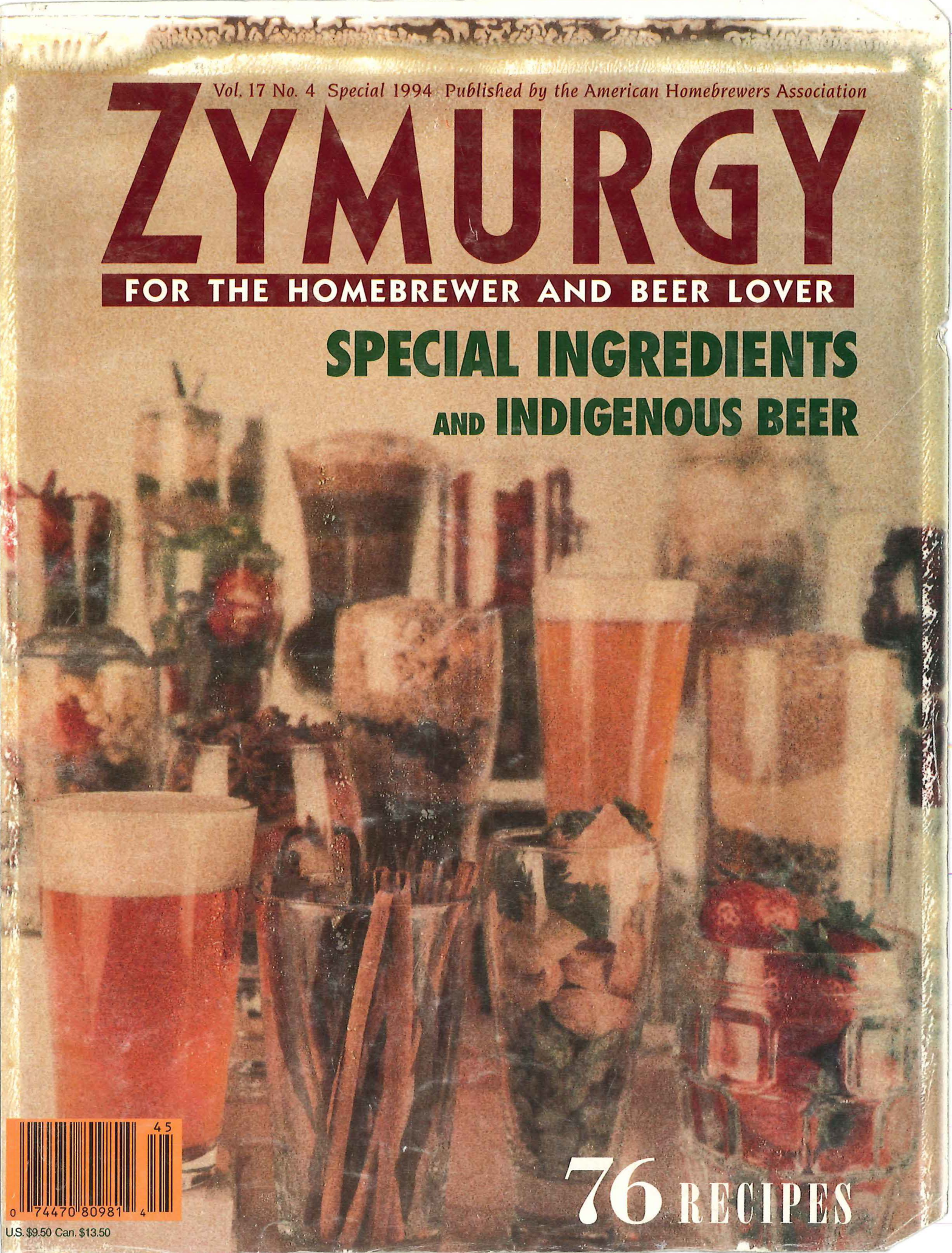
Vol. 17 No. 4 Special 1994 Published by the American Homebrewers Association

ZYMURGY

FOR THE HOMEBREWER AND BEER LOVER

SPECIAL INGREDIENTS AND INDIGENOUS BEER



76 RECIPES

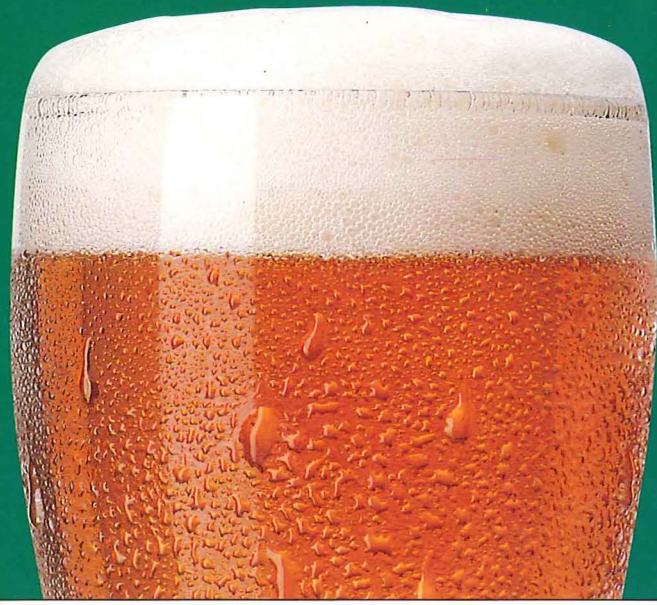
0 74470 80981 4 45

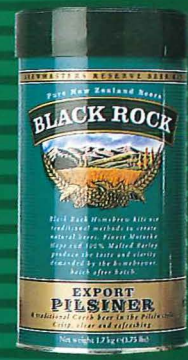
U.S. $9.50 Can. $13.50

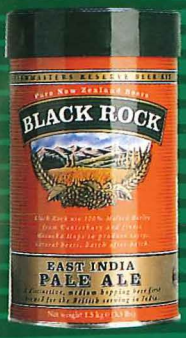
Pure New Zealand Beers

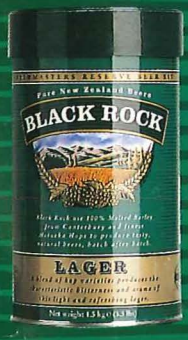
BLACK ROCK

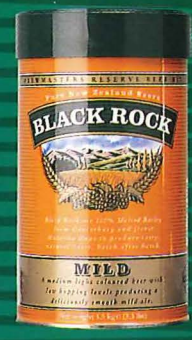
from natural ingredients we craft unnatural pleasures...

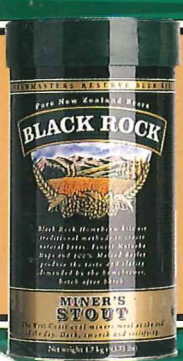


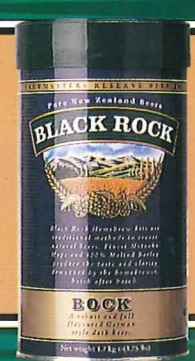












EXCLUSIVE IMPORTERS, BLACKROCK BREWING COMPANY OF NORTH AMERICA

Toll Free Phone: Canada & USA 1-800-561 2039

CANADA

Québec and Maritimes
DISTRIVIN LIMITÉE
996 Place Trans-Canada
Longueuil,
Québec J4G2M1
Tel: 1-800-363-8581
Fax: 514-442-3531

Ontario
WINEXPERT INC.
710 South Service Road,
Unit "A", Stoney Creek,
Ontario L8E5S7
Tel: 1-800-267-2016
Fax: 416-643-9161

Western Canada
BREWKING INC.
1622 Kebet Way
Port Coguitlam,
B.C. V3C 5W9
Tel: 604-941-5588
Fax: 604-941-9811

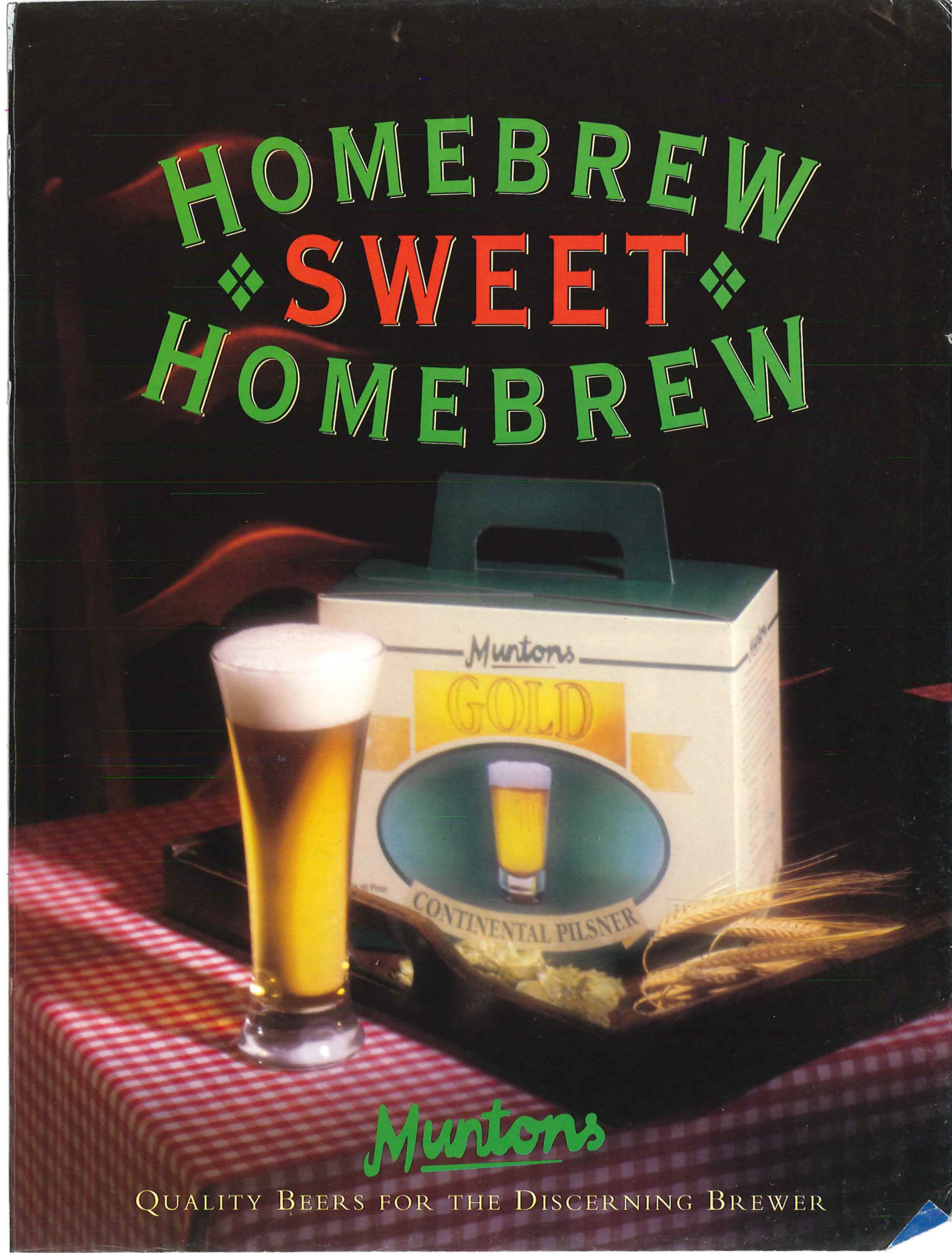
USA

F.H. STEINBART COMPANY
234 S.E. 12th Avenue
Portland, OR 97214
Tel: 503-232 8793
Toll Free Tel:
1-800-735 8793
Fax: 503-238 1649

BIERHAUS INTERNATIONAL INC.
3723 West 12th Street
Erie, PA 16505
Tel: 814-833 7747
Fax: 814-833 4090

MAYER'S CIDER MILL INC.
699 Five Mile Line Rd
Webster, N.Y. 14580
Tel: 716-671-1955
Fax: 716-671-5269
Order Line: 800-543-0043

HOMEBREW SWEET HOMEBREW



Muntons

QUALITY BEERS FOR THE DISCERNING BREWER

ARMSTRONG

THE NEW BREW FROM NEW ZEALAND

Québec and Maritimes
DISTRIVIN LIMITÉE
996 Place Trans-Canada
Longueuil, Québec J4G2M1
Tel: 1-800-363-8581
Fax: 514-442-3531

Ontario
WINEXPERT INC.
710 South Service Road, Unit "A"
Stoney Creek, Ontario L8E5S7
Tel: 1-800-267-2016
Fax: 416-643-9161

Western Canada
BREWKING INC.
1622 Kebet Way
Port Coquitlam, B.C. V3C 5W9
Tel: 604-941-5588
Fax: 604-941-9811

USA
EVERGREEN
HOMEBREW WHOLESALE
P.O.Box 3760
3847 Evergreen Parkway
Evergreen CO 80439
Tel: 1-800-285-BREW (2739)
Office: 303-674-6668
Fax: 303-674-1220

RYECOR LTD
7542 Belair Rd
Baltimore MD 21236
Tel: 1-800-799-3353
Office: 410-668-0984
Fax: 410-668-3953

Exclusive Importer, JONMER INC. Freephone: Canada & USA, 1-800-366 MALT

Introducing The Revolutionary

Mr. BEER™

MICROBREWERY

BEER KIT

Mr Beer™ MicroBrewery is THE STATE OF THE ART for home brewers. Engineered for both the beginner and advanced home brewer to brew high quality beers with a minimum of time and effort.

