(301) 932-1706

The Yeastern Shore Brewers of Delmarva

c/o Stephen L. Pratt
PO Box 342
Upper Fairmont, MD 21867

MASSACHUSETTS

Ana-Lagers

c/o Steve Robinson
89 Bruin Hill Rd.
North Andover, MA 01845
(508) 691-5238;
steve.robinson@analog.com

Barleyhoppers Brewing Club

c/o Mark Larrow
154 King St.
Northampton, MA 01060
(413) 586-0150

Biermeister Brewers Club

c/o Eric Marzewski
706 Chelmsford St. #301
Lowell, MA 01851
(508) 458-0604

Boston Brew-Ins

c/o George Curran
16 Cutter Ave. #3
Somerville, MA 02144

Boston Wort Processors

PO Box 397198
Cambridge, MA 02139-7198

Cape Cod Lager and Ale Makers (CCLAM)

c/o Carl Laman
11 Pleasant Park Rd.
Harwich, MA 02645
(508) 432-9524

Colonial Brewers

c/o Bill Lytle
Box 229
Brookfield, MA 01506

Gambrinus Society

c/o Herbert Holmes
92 Marsh Rd.
Barre, MA 01005
(508) 355-2753

Hampshire Brewing Collective

c/o Rob Young
Hampshire College
PO Box 1527
Amherst, MA 01002
(413) 549-7604

Homebrew at Sloan

c/o Greg Hennessy,
MIT Sloan School of Management
50 Memorial Dr.
Cambridge, MA 02139
(617) 628-2309

IBIS

c/o Wade Krull
32A Cherry Hill Dr.
Danvers, MA 01923
(508) 777-4247

Merrimack Valley Brewers Homebrew Club

c/o Gregg C. Cummings
15 Jere Rd.
Wilmington, MA 01887
(508) 658-5324

Missile Mashers

c/o Edward Bardsley
38 Hillside Ave.
Lawrence, MA 01841
(508) 681-9064

North Shore Brewers

c/o Robert B. Murphy
9 1/2 Bisson St.
Beverly, MA 01915
(508) 921-7352

South Shore Brew Club

c/o Randy Reed
32 Copperwood Dr.
Stoughton, MA 02072
(617) 341-8170

Spinal Taps

c/o Dr. Michael Biblyk
19 Shaw St.
West Newton, MA 02165
(617) 527-4255

Stellar Brewers

c/o Bruce Susel
197 Main St.
Marlboro, MA 01752
(508) 460-5050

Trubadours

c/o Dan Harris
12 Roosevelt Ave.
Holyoke, MA 01040
(413) 532-4457

Valley Fermenters

c/o Charlie Olchowski
PO Box 988
Greenfield, MA 01302-0988
(413) 773-5920

Worry Worts

c/o Glen Tremblay
139 South St.
Upton, MA 01568
(508) 529-6694

MICHIGAN

Ann Arbor Brewers Guild

c/o Rolf Wucherer
1942 Steere Place
Ann Arbor, MI 48104
(313) 663-8196

Beernutz

c/o Brew & Grow/Bonnie Day
33523 W. 8 Mile #F5
Livonia, MI 48152
(313) 442-7939

Capital City Brew Crew

c/o Jim Booth
412 Everett Dr.
Lansing, MI 48915
(517) 371-1754

Cass River Home Brewers Club

c/o John Jackson
14098 Landings Way
Fenton, MI 48430
(810) 629-4804

Detroit Car Boys

c/o Rich Byrnes
PO Box 92418
Warren, MI 48092-0418
(313) 558-9844

Fermental Order of Renaissance Draughtsman

c/o Rich Byrnes
30972 Cousino
Warren, MI 48092
(313) 558-9844

Firkin Home Rackers

c/o Allan Lindsey
4249 Bellevue Rd.
Onondaga, MI 49264
(517) 589-5556

Great Lakes Brewers, Michigan Chapter No. 1

c/o Joe Gedmen
34632 Hivley
Westland, MI 48185
(313) 721-6288

Hogshead Brewers

c/o D.J. Downs
1994 A Woodward Ave. #215
Bloomfield, MI 48304
(313) 362-4466

Kalamazoo Libation Organization of Brewers (KLOB)

c/o Dan Klipfinger
632 Oak St. Apt. 3
Kalamazoo, MI 49008
(616) 381-3266

Keweenaw Real Ale Enthusiasts United for Serious Experimentation in Naturally-Effervescent Refreshment Science (KRAEUSENERS)

c/o Daniel Butler-Ehler
Route 1, Box 27
Calumet, MI 49913
(906) 337-3525

Lake Street Brewers

c/o Butch or Rich
220 W. 8th St.
Holland, MI 49423
(616) 396-8227

Michiana Omnifarious Nomadic Kraeuseners & Spargers (MONKS)

c/o Todd Keller
1350 Ferry St.
Niles, MI 49120
(616) 683-9162

Mid-Michigan Brewers Union

c/o Martin Woods
1404 Westerrace Dr.
Flint, MI 48532
(810) 733-1870

Port Elizabeth Brewers Guild

c/o Mike Kelly
PO Box 1452
Caseville, MI 48725

Prime Time Brewers

PO Box 346
Rockford, MI 49341

MINNESOTA

Boreal Bottlers

c/o Jerry Bourbonnais
Route 6 Box 236
Bemidji, MN 56601
(218) 586-2488

Minnesota Brewer Association (MBA)

c/o James Frechette
7169 167th Court W.
Rosemont, MN 55068-1903
(612) 891-5458

Minnesota Timberworts

c/o Leo Vitt
720 15 St. N.E.
Rochester, MN 55906
(507) 285-0468;
vitt@rchvmw2.ibm.com

Mobius Microbrewers

c/o Mark W. Peery
400 Wilshire Dr. S.
Minnetonka, MN 55305-1560
(612) 591-1602

Northern Ale Stars

Homebrewers Guild

c/o Don Hoag
5426 Beartrap Rd.
Saginaw, MI 55779
(218) 729-6302

The Redwing Homebrew Club — Northern Lights and Stouts

c/o Art McLeran
1622 W. 5th St.
Redwing, MN 55066
(612) 388-4984

MISSISSIPPI

Gulf Coast Brews Brothers

c/o Wade Wallinger
801 Swordfish St.
Pascagoula, MS 39581
(601) 762-7662

Proud Brewing Rebels (PBR)

c/o Charles Gutherlet, III
1761 Warrenton Rd.
Vicksburg, MS 39180
(601) 638-2144

MISSOURI

K. C. Cú Mheadha

c/o David L. Strange
4311 Charlotte
Kansas City, MO 64110
(816) 531-7240

Missouri Association of Serious Homebrewers (MASH)

c/o Micheal Muller
1316 Eastwood
Rolla, MO 65401
(314) 364-6422

Missouri Winemaking Society

c/o Paul Hendricks
2018 Norma Lane
St. Louis, MO 63138

St. Louis Brews

c/o Jerry S. Dahl
9 Adams Lane
Kirkwood, MO 63122
(314) 822-8039

MONTANA

Big Sky Basement Brewers and Blues Revival Society

c/o Jim Hunter
614 S. Cottage
Miles City, MT 59301
(406) 232-4378

Hopping Anarchists

c/o Kirk Astroth
7359 Raven Dr.
Belgrade, MT 59714
(406) 388-1232

MT Bocks Society

c/o Dudley Leaphart
33 Wyoming Ave.
Billings, MT 59101
(316) 245-6366

Pour Bastards of Northeast Montana

c/o Paul Pence
PO Box 281
Fort Peck, MT 59223
(406) 369-9367

Zoo City Zymurgists

c/o James Pelland
108 Northview Dr.
Missoula, MT 59803

NEBRASKA

Barley Pops and Alewives

c/o Marilyn Kielniarz
1402 S. 52 St.
Omaha, NE 68106

Lincoln Lagers

c/o Mark Krcmarik
1301 S.W. 24th
Lincoln, NE 68522
(402) 435-0019

Respected Ale & Lager Fermentors — Of Nebraska (RALF-ON)

c/o Jeff Ramage
116 Westridge Ave.
Bellevue, NE 68005-3515
(402) 291-2208

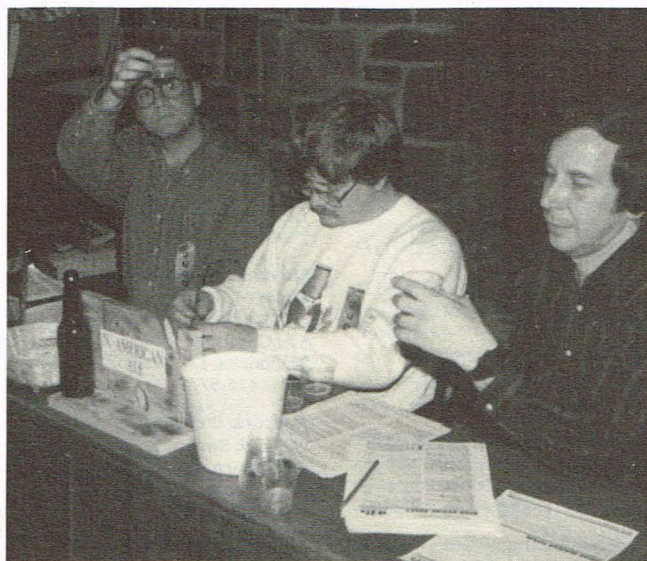
NEVADA

Southern Nevada Ale Fermenters Union (SNAFU)

c/o The Homebrewery
4300 N. Pecos Rd. #13
Las Vegas, NV 89115
(702) 644-7002

Washoe Zephyr Zymurgists

c/o Eric McClary
6185 Franktown Rd.
Carson City, NV 89704
(702) 883-7187



Upstate New York Homebrewers Association Beer Judging Contest, June, 1994

PHOTO COURTESY OF UNYHA

NEW HAMPSHIRE

Brew Free or Die

c/o Dan Hall
PO Box 1274
Merrimack, NH 03054-1274
(603) 778-1231

Fermenting Minds

c/o Bill Toothaker
150 Portland St.
Rochester, NH 03867
(603) 335-7012

Lakes Region Homebrewers

c/o Jon Scanlon
RFD1 Box 388B
Northfield, NH 03276
(603) 286-8149

New Hampshire Biernuts

c/o Dave Weisberg
PO Box 624
Peterborough, NH 03458
(603) 827-3502

Northern Brewers

c/o The Wine Cellar
650 Amherst St.
Nashua, NH 03063
(603) 883-4114

Seacoast Homebrewers Club

c/o Scott Kaplan
2 Broadway Apt. 4
Dover, NH 03820
(603) 743-6469; GrtScott@aol.com