Now Available from your Home Brew Retail Specialist

Mr. Beer™ is the most easy to use complete beer making system. **The Perfect Gift.**

Mr. Beer™ is **THE BEST** and here's why:

Better than glass performance with LEXAN® Polycarbonate Resin, a product of GE Plastics. LEXAN® is:

- Chemically stable, imparts no taste or flavor migration
- FDA compliant
- Withstands temperatures from -150°F to 290°F
- Holds shape with hot liquids
- Highest clarity and optic qualities
- Lightweight, impact resistant, shatterproof and virtually indestructible

The no drip, no leak faucet provides a fast flow rate of .85 gallons per minute with a lock open handle to make bottle filling easy.

Plus:

- 7.5 gallon capacity marked in gallons and liters
- Wide mouth for easy cleaning and filling
- Easy to handle and move
- Easy bottle filling with 11" filler extension tube
- Perfect for single or double stage fermentation
- Easy screw on top with gasket for air tight fit and 3 piece airlock assembly
- Clear, so brewer can watch fermentation
- No interior ledges for yeast to settle on
- Quick, easy sanitizing
- Includes 6 U.V. light barrier protected reusable 2 liter PET "micro kegs" with caps

Wholesale inquiries call 602-529-0839. If your home brew retailer has not yet stocked Mr. Beer™, call 1-800-852-4263 to order with Visa or MC, add $6.00 for shipping and handling.

Complete MicroBrewer System
MSRP $59.95

System packed with yeast and 3.75 lb. can Armstrong Pilsner Blonde
MSRP $73.95

AUSTRALIAN BEER AT IT'S BEST

- Draught, Lager and Bitter
- Quick and easy brewing

Morgan's Brewing Co. Australia

Morgan's beer kits, liquid malts and spray dried extracts are made from only the finest quality Australian two row malted barley. No syrups or preservatives are used in our products.

With Morgan's you can make your brews more individual, ask your local stockist about our "Down Under" club, Outback recipes and how you could become a Morgan's "Master Brewer".

For details on your nearest Morgan's stockist call:

L.D. CARLSON CO. OHIO
1 800 321 0315

CROSBY & BAKER LTD. MASS.
1 800 992 0141

WINE-ART INC. ONT.
1 800 268 6813

ASSOCIATION OF BREWERS INC.

The Association of Brewers Inc. is a Colorado 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.

The Association of Brewers has four divisions: American Homebrewers Association, Institute for Brewing Studies, Brewers Publications and the Great American Beer Festival℠.

ASSOCIATION OF BREWERS

President — Charlie Papazian
Vice President — Cathy L. Ewing
Marketing Director — Lori Tullberg-Kelly
Operations Director — Robert Pease

AMERICAN HOMEBREWERS ASSOCIATION
President — Karen Barela

INSTITUTE FOR BREWING STUDIES
Director — David Edgar

BREWERS PUBLICATIONS
Publisher — Elizabeth Gold

GREAT AMERICAN BEER FESTIVAL℠
Director — Marcia Schirmer

AOB Board of Directors
Marlin Buse, Harris Faberman, Sandi Genova, Stuart Kingsbery, Charles Kirkpatrick, Charles Matzen, Charlie Papazian, Loran Richardson, Jim Christoph

For information on the Association of Brewers or any of its divisions, write PO Box 1679, Boulder, CO 80306-1679; call (303) 447-0816 or FAX (303) 447-2825.

Get Involved Join a Club!

The homebrewing community is growing, so take this opportunity to get involved with other homebrewers in your area. *Your Homebrew Will Thank You!*

To find the nearest AHA registered homebrew club in your area, contact the AHA, PO Box 1679, Boulder, CO 80306-1679; (303) 447-0816, FAX (303) 447-2825.

ZYMURGY

FOR THE HOMEBREWER AND BEER LOVER

Journal of the American Homebrewers Association

THE AMERICAN HOMEBREWERS ASSOCIATION 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.

The American Homebrewers Association is a subsidiary of the Association of Brewers. Membership is open to everyone. ***zymurgy*** is the journal of the American Homebrewers Association and is published five times a year. Annual memberships which include subscriptions (payable in U.S. dollars) are $29 U.S., $34 Canadian and $44 foreign. **Changing your address? Let us know in writing, please.**

zymurgy welcomes letters, opinions, ideas, article queries and information in general from its readers. Correspondence and advertising inquiries should be directed to ***zymurgy***, PO Box 1679, Boulder, CO 80306-1679, (303) 447-0816, FAX (303) 447-2825. On CompuServe contact AHA President Karen Barela at 75250,1350, AHA/BJCP Administrator James Spence at 70740,1107 and ***zymurgy*** Managing Editor Dena Nishek at 73252,3571.

(ISSN 0196-5921)

Printed in the USA by EBSCO Media, Birmingham, Alabama.

ZYMURGY

SPECIAL 1994 ● VOLUME 17, NUMBER 4

Zymurgy *\ zī'mər jē \ n: the art and science of fermentation, as in brewing.*

SPECIAL INGREDIENTS AND INDIGENOUS BEER

AROUND THE WORLD IN 76 BREWS

INDIGENOUS BEERS

HERBS AND SPICES

FRUITS AND VEGETABLES

GRAINS

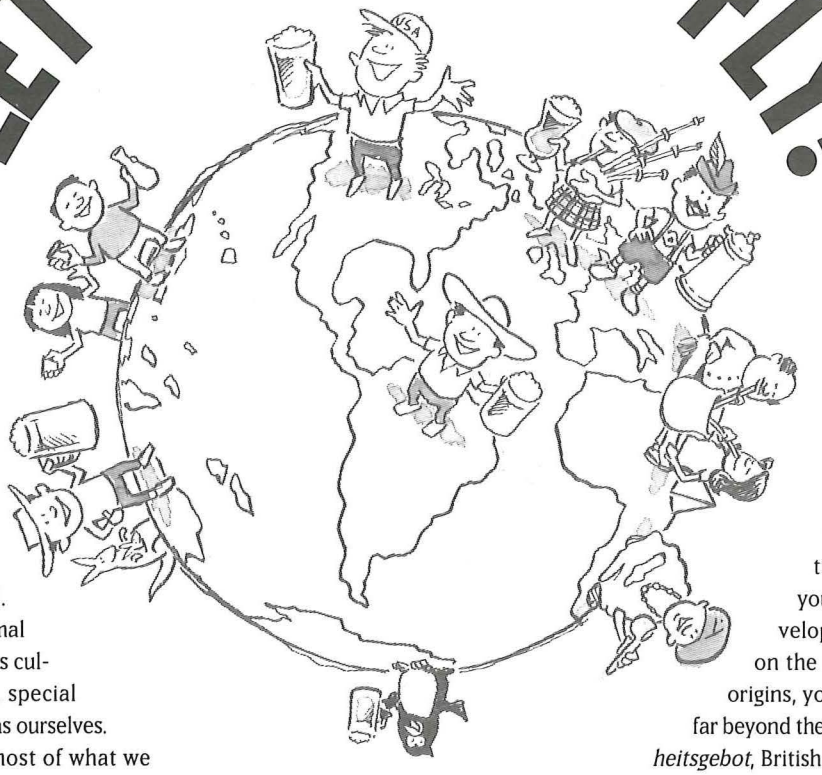
OTHER

SPECIAL ISSUE FEATURES

COVER PHOTO BY ZACHARY EPPS PHOTOGRAPHY

Interior plant illustrations by Marie Orlin, with thanks to Solange Gignac, Denver Botanic Gardens librarian.

LET YOURSELF FLY!



Spices, fruits, herbs, grains, cereals, roots, tubers, starches, sweets, sugars, smoke, rocks and wood, unique (to us) processes, incantations and rituals make for thousands of variations on beer — a sympathetic expression of the human spirit to which we are all joined. Expressions that are so normal and typical for the indigenous cultures, yet so foreign, weird, special and fantastic to visitors such as ourselves.

It just so happens that most of what we enjoy as beer in Western culture has American, British and German brewing traditions as its foundations. What we consider to be "normal" and "beer" derives from these traditions a certain degree of consistency from style to style, being brewed primarily with malted barley, water, hops and yeast. Variations of these ingredients offer us plenty of variety and not enough time to brew and enjoy them all. Though many of us try.

If we let ourselves imagine what brewing would be like outside the noble standards of America, Germany and Britain, one realizes these standards are but a narrow band of brewing traditions. True, they predominate throughout the world. But just because certain brewing traditions have survived to impose themselves on the world's beer culture should not detract from the significance of hundreds of other fermented beverages that have played an important spiritual, commercial and celebratory role in diverse cultures throughout the world.

Are you with me? Have a homebrew. Relax. Carefully and contemplatively watch the bubbles rise in your glass of homebrew and consider Belgium. Here is an example to which most of us can relate. Sure, they make many beers that resemble German or British traditions, but here we also begin to discover an entirely new kaleidoscopic world of other beers. Fruit beers, spiced beers, spontaneously fermented beers, warm lagered beers, wheat beers, oat beers and *wowIcan'tbelievethisis* beer.

Are you beginning to get my drift? Belgium offers an acceptable or convenient westernized window to the special nature of what beer can be. If you could take the time to develop an objective perspective on the real world of beer and its origins, you'd find that beer goes far, far beyond the traditions of German *Reinheitsgebot*, British real ale and American ales and lagers. The beer treasures of the world are there to be discovered in ancient texts and tucked away in present-day corners of the world. With an open mind and a creative thirst the world of beer is especially accessible to homebrewers.

This 1994 Special Issue of ***zymurgy*** is about visiting the human spirit that expresses itself as beer. It is a spirit that embraces the world. Let yourself partake of the freedom to wrap yourself in your own homebrewed version of German-style Oktoberfest or Ethiopian t'ella, knowing you have unbounded brew freedom.

It's all about freedom to observe and consider the *real* world of beer. It's not simply about scientific and brewing techniques, ingredients and processes or only Western traditions but about world people, cultures, traditions, mysticism, ingredients, processes, feelings, experiences and how the human spirit has combined all of these to manifest itself as unique expressions — beer in all its languages.

Read this very Special Issue of ***zymurgy*** and let yourself fly as so many homebrew kin have done throughout history and in every corner of the planet. Homebrewers. We have a very ancient tradition to carry on. It is the most universal and oldest tradition in the world, yet somehow we always seem to find ourselves on the frontier. Have a homebrew and let yourself fly.

By Charlie Papazian

ILLUSTRATION BY JOHN MARTIN

BY DENA NISHEK

My carboy bloweth over. I feel that way about this Special Issue. Not in the bad, sticky, messy, stain-the-carpet sense, but in the too-much-of-a-good-thing sense. I found so much fascinating information about indigenous beers and special ingredients I couldn't possibly fit everything into this one Special Issue of ***zymurgy***. In fact, I had enough information to fill about 160 pages, and there were still topics I wanted to include, like chocolate and prickly pears. Topics, articles and authors were still emerging way past the deadline. I knew what I had found was only the beginning.

This collection of beers, from far points on the globe and far reaches of imagination, is presented by professors, award-winning homebrewers and professional brewers. You'll recognize quite a few of the authors — they've contributed before, but many are contributing for the first time. To find them, I looked for homebrewers whose specialty beers had advanced to the second round of the AHA 1993 National Homebrew Competition — a perfect pool of potential authors. I looked through an AHA file of indigenous beers 15 years in the making to find authors who are experts, or were interested and willing to do some research in the name of beer. What they created is a collection of articles that details some 34 herbs, spices, grains, fruits and vegetables, no less than 15 indigenous beers, a handful of unique techniques to inspire you and 76 recipes to get you brewing. A whole new world of beer really is only a steaming brewpot away.

In an effort to present such a variety of ingredients and how they work in beer, we included quite a bit of botanical information. This not being our area of expertise, a botanical expert reviewed all of the articles to make sure we got the plant terminology and history right. The history is important (and just plain interesting) to understanding what properties make the ingredients good in beer. These are largely uncharted worts, by the way.

I'm happy with the collection. It was challenging to get here, but if you enjoy this Special Issue as much as I do, it will have been worth every minute of its preparation.

So why special ingredients *and* indigenous beers? We began as brewers using what was available technologically and agriculturally. Then in the modern world we perfected a good number of beer styles and pared down and standardized the ingredients and techniques. Now we homebrewers have access to just about any ingredient we could imagine and can build or recreate most any brewing method — so we explore. We can go back to our indigenous brewing roots armed with the knowledge we've collected along the way. We can take risks. By revisiting some historic brewing methods and recipes, and by broadening our ingredient options, we will take homebrewing into the future.

ILLUSTRATION BY JOHN MARTIN

SAHTI: A TRADITIONAL FINNISH BREW

By Mike Schaefer

Sahti (pronounced SAH-tee) is a traditional fermented beverage of southern Finland. Although a wide variety of ingredients and brewing methods exist, depending on the province, a few stylistic parameters may be used to define sahti: it is an uncarbonated beer using barley malt as a primary source of fermentable sugars, juniper as a flavoring agent and employing a top-fermenting yeast strain to convert sugars to alcohol.

Sahti has been brewed in Finland since at least the ninth century. The origin of the name is not known, although one story has it that Swedish merchants who purchased the drink poured it into barrels that had contained berries, possibly as a way in which to improve the flavor or to increase the alcohol content through an additional fermentation. The berry juice was called *saft* in Swedish, and it is possible that "saft" was transformed to "saht" and then "sahti" by the Finnish vendors. In Estonia, a similar product is called *o'lu*, and on the Swedish island of Gotland, *gotlandsdricka*. In Finland, sahti is most commonly brewed in the vicinity of Lammi, about 60 miles northeast of Helsinki, and around Sysmä, about 40 miles farther north.

Traditionally sahti was brewed by women on farms, but today men are the primary brewers. The skills and recipes were passed along from mother to daughter, and some women traveled from house to house as freelance brewsters. It was considered a nutritious drink possessing some curative powers and was brewed for special occasions — weddings, midsummer celebrations, harvest, Christmas and funerals. As is common in many cultures, the drink is seen as an integral component in observing festive occasions. Two versions often were brewed for these times — a strong sahti for men and a weaker version, perhaps using the second runnings from the grain, for women and priests.

Sahti brewing once took place, and sometimes still does, in a sauna. Not only was this the most sanitary area of the farm, by virtue of being heated to 200 degrees F (93 degrees C) or so each week, but the sauna also had a large cast iron pot for mashing grain. Grain was malted on the upper benches. Because of the spiritual overtones of the sauna in Finnish culture, brewing sahti acquired a somewhat mystic role in society.

Around 1850, a dozen or so small breweries sold sahti; however, production declined and finally ceased around the end of World War II. Lammin Sahti Oy, founded in 1985 by Pekka Kääriäinen, was licensed to sell sahti by the state monopoly ALKO in 1987, and is now the best-known commercial sahti brewer in Finland. Their product is a typical example of a medium-strong sahti.

At one time the range of ingredients used in brewing was limited naturally to what was grown on the farm or found in the wild. The ingredients typically were barley, rye and possibly oats, juniper and the occasional additions of other berries such as raspberries for flavor. Top-fermenting commercial yeasts were available after 1885.

Traditionally sahti was brewed solely with malted barley, although rye and oats were sometimes added to lend a darker color. Despite the assertion in *Michael Jackson's Beer Companion* (Running Press, 1993) that, "One or other of these grains or a blend of both, may comprise half the mash in very traditional examples ..." my sources indicate that 10 percent rye malt is generally the maximum amount used. Oats are rarely used today. In some places, oat or rye flour is used instead of malted grain types. A larger amount of dark malted rye, also known as *kalja* malt, is added to the mash when brewing a Finnish table beer called *kalja*.

Sahti malt sold in Finland by Lahden Polttimo Oy (the major Finnish maltster) is a combination of various two-row strains of locally grown barley. These are highly modified and kilned at very low temperatures. This malt is combined with about 2 to 5 percent dark crystal malt, 1 percent chocolate malt and 10 percent enzyme malt for conversion.

Tuoppi Kallamallas is a very hard grain (similar to CaraPils), and with a dark chocolate malt color. However, rather than a roasted scent, it seemed to have a slightly acidic (citrusy) flavor and aroma.

Originally, when malting was done at home, the dried grain was placed in a cloth sack and submerged in a body of water to soak for a few days. Germination took place in the sack or was moved to a semicircular wooden trough called a *kuurna*. When the germination phase was complete, the raw malt was heaped and heated in the sauna. Next, the malt was moved closer to the ceiling, where heat dried the grain as it was turned manually. This malt was then stored in tightly sealed wooden barrels until needed.

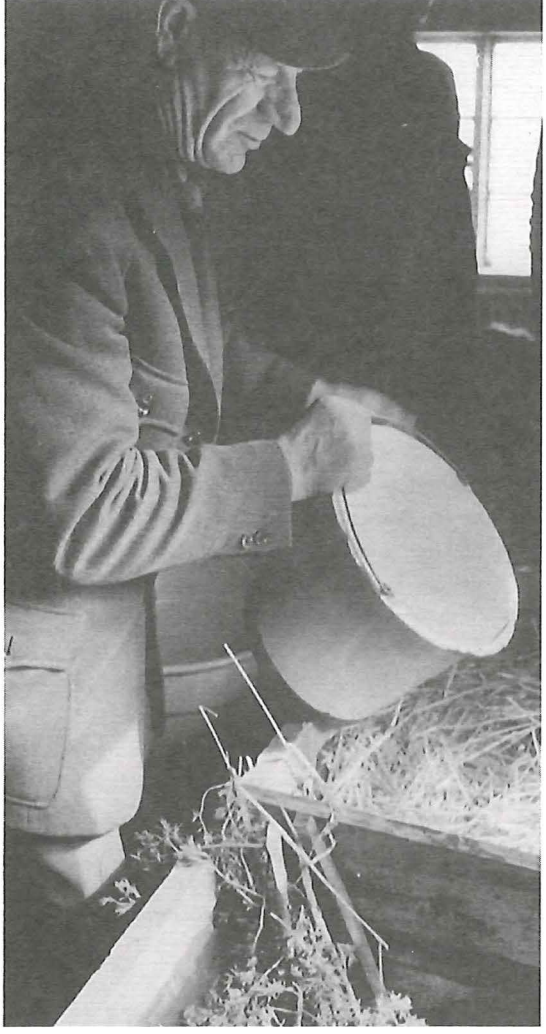
Juniper, or *kataja* in Finnish, performs a dual function. It is a sanitizing and filtration agent and, in turn, the twigs, berries and/or needles impart flavor to the finished product. First the mash water and juniper twigs (or *katajavari*) were heated to boiling. All the

brewing equipment, which was usually made of pine, were immersed in this water and wiped with bundles of juniper branches. Flavoring was added when the wort was filtered through the *kuurna* during sparging. In this procedure, branches with berries and straw were layered and the liquid filtered through this bed.

The Finnish word for hops, *humala*, also refers to "a state of drunkenness." (Interestingly enough, *tappo*, or "hop garden," also means "manslaughter"!) Hops were added to sahti from at least the 15th century, although no one seems to know which varieties were used, other than that they were sometimes wild. As in beer, hops were used as a buffer against bacterial infection, and for both bittering and aroma. Often they were boiled separately to alleviate some of the bitterness. Most recipes were not too specific in terms of quantity, rather, "a handful or two" might be added to the wort. Since hand sizes varied and batch sizes ranged from 30 to 200 liters, accuracy seemed to be a matter of brewer's preference.

Presently sahti is brewed using bakers yeast, which belongs to the *Saccharomyces cerevisiae* branch of the yeast family tree, as do most brewing yeasts. (After fermenting a batch with bakers yeast that ended up smelling like used baby diapers, I'd recommend sticking with beer yeast.) Often a 50-gram yeast cake is crumbled into a small portion of the mash runnings and added to a 40- to 50-liter batch after it has cooled. Fermentation temperatures are similar to those for ales. At Lammin Sahti, primary fermentation is 65 to 70 degrees F (18 to 20 degrees C) for three days, 45 to 50 degrees F (4 to 10 degrees C) for 10 days in the secondary and then the product is packaged for sale.

Prior to the commercial availability of yeast, fermentation was induced by whatever means possible. In the Finnish epic *The Kalevala* (Oxford University Press, 1989) the better part of Canto 20 deals with the problems involved with starting the fermentation for the "First Beer" for a wedding celebration. One alleged source for yeast was the saliva from a wild boar in heat (kids, don't try this at home) which was cultured in the wort and pitched. If an acceptable strain was found — when a good-tasting batch was brewed — the yeast cake was collected in a clean bottle with a cloth stopper and stored in a cold lake, spring or well. Another method was to dry the yeast in flax fibers or oat flour, wrap it in cloth and store.



Traditionally, sahti is infused in a wooden tub and the mash is filtered through straw and berry-covered juniper branches.

Water used in brewing generally came from local wells. Because it was untreated, it normally would have an assortment of minerals present. The water does seem to have an effect on the perception of the quality of the sahti: one farmer claimed that of the three wells he had, only one produced good sahti.

Although many variations of the brewing process were used, malt was basically mashed in the same fashion as for beer. Since consistent control during malting was not guaranteed, nor were optimal mashing processes understood, a long gradual increase in temperature resulted in a brewing day that lasted from dawn to dusk.

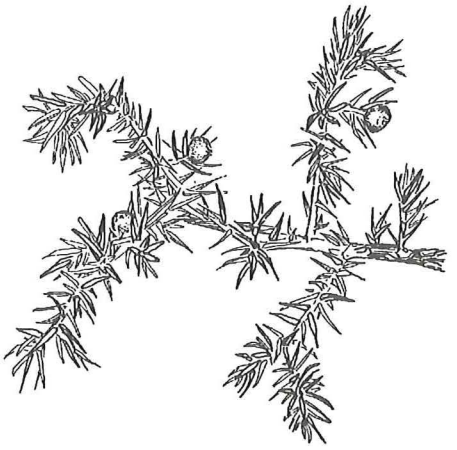
First, wooden equipment was soaked in water until swollen tight. Grain, in a proportion of about 44 pounds per 13 gallons (20 kilograms per 50 liters) of mash, was placed in a wooden tub and moistened with lukewarm water. The temperature was increased by adding hot water in amounts and intervals determined by the brewster and her recipe. The pail was wrapped in old blankets to maintain a constant temperature during rests. Gradually the mash was brought up to 150 degrees F (66 degrees C). Before thermometers were used this was the temperature at which the brewster could draw her finger through the mash across the pail three times. If she couldn't, it was too hot. After the rest, boiling water or heated stones were added to complete the mashing process.

Sticks were then laid perpendicular to the length of the *kuurna*. Next, a layer of rye straw was added, with juniper twigs and berries forming the top of the filter bed. Then, usually without a boiling stage, the mash was slowly ladled over the length of the *kuurna*. When the wort filtered through it was collected at one end, directed through a hole at the bottom of the trough controlled by a wooden peg and poured into a wooden milk churn. After cooling, the yeast was pitched into this churn to initiate fermentation.