Seacoast Union of Maltsters

c/o Bill Rucker
3 Jessica Court
Somersworth, NH 03878-2300
(603) 692-3609

Stagger Inn Brewers

c/o Scott Dean
219 N. River Rd.
Epping, NH 03042
(603) 679-1045

Twin State Brewers

c/o Paul White
RR1 Box 106A
Orford, NH 03777
(603) 353-4564

NEW JERSEY

Bell Hops

c/o Dave Ballard
599 Putnam Ave.
Piscataway, NJ 08854
(908) 752-7347

Brunswick Brew Club

c/o Brian Conger
4302 Hana Rd.
Edison, NJ 08817-2569
(908) 248-1559

Delaware Valley Draughtsmen

c/o Hunterdon Homebrew Shoppe
10 Bridge St.
Frenchtown, NJ 08825
(908) 996-6008

Gloucester County Homebrewers

c/o Paul Kennedy
578 Washington Ave.
Franklinville, NJ 08322
(609) 881-5718

Hansen House Hoppers/3-H Club

c/o David R. Hoffmann
115 N. Union Ave.
Cranford, NJ 07016
(908) 709-9295

Hophedz

c/o Kerry Bendel
38 Kirschner Ave.
Lincoln Park, NJ 07035
(201) 633-7679

Jersey Shore Homebrewers

c/o Mike Killkenny
607 Larkspur Lane
Jackson, NJ 08527
(908) 842-7507

Mid-Atlantic Sudsers and Hoppers

(MASH)

c/o Ed Busch
PO Box 105
Flagtown, NJ 08821
(908) 359-3235

New Jersey Worthogs

c/o Bill Luchkiw
49 Windmill Lane
New City, NY 10956

South Jersey Fermenters

c/o Bruce Hammell
868 Quinton Ave.
Trenton, NJ 08629
(609) 393-2946

NEW MEXICO

Atom Mashers

c/o Geoff Reeves
425 Quartz St.
Los Alamos, NM 87544
(505) 662-0417

Block 50 Brewers

c/o Pete Bohannon
2200 Oregon Ave.
Alamogordo, NM 88310

Desert Quencher

c/o Mark McClure
Box 670
Mesilla, NM 88046
(505) 523-6649

Dukes of Ale

c/o Guy Ruth
11524 Manitoba N.E.
Albuquerque, NM 88310
(505) 294-0302

The Grainful Heads

c/o Alewife Homebrew Supply
1314 Rufina Circle, Suite A6
Santa Fe, NM 87505
(505) 474-8046

NEW YORK

Adirondack Homebrewers

c/o Dick Cummings
5 Highland Pl.
Lake Placid, NY 12946
(518) 523-1557

Albany Barley Converters

c/o Cindy Hill
132 Salisbury Rd.
Delmar, NY 12054-1219
(518) 439-0923

The ALERS (Allegany Libation Education and Recreation Society)

c/o Jim Lee
146 N. 9th St.
Olean, NY 14753
(716) 373-0927

Borderline Yeast Infectors

c/o Gary (Doc) Dougherty
449 Court St.
Binghamton, NY 13904
(607) 722-2476

Brewbonic Plague

c/o Eric Hahn
65 Clarendon Pl.
Buffalo, NY 14209
(716) 884-8099

Brewers United for Real Pilsner (BURP)

c/o Joyce Decker
RD#1 Box 354
Livingston Manor, NY 12758

Broome County Fermenters Association

c/o Brice Feal
2601 Grandview Pl.
Endicott, NY 13760
(607) 757-0634

Catskill Mountain Homebrewers Club

c/o Bill & Sue Norotny
RR 3 Box 14B
Hudson, NY 12534-9535

D.P. Homebrew Supply

c/o Don Graham
1998 E. Main St.
Mohegan Lake, NY 10547
(914) 528-6219

Homebrewers of Staten Island

c/o Jeff Lewis
1569 Richmond Rd.
Staten Island, NY 10304
(718) 351-8124

The Honourable Company of Fermenters of The Baroncy of Concordia of the Snows

c/o Ari Fisher
64 South Pine Ave.
Albany, NY 12208
(518) 482-3118

Hudson Valley Golden Brewers

c/o George Mann / Science & Hobby Emporium
Route 32, PO Box 3
Tillson, NY 12486
(914) 658-3212

Hudson Valley Homebrewers

PO Box 285
Hyde Park, NY 12538

Ithaca Brewers Union

c/o Perry Geib
PO Box 6604
Ithaca, NY 14851
(607) 277-7122

Last of the Brewhicans

c/o Dave Jasnau
51 Hamilton Rd.
Corinth, NY 12822
(518) 654-6378

Long Island Brewers Association

c/o Mark Burford
20 Bell Ave.
Blue Point, NY 11715
(516) 363-2713

Malted Barley Association

c/o James Simpson
58-07 Metropolitan Ave.
Ridgewood, NY 11385
(718) 821-6022

Mohawk Valley Friends of Beer

c/o Karl Sweltzer
RR1 Box 275 Roberts Rd.
Sauquoit, NY 13456-9604
(315) 737-8341



Carl Brown, Second Best of Show, 1989 Bidal Society Homebrew Club Regional Competition

Mutually United Grape and Grain Zymurgists (MUGGZ)

c/o John Diana
1675 Helderberg Ave.
Schenectady, NY 12306

New York City Homebrewers Guild

c/o Greg Zaccardi
174 Walnut St.
Montclair, NJ 07042
(718) 398-1610

New York Notorious Brewers

c/o Chuck Lutz
PO Box 10591
Newburgh, NY 12550
(914) 895-1057

North Chautauqua Homebrewers

c/o Victor Szweczk
119 E. Hazeltine Ave.
Kenmore, NY 14217
(716) 873-6080

North Yeast Homebrew Club

c/o Michael J. Bauer
120 Fairmont Ave.
Watertown, NY 13601

Paumanok United Brewers (PUB)

PO Box 8023
Hicksville, NY 11802-8023
(516) 368-0406

Salt City Brew Club

PO Box 1935
Syracuse, NY 13201

Saratoga Thoroughbrews

c/o Wolfgang Kurth, The Hoppy Troll
454 Broadway
Saratoga Springs, NY 12866
(518) 581-8160

Sultans of Swig
c/o Timothy Herzog
412 Lamarck Dr.
Buffalo, NY 14225
(716) 837-7658

Upstate New York Homebrewers Association
PO Box 23541
Rochester, NY 14692
(716) 272-1108

Wort Ever Ales You
c/o Andrew Schmid
307 Quaker Rd.
Chappaqua, NY 10514
(914) 238-4549

NORTH CAROLINA
Carolina Brewmasters
c/o Bruno J. Wichnoski III
5323 Larewood Dr.
Charlotte, NC 28215
(704) 597-5782

Piedmont Institute of Sud Sippers (PISS)
c/o Phil Ridge
309 Concord St. #203C
Greensboro, NC 27406
(910) 273-6856

Triangle Unabashed Homebrewers (TRUB)
c/o Andrew Kagan
203 E. Trinity Ave.
Durham, NC 27701
(919) 688-4089

NORTH DAKOTA
Buffalo Brewers
c/o Curt Saylor
1206 3rd Ave. N.E.
Jamestown, ND 58401
(701) 252-4358

Prairie Homebrewing Companions
c/o Marty Draper
1130 Oak St.
Fargo, ND 58102
(701) 280-1892

Society of Brewing Scientists (SOBS)
c/o James MacArthur
1814 Ryan Dr.
Bismarck, ND 58501
(701) 222-0991

OHIO
Akron-Canton Homebrewers Association
PO Box 558
Green, OH 44232
(216) 239-1472

Bloatarian Brewing League
c/o Larry Gray
7012 Mt. Vernon Ave.
Cincinnati, OH 45227
(513) 271-2672

Columbus Homebrewers Under-stand Good Stout (C.H.U.G.S.)
c/o Walter den Haan
6600 Dublin Rd.
Delaware, OH 43015

Dayton Regional Amateur Fermentation Technologists (DRAFT)
c/o Marty Vinings
PO Box 246
Dayton, OH 45449
(513) 298-3623

DLB Home Brewers Club
c/o Tom Jarvis
6006 Rosebelle Ave.
North Ridgeville, OH 44039
(216) 228-3619

Salacious Homebrewers In Toledo
c/o Robert Morris
2160 Thornridge
Toledo, OH 43614

Society of Northeast Ohio Brewers (SNOBs)
c/o Fred Dockus
515 High St.
Wadsworth, OH 44281
(216) 336-9262

Youngstown Area Homebrewers Organization of Ohio (YAHOO)
c/o Bob Bero
6140 Leffingwell Rd.
Canfield, OH 44406
(216) 533-1035

OKLAHOMA
Fellowship of Oklahoma Ale Makers (FOAM)
c/o Tony Brown
326 S. 8th St.
Broken Arrow, OK 74120

High Plains Draughters
c/o Joe Bocock
513 N.W. 38th St.
Oklahoma City, OK 73118
(405) 525-9858

Just Brew It!
c/o Tim Harper
PO Box 3082
Bartlesville, OK 74006
(918) 335-0122

OREGON
Capitol Brewers
c/o Bill Andrews
755 Boone Rd. S.E.
Salem, OR 97306

Cascade Brewers Society
c/o Scott Weech
26654 Pickens
Eugene, OR 97402
(503) 484-4758

Grateful Deaf Homebrew Society
3406 S.E. 65th Ave.
Portland, OR 97206-2715

Heart of the Valley Homebrewers
c/o Lee Smith
2190 Maier Lane N.W.
Albany, OR 97321
(503) 926-0596

Helles Canyon Quaffers
c/o Ken Hohmann
69796 Jimtown Rd.
Walla, OR 97885
(503) 886-3501

Mary's Peak Lagers
c/o Dean Bautz
1610 N.W. Division St.
Corvallis, OR 97330-2102
(503) 745-5865

Oregon Brew Crew
c/o Scott Sanders
7260 S.W. 82nd
Portland, OR 97223
(503) 293-6120

Saccharomyces First!
c/o David L. Murray
73 Pine St. #5
Klamath Falls, OR 97601
(503) 883-3070

Society for Upgrading Drinkable Spirits (SUDS)
c/o Rob Sampson
HCR 87 Box 1072
Baker, OR 97814
(503) 523-6063

Southern Oregon Beer Farmers
c/o Ross Litton
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White City, OR 97503

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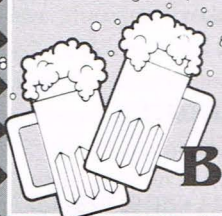
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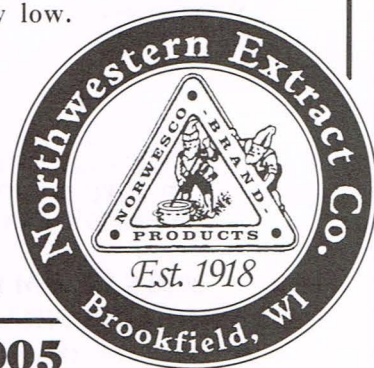
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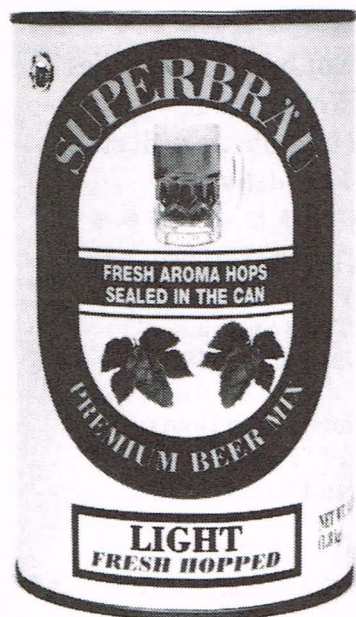
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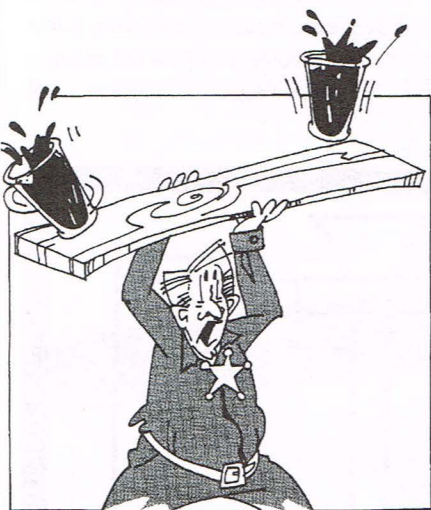
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WORLD OF WORTS

Charlie Papazian



Ira's Teeter Totter Altbier

I imagine would contribute a "softer" palate and maltiness to this ale.