Most authentic sahti recipes call only for collecting the first runnings. In the above-mentioned proportions, a 13-gallon (50-liter) mash would yield about 10 1/2 gallons (40 liters) of wort with an original specific gravity in the range of 1.100. Then the mash bed would be sparged with hot (or sometimes cold) water to produce weaker worts, which would be served to women or consumed to quench thirst. Another option was to sparge and boil both runnings together to reduce the wort volume to a point where the original gravity might be in the range of 1.100 to 1.120. This type of sahti, called "double," has a sweet flavor as a result of a high final gravity.

Lammin Sahti follows a mashing profile of 104, 130, 148 and 172 degrees F (40, 55, 65 and 78 degrees C). However, using true, highly modified sahti malts (or typical American malts) would most likely require only a single infusion.

When fermentation was complete, the sahti was consumed directly from the container in



JUNIPER

which it fermented. A two-handled juniper bucket, called a *haarikka*, is the vessel in which the drink is traditionally consumed. The drink could also be bottled or kegged. Lammin Sahti packages its product in containers similar to the "wine in a box." Sahti is not primed and is served uncarbonated about three to 10 days after brewing, depending on its strength.

The following are four recipes for various styles of sahti. They will give an indication of the range of methods and proportions of ingredients used. Maintain the same sanitary procedures for brewing sahti as one would for brewing beer. Also, a portion of malt extract may be substituted for some of the grain in order to attain target gravities.

SAHTI

This recipe, provided by Anneli Lukka of McGill University, Montreal, Quebec, is paraphrased from the 1901 cookbook, *Keittokirja Yksinkertaista Ruoanlaittoa Varten Kodissa ja Koulussa*, by Anna Olsoni.

Ingredients for about 5 gallons

11	**pounds malted barley**
1	**pound malted rye**
8	**gallons water**
	a fistful of hops
	brewing yeast

Moisten malts with cold water, mix, cover and let sit overnight. In the morning add two scoops of hot water to the malt. Boil the remainder of the water and add a scoopful at a time to the malt, mixing well, until the mash has the consistency of porridge. Add the remainder of the water and allow the mash to stand one hour.

Bring the clear portion of the mash to a boil four to six times by alternating between two kettles and adding the porridge at the conclusion of each boil. Mix, allow the grains to settle, pour off the clear wort and reboil.

During the final boil prepare a container with a hole and plug near the bottom. Rinse rye straw with boiling water, place a layer on the bottom of the barrel, dump the porridge on the straw and pour liquid from the final boil on top of it. Let the wort flow through the tap into a fermenting vessel. Pour clean juniper water, made by boiling juniper branches and berries in water, over the porridge, and through the tap. Boil the liquid with hops. When cool, add yeast and ferment.

To make Juniper Berry Sahti (*Katajanmarjajuoma*), take one-half gallon (2 liters) of cleaned juniper berries per quarter gallon (liter) of liquid, macerate in cold water, let sit for 10 hours and use this liquid to moisten the malt. Follow the remainder of the procedures above.

POHJANMAAN SAHTI

Anne Ranta-Panula provided this recipe, which is typical of the sahti brewed around Seinäjoki in the Pohjanmaa region of western Finland.

Ingredients for 5 gallons

2 1/5	**pounds malted barley**
4/5	**pound rye flour**
2	**pounds dark brown sugar**
	juniper branch (6 to 8 inches long)
	ale yeast

- **Original specific gravity: 1.038**
- **Final specific gravity: 1.004**

Add malt and flour to 1 gallon of water heated to 140 degrees F (60 degrees C). Mix well, cover the container with a towel or blanket and let stand for four to five hours. Bring the mash to a boil for five minutes. Transfer to a sanitized plastic fermenter. Add sugar to 4 gallons boiling water. Stir well, add to the fermenter and stir again. Add the juniper branch. After the wort has cooled to pitching temperature, transfer liquid off the sediment and pitch ale yeast, such as Wyeast American ale No. 1056.

This recipe yielded about 2 1/2 gallons of sahti at bottling because of the numerous rackings, so adjust amounts for a 5-gallon batch. A lot of sediment was generated, so it may be necessary to rack at least twice. The final product was a cloudy reddish color and had an earthy spruce flavor.

LAMMIN-STYLE SAHTI

This recipe, provided by Antti Salminen, follows some of the procedures used by Lammin Sahti.

Ingredients for 5 gallons

16	**pounds sahti malt (in proportions explained previously)**
1 1/2	**pounds malted rye (optional)**

Mash-in at 104 degrees F (40 degrees C), using about 7 gallons of water (2 1/2 liters per kilogram of grain). Mix well. Raise temperature slowly, without scorching, to 130 degrees F (54 degrees C). Hold for 30 minutes. Raise temperature to 148 degrees F (64 degrees C). Hold for 120 minutes. Raise temperature to 172 degrees F (78 degrees C) for 15 minutes. Mash-out at 190 degrees F (88 degrees C).

Sparge to collect 5 gallons with an original gravity of about 1.080. Add a handful of hops, cool to room temperature and pitch ale yeast. Ferment for three days at 65 degrees F (18 degrees C). Ferment in the secondary at 45 degrees F (7 degrees C) for 10 days, then serve.

SYSMÄ-STYLE SAHTI

Kari Nikkanen sent this recipe for a sahti similar to the type brewed in the region around Sysmä.

Ingredients for 5 gallons

17 1/2	**pounds pale barley malt**
1	**pound dark rye malt**
	long straws (Use these to support the juniper and mash and act as a false bottom. Choose twigs or branches that can support the weight and let liquid flow through.)
	juniper twigs with berries
	ale yeast

Heat 2 gallons of water to about 170 degrees F (77 degrees C). Transfer to a large

ILLUSTRATION BY MARIE ORLIN

container, add malt and mix well. At 30-minute intervals add 1 to 2 quarts of progressively hotter water, mixing after each addition. This is done 10 to 12 times. Cover the mixing container to retain heat. By the last addition the water should be boiling. Transfer (by siphoning) the clear portion of the mash to a kettle and bring to a boil.

Prepare a filter bed in the *kuurna* with straw and juniper twigs over wooden sticks. Run the thicker part of the mash over the bed and collect the runnings. If necessary, run boiling water through the *kuurna* until 5 gallons of wort are collected.

Pour off about 2 quarts of wort, cool to 93 degrees F (34 degrees C) and add yeast. When the remainder of the wort has cooled to 70 degrees F (21 degrees C), add this starter back to the fermenting vessel. Ferment for two to three days. Rack to a wooden keg and move to a cooler place after one day. The sahti is ready to drink when fermentation is complete.

ACKNOWLEDGMENTS

The author would like to thank the following people for their generous assistance in researching and translating information. Without their help, writing this article would have been impossible: Mikko Anttila, Tampere; Anne Ranta-Panula, Seinäjoki; and especially Kari Nikkanen, Vantaa; and Antti Salminen, Espoo, all of Finland.

REFERENCES

Bosley, Keith (translator), *The Kalevala*, Oxford University Press, 1989.

Jackson, Michael, *Michael Jackson's Beer Companion*, Running Press, 1993.

I have been unable to locate any information published in English on the history and brewing of sahti, other than *Michael Jackson's Beer Companion* (Running Press, 1993) and his *New World Guide to Beer* (Running Press, 1988). The best reference in Finnish, *Sahtikirja*, published by the Finnish Sahti Society (*Suomen Sahtiseura*), is not translated into English and is unavailable in the United States.

GOTLANDSDRICKA, THE ANCIENT BREW OF GOTLAND

By Håkan Lundgren

Homebrewing in Scandinavia originated on Gotland, the largest island east of Sweden in the Baltic Sea. The traditional "gotlandsdricka," a malt beverage with flavors of smoked malt and juniper, can be traced to evidence of brewing on the neighboring island of Oland, where malt from the 13th century was found.

The ancient tradition has survived. Today an estimated 500 active homebrewers are among the island's population of 60,000. Each year they produce about 92,400 gallons (350,000 liters) of gotlandsdricka, which probably was the everyday drink of the people of Gotland during the Viking era (800 to 1066 A.D.). Mead was their celebration drink.

The flavor profile of gotlandsdricka is complex. When young, it can be very sweet and is called "woman-dricka." The background is smoked malt, sometimes with a salty touch and, of course, juniper, bringing the freshness and spiciness to the "dricka." There is only minimal hop flavor evident. Aged gotlandsdricka will be drier with a taste of tar and a sourness similar to that found in Belgian lambics.

The ingredients used depend on the recipe, but typically include smoked barley malt as

Gotlandsdricka is not bottled. Old kegs and milk flasks are used.

PHOTO BY HÅKAN LUNDGREN

the major extract source. Juniper and nowadays even hops are added to most recipes. It is common to use other extracts and spices as well as honey, rye, wheat and different kinds of sugar. The amounts of these ingredients generally are not large enough to dominate the flavor except for the taste of alcohol in strong versions of gotlandsdricka.

The first step is malting, which takes place on Gotland from September to April. Barley is steeped for three days, drained for one day and germinated on the floor in layers about four inches deep. After a week of growth the barley is kilned in wood smoke, often from birch. This step may take as long as one week.

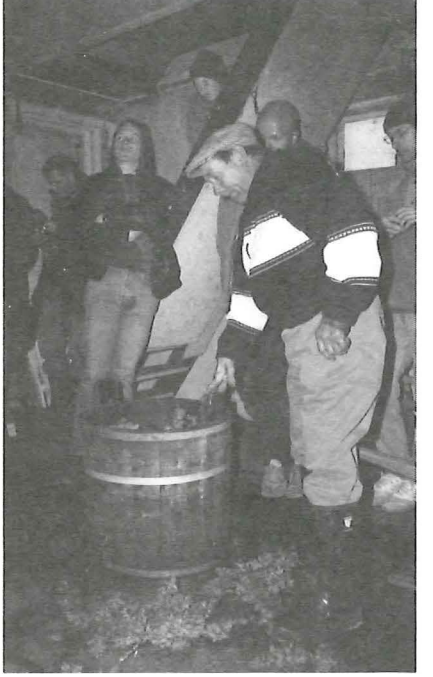
Before mashing, the mash liquor is prepared by boiling water with juniper branches and berries for about one hour. At the same time the combined mash and sparge tun, called *rostbunn*, is prepared with a kind of false bottom built up with juniper sticks arranged around the runoff hole in the bottom. Some brewers use very old sticks from previous generations, believing they have a magic force. Some lay juniper and straw layers on top of the sticks before the crushed malt and other ingredients are added to the tun.

After sparging, the sweet wort is sampled through the hole in the bottom of the tun and is boiled with hops and sometimes honey or sugar. The wort is cooled, and yeast pitched.

After one week of fermentation the gotlandsdricka can be enjoyed. Typically the yeast is still working — a guarantee of freshness and preservation. In the following weeks the brewer feeds yeast with a sugar cube every day until the keg or cask is emptied.

If we translate the old methods to modern homebrewing technology, the following instructions will give a nice result.

Label from Vivungs, an unfermented gotlandsdricka in five-liter plastic flasks.



Sven Jacobsson, in the small village of När, shows the 1993 gold-prize winners from the Swedish national homebrewing competition how to put the juniper in the *rost* (sparge-kettle).

KING GORM'S GOTLANDSDRICKA

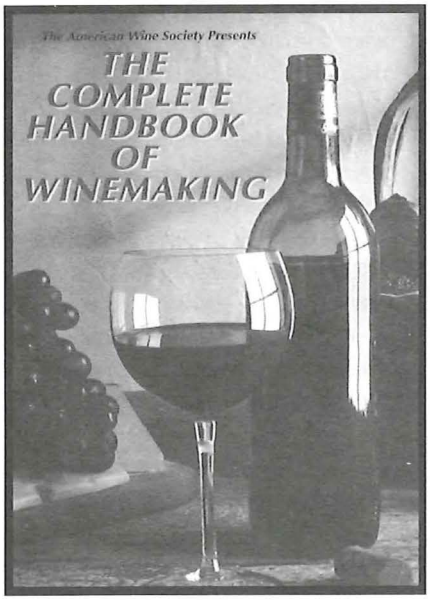
Ingredients for 5 gallons

- **5 pounds home-smoked barley malt**
- **1 pound honey**
- **4 pounds juniper (branches with berries)**
- **1/3 ounce Perle hops, 6 to 7 percent alpha acid (60 minutes)**
- **bakers yeast, cake the size of a sugar cube, dissolved in water**

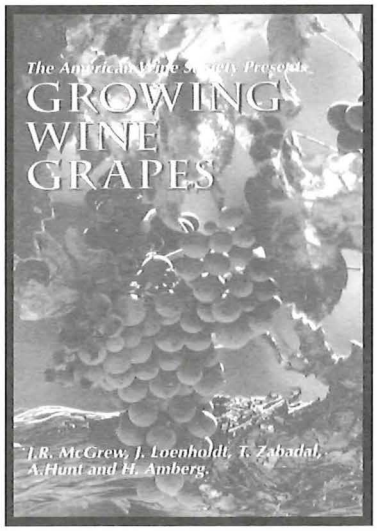
- **Original specific gravity: about 1.060**
- **Final specific gravity: depends on when it is consumed**

Boil 8 gallons (30 liters) of liquor with juniper for one hour. Mash the smoked malt for 90 minutes at 154 degrees F (68 degrees C) then sparge with the juniper-infused liquor. Boil 60 minutes with hops. Primary ferment one week at 65 to 68 degrees F (18 to 20 degrees C). You may want to try a batch with beer yeast and compare. Secondary fermentation is optional.

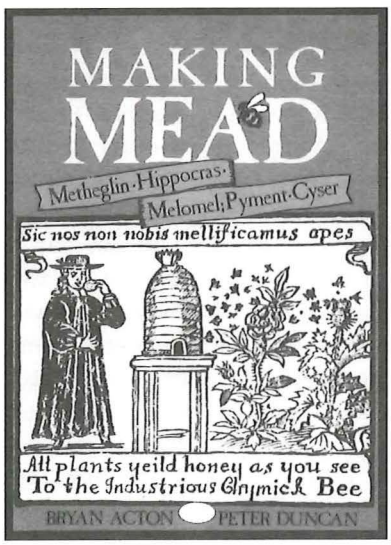
PHOTO AND LABEL COURTESY OF BY HÅKAN LUNDGREN



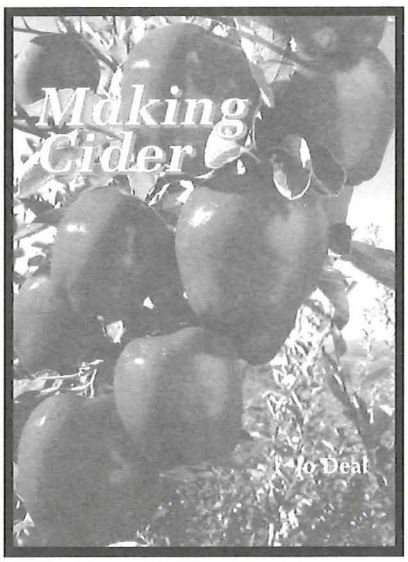
An invaluable reference source for the home winemaker of any skill level. This book explains how to produce wines, champagne, port & sherry. It covers analytical testing , monitoring malolactic fermentation and blending wines.



This book will help you select the best site for your vines, choose the grape varieties best suited to your climate, properly establish the vines, prune and train the vines, know when and how to harvest the ripe grapes, plant and nurture grafted vines, recognize grape pests and diseases, control and prevent pests and diseases.



A complete guide to the making of sweet and dry meads, melomel, metheglin, hippocras, pyment and cyser. Scores of recipes.



"Making Cider was far and away the single most valuable guide I had in learning to make hard cider"

Gabriel Ostriker
1993 AHA Cidermaker of the year

Published by: G.W. Kent, Inc.
3667 Morgan Road, Ann Arbor, Michigan 48108

SPECIALTY BEERS OF THE EUROPEAN LOWLANDS

By Lanny Hoff and Finn Knudsen

Most American beer enthusiasts are familiar with the beers of Europe. We have tasted ales from England, lagers from Germany and a wide variety of specialty beers from every part of the Continent. That a tremendous diversity of styles exists in Europe cannot be disputed, but what often goes unnoticed is the staggering density of this brewing activity.

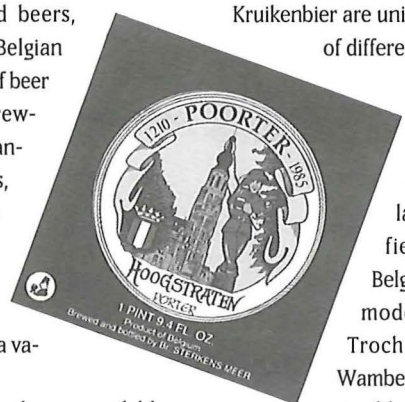
In a region comprised of Belgium, Holland and Northern France (French Flanders), an area about the size of Pennsylvania, we see the brewing traditions of Europe come together. Lambics, lagers, Trappist ales, Scottish ales, Pilseners, white beers, red beers and brown beers are all brewed in this tiny region. By comparison, the present American microbrewing scene seems somewhat homogenous. Most micros fall into "pale ale, porter, stout" categories, offering many variations on English ales. Whereas European brewers have evolved distinct regional styles, American brewers can claim at most a regional emphasis. Pale ales in the West, for example, are somewhat hoppier than pale ales from the Midwest or Northeast.

In Europe, many beers have emerged reflecting local brewing practice and taste. Because of regional availability of ingredients, pride in local products and historically limited travel (before trains, planes and automobiles it was harder to get around) people were not exposed to different beer styles and became quite attached to "their" kind of beer, enabling small local brewers to survive.

It is in this context that we examine the beers of the European lowlands. Separated more by history than geography, many distinct styles have emerged, of which the following is only a small sample.

BELGIUM

Belgium is a land of specialty beers. Lambics, white beers, red beers, saisons, Trappist ales and Belgian ales are each distinct styles of beer brewed at a number of breweries. Produced in small quantities by regional breweries, these beers are typically one of a kind and defy categorization, although they tend to be somewhat high in alcohol and often contain a variety of spices.



Several Belgian specialty ales are available in the United States. Ingredients may include wheat, oats, spices and fruit in addition to hops and malt. Yeasts employed may be top or bottom fermenting, fermentation may be cool or warm and color varies from very light to very dark. Many Belgian specialty beers use sugar adjuncts to produce a light-bodied palate, and the American homebrewer should confidently use up to about 10 percent sugar to faithfully reproduce these beers.

The Sterkens brewery of Meer, Belgium, offers two excellent non-traditional Belgian ales: Poorter and Bokrijks Kruikenbier, packaged in distinctive stoneware crocks. Poorter (meaning "freeman" and in no way similar to porter) was introduced in 1985 to commemorate the 775th anniversary of the freeing of the serfs in the region around Meer. Poorter seems to fall somewhere between the brown ales of Belgium and the paler Belgian ales. It is fairly strong (5.5 percent alcohol by weight, 6.9 percent by volume) like the Belgian browns, but is much lighter in palate and color. Moderately brownish copper, Poorter is a strong malty ale with hints of caramel and raisins. Light but solid in body, it finishes dry and grainy.

Bokrijks Kruikenbier (literally "crock beer," in reference to the unique bottle), is closely related to a typical (if there is such a thing!) Belgian ale. Much lighter in color than Poorter, Kruikenbier features a more pronounced hop character because of the dry-hopping technique employed and is slightly stronger (6 percent alcohol by weight, 7.6 percent by volume). Unlike Belgian-style ale, which tends to have a malty palate, Kruikenbier has a decidedly higher bitterness level (rare among Belgian beers). Golden with orangish highlights, it starts somewhat sweetly and dries to an almost tart finish.

Like many of the Belgian specialty beers (they are really superspecialties), Poorter and Bokrijks Kruikenbier are unique, combining elements of different beer styles.

Alongside its specialty brews, the traditional beers of Belgium continue to evolve. Even lambic, which is the most fiercely traditional of all Belgian styles, has seen some modern updates. The De Troch Brewery, located in Wambeek, Belgium, practices the age-old art of lambic brewing using wild yeast and bacteria (spontaneous

LABELS COURTESY OF ALL SAINT'S BRANDS

fermentation), wooden fermenters, raw wheat, aged hops and traditional brewing practices to produce not only outstanding gueuze, faro, kriek and framboise, but also plum, pineapple, peach, banana and strawberry lambics under the Chapeau label.

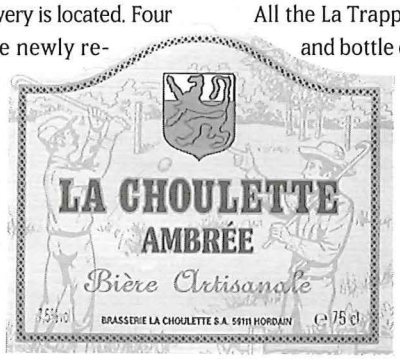
The beers of De Troch's Chapeau line, being lightly filtered, are clear and clean in flavor. The acidic attack of the gueuze and the intense character of the fruit lambics are certainly not for everyone, but any beer enthusiast who seeks an authentic Belgian lambic need look no further.

HOLLAND

Moving northward into Holland, we see brewers who turn traditional styles of beer into specialties. Two breweries, Schaapskooi in Tilburg and Christoffel in Roermond, brew established styles in such a way as to make them unique.

Merely by geography, Schaapskooi is a unique brewery. That it is a Trappist brewery is certainly notable, but that it is the only Trappist brewery outside Belgium puts it into a class of its own. Like the five Trappist breweries in Belgium (Westmalle, Orval, Chimay, Rochefort and Westvleteren), Schaapskooi's beers are extraordinary.

Monks began brewing La Trappe (the denomination for the beers of Schaapskooi) in 1884, in part to help support the abbey, Koningshoeven, where the brewery is located. Four beers are produced in the newly remodeled brewhouse: a single (called Enkel) a dubbel, tripel and quadrupel.



Most Trappist ales, being fairly high in alcohol, are too powerful for daily consumption. The monks have historically produced a beer lower in alcohol for themselves and for export. La Trappe Enkel, with a 1.059 original gravity, is a good example of this "everyday" beer. Enkel is still fairly high-gravity by American standards, full in body and flavor. Well-balanced and spicy, Enkel is a golden beer with creamy white foam that leaves "Brussels lace" on the glass to the last drop.

The dubbel, with an original specific gravity of 1.066, is a dark russet color. Malts used in its production (pale, Munich and dark crystal — perhaps a Special "B") give La Trappe Dubbel a malty, complex flavor. Many people find familiar flavors in this beer, but chocolate is most commonly mentioned. The yeast contributes a fruity, rounded character and the body is quite substantial.

La Trappe Tripel, with an original specific gravity of 1.070, is a cloudy deep golden to light copper unlike most other beers in the tripel style, which are very light in color. The aroma is quite full, spicy, yeasty and not as fruity as the dubbel. Starting and finishing somewhat malty-sweet, it nevertheless has quite a hoppy character that fades quickly. The aftertaste is very malty and spicy-sweet.

The quadrupel, a 1.084 to 1.088 original-gravity brew, is currently featured as a yearly autumn specialty. Deep copper and somewhat chill-hazed, it has a malty sweet, fruit-cocktail aroma that is much more subdued than the flavor of the beer. This is a beer that changes tremendously on the palate. It starts big and spicy with a slight malt emphasis, but the malt seems to come through stronger and stronger. At the same time, the subtly balanced hop bitterness keeps the sweetness in check. Despite its hefty gravity, this is a remarkably balanced beer and the body, although considerable, is less pronounced than expected.

All the La Trappe beers are sugar primed and bottle conditioned, making them ideal for long-term storage. Also, they are only nominally filtered and unpasteurized so the flavor will continue to develop. Homebrewers looking to emulate this style should find a suitable yeast (try culturing the dregs from a bottle of La Trappe) and keep in mind that some sugar will be required to get the right amount of body. Trappist brewers use candi sugar, but American homebrewers should feel free to use cane, corn or brown sugar. None of these beers can be duplicated with an all-malt brew; the body would simply be too substantial.