I really didn't have the opportunity to secondary-ferment and cold-condition this particular batch as German tradition would dictate. So the opportunity to take a little bit of the bite out of the "aleyness" was foregone for lack of time, but three months later I'm still enjoying the results of this well-balanced essay on Altbier. Oh yes, I did brew 10 gallons with the original batch; after all, I wanted some for myself after contributing to Ira's crew.

So let's cut the shuck and jive and get on with the recipe for Ira's Teeter Totter Altbier.

Mash-extract recipe for 5 gal (19 L)

- 1 1/2 lb crushed pale two-row malt (0.68 kg)
- 1/2 lb crushed wheat malt (0.23 kg)
- 1/2 lb crushed Belgian biscuit malt (0.23 kg)
- 1/2 lb crushed 40 °L or crystal malt or German dark malt (0.23 kg)
- 1 1/4 lb crushed Munich malt (0.57 kg)
- 1/4 lb crushed Belgian Special "B" malt (113 g)
- 1/8 lb crushed chocolate malt (57 g)

Add to the mash runoff

- 3 3/10 lb German-made light malt extract (Munich style if available) extract syrup (1.5 kg or use about 4/5 lb or 1.3 kg of light dried malt extract)
- 1/4 tsp non-iodized salt (1.2 mL)

And boil with hops

- 6.5 Homebrew Bittering Units. I used 3/4 oz or 21 g of 9% alpha acid German-grown Northern Brewer whole hops for bittering
- 3 Homebrew Bittering Units of flavor hops. I used a tad more than a 1/2 oz or 14 g of 5% alpha acid Mount Hood whole hops for flavor (30 min.)
- 3 Homebrew Bittering Units of aroma hops. I used a combination of Czech Saaz and American Tettnanger whole hops.

- 1/4 tsp Irish moss (1.2 mL) (30 min.)
- 3/4 cup corn sugar (113 g) (to prime)
ale yeast is recommended

- Original specific gravity: 1.050 to 1.054 (12.5 to 13.5 °B)
- Final specific gravity: 1.012 to 1.016 (3 to 4 °B)
- IBUs: about 35

Use a step infusion mash for the grains. Add 4 quarts (3.8 L) of 148-degree-F (64-degree-C) water to the crushed grain, stir, stabilize and hold the temperature at 135 degrees F (57 degrees C) for 30 minutes. Add 2 1/2 quarts (2.4 L) of boiling water and add heat to bring temperature up to 150 degrees F (66 degrees C) and hold for about 30 minutes.

After conversion, raise temperature to 167 degrees F (75 degrees C), laut and sparge with 2 gallons (7.6 L) of 170-degree-F

When Ira Greschler called and asked me to brew a batch of beer for an organizational meeting of the Great American Beer Festival® security captains who volunteer each year to help, I was more than willing.

"When do you need it, Ira?"

"Well, Charlie, I'm having a meeting in five weeks."

There was no time to delay so that next weekend I brewed my first batch of dark American-style Altbier for Ira (who has a law practice, a family and has been volunteering as Festival chief of security for nearly 10 years) and his dedicated crew. The Festival was closing in on all of us and Ira was juggling a lot of things at the same time, so Teeter Totter Altbier was born.

A good dose of hop bitterness with the chocolatelike smoothness of roasted malts was the impression I was attempting to achieve. The original recipe had one-eighth pound of black malt, but in the final version it was purposefully omitted because of the hint of burnt malt bitterness it contributed to the overall character of the brew. The recipe also gave an option of using some German Munich-style dark crystal malt (at least 40 degrees Lovibond in color) for what


(77-degree-C) water. Collect about 2 to 2 1/2 gallons (7.6 to 9.5 L) of runoff and add the malt extract and bittering hops and bring to a full and vigorous boil.

The total boil time will be 75 minutes. When 30 minutes remain add 3 Homebrew Bittering Units of flavor hops and Irish moss. After a total wort boil of 75 minutes turn off the heat and add aroma hops. Then strain into a sanitized fermenter to which you've added 2 gallons (7.5 L) of water. It helps to prechill the water to 33 degrees F (1 degree

C) before adding to the fermenter rather than simply adding warmer tap water.

IBU bitterness of about 35 IBUs were calculated for this recipe by making the following assumptions: (1) whole hops were used, (2) the wort boil was a concentrated boil with about 3 pounds of extract per gallon (0.4 kg per L) of liquid boiled, (3) 25 to 27 percent utilization was assumed for 75 minutes of boiling and 14 to 15 percent utilization was assumed for 30 minutes of boiling. Beginners and intermediate brewers should relax, not worry and have a homebrew.

Primary ferment at temperatures between 50 and 75 degrees F (10 and 24 degrees C) with the ale yeast. If you have the means, rack into a secondary after primary fermentation and lager at chilled temperatures. A good regime would be to lager at 50 degrees F (10 degrees C) for the first 1 1/2 weeks and then lower the temperature to 35 to 40 degrees F (2 to 4 degrees C) for the final weeks.

When fermentation is complete, prime with sugar and bottle. Enjoy the old and new tradition of Ira's Teeter Totter Altbier. 

Bittering Units

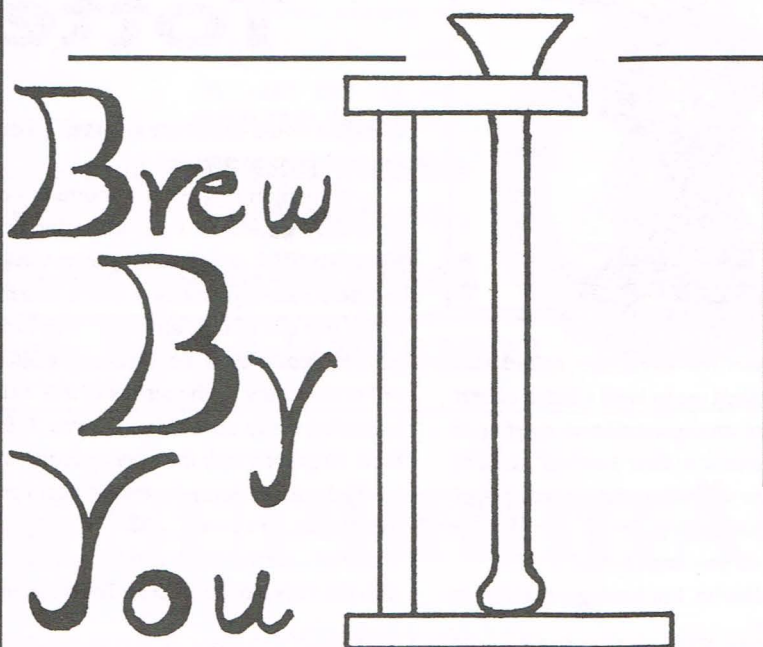
Homebrew Bittering Units are a measure of the total amount of bitterness in a given volume of beer. Homebrew Bittering Units can easily be calculated by multiplying the percent of alpha acid in the hops by the number of ounces. For example, if 2 ounces of Northern Brewer hops (9 percent alpha acid) and 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:

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



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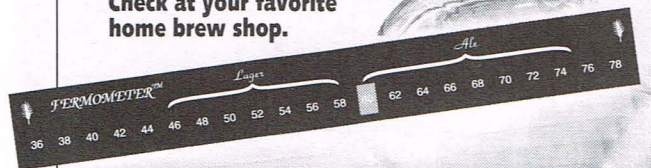
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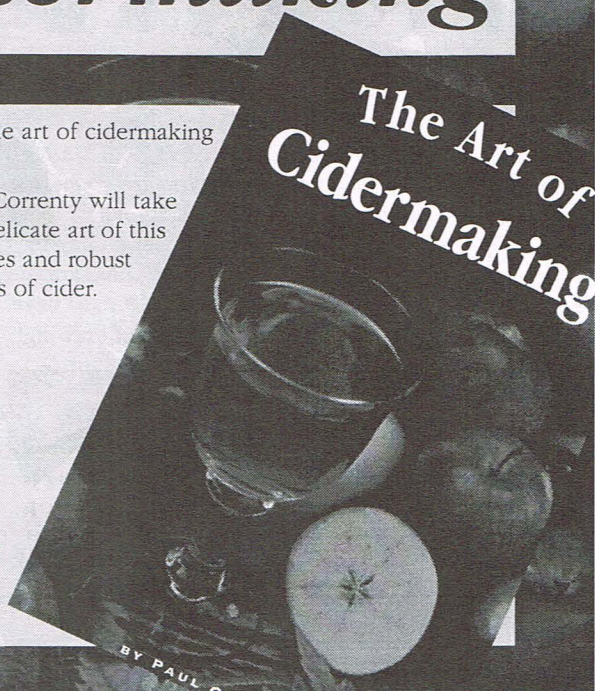


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DEAR

P R O F E S S O R

Trouble with Trub

Dear Professor,

There is quite a bit written about when, where and how to remove trub from our homebrews. How do commercial breweries handle the trub? Is this what a whirlpool tank is used for? If yes, can a whirlpool tank be built and used in homebrewing?

Yours truly,
Greg Josiak
Stavanger, Norway

Dear Greg,

You have it right! Whirlpools not only help remove the hot break trub, but also help consolidate spent hops. How does a whirlpool work? To understand, make a cup of tea with tea leaves in the cup. Stir in a whirlpoollike manner and observe. Because of the nature of forces and mass, the particulates are drawn to the center and will form a conelike pile.

*The pros usually inject liquid tangentially into a vessel (that's kinda like sideways) to create a circular flow. This motion causes a whirlpool. Homebrewers brewing five to 10 gallons can achieve the same effect by stirring the wort in their kettles with a long spoon then, either by siphoning through a cane or an out spout in your vessel, drain the wort from the side of the vessel leaving the cone of trub in the center. For more information on trub removal see "Groovy Ways to Remove Trub" in *zymurgy* Spring 1994 (Vol. 17, No. 1).*

Hope that spins your wheels in the right direction.

*Dizzy in the pool,
The Professor, Hb.D.*

Cutting a Deal

Dear Professor,

I recently purchased a few tins of malt extract at a cut-rate price because the tins were at least a year old. I was told that old malt extract will caramelize over time and that the finished product would have an off-taste. Will malt extract caramelize or is this an old brewers' tale? Fermenting in Baton Rouge,
Tom Oswald
Baton Rouge, Louisiana

Dear Tom,

The extract will suffer the effects of age in the can by taking on a bit of a darker color and reduced "fresh" flavor. Now don't get me wrong — a deal is a deal and I've made some pretty tasty beers with some ancient malt extract in my brewing history. But I'm at a point where I have a choice and if I'm going to make the effort, well then I want the best and freshest I can buy. It's just personal priorities and preferences. Isn't that what great homebrew is always about?
The Professor, Hb.D.

Before Bleach

Dear Professor,

Before bleach, how were carboys sanitized? I have heard that the venerable beer predates the production of wine, so it logically predates bleach. Surely carboys or wooden kegs weren't boiled. If you can answer this question and include an interesting history, I'll subscribe to your magazine. (Not a threat — a bet.)
Towns Gray
Memphis, Tennessee



Dear Towns,

*They probably weren't sanitized. You've got to remember that it wasn't until the mid-1800s that ol' Louie Pasteur discovered germs. And it's likely that brewers by happenstance developed procedures of cleaning that worked to a limited extent, but certainly beer did not have the stability it does today. Ante up your 29 bucks.
A quickie,
The Professor, Hb.D.*

Whole Lotta Shakin'

Dear Professor,

Since I made the transition from extract to all-grain brewing I've noticed that fermentation has changed from two to three

days of intense activity to two weeks or more of moderate activity.

The wort seems well-oxygenated (by shaking) prior to pitching, and I haven't changed yeast cultures or fermentation temperatures.

Is this normal? Would a higher dextrin content cause this or maybe too much trub in the fermenter? Frankly, Professor, I'm worried.