La Trappe represents the decidedly Dutch interpretation of a largely Belgian style. Likewise, Christoffel offers a fresh perspective on the most popular beer style in the world — Pilsener. Christoffel Blond, with an original gravity of about 1.048, differs from a vast majority of the Pilseners in the world because it is not only unpasteurized and packaged in flip-top bottles (several other Pils brewers can say the same), but also is totally unfiltered and bottle conditioned. A Pils with sediment!

Christoffel Blond appears pale golden in color and slightly hazy. The dense, white foam collar billows up as the beer is poured and remains to the end of the glass. Hops, yeast and a slight fruit accent all combine in the nose. From initial sip to aftertaste, this is a hoppy beer. Extremely dry and powerfully bitter, the hops come through loud and clear from start to finish. A strong malty foundation keeps the hops from overpowering the beer and the final impression is one of careful balance. This beer could very easily have been one dimensional, but instead it is among the most distinctive and complex of all Pilseners.

FRANCE

A specialty of Northern France, bière de garde (or "beer to keep") is typically brewed in small rustic breweries. In fact, many devotees of the style refer to it as "farmhouse ale," a name that indicates its historic role in everyday life. In a tradition similar to that of the German Märzen, bières de garde were often brewed during cool winter months and stored until summer. Because of problems with sanitation, many breweries did not brew in the summer but relied on the winter's brewing activity to keep their patrons supplied.

So that it would "keep," bière de garde was required to be fairly strong. Most are still brewed to a starting gravity of between 1.060 and 1.075 to allow the beer to age over time. Bières de garde vary in color from gold to dark brown, are typically quite full-bodied and tend to be highly carbonated. To build the body and color, Viennalike malts are used in the mash and the wort is boiled for extended periods to give the beer not only a deeper color but also a more pronounced malt flavor. High mash temperatures are used to further enhance the

body of the finished beer. Hop bitterness is quite low (25 to 30 IBUs), primarily from "noble-type" varieties, and there is negligible hop aroma in the finish. Most bière de garde brewers use top-fermenting yeast, but it is not uncommon to see a bottom-fermenting strain fermented at higher temperatures, or even a mixture of both.

Producing a blond, an amber and a special Bière des Sans Culottes (a tribute to the trouserless peasants of the French Revolution), La Choulette of Hordain, France, is a good example of a rustic bière de garde brewery. Bottle conditioned and only lightly filtered, La Choulette uses a mixture of top- and bottom-fermenting yeast to achieve its clean fruity character.

La Choulette Amber represents the malty extreme in bières de garde. It is deep reddish copper and has a sweet, malty, somewhat rough palate that dries out in the finish. The overall flavor of this beer reflects to a small degree the rustic environment from which it evolved. There is virtually no evidence of hops in the aroma, which is instead fruity and sweetish.

Although not many distinct styles of beer can be found in France, bière de garde, with its traditional, somewhat rough character, makes for an interesting and worthwhile addition to the world beer scene.

From the Pils of Christoffel to the bières de garde of La Choulette, these beers have one thing in common: they are unique. Be it packaging, style or emphasis, they have a distinct character unlike anything else available. How many American porters, stouts or pale ales can say the same?

As American homebrewers, we must look to these kinds of superspecialty beers to expand our horizons. Adventurous brewers interpret traditional styles in new ways, making us rethink our definitions of those styles. When we consider that the above beers are all brewed within a 200-mile radius, we can see that the American microbrewing world has great creative potential. We may never approach the creative density of the European lowlands, but let's hope we get close!

BIÈRE DE GARDE

Ingredients for 5 gallons

8 pounds Belgian pale ale malt
4 1/2 pounds Vienna malt
8 to 12 ounces Belgian Special "B" or 120 °L American caramel malt (optional)
6 to 8 HBUs of Hallertauer, Brewers Gold, Golding or Tettnanger hops (45 minutes)
1 to 1 1/2 pounds corn sugar in the boil
Wyeast No. 2112 California lager and No. 1338 European ale yeast pitched together
1 cup corn sugar (to prime)

Mash grains at 165 to 167 degrees F (74 to 75 degrees C) for 90 to 120 minutes in 4 gallons soft water. Sparge with 4 gallons of 165-degree-F (74-degree-C) water. Boil wort for a minimum of two hours, adding water if necessary to maintain volume. Cool to 65 degrees F (18 degrees C), pitch yeast and ferment between 65 and 68 degrees F (18 and 20 degrees C).

REFERENCES

Jackson, Michael, *The Great Beers of Belgium*, Coda, 1992.

Jackson, Michael, *Michael Jackson's Beer Companion*, Running Press, 1993.

The Beverage People!

Get the good stuff here, *... with service,* *... and knowledge, too.*

Ingredient Kits for 18 Beer Styles. Standard, Deluxe or Super Brewer Equipment Kits.

10 Gallon Tower All-Grain Brewing Systems.

Counter-Pressure Fillers. Temptestr ™ Thermometers.

Fast, Mail Order. Beermaking, Mead and Winemaking Catalogs. Discount Program.
The Beverage People News

Retail store open 6 days Toll-Free Order Line Service Worldwide

Award winning staff of Homebrewers, teaching classes in Beginning and Advanced Brewing.

National and Certified Beer Judges on staff.

We look forward to serving your brewing needs.

Byron Burch, Proprietor *840 Piner Rd, #14 Santa Rosa, Ca 95403* *(800) 544-1867*

The Malt Shop

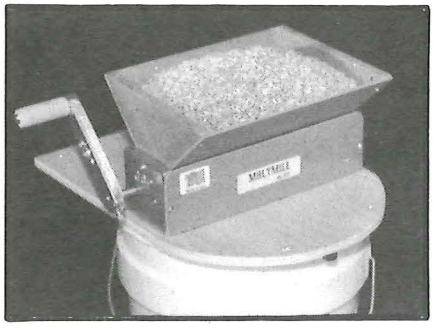
Quality Brewing Supplies from America's Heartland

The Maltmill ... $99.00 Adjustable model $129.00
plus UPS shipping
This is without a doubt, the best grain mill available to homebrewers today!!!

Call for Free Catalog of Home Brewing Supplies

The Malt Shop

N3211 Highway S, Cascade, WI 53011
414-528-8697 · 1(800)235-0026



The Maltmill

TRADITIONAL GERMAN STEINBIER

By Phil Rahn and Chuck Skypeck

Steinbier is German for stone beer. The name sounds bold and mysterious, conjuring up images of cold beer mugs full of refreshing, foamy beer being fisted by brawny beer drinkers of old. Modern interpretations of steinbier are produced by adding red-hot rocks to the boiling wort. The same rocks are then reintroduced to the beer at some point during fermentation or aging. Brawny or not, beer drinkers should visualize this style as having a faint smoky character blended with a pleasant caramelized sweetness. These aspects of the beer's flavor profile are a result of adding the rocks to the brewing process.

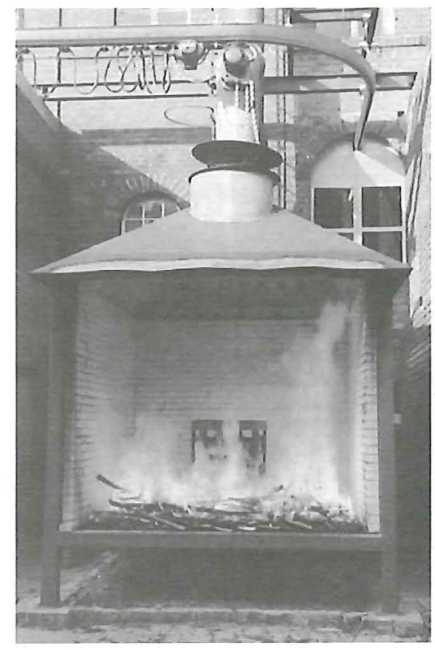
The Austrian brewing publication *Gambrinus*, (#13, 1906), contains the following details about steinbier production in three breweries in Weidmannsdorf and Klagenfurt where steinbier was still in commercial production as late as the early 1900s. Production in these three breweries ranged from 40 to 750 hectoliters per year. All three produced a top-fermented beer using one-third malted oats, one-third malted wheat and one-third malted barley. All three malted their own grain. Stones were placed on large wood piles, which were ignited. This brought the stones to a usable temperature in two to 2 1/2 hours. Large baskets soaked in water were used to carry the stones to the "boiling tub," a circular wooden vessel that looked like a very large cask with a tap in the bottom (estimated volume 250 to 300 U.S. gallons).

The bottom of the boiling tub was lined with juniper branches, which in turn were moistened with water. Using tongs, the brewers then spread 20 to 30 of the stones over the bottom of the tub, covering the branches. Whole hops were then spread evenly on top of the hot stones, with more water added to prevent the hops from bursting into flames This mixture was allowed to sit for about 10 minutes. At this time the brewers "mashed in," first adding the oat malt with enough water to fill the tub halfway. It is noted that the brewer must take care not to disturb the hops and branches at the bottom of the tub while stirring the mash.

Next came the barley malt and the wheat malt with enough water to fill the tub three-quarters full. The brewers indicated that the mash should be stirred until the temperature was even throughout. However, the authors noted the use of thermometers in stone-brewing was unknown. After a two-hour rest, more stones were gradually added to the mash until it boiled. This process took about four hours. At this point the mash was drained from the tap in the bottom of the tub into two fermentation tubs. Hot water, heated with stones, was used to sparge the mash. The beer in one tub was allowed to ferment for seven to 10 hours before being siphoned into casks and sealed. The beer in the second tub was allowed to ferment for two days before being kegged and saved for later consumption. Aging time in the kegs ranged from three to 14 days. The beer was quite lively when tapped.

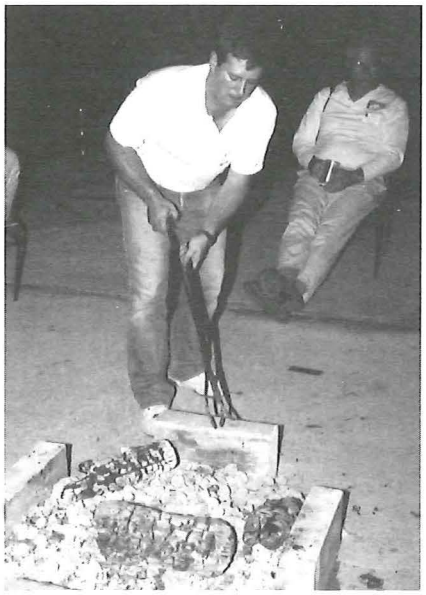
These steinbier brewing techniques are interesting in the way they combine both the old and the new. The use of juniper is an ancient tradition. Half of the beer was kegged for immediate use, while the other half was put away for future consumption or sale. The boiling of the mash was likely a forerunner of decoction mashing, where portions of the mash are boiled. The most obvious drawback to steinbier brewing is its labor-intensive character. As modern equipment and techniques became widespread, traditional steinbier brewing died out.

With the revival of craft-brewing in the 1980s, interest in steinbier grew. The Rauchenfels brewery became the best-known, if not the only, producer of steinbier. Using modern brewing equipment and techniques, Rauchenfels brews steinbier in a way that allows the efficient production of a stable product while incorporating the traditional flavors of the original. At Rauchenfels the red-hot rocks are added to the wort after precise temperature control is executed in the mash. While the rocks do not represent a major source of heat



Six cubic meters of seasoned, resinless beechwood are necessary to heat 400 kilograms of stones to around 1200 degrees C.

PHOTO COURTESY OF HDT IMPORTERS, INC., PORTLAND, ORE.



Steve Frimel uses long-handled tongs to remove the white-hot stones from the fire.

Flaming Stone Beer™ brewed by Boscos Pizza Kitchen & Brewery in Germantown, Tenn. Boscos employs their wood-fired pizza oven to heat Colorado pink granite to 900 degrees F (482 degrees C) before adding the rocks to the boiling wort. The caramelized sugar on the surface of the granite is later rinsed off the rocks and returned to the beer after fermentation. The Famous Flaming Stone Beer™ is top fermented and has an original gravity of 1.049. With a terminal gravity of 1.011, the alcohol content is 3.8 percent by weight. The beer is light and refreshing and has a unique caramel flavor. Boscos does not package its products, so The Famous Flaming Stone Beer™ is available on-premises only.