Sincerely,

Jim Pace

Geneva, Illinois

Dear Jim,

The clue may be in your statement, "the wort seems well oxygenated ..." Well, if it really isn't (but seems to be) then that will surely be your problem without a doubt. And that's what I suspect. You got to shake dat jug and aerate the bejabbers out of it. There have been several gadgets discussed in past issues of the big Z that can help you out.

Air it out,

The Professor, Hb.D.

A Rousing Question

Dear Professor,

I'd like to hear your opinion of something I've been doing to my fermenting wort for 15 of my last 20 batches.

After about four days of active fermentation I tilt the 6 1/2-gallon glass carboy slightly and, by using a rhythmic motion, get the wort swirling around inside. I do this for about 15 to 20 seconds, and it picks up quite a bit of yeast from the bottom, gets it into suspension again, releases a lot of CO₂ that sometimes vents from the airlock in a continuous whistle and generates one to two inches of bright foamy krausen. I do this again at about six days and go to secondary at eight to 10 days. My question is this: Is this good for the beer or not? Am I "rousing" the yeast and helping it to have a more complete fermentation or is the release of so much CO₂ damaging the yeast?

Many commercial breweries use shallow, wide and long fermenting vessels that make it easier to get complete fermentation. A carboy is narrow and deep, relatively, and may not lend itself to complete fermentations without a rousing or two.

Am I exploding my yeast, or simply getting a more complete fermentation? There doesn't seem to be a direct connection between how good a particular batch is or isn't and whether I've roused or not. To rouse or not to rouse?

Not quite worrying yet,

Quest Richlife

San Francisco, California

Dear Quest,

I gotta think you're doing the right thing.

Rousing under closed fermentation conditions is OK for fermentation and helps complete the fermentation a bit more easily (easier, that is, if there was a problem to begin with).

I got to thinking that if you are swirling then you may be creating a whirlpool effect and mounding a lot of the yeast in the center. This may be an advantage when racking to avoid yeast uptake during siphoning. Just a thought.

The release of CO₂ is inconsequential.

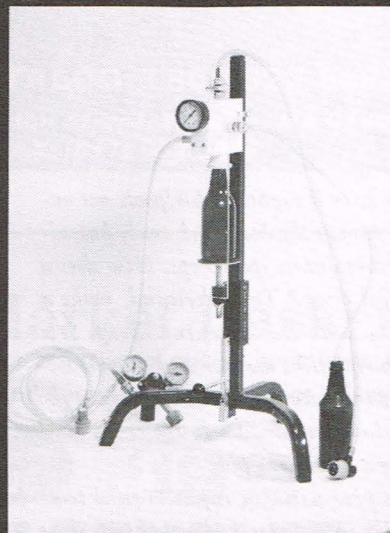
No exploding yeast here,

The Professor, Hb.D.



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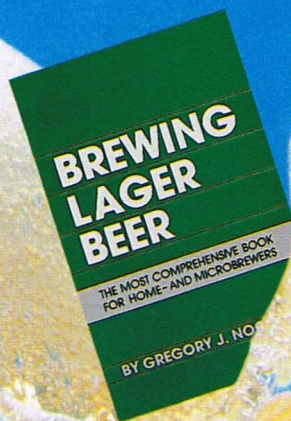
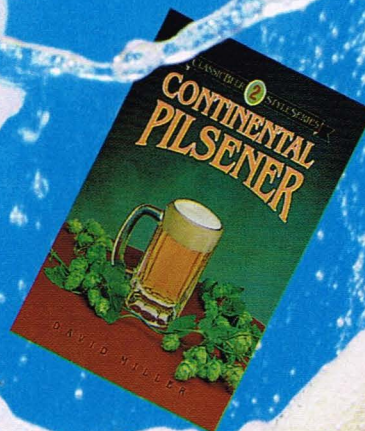
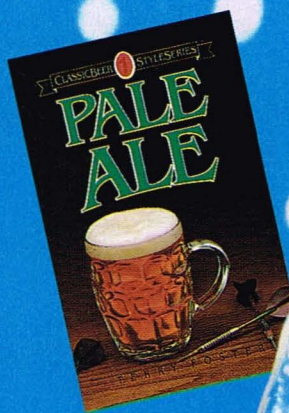
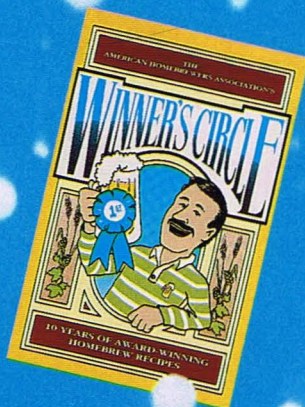
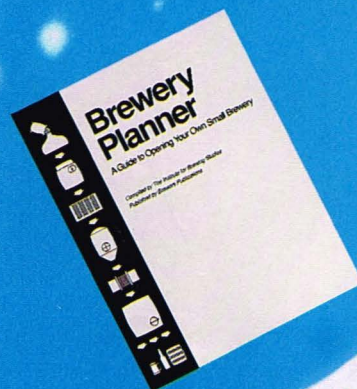
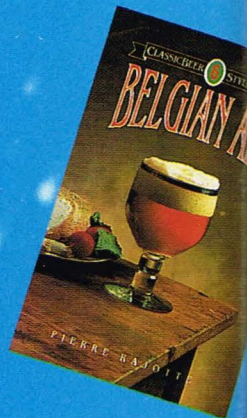
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sured yeast that comes in the package and water. Redhook, Thomas Kemper, Hales Ales, Maritime Pacific and Widmer are the Northwest brewers that supply the Spent Grain Baking Co.

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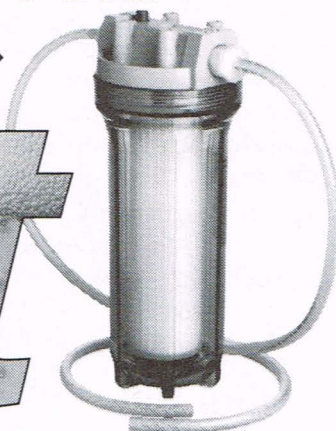
tap cap that prevents contamination or spills and a volumetric ruler that allows for easy liquid level readings. Manufacturer's suggested retail price is \$39.95. Large tubing with a tap adapter for beer and wine bottle fillers is available for an additional charge.

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THE BEST FROM KITS

Rob Nelson

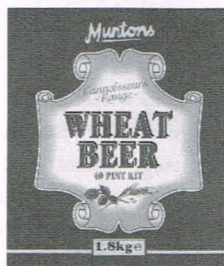
Savor a Wide Range of Wheat Beers

When I read my e-mail and found a letter from the folks at *zymurgy* I was puzzled. It was an invitation to write this issue's "Best From Kits" article. Why ask me? I'm one of those snooty all-grain types who hasn't used a can of extract in years. The fact that I prevailed in the AHA Club-Only Weiss is Nice competition might have influenced them. Craving the fame, free beer and a hat, I agreed, and packages of extract arrived on my doorstep.

I've kept records of my brews back to the Cretaceous period so I blew the dust from my notes from the 1970s. Hmmm ... "One can of Lena, three pounds sugar." Nope, not much help. I knew I was in trouble. Could I make a decent brew from extract? I decided to start with a control batch to get in the groove. I thought the easiest way to begin would be to follow the directions on the can.

I started with a four-pound (1.8-kg) can of Munton and Fison Connoisseurs Range Wheat Beer extract. The label indicated a yield of five gallons (19 L). I turned over the can and read the recipe. *Déjà vu!* I was instructed to mix the contents of the can with a gallon of boiling water and two pounds three ounces of brewing sugar in a "fermenting bin" and top it off with cold water to make five gallons. I gulped, and pressed on. Since I use carboys for fermenting, I decided to modify the process to include a 30-minute boil of the full five gallons and chill the whole thing. I also decided to rehydrate the included packet of Munton and Fison ale yeast in a cup of warm sanitized water before pitching. Here's the recipe, short and sweet.

Outta the Can Weizen



- 4 lb can Munton Connoisseurs Range Wheat Beer kit (1.8 kg)
 - 2 lb 3 oz dextrose (corn) sugar (1 kg)
 - 1 pack Munton and Fison ale yeast (7 g)
 - 3/4 cup corn sugar (177 mL) (to prime)
- Original specific gravity: 1.056 (1.019 of this was from the sugar.)
 - Final specific gravity: 1.013

Boil 5 gallons (19 L) of water. Soften the contents of the can by soaking in hot water for 10 minutes. Remove kettle from the heat and add the extract. (Don't leave the kettle on the burner. The extract sinks to the bottom and scorches!) Mix well and return to a boil for 30 minutes.

Meanwhile, boil a cup (237 mL) of water, cover with foil and let it cool to about 100 degrees F (38 degrees C). Add the contents of the yeast package and allow to sit for a few minutes.

Cool the wort and add the yeast.

I fermented this in a carboy at 72 degrees F (22 degrees C). Fermentation took 30 hours to begin and finished in four days. I didn't rack the beer to another carboy, electing to bottle it immediately. The directions

on the can indicate a half teaspoon (2.5 mL) of priming sugar per bottle. Instead, I mixed 3/4 cup (177 mL) dextrose in boiling water to prime the beer before bottling. I left the brew at 70 degrees F (21 degrees C) for a week before trying one.

My impressions? It's *déjà vu* all over again. This batch had many of the earmarks of a beginner kit brew. It was out of balance, lacking any hop notes to balance the sweetness and fruitiness. I should have known. For what it's worth, the malt flavor was quite good, with more roundness and fullness than I expected with all of that sugar. After a month in the bottle, it became rather refreshing when served cold. Live and relearn.

OK, so it wasn't a raving success. I used most of the batch as gifts to my wife's friends who have been pestering her for samples. As I prepared to formulate and schedule batch number two, I came to a realization. I could brew it in the evening after work and not have to dedicate an entire day to milling, mashing, sparging, boiling, hopping and barming. If a straight-from-the-kit recipe turned out acceptable, I might be able to crank out some exceptional brew and be done in time for the late news!

With my head oriented to the challenges of extract brewing, I made the logical decision: Eliminate the sugar and use two types of extract to give the brew more complexity. I also decided to use Wyeast's No. 3068 Weihenstephen Weizen liquid yeast strain. I've read conflicting reports about this yeast. Some say that warm fermentation generates too much banana aroma. I partially disagree. Warm, 70-degree-F (21-degree-C), fermentation does generate banana. Really warm 78-degree-F (26-degree-C) generates the same

amount of banana but more clove/spicy notes. That was the path I would take. It worked for me before with all-grain recipes. I cultured up a quart of very active starter and assembled the next recipe, a Dunkelweizen.

Souped Up Dunkelweizen



- 6 3/5 lb can Ireks wheat extract (3 kg)
- 1 lb can Alexander's Sun Country dark extract "Kicker" (0.5 kg)
- 1 oz Hersbrucker whole hops, 2.9% alpha acid (28 g) (60 min.)
- 1/2 oz Tettnanger hop pellets, 4.8% alpha acid, (14 g) (30 min.)
- 3/4 cup dextrose (177 mL) (to prime)

- Original specific gravity: 1.056
- Final specific gravity: 1.019

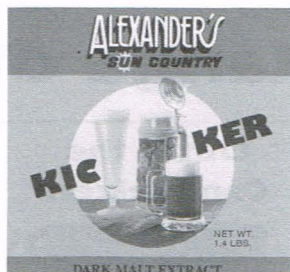
I used the same warming and boiling process as the previous recipe and used my own hops with these unhoppped extracts. I boiled the whole batch for 75 minutes, chilled the wort and put it into a carboy with the quart of yeast starter I'd made. I was gratified with the short four-hour lag time. I kept this batch next to the baseboard heater in my office and it stayed between 75 and 78 degrees F (24 and 26 degrees C) for five days, perking like a banshee until suddenly quieting down on the fifth day. I bottled this with 3/4 cup (177 mL) of dextrose and set it in the closet for a couple of weeks to mature.

This effort was much better. It had more dimension to its malt profile and the fresh hops, though low (estimated at 13 IBUs) gave it a fuller flavor. It was drinkable after a week in the bottle but needed two more weeks to develop full carbonation. In three weeks it was fully conditioned and a very pleasant effort although the clove-banana profile was more subtle than I expected.

I examined my stock of canned goods and

materials. I had about 11 pounds of extract left and a huge yeast cake still in the bottom of my 6 1/2 gallon primary fermenter. I stroked my facial hair, consumed a few from batch one and decided to create a monster. It's big! It's nasty! It doesn't deserve to live among decent people! It's a Doppel Weizenbock!

Bighorn Weizenbock



- 6 3/5 lb can Ireks wheat extract (3 kg)
- 1 lb can Alexander's Sun Country dark extract "Kicker" (0.5 kg)
- 4 lb can Munton Connoisseurs Range Wheat Beer kit (1.8 kg)
- 1 oz Tettnanger whole hops, 6.2% alpha acid (28 g) (60 min.)
- 1/2 oz Hersbrucker whole hops, 2.9% alpha acid (14 g) (60 min.)
- 4 oz maltodextrin powder (113 g) (30 min.)
- 1 tsp Irish moss flakes (5 mL) (20 min.)

- Original specific gravity: 1.081
- Final specific gravity: 1.022

I boiled this entire batch for one hour in my trusty 6 1/2 gallon pot, fighting biblical boilovers the entire time. I used my counterflow chiller to cool the wort, then shook the daylight out of the 6 1/2 gallon carboy for an hour or so to aerate, and capped it with an airlock and retired for the night. I hoped that the quart of slurry in the carboy from the previous batch would be able to chew through the 1.081 wort. The next morning, I had gentle airlock activity. The fermentation temperature was 72 degrees F (22 degrees C). Later that same afternoon, the evil beer had thrown up a 10-inch krausen and blown the airlock! Judging from the color of the stains on the wall, this would be a medium-dark beer. I fitted a one-inch blowoff tube and watched in amazement as this beast blew foam for three days!

Keep in mind that my large carboy had at least nine inches of head space to begin with. Don't try this at home, kids — I'm a trained professional.

Fermentation subsided in four days and I was able to fit an airlock. In two more days, at 74 degrees F (23 degrees C), fermentation stopped dead. Was it done? I checked the gravity after 12 days and it had stuck at 1.034. I had pitched plenty of yeast and aerated the wort as much as possible, short of direct oxygen injection. I can only surmise that the yeast has an alcohol threshold. I pitched an 11-gram pack of Edme dry ale yeast to try and jump-start the stuff, and in a day it had begun to perk slowly. I let this slow primary fermentation continue for five more days and racked it to a second carboy. My usual practice with wheat beers is to bypass a secondary fermentation but I wanted to get the beer off the enormous yeast cake. After a couple of days, I kegged the monster and force carbonated it.

This was truly a large and impressive mahogany-colored beer. It had a huge head that lasted to the bottom of the glass and a rich, toffeelike sweetness in the midrange. The clove and banana signature was subdued but discernible and the alcoholic strength was evident from the first sip. Be afraid!

Conclusions

It is indeed possible to produce a fine example of a German-style Weizen using malt extract. By boiling the full volume of the wort, using the proper yeast strain and fermenting under warm conditions, I was able to brew in less than three hours and drink the results in two weeks. While I don't expect to convert my mash tun into an umbrella stand, I plan to explore high-quality extract brewing more in the future as a way of freeing up the occasional Saturday.

Rob Nelson is a BJCP Certified judge who has brewed prize-winning beers for 10 years. He lives in the hamlet of Duvall, Wash., and publishes *Brews News*, the newsletter of the *Brews Brothers Malting, Mashing, Sparging, Hopping and Barming Society of Greater Seattle*.

This article is available on Library 13-AHA/zymurgy/Clubs on CompuServe's Beer and Wine Forum as BSTKIT.S95.

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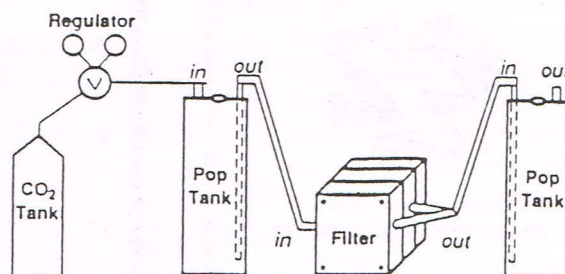
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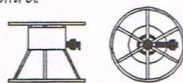
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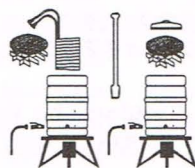
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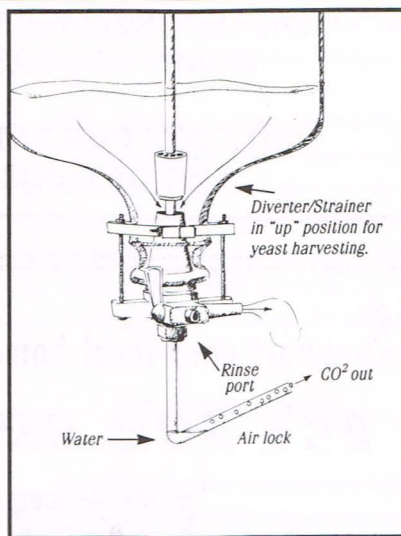
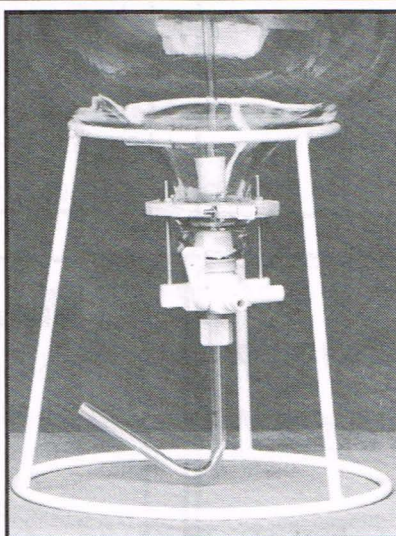
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REVIEWS

The opinions of individual reviewers do not necessarily represent the opinions of the American Homebrewers Association or *zymurgy*.

Mr. Beer Microbrewery

The Mr. Beer kit comes close to being the perfect all-in-one introduction to homebrewing. Its first advantage is the low number of components included: a fermenter, valve assembly, lid, airlock, small piece of tubing and six two-liter PET plastic bottles. The kit can be purchased with or without a malt extract kit. That's it. And that's all that's needed. The kit comes in one largish box and is packaged with efficiency and attractiveness.

The heart of the Mr. Beer kit is the fermenter — a 7 1/2-gallon oddly shaped container made of Lexan®, a plastic product renowned for its durability. It is lightweight, clear and can withstand very low and very high temperatures if need be, eliminating the potential for shattered glass carboys or melted plastic buckets. It is conveniently graduated in gallons and liters. The plastic spigot attaches without tools, and the lid screws onto the mouth. The short piece of rigid tubing used as a bottle filler is inserted into the spigot to fill bottles from the bottom, thus helping prevent oxidation.

The six plastic bottles come packaged inside the fermenter, along with all the other components including the can of malt extract. The bottles are decorated with a Mr. Beer label. The plastic lids just twist on and off for filling (and emptying).

So how well does all this high technology perform? Extremely well. The weakness in most homebrewing kits is in the instructions, which often recommend adding sugar and

omit sanitation and boiling operations. Mr. Beer, however, includes instructions that meet the standards of expert homebrewers, including good sanitation procedures, yeast hydration, boiling (although the instructions do not say how long) and cautions against the use of sugar. Brief bits of beer and brewing science are included to answer the questions of the more inquisitive novice.

I used the Mr. Beer kit several times, once as a secondary fermenter with an all-grain ale I had previously brewed. The wide mouth makes it easy to rack the beer. It also made it easy to add a half brick of whole hops for dry-hopping. When I was ready to bottle, I sanitized the six plastic bottles according to the instructions, inserted the bottle-filling tube and started filling. Uh oh. After the first four bottles, the whole hops completely clogged the spigot. Oh well. I don't recommend using whole hops with Mr. Beer, but neither does Mr. Beer. Everything else went like clockwork.



For the second brewing I used the Armstrong Pilsener Blond kit that came with Mr. Beer. I followed the instructions, boiling for 30 minutes and using the water quantities recommended in the instructions for diluting and so on. Fermentation began within hours, developing a nice krausen. After several days, I bottled with no problems. At 12 days in the bottle, I tasted the beer. It could be better — the Armstrong kit produced beer with a lot of the characteristic cidery flavor that many of us know so well. The beer was clear, well-conditioned and clean, just cidery, which probably has more to do with Armstrong than Mr. Beer.

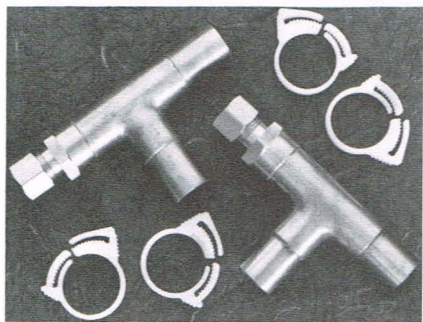
Mr. Beer is a high-quality product of innovative design. It meets the needs of the first-time brewer, but also lends itself readily to the most advanced brewer's inventory as an alternate fermenter. The large capacity makes blowoffs a thing of the past. Its light weight and durability are also attractive features. If the literature included with the kit is any indication, the company knows homebrewing and is making efforts to provide useful, up-to-date information

that will benefit the homebrewing hobby. The company offers mail order replacement and additional parts, and a wide selection of malt extracts. The product is backed by a 30-day unconditional money-back guarantee.

Manufacturer's suggested retail price for Mr. Beer with malt extract is \$69.95, without malt \$59.95 plus shipping. For information, wholesale or retail orders contact Michael Smith (800) 852-4263.

Reviewed by Kevin Micklowde, a homebrewer of six years.

PhillChill Phittings



These "Phittings" are the connections required to build a counterflow wort chiller. The purpose of a wort chiller is to cool boiling wort quickly to yeast-pitching temperature, below 80 degrees F (27 degrees C), to start your beer fermenting faster. This counterflow chiller allows the hot wort to pass through a 25-foot length of three-eighths-inch outside-diameter soft copper tube and into your fermenter. The wort is cooled because the copper tube is inside a 24-foot length of five-eighths-inch garden hose with cold water running in the opposite direction of the hot wort. The chilling time was determined by the amount of wort that had to be siphoned through the chiller. The final temperature of the chilled wort is dependent on the amount of cold water passed through the chiller, the temperature of the water and how fast the beer passes through the chiller. I found that with my water faucet opened halfway, my final wort temperature was around 70 degrees F (21 degrees C).

The PhillChill Phittings kit contained the copper and brass fittings and plastic hose clamps that are required to secure the copper tube inside the garden hose and to connect the garden hose to the fittings. The instructions require you to provide 25 feet of three-eighths-inch outside diameter soft copper tubing and at least 25 feet of reinforced five-eighths-inch garden hose. I found that you will also need to buy (if you do not already have them) two lengths of high-temperature braided vinyl hose with clamps (to run from the racking cane to the chiller and from the chiller into the fermenter), a copper racking cane with strainer (a plastic racking cane will melt) and an adapter that will allow you to connect the female end of a garden hose to your kitchen sink (unless you

brew near a standard hose spigot). Finally, it is a good idea to have a hose pinch valve at the end of the hose going into the fermenter, as this will allow you to fill the chiller with water in order to start the siphon and to control the flow of wort through the chiller. Use clamps at all connections, because the braided vinyl tube will soften with the high heat and might leak air that will stop your siphon.