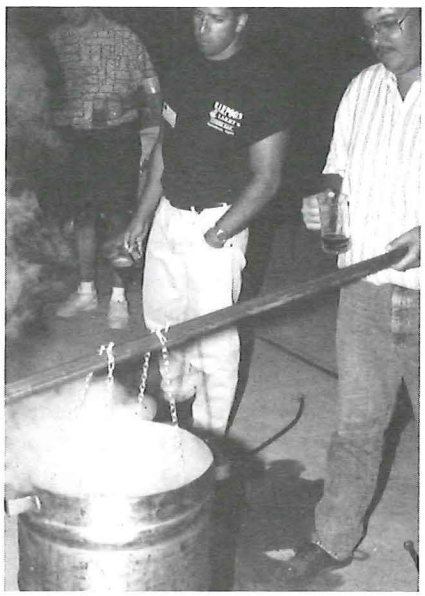
Homebrewing the style is not as difficult as it might seem. It's much more fun, rewarding and even educational if a group approach is used. Make it an outdoor event, as we did at an Oktoberfest picnic.

Warnings: The biggest difference in brewing a steinbier is the use of heated stones. Be careful with the fire used to heat the stones. A big bonfire is not necessary. A small heap of glowing embers is all it takes to heat three or four softball-sized stones. *Handle the hot stones with long tongs, not gloves or a makeshift paddle. Wear eye protection when*

Allen Moellmann uses the tongs to place the white-hot stones into a stainless-steel basket suspended from a wooden pole.

near the heated stones. Some rocks will chip, pop or explode when heated, sending sharp, hot pieces everywhere. Be sure to avoid using any rocks containing carbonate such as limestone or marble. Not only can they pop when heated, but the acid wort will dissolve or break down the rocks and neutralize the wort. Our results have been best when using granite from the Rocky Mountains.

Our stone-heating method is to use a fireplace grate to hold the stones above the burning wood (eastern red cedar). This allows easy retrieval, prevents overheating and keeps the stones cleaner than if buried in the ashes. Heat them for an hour or so, but not to "red hot" temperatures, as this could crack the stones or scorch the wort.



The stones are dunked into the wort by dipping the basket into the liquid and holding it there for several minutes.

in boiling the wort, the stones do add a faint smoky character to the beer, as well as a unique sweetness from the sugars in the wort that caramelize on their surface. The rocks are removed from the boiling wort, cooled and stored until the beer has fermented. The cooled rocks are then reintroduced to the beer, and the dissolving caramelized sugars create a vigorous secondary fermentation.

One of the most interesting aspects of Rauchenfels Steinbier is the nature of the stones used to produce the beer. Rauchenfels claims to heat the stones to 2,192 degrees F (1,200 degrees C) with a seasoned resinless beechwood fire. As the stones are lowered into the beer, they rapidly cool to 212 degrees F (100 degrees C). Graywacke, a metamorphic rock with a dense structure, is used because it withstands these temperature extremes without shattering. The graywacke is also said to "bloom" when heated, that is, the surface expands increasing the overall area upon which sugars are caramelized.

Rauchenfels Steinbier has an original gravity of 1.047 and a terminal gravity of 1.011. The alcohol content is 3.7 percent by weight. The brewery also produces a "steinweizen."

The only U.S. steinbier we know of produced on a regular basis is The Famous

"FIRE-BREWED" STONE BEER

Ingredients for 5 gallons

8	**pounds German two-row Pilsener malt**
1	**pound wheat malt**
8	**ounces CaraPils malt**
8	**ounces light German crystal malt**
4	**HBUs Hallertauer hops (60 minutes)**
4	**HBUs Hallertauer hops (45 minutes)**
	Wyeast No. 1056 American ale yeast

- **Original specific gravity: 1.047**

Mash grains as usual with protein rest for 30 minutes at 135 degrees F (57 degrees C). Raise the mash temperature to 150 to 152

PHOTOS COURTESY OF THE BLOATARIAN BREWING LEAGUE

degrees F (66 to 67 degrees C) by adding boiling water or gently heating the mash. Hold until starch conversion is complete. In the meantime, have the fire prepared and begin heating three softball-sized stones. After the runoff, begin heating the wort as usual. Before the wort reaches the boiling point, immerse each stone one at a time in the kettle. Raise and lower each stone several times, allowing them to rumble and bump in the wort. Each time they are removed, allow them to sizzle dry. Repeating this action covers the stones with a shiny caramelized coating. After four of five minutes the stones will no longer sizzle dry quickly and you can stop dunking them, but they will still be very hot to the touch. Carefully let them cool on a clean surface. As you are working with the stones, you will immediately notice the sweet caramelized aroma they give off. When they are cool, place them, still coated, in sealable plastic bags and freeze for later use. Finish the boil in the usual manner and ferment the beer at ale temperatures.

When the beer is finished and ready for bottling or kegging, rinse the candy shell off of the stones and add it to your beer. A simple way to perform this task is to add some finished beer, right out of the siphon hose, directly into the bag with the stones. Add this "fortified" beer to the keg or bottling vessel. After several rinses, the stones will lose their glossy appearance. Carbonate or bottle your beer as usual. You will be in for a pleasant surprise when you draw your first hand-crafted steinbier.

An alternative method for returning the caramelized sugars to the beer is to actually put the stones in the secondary fermentation. A soda keg works well for this if the stones will fit through the opening. If you want even more smoky character, try smoking the glazed stones over a small fire for a few minutes before rinsing with finished beer and adding to the keg.

After working with this style for the past couple of years, a few factors affecting it have been identified. The type of wood used to heat the stones will make subtle differences in the beer's flavor and aroma. Oak, pecan or hickory tend to give a hot dog or barbecue character not normally associated with a beer flavor. We prefer the mysterious, complex character that cedar gives the beer. Other good choices would be any of the fruitwoods, like apple or plum. You might choose beechwood as does Rauchenfels.

History seems to have a way of repeating itself, and production of today's craft beers is no exception. Homebrewers surely developed the methods and solved the technical problems of brewing a stable, commercially viable product in Northern Europe with the development of steinbier brewing. They probably even created their own markets with a unique product. Just as the homebrewers of yesterday worked out the methods of brewing in wooden vessels, modern homebrewers and craft brewers are today's trail blazers, providing the thirsty public with beers that combine tradition with quality. Steinbier exemplifies this combination of the old and new brewing methods, a beer whose origins are lost in time but still appreciated by a modern audience.

ADDITIONAL READING

Rahn, Phil and Chuck Skypeck, "Flaming Stone — Brewing Traditional Steinbiere," ***zymurgy*** Winter 1992 (Vol. 15, No. 5).

Good... Better... Best!

Customer Service

Our open lines of communication and monthly Newsletters provide you with the ***best*** information. We work ***with you*** when a return or credit is requested. Our customer service program makes ordering easy!

Inventory

A full line of quality products is available at our fingertips! We offer the most complete line of **quality products** available within the industry and are constantly improving our packaging and expanding our product lines.

Personnel

At the **L.D. Carlson Company** our friendly and knowledgeable staff will serve you with ***complete*** satisfaction. ***Courtesy is our policy!***

Facility

Our ***NEW*** warehouse, covering twenty-eight thousand square feet, is efficiently designed to expedite your order, ensuring ***quick*** delivery!

Featuring Quality Products

Malt Extracts

- Bierkeller
- Brewferm
- Brewmart
- Coopers
- Edme
- Glenbrew
- John Bull
- Laaglander
- Munton & Fison

"Brewer's Best" Equipment Kits, Ingredient Kits, Crown Caps and Liquid Thermometers

"Vintner's Reserve" Wine Kits
"Vintner's Best" Wine Equipment Kits

Domestic, English and Belgian Grains
Leaf Hops, Hop Pellets and Hop Plugs

At the **L.D. Carlson Company** we always give you our ***best!*** Call us today...

1-800-321-0315

463 Portage Boulevard
Kent, Ohio 44240

Toll Free Fax!
1-800-848-5062

(WHOLESALE ONLY PLEASE)

LD Carlson COMPANY

Quality Products for the Discriminating Winemaker and Beermaker

KEPTINIS ALUS, LITHUANIAN BAKED BEER

By Michael Matucheski

A few years ago I found myself in the cozy kitchen of some dear friends in Debica, in southeastern Poland. I had an insane notion of forming some sort of brewing partnership there, so naturally there was much talk about beer and brewing. One afternoon over a dinner of pirogi (small filled turnovers), sauerkraut and many bottles of hoppy Lezajsk beer, my friend Darek asked me if I had ever "baked" beer. At times my Polish and his English were a little awkward, so I assumed he was talking about beer bread until he pulled out a Polish-language Lithuanian cookbook that had recently been published.

Chodnik Znad Niema Kuchia Litewska, by Biruta Markuza-Bieniecka, was a compact but fact-filled record of Lithuanian cooking including a long chapter on the history and how-to of homebrewing in Poland's northeastern neighbor and onetime co-state. Reading on, I realized my idea of beer bread was more accurately beer made from bread, an ancient technique traced to the Sumerians and recently reincarnated as Anchor Brewing Co.'s Ninkasi. It is known in Lithuania as *keptinis alus*, literally, baked beer.

Through historical and ethnographic research, Markuza-Bieniecka came up with a folkloric account of what was the most ancient style of brewing in Lithuania, if not in all of Eastern Europe. With the roughest of translation, I will describe the brewing of this unusual beverage.

In the making of *keptinis alus*, a mixture of coarsely ground rye, oats and barley malt are mixed with water and clean straw (or dried fescue hay) to form a stiff dough that is kneaded with a little salt. Loaves are formed and baked until crusty and then broken up and added to a barrel of hot water with hops and linden blossoms. The resulting mash is then covered and allowed to sit until the "change" takes place. Traditionally the mash was strained through linen or wool cloth directly into a wood barrel or cask without boiling the extracted wort.

While yeast was usually added, brewers often left fermentation to the natural wild yeasts and other organisms or the residues of previous brewings. After the primary fermentation had subsided, this rough beer was racked off its lees and into another wooden cask where it was closed with a bung. The beer was usually consumed straight from the cask after a month of aging. Depending on the age of the beer, its clarity ranged from the cloudiness of a Berliner Weisse to the brightness of a several-year-old gueuze. There was little mentioned about the taste, however.

On several occasions I have re-created this artifact of brewing, producing a beer that combines the flavors of Berliner Weisse, kvaas and some characteristics of a Belgian white. A recipe of sorts follows.

KEPTINIS ALUS

Ingredients for 5 gallons

- **2 pounds pale barley malt**
- **4 pounds rye**
- **4 pounds oats**
- **2 handfuls clean straw or hay**
- **1 handful salt**
- **1 handful hops (1/2 ounce Hallertauer)**
- **1 handful linden (basswood) blossoms***
- **1 ounce yeast (Chico or Belgian white)**

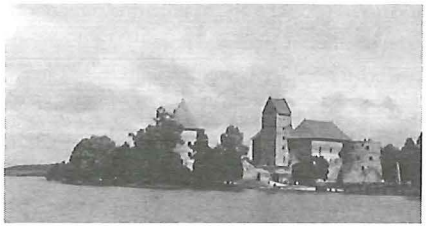
1/2 to 2/3 cup corn sugar (to prime)

- **Original specific gravity: 1.030**
- **Final specific gravity: 1.010**

* The flowers of American basswood (*Tilia americana*) and European species (*T. cordata* and *T.* x *europaea*) were traditionally made into herbal tea. The tea is supposedly a gentle

Typical farm homestead of the 19th century

PHOTOS BY AL KORZONAS



Ancient capital of Lithuania — the Trakai castle

sedative and digestive, good for the treatment of colds. *Note: Frequent consumption of* T. americana *flower tea may cause heart damage.*

Combine the barley malt, rye and oat grains and grind into a coarse meal as you would for any all-grain beer. Mix with lukewarm water and the straw or hay to form a stiff dough. Knead on a salted board or counter until the dough is elastic. Form loaves 2 1/2 inches square and place on cookie sheets. Bake in a 350-degree-F (177-degree-C) oven until the tops of the loaves form a hard crust, but try not to let them brown — usually 20 or 30 minutes will do. Remove the loaves from the oven and cool until they can be handled easily. In the meantime bring 3 gallons of water to 170 degrees F (77 degrees C).