The chiller took less than an hour to build and there was no soldering required. The instructions for assembly and use are excellent. If you do not have a tap or spigot in your kettle (for gravity feed into the chiller), I recommend that you get one because the racking cane and siphon method is difficult at best.

PhillChill Phittings are made by Listermann Manufacturing Co., 1776 Mentor Ave. Suite 360, Norwood, OH 45212; (513) 731-1130. The manufacturer's suggested retail price is about \$16. You will need to spend about \$30 for the copper tube and garden hose required to build the chiller, as well as up to \$30 for the other connections and gadgets (faucet adapter, braided hose, copper racking cane and strainer or a kettle tap and strainer assembly) that you might not already own to adapt the chiller to your system.

Reviewed by Scott Samson, a homebrewer of 2 1/2 years.

Fermentap

The Fermentap is a homebrewer's latest attempt at building a miniature version of full-size professional brewing equipment. Fermentap converts your five- or 6 1/2-gallon fermenter into a home-sized cylindroconical fermenter. This not only enables the homebrewer to transfer beer without siphoning, but also allows for the sampling of beer and harvesting of yeast without exposing the beer to air.

The Fermentap is not the first example of upside down brewing to reach the market, but it does offer a few new twists. The product comes with a sturdy metal stand, valve and hop-straining assemblies and a vent-tube screen. The Fermentap

does not include the three-eighths-inch vent tube (a standard racking cane) or the carboy.

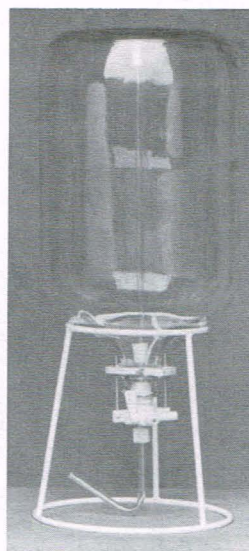
After transferring the wort to the fermenter, the Fermentap is attached to the neck of the carboy. A screwdriver and small wrench are required. The carboy is then inverted and placed on the stand. The vent tube extends from the Fermentap assembly to the bottom, which is now the top, of the carboy. Carbon dioxide is vented through the tube and out the bottom of the tap. It should be noted that the vent tube is not, nor is it designed to be, a blowoff tube. It is meant only to expel gas and is not of sufficient diameter to serve as a blowoff tube.

Warning: if the vent tube clogs, enough pressure could build to crack the carboy. Allow sufficient head space. A safety screen is provided to prevent clogging.

The hop straining device is a cone-shaped piece that is positioned on the vent tube, approximately one-half inch above the valve. When transferring from the primary fermenter to a secondary or bottling tank, the beer bypasses the strainer and passes through the valve. If you will be dry hopping in a secondary fermenter, the hop strainer is repositioned and seated up against the valve assembly. When transferring to the bottling tank, the beer is diverted through the hop strainer, straining out all the hops. A second Fermentap for your secondary makes this procedure even easier.

Although the Fermentap is a well-constructed product, I do have a few reservations. First, the instructions are cryptic at best, and it was difficult to picture how the

Fermentap worked. (The instructions have since been rewritten.) Second, one of the features touted by the manufacturer is the tap's ability to draw off trub and settled yeast. I found both the trub and the yeast tend to settle on the shoulders of the carboy and remain there despite efforts to drain them off. I thought swirling the carboy would help, but yeast and trub just seemed to resettle on the shoulders. This is more an issue of fermenter geometry than Fermentap design. I was able to



drain off most of the yeast. Some was transferred to the secondary and some remained in the primary. In defense of the Fermentap, I did use a highly flocculent yeast that tends to form a hard cake when it settles out. Last, if you are used to brewing five-gallon batches and only have five-gallon carboys, be prepared to either reduce the size of your batches or purchase a larger carboy. Ample space must be allowed for the vent tube so foam and hops will not plug the tube.

Overall, it is a well-made product, and with a little practice will become an excellent addition to your arsenal of brewing gadgets.

The Fermentap's suggested retail price is \$29.95 plus shipping. Check with your local homebrew supplier or send check or money order to Fermentap, PO Box 30175, Stockton, CA 95213-0175; (800) 942-2750. *Reviewed by Ron Moucka, of Fort Collins, Colo., a homebrewer of four years.*

Victory Beer Recipes

Homebrewers now are faced with the contemporary challenge of how to navigate the myriad information available on homebrewing through magazines, books and cyberspace. Issues of *zymurgy* and other publications can start to pile up. Then where do you find the recipe that won best of show in Portland a couple of years ago? What are the general style guidelines for brewing a certain beer? These questions are answered in *Victory Beer Recipes* (Brewers Publications, 1994), a convenient compilation of winning recipes from AHA National Homebrew Competitions from 1989 through 1993. Winning mead, cider and saké recipes are also included. This is the AHA's second compilation of recipes in book format, the first being *Winners Circle* (Brewers Publications, 1989).

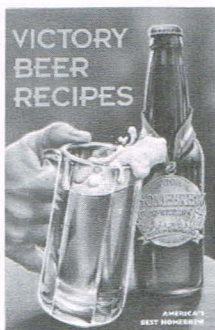
Aside from the book's index, the information provided in these chapters could be found by consulting various back issues of *zymurgy*. Here the value is 128 winning recipes packaged with an index of ingredients and styles, along with a glossary of brewing terms and examples of judging score sheets all in one book.

The recipes are transcriptions of the information provided by competitors for each entry submitted to an AHA National Homebrew Competition. Brewers are required to list ingredients, fermentation and mashing temperatures and any special brewing techniques on their entry forms.

Indeed, the most important elements of a formulation exist not in a list of ingredients and temperatures, although this information is useful. Instead, it is with an understanding of basic brewing science, stylistic guidelines and experience that recipes can be interpreted most effectively. No book could provide all this.

Victory Beer Recipes does not attempt to replace brewing manuals and books dedicated to beer styles. Instead, it provides suggestions and information that can assist brewers in approaching the formulations. For example, brewers are encouraged to think of the recipes as their own, to be adapted and used as inspiration as they see fit. Extra-wide margins for notes are provided along the side and underneath each recipe.

Although the back cover advertises, without qualification, that "these recipes will thrill your taste buds and tune your brewing skills, no matter what level brewer you are," warnings inside the book such as "your results may vary" and "we did not brew [the recipes] ourselves or test them in any way" encourage the reader to proceed thoughtfully.



These caveats could be emphasized further; for example, by describing how results could vary. Instead, the producers of the book have opted to mention that practical brewing considerations do exist, then they refer readers to an appendix of other books available. Serious students of brewing will consult a variety of technical and historical reference works in an effort to perfect their products.

The book's recipes are grouped by beer style, with ales and barley wine presented first. This is an attractive method, if only coincidental, to capture the attention of homebrewers. Many brewers stand upright at the thought of huge beers that assert flavor, intensity and alcohol.

Each style is presented with a brief discussion of key features of which to be mindful in brewing a beer within that style. For example, the chapter on Belgian-style spe-

cialty ales mentions the importance of using authentic Belgian yeast strains and describes spontaneous fermentation. The chapter on stouts includes the reminder that dry stouts should have a dry-roasted finish.

The index lists ingredients and brewing styles found in the book. You could quickly determine which recipes were brewed with Hallertauer hops, for example. Or you might scan for more exotic fare and discover recipes that include black walnut leaves, lemon grass or a variety of other ingredients.

While the complete playbook necessary to turn formulations into championship beers still rests in the minds and hands of resourceful and motivated brewers, *Victory Beer Recipes* provides a convenient and enjoyable source of published formulations.

Victory Beer Recipes, Brewers Publications, 1994, 218 pages, publisher's suggested retail price: \$11.95.

Reviewed by Michael Byers, AHA 1994 Ninkasi Award winner and BJCP Certified judge. He is a graduate of Siebel Institute's Diploma Course in Brewing and has studied at the University of California at Davis.

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HOMEBREW CLUBS



Marc Arkind

To Incorporate or **Not** to Incorporate

In *Zymurgy* Spring 1995 (Vol. 18, No. 1) "Club News" we learned that clubs may apply for not-for-profit status through the Internal Revenue Service. Once clubs are established as not-for-profits, they are considered tax-exempt and are able to make money (tax-free) for club events as well as accept tax-deductible donations. Clubs may also choose to become incorporated not-for-profit entities. Here's the story of how one club became incorporated.

Our road to incorporation began more than a year ago when the board of directors became increasingly concerned about liability at club events. In addition to providing a forum for local homebrewers, Paumanok United Brewers Inc. (PUB) sponsors pub crawls, bus trips to microbreweries, a summer beer picnic and our flagship event, the Northeast Craft Brewers' Festival. Because alcohol is involved in all of these events, the board and I, as president, decided that some form of protection was needed.

Alcohol liability insurance is extremely expensive, if available at all to homebrew clubs. We made extensive inquiries and came up empty-handed. To give an example of the cost, a one-day policy for our Craft Brewers' Festival cost more than \$1,200 and did not even cover alcohol liability, only general liability. Insurance companies are reluctant to write these types of policies, particularly when they learn what a homebrew club does.

At the advice of several attorneys, our next best course of action was to incorporate and take out a general liability policy for the officers and directors. Generally, a corporation provides a layer of insulation to the officers, directors and members against being sued individually. Keep in mind the corporation can be sued, but the individual members, officers and directors cannot be sued individually, except in extreme cases such as gross negligence or a board member or officer acting as an individual and not on behalf of the club. Incorporation is not a substitute for good insurance, but rather a supplement.

The steps to incorporation differ on a state-by-state basis. However, if your club is interested in pursuing incorporation there are a few basic steps. First, a club member should contact your state's Secretary of State or the state's equivalent. This office can advise which forms are needed for that state's process of incorpo-



Paumanok United Brewers Inc. (PUB) members left to right (back) Alex Porten, Les Stoddard and Bob Pickwick, board of directors; John Naegele, treasurer; (front) Marc Arkind, president; Joe Messina, vice president

ration. Second, as there are different types of incorporations, it would be useful to contact an attorney to determine what type of incorporation the club wants to pursue. In PUB's case we are a domestic, not-for-profit incorporation, Type A, under Section 402 of the New York State Charter.

Because PUB Inc. incorporated as a not-for-profit corporation in the state of New York,

BEST OF FEST CLUB-ONLY COMPETITION WINNERS

First Place

Kirk Olsen, Erie, Pa., of Brewing Excellence in the Erie Region (BEER).

Second Place

Russel Tyler Aceto, Naperville, Ill., of the Urban Knaves of Grain.

Third Place

Bruce Stevens, Winthrop, Maine, of the Maine Ale and Lager Tasters (MALT).

The 46-entry competition was organized by the American Homebrewers Association and judged on Dec. 11 in Boulder, Colo. Twelve BJCP judges and one apprentice judge scored beers of wide-ranging character including Bruce Stevens' third-place wasabi, cardamom and lemon beer. Kirk Olsen's winning beer had more than a dozen special ingredients!

NEW AHA REGISTERED HOMEBREW CLUBS

For a complete list of AHA Registered Homebrew Clubs, see the AHA Registered Homebrew Clubs insert in this issue. If you want to register your homebrew club with the AHA, send a brief letter about your club including the same kind of information you see here to AHA Administrator James Spence, PO Box 1679, Boulder, CO 80306-1679; (303) 447-0816, Ext. 121; FAX (303) 447-2825; CompuServe 70740,1107; Internet james@aob.org

Clubs registered after Jan. 3, 1995, will appear in the next issue.

NEW CLUBS

CALIFORNIA

Anderson Master Brewer's Association (AMBA), c/o Jeff Lulenski, 1252 Barry Ave. #5, Los Angeles, CA 90025.

Culinary Brewing Arts Association — Sacramento, c/o David Avalos/Lederwolff, Culinary Academy, 3300 Stockton Blvd., Sacramento, CA 95820; (916) 446-9426.

Hetch Hetchy Hopheads, c/o Bucket of Suds, 317 Old County Rd., Belmont, CA 94002; (415) 637-9844.

FLORIDA

Florida Suncoast ThunderBrewers, c/o Matthew Wiseman, 211 60th Ave. S., St. Petersburg, FL 33705, (813) 867-3693; 71543.763@compuserve.com.

ILLINOIS

Lagerhead Brew Club, c/o Chuck Aleshire, 102 Yale Court, Shorewood, IL 60436; (815) 729-2295.

MARYLAND

The Yeastern Shore Brewers of Delmarva, c/o Stephen L. Pratt, PO Box 342, Upper Fairmont, MD 21867.

MASSACHUSETTS

Ana-Lagers, c/o Steve Robinson, 89 Bruin Hill Rd., North Andover, MA 01845, (508) 691-5238; steve.robinson@analog.com.

North Shore Brewers, c/o Robert B. Murphy, 9 1/2 Bisson St., Beverly, MA 01915; (508) 921-7352.

MICHIGAN

Firkin Home Rackers, c/o Allan Lindsey, 4249 Bellevue Rd., Onondaga, MI 49264; (517) 589-5556.

MISSISSIPPI

Gulf Coast Brews Brothers, c/o Wade Wallinger, 801 Swordfish St., Pascagoula, MS 39581; (601) 762-7662.

NEW JERSEY

Delaware Valley Draughtsmen, c/o Hunterdon Homebrew Shoppe, 10 Bridge St., Frenchtown, NJ 08825; (908) 996-6008.

NEW YORK

Brewers United for Real Pilsner (BURP), c/o Joyce Decker, RD#1 Box 354, Livingston Manor, NY 12758.

NORTH DAKOTA

Society of Brewing Scientists (SOBS), c/o James MacArthur, 1814 Ryan Dr., Bismarck, ND 58501; (701) 222-0991.

OREGON

GENie Users Zymurgy Lodge (GUZL), c/o Stephen Quarterman, 2359 N.W. Hoyt, Portland, OR 97210; (503) 241-1856; GENie page 1152;1.

PENNSYLVANIA

Brewing Excellence in the Erie Region (BEER), c/o Kirk W. Olsen, 649 W. 50th St., Erie, PA 16509-2509; (814) 868-8530.

SOUTH CAROLINA

Sandy Bottom Brew Crew of the Coastal Carolinas, c/o Steve Nay, U-Brew, 1207 Hwy. 17 S., North Myrtle Beach, SC 29582; (803) 361-0092.

TEXAS

The Arlington Homebrewers Club, c/o Jerry Darling, 6104 Hedgeapple Ct., Arlington, TX 76017; (817) 468-8338.

Dry County Brewers, PO Box 131738, Tyler, TX 75713.

VERMONT

The VLS Homebrewer's Club, c/o Student Bar Association, Chelsea St., South Royalton, VT 05068; (800) 227-1395.

VIRGINIA

Society of Harrisonburg Abc Dogged Yeasters (SHADY), c/o Tom Furgeson, 156 New York Ave., Harrisonburg, VA 22801; (703) 432-6799; rokto@aol.com.

WYOMING

The High Plains Drafters, c/o Dave Clements, 316 W. 15th St., Cheyenne, WY 82001; (307) 635-6440.

AUSTRALIA

The Fern, c/o Christopher Pittock, 46 Glosop Crescent, Campbell, ACT 2601.

The Fermenters, 276 Raymond St., Sale, VIC 3850, 051 43 1143.

CANADA

The Chartwell Brewers Union, c/o Glenn Anderson, 12 Chartwell Crescent, Keswick, ON L4P 3N9; (905) 476-9658; gramps@interlog.com.

SWITZERLAND

Swiss Homebrewing Society, c/o Marco Sanger, Rütihofstr. 15, 8049 Zürich, 01 342 48 28.



AHA SANCTIONED COMPETITION

Kudos

Aug. 24, 1994.

WESTERN WASHINGTON FAIR
Puyallup, Wash., 250 entries.
Craig Paterson of Seattle, Wash., won best of show.

Sept. 24, 1994.

MINNESOTA BREWFEST '94
Minneapolis, Minn., 241 entries.
Carl Eidbo of Fargo, N.D., won best of show.

Sept. 27, 1994.

MID SOUTH FAIR HOMEBREWED BEER COMPETITION
Memphis, Tenn., 75 entries.
Barry Davis of Olive Branch, Miss., won best of show.

Oct. 9, 1994.

SECOND FOLSOM TOURNAMENT & RENAISSANCE FAYRE HOMEBREW COMPETITION
Folsom, Calif., 37 entries.
Sally Weinland of Carmichael, Calif., won best of show.

Oct. 14, 1994.

DIXIE CUP
Houston, Texas, 639 entries.
Steve Moore and Scott Birdwell of Houston, Texas, won best of show.

Oct. 15, 1994.

CAMRA VICTORIA HOMEBREW COMPETITION '94
Victoria, British Columbia, 94 entries.
Mike Feist of Vancouver, British Columbia, won best of show.

Oct. 15, 1994.

GORDONS CAVE A VIN OKTOBERFEST '94
Montreal, Quebec, 80 entries.
Gordon Saby of St. Bruno, Quebec, won best of show.

Oct. 16, 1994.

BREWMASTER OKTOBERFEST HOMEBREW COMPETITION
San Leandro, Calif., 65 entries.
Sloan Venables of Oakland, Calif., won best of show.

Oct. 16, 1994.

FLAGSTAFF MEDICAL CENTER BREW HA HA
Flagstaff, Ariz., 16 entries.
Jere and Sue Rieneburg of Flagstaff, Ariz., won best of show.

Oct. 21, 1994.

THE TASTE OF THE GREAT LAKES
Frankenmuth, Mich., 80 entries.
Bruce Brandt of Nunica, Mich., won best of show.

Oct. 29, 1994.

ALL ABOUT ALES COMPETITION
Toronto, Ontario, 140 entries.
Lorne Romano of Toronto, Ontario, won best of show.

Oct. 29, 1994.

CBS SPOOKY BREW REVIEW
Chicago, Ill., 125 entries.
John Walaszek of Schaumburg, Ill., won best of show.

Nov. 4, 1994.

SIXTH ANNUAL REGGAE AND DREADHOP
Boulder, Colo., 42 entries.
Tom Hall of Denver, Colo., won best of show.

Nov. 5, 1994.

1994 CAPITOL DISTRICT OPEN
Washington, D.C., 166 entries.
Delano DuGarm of Arlington, Va., won best of show.

Nov. 5, 1994.

TENNESSEE VALLEY HOMEBREW COMPETITION
Knoxville, Tenn., 86 entries.
David Pappas of Coee, Fla., won best of show.

Nov. 5, 1994.

NOVEMBERFEST '94
Seattle, Wash., 95 entries.
Marvin Crippen of Seattle, Wash., won best of show.

Nov. 6, 1994.

HOPS-BOPS '94
Philadelphia, Pa., 96 entries.
Laura Briggs of Levittown, Pa., won best of show.

Nov. 12, 1994.

NORTHERN NEW ENGLAND REGIONAL HOMEBREW COMPETITION
South Portland, Maine, 230 entries.
Tom O'Connor III of Rockport, Maine, won best of show.

Nov. 12, 1994.

SPIRIT OF BELGIUM
Fairfax, Va., 89 entries.
Scott Bickham of Ithaca, N.Y., won best of show.

Nov. 12, 1994.

SECOND ANNUAL SALT CITY BREW CLUB COMPETITION
Syracuse, N.Y., 159 entries.
Bob Talkewicz of Binghamton, N.Y., won best of show.

Nov. 12, 1994.

THIRD ANNUAL DOMINION CUP
Richmond, Va., 42 entries.
Rhett Rebold of Burke, Va., won best of show.

Nov. 12, 1994.

CALIFORNIA HOMEBREW COMPETITION
San Francisco, Calif., 156 entries.
Vern Wolff won the Sierra Nevada Homebrewer of the Year Award.
The Maltose Falcons won the California Homebrew Club of the Year.

Nov. 19, 1994.

1994 THIRSTY HOMEBREW COMPETITION
Iowa City, Iowa, 104 entries.
Dennis Davison of Greenfield, Wis., won best of show.

Nov. 19, 1994.

NAKED PUEBLO HOMEBREW COMPETITION
Tucson, Ariz., 71 entries.
Ken Jones and Tim Andrews of Flagstaff, Ariz., won best of show.

Nov. 19, 1994.

MADISON HOMEBREWERS AND TASTERS GUILD NINTH ANNUAL NOVEMBER CLASSIC
Madison, Wis., 33 entries.
Don McCreath of Maple Bluff, Wis., won best of show.

Dec. 10, 1994.

HAPPY HOLIDAYS HOMEBREW COMPETITION
St. Louis, Mo., 184 entries.
Tony McCauley of Normal, Ill., won best of show.

CORRECTIONS

Aug. 5, 1994.

NORTH TEXAS STATE FAIR HOMEBREWED BEER COMPETITION
Denton, Texas, 256 entries.
David Lloyd of Gainesville, Texas, won best of show.

Sept. 5, 1994.

CENTRAL ILLINOIS BREWERS ASSOCIATION FIRST HOMEBREW COMPETITION
Decatur, Ill., 39 entries.
Mark Hansen of Oakbrook, Ill., won best of show.

we are subject to the provisions in Internal Revenue Service Code Section 501(c)(7). This section deals with membership corporations, which is the closest fit to a homebrew club. Since PUB's purpose is to promote a better understanding of the joys of homebrewing (an educational role), we decided to incorporate as not-for-profit. Applicable restrictions and regulations vary by state.

Aside from a shield against personal liability for the officers and directors, incorporating as a not-for-profit corporation versus a regular corporation enables the organization to apply to the IRS and State for letter rulings on not-for-profit status. If approved, the not-for-profit corporation need not file income tax forms if the source of all revenues is from membership dues and/or permitted fund-raising activities and total revenues do not exceed \$25,000 per year. If total revenues exceed \$25,000 per year and/or the source of revenues is not exclusively from membership dues and/or permitted fund-raising activities, then IRS Form 990 must be filed and any applicable taxes must be paid. If approval is not given, then the corporation must file the appropriate Federal and State Corporate Income Tax Forms and pay all applicable taxes. (Note: after IRS approval, the corporation must apply for State approval). We are awaiting our letter ruling, which could take months. The form to request the ruling is a 25-page document, Package 1024, that asks everything except the officers' shoe sizes! Our next step is to acquire officers' and directors' liability insurance as an additional layer of protection.

On a more mundane level, being a not-for-profit corporation gives the homebrew club more respectability and credibility. Additionally, many banks offer free checking accounts to such organizations. The down sides to being a corporation are that much more record-keeping is involved, the process itself is time-consuming and expensive (\$500 to \$1,000 depending on legal fees and state filing requirements), minutes must be taken at member and board meetings and all requirements and regulations of the not-for-profit law must be adhered to. In essence, a corporation imposes a certain degree of formality and rigidity on the homebrew club, which can be at odds with the original intent of the organization (it's no longer possible to simply "relax, don't worry and have a homebrew.")

The scope of this article does not permit getting into all of these regulations. Simply put, a not-for-profit corporation may not distribute any of its net earnings to members, directors, officers, trustees or any other individual (except reasonable compensation for services and goods). It is strongly recommended that any club considering incorporating should consult with an attorney who can explain the various types of corporations and the myriad restrictions and regulations.

Incorporating may not be for every club,

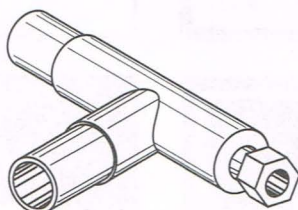
but our club decided that it was a necessary evil. Aside from a few growing pains, things have gone smoothly and PUB is still PUB, or I should say, PUB Inc.

Marc Arkind is the president of Paumanok United Brewers Inc., Long Island's largest homebrew club and the president of Alpine Computer Technologies Inc., a Long Island based computer consulting firm. Marc has been an avid homebrewer for eight years; his interest in homebrewing is an offshoot of his passion for cooking. Marc is also a Certified BJCP judge. ☺

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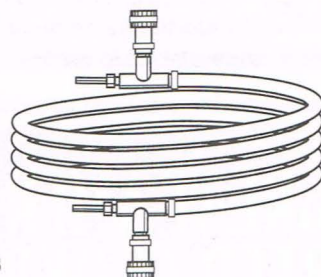


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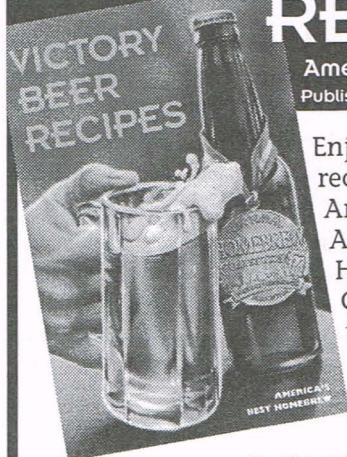
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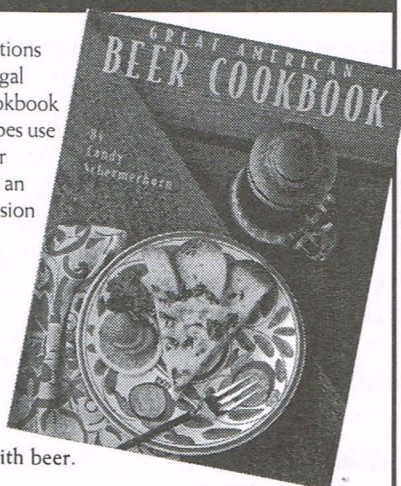
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Send all entries to:
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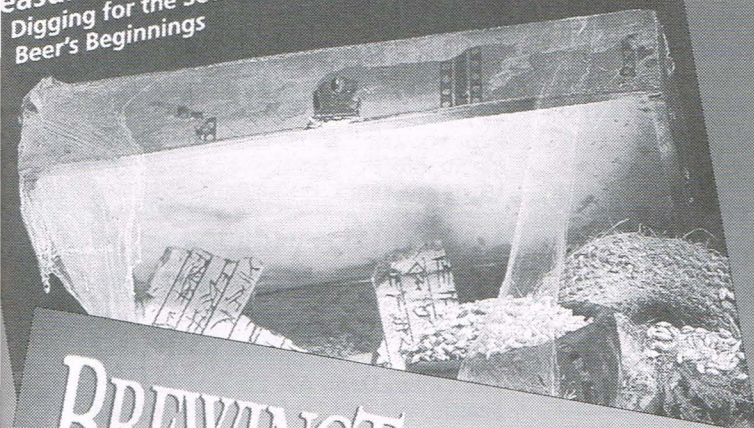
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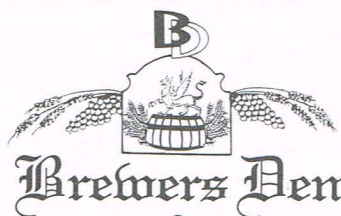
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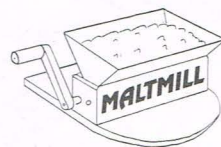
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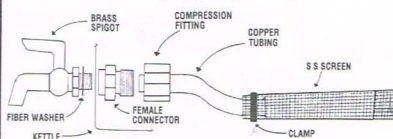
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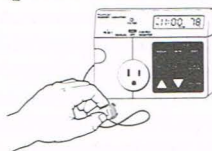
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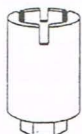
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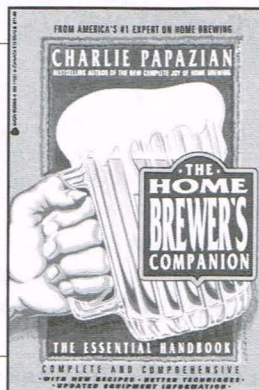
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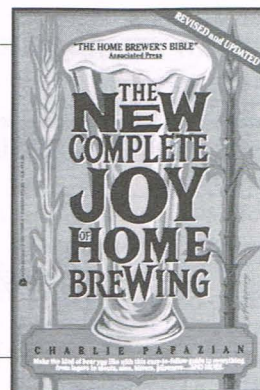
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LAST DROP

By Mark Moylan

The Homebrew Grin

First off let me say that the Homebrew Grin is not that silly smile you get after sampling every one of the homebrews you've got tucked away in your cellar or beer fridge, and the Homebrew Grin is not limited to contest winners or homebrewers with a dozen years of experience.

In fact, the only requirement for the Homebrew Grin is to have made a batch of homebrew. Pretty simple, right? Well, for those who were chosen by the beer gods to make beer, yes. For those mortals who need a little more time to perfect the brewing processes and figure out just how all those ingredients work together, it takes a little longer. But the Homebrew Grin will appear. I guarantee it.

I first experienced the Homebrew Grin about a year ago. Three years of brewing had given me enough experience to produce some mighty tasty beers. I had a pretty reliable stout recipe, a delicious brown ale recipe and I was fooling around with lighter ales and ersatz lagers aged in the bottle. I loved experimenting and every batch I brewed was better than the last.

But something was missing. I wasn't hearing the oohs and ahhs from my friends and family that I usually bestow upon my homebrew in quieter moments. So I went on a mission to make my homebrew worthy of the admiration I thought it deserved.

My basic brewing techniques were good: using fresh ingredients, sanitizing with household bleach and an iodine-based product, pitching liquid yeasts, using minimashes for every batch and fermenting in a 6.5-gallon carboy that let me witness the fury of the fungus at high krausen.

I started to slowly drive my wife, Nadia, nuts talking about the nuances of different hops.

I paid closer attention to temperatures, took better notes, read back issues of *zymurgy*, visited local homebrew club meetings, and asked a bazillion questions of any homebrewer I met. I bought a modem and dialed cyberspace for more information.

I began tasting commercial beers with a curious palate. Luckily, the beer revolution hit the Detroit area a few years ago and a good selection was just a few miles' drive. I drank my first Chimay Trappist Ale. Fell crazy in love with the malty sweet Frankenmuth Bock produced in Michigan. Made my friends bring Anchor Steam[®] and Samuel Adams[®] to our summer barbecues.

And I kept brewing. Did it help? *Mon dieu*, yes, as the homebrewers in France would say. Which brings us back to the Homebrew Grin.

My brother Kevin had dropped by one evening and I poured him a stout brewed using a minimash with flaked barley, liquid yeast and everything I knew about homebrewing. He took a sip, paused a minute, then took another drink.

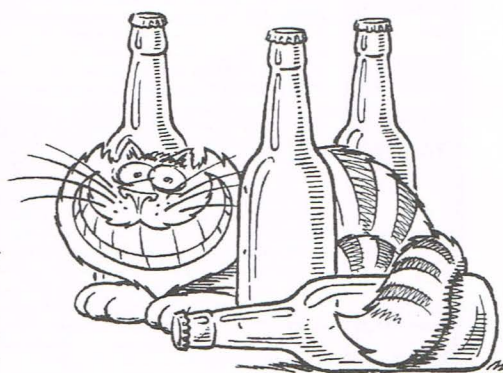
"This is good beer," he said. "I mean, it's really good beer."

When he said this I felt the corner of my mouth go up in a tight smile. I was experiencing my first Homebrew Grin. And then he said those words that every homebrewer longs to hear.

"Got another?" At those words, the Homebrew Grin on my face started to emit light. I was beaming.

And this wasn't some freak accident. A few months later, my friend Dan stopped in and I proffered the usual glass of homebrew. He took a taste and stared into the glass for a minute.

"This tastes really good," he said. "I think



you're getting the hang of it."

Again I felt the Homebrew Grin on my face. But the final test came last weekend when one of my neighbors heard I made homebrew and stopped by to try some. Monty had been on his own beer crusade for the last three years and knew a bit about good beer. I poured a stout, a Dortmund export and a Trappist ale made with yeast cultured from a Chimay bottle.

He emptied the glass of every brew I poured. He wanted to call his wife and tell her he was going to be late when he found out there were more beers to sample. I assured him through my Homebrew Grin there would be plenty of time to try them all. He had tried his first homebrewed beer and was hooked, and it was *my* homebrew.

When it comes to learning new things I'm a bit of a fumbler, so a few years to make great homebrew doesn't faze me, though you might get the Homebrew Grin from your first batch. No matter, homebrew gets better with practice and, as you brew, you will sooner or later experience the Homebrew Grin.

And when you do? Enjoy it. Do a jig. Savor it like the best glass of beer you ever made. Then start planning that next batch. It only gets better.

©1994 Mark Moylan

Mark Moylan is a free-lance writer in Michigan where he brews a number of homebrew-grin winning beers. In addition to *zymurgy*, his work also appears in *All About Beer* magazine.

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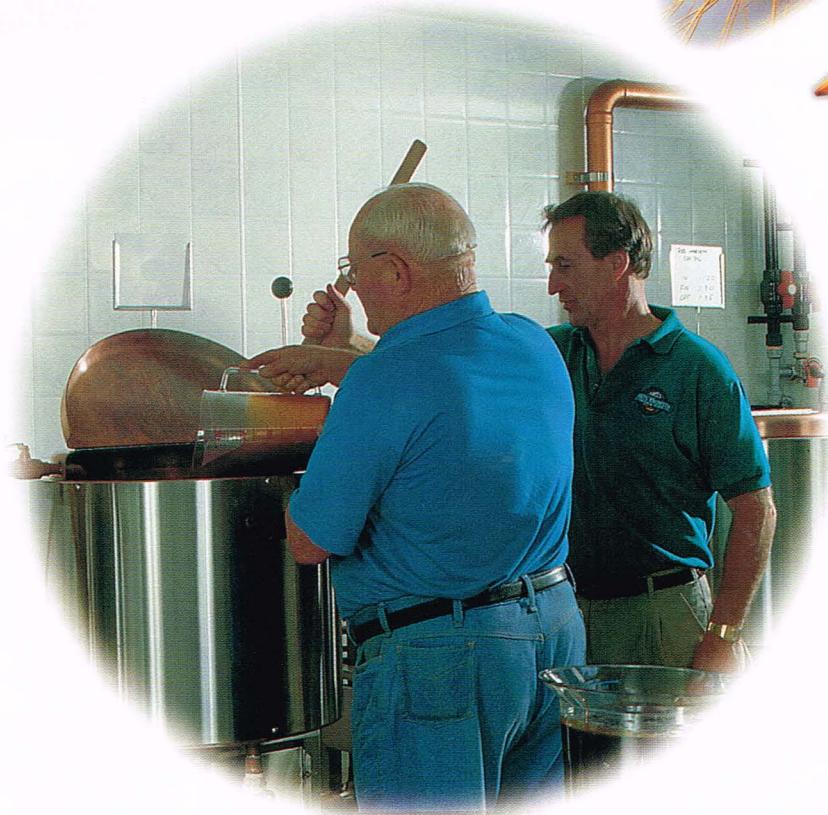
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