Transfer the hot water to an insulated mash/lauter-tun, break up the "malt" loaves and mix them in along with the hops and linden blossoms. Cover the mash and let sit for four to five hours during which time a conversion of sorts will take place.

Sparge with 170-degree-F (77-degree-C) water and collect six gallons of wort. Chill to a pitching temperature of 70 degrees F (21 degrees C), either with a wort chiller, cold-water bath or the outdoor cold-weather method. Remember, do not boil the wort!

Primary ferment in wood if you have it, but I have had good luck in plastic as well. Rack to a carboy or small wood cask for its one-month conditioning. Bottle or keg as usual, but only with one-half cup of priming sugar as this was never a gassy beer. It will be ready to sample in about 10 days. Look for a green-gold, hazy pale color that will gradually brighten with age. The beer will be gently sweet-sour at first, growing more lactic with time. It is in my opinion a classic quencher, and beats any of the "lawnmower beers" during the summer's dog days.

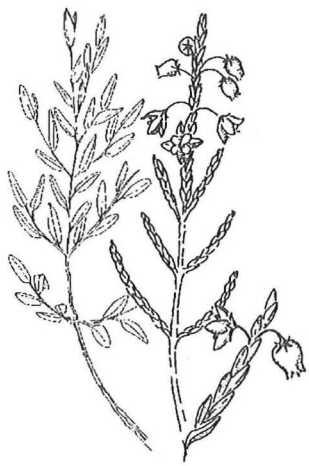
LEANN FRAOCH — SCOTTISH HEATHER ALE

By Bruce Williams

Leann fraoch (pronounced lyan frāoogh with a soft 'oogh') is Gaelic for heather (*fraoch*) ale. Heather is a low-growing shrub common in the peat hills of Scotland. Bell heather, also called bonnie bells (*Erica tetralix* and *E. cinerea*), has bell-shaped white to purple flowers from April to June. Ling heather or broom heather (*Calluna vulgaris*) has small bud-like flowers that are white, red or purple and flower from August to September.

For brewing, use only the top five centimeters of the plant. Heather flowers should be used within 36 hours of picking or stored at temperatures lower than 38 degrees F (3 degrees C) because they lose their aroma value. Moss (*fog*) grows on the woody stem inside the heather plant, not near the flowers, and contains wild yeast. *Fog* has some narcotic effects that have been omitted from commercial recipes. The moss grows deep within the stalks but does fly around when the flowers are picked. It is a lightweight white powder that can be easily removed by rinsing in cold water.

Heather ale is undoubtedly Scotland's oldest brewing heritage. The brew was made by first mashing Scotch ale malt, boiling the wort with flowering heather tips, then covering the surface with fresh heather flowers leaving it to cool and ferment for 12 days until the heather blackened. It was drunk straight from the *cran* (barrel) with the tap hole one-quarter of the way up. It is an amber-colored lightly conditioned ale with a soft bitterness, firm oily body and winelike finish — just ask Michael Jackson. This is the drink the French called Scottish burgundy during the 18th century Auld Alliance and the English referred to as Scottish malmsey.



HEATHER

The brewing of heather ale predates history. An archaeological dig on the Scottish Isle of Rhum discovered a Neolithic shard, circa 2000 B.C., in which were found traces of a fermented beverage containing heather. Much later, circa 100 B.C., the definitive Europeans (the Celts) were known to produce an intoxicating decoction from heather flowers and honey, but the most powerful heritage of heather ale comes from the time when Scotland was Pictland.

The famous fourth century B.C. navigator Pytheas noted that the Picts were accomplished brewers, and the Scottish dictionary notes, "The Picts brewed some awful grand drink they ca't heather ale out of heather and some unknown kind of fogg." The kings of Pictland fought off many invasions from Europeans, Anglo-Saxons and Irishmen, and they even turned away the mighty Roman Empire. For this they became known as a ferocious race with a secret magical potion called heather ale. One legend still told today is recorded by Neil Munro, Sir Herbert Maxwell and is the subject of a poem by Robert Louis Stevenson — the accounts differ only in detail.

In 400 A.D., an Irish king invaded Dalriada in southwest Scotland and began to wipe out the local Picts. In his frenzy to win the battle he was thought to have killed them all before remembering the heather ale. He sent his army to find survivors and they returned with a Pictish chief and his son. The Irish king was going to torture them to gain the secret of the heather ale when the chief agreed to tell the secret if they would kill his son quickly. Once his son was dead the old chief took the Irish king up to a crop of heather by a cliff and, according to Robert Louis Stevenson, said, "But now in vain is the torture, fire shall never avail, here dies in my bosom, the secret of the heather ale." The chief threw himself at the king and they both fell to their death over the cliff.

Although this legend is based on fact, the Picts were not totally wiped out. They were cleared from the Dalriadic area and the custom of brewing heather ale continued, particularly in the Highlands.

By the 12th century the Pict and Dalriadic lands had united to become Scotland, "Alba" to the Gaels, and heather ale became the common drink of the clans. One Ceilidh legend told of a cold winter inside a cave in the Highlands where a Gaelic clan was gathered. They sat around a pot of heather ale warming over the fire, telling stories, singing and drinking. Meanwhile, the steam from the heather ale was condensing on the ceiling and dripping straight into a bowl on the ground. The clansmen drank from the bowl and experienced sensations of euphoria, warmth and coolness

ILLUSTRATION BY MARIE ORLIN

they had never known. "Uisge-beatha!" they exclaimed, and water of life was discovered that night. Its name was soon shortened to "uisge," uis-ge, which was bastardized by the English language to whiskey.

In the 18th century Scotland was at its darkest. After the massacre at Glencoe and 50 years of fighting the British Empire, Bonnie Prince Charlie's 1745 rebellion was defeated by overwhelming odds and Scotland lost its independence. To prevent any further uprising, the British government tried to destroy the entire clan system by banning the wearing of tartan or any traditional Highland clothing, the carrying of arms, outlawing the Gaelic language and generally repressing Highland communities. This and the Highland clearances resulted in the loss of many crafts and skills, in fact, a whole cultural way of life was under threat. Heather ale was soon reduced to legend. Legislation prevented the use of anything but hops, malt and water in the brewing of ale. This ethnic cleansing by the British caused thousands of Scots to be transported to the West Indies, New Zealand, Maryland or South Carolina, which in turn created a mass exodus. Scottish society began to emigrate and follow their clans.

The 20th century saw the recognition of Scotch whiskey as the definitive distillate, and Scotch ale was being shipped to destinations all around the world. Heather ale is known to have been produced, perhaps in defiance, in the remote Highlands and islands from ancient Gaelic recipes recited by clan alewives to their descendants. In Glasgow in 1986, a Gaelic-speaking islander translated one such recipe to me, and like the Bruce before me I tried and tried again before successfully reviving the *leann fraoch*.

I began by brewing the ale in July 1986 at the small West Highland Brewery in Argyll and selected three pubs in Edinburgh and three in Glasgow to sell the naturally conditioned cask heather ale. The publicity was good and the product took off. The six pubs I chose were ordering more than the capacity of the plant and by September I was renting 120-barrel facilities at the Thistle Brewery in Alloa (heather ale being made at the Thistle Brewery!). By October the heather flowers were gone and only one batch of 18,000 17-ounce (50-centiliter) bottles had been produced. I kept 1,000 bottles and the rest were sold within 10 weeks. *Leann fraoch* became a cult product within the year.

Bruce Williams

Brewing heather ale is dependent on the flowering season. The heather pickers begin in May and the first pubs to receive stock will have it on sale in Scotland by the end of June. This could fast become the Beaujolais Nouveau race for cask ale.

For technical buffs the numerical specifications for the bottled ale are alcohol by volume, 4.9 percent; original gravity, 1.048; pH, 4.1; color, 9 SRM (23 EBC) and bitterness, 21 IBUs.

HEATHER ALE

Ingredients for 5 gallons

6 2/3	**pounds (3 kilograms) crushed Scotch ale malt, or 6 pounds (22.7 kilograms) U.S. two-row malted barley and 10 1/2 ounces (300 grams) amber malt (crystal or Cara-type)**
12 2/3	**cups (3 liters) lightly pressed flowering heather tips**
3/10	**ounce (8 grams) Irish moss (10 minutes)**
2 3/5	**gallons (10 liters) soft water lager yeast**
1/2 to 3/4	**cup corn sugar (to prime)**

- **Original specific gravity: 1.048**
- **Final specific gravity: 1.011**

Mash the malt at 153 degrees F (67 degrees C) for 90 minutes. Sparge to collect up to 5 1/5 gallons (20 liters). Add about one-half gallon (2 liters) of lightly pressed heather tips and boil vigorously for 90 minutes.

Run hot wort through a sieve filled with 2 cups (1/2 liter) of heather tips into the fermenting vessel. Allow to cool and ferment at 61 degrees F (16 degrees C) for seven to 10 days. I recommend a lager-type yeast. My original yeast was a Scotch ale yeast, but years of cold slow fermentation has evolved a strain with a bottom-fermenting bias. When the gravity reaches 1.015, usually the fifth day, remove 1/2 gallon (2 liters) of ale, add 2 cups (1/2 liter) of heather flowers and warm to 158 degrees F (70 degrees C). Cover and steep for 15 minutes, then return to the fermenter.

Condition the ale as usual. For those needing a hop fix, add 1 4/5 ounce (50 grams) of 6 percent alpha acid hops for the 90-minute boil to provide bitterness that will not unbalance the flavors. Late addition aroma hops would compete with the delicate heather.

SOURCES

Glenbrew, Bruce Williams, 736 Dumbarton Rd., Glasgow G11 6RD; phone (041)3393479 or FAX (041)3376298.

Northeast Heather Society, Walter Wornick, PO Box 101, Alstead, NH 03602; (603) 835-6165.

Speyside Heather and Heather Craft, Fran Rowley, Dulnain Bridge, Iverness-Shire, PH26 3PA, United Kingdom; phone (047)985359 or FAX (047)985396.

LABEL AND PHOTO COURTESY OF A. ROMANES & SON LTD. AND BRUCE WILLIAMS

EGYPTIAN BOUZA AND MESOPOTAMIAN BEER

By Solomon H. Katz, Ph.D.

A few years ago Anchor Brewing owner Fritz Maytag and I attempted to recreate as much as possible the ancient beer of Mesopotamia. Called Ninkasi, it came from a recipe embedded in the lines of the famous hymn to the Goddess Ninkasi that was first translated by the Sumerologist Miguel Civil. We chose to focus only on the ancient Mesopotamian beer because the archaeological evidence suggested that was the first civilization where beer came to be brewed, and it was close to the region where barley was first domesticated at least 5,000 years earlier. Our goal was to provide clues about brewing practices, and ultimately to tap into ancient origins of the brewing process and develop testable hypotheses for archaeologists concerning the reconstruction of brewing knowledge at the time surrounding the earliest domestication of barley.

Several interesting findings emerged from the recreation and analysis of Mesopotamian brewing methods. Unlike modern brewers, Mesopotamian brewers first baked the ground barley (and sometimes emmer wheat) into flat cakes or breads. These *bappir* were often sweetened with dates or honey that both boosted the fermentable sugar content and the final flavor of the beer.

The bappir were baked in an oven and stored for use in beer production. In baking the bappir we found, as is still the case in Crete and other Mediterranean countries, that these cakes needed to be baked twice to dry them sufficiently to be stored.

It was also clear that the malted barley, a valuable and prized commodity, was made fresh and used along with the bappir to make a mash that was warmed to improve the efficiency of starch conversion to sugar. Also, the gelatinization of the starch achieved in the baking process clearly would speed this reaction between the diastase and the starch. Because the enzymes react most efficiently at 150 ± 5 degrees F (66 ± 5 degrees C), the inability to measure the temperature must have posed a problem for these ancient brewers who may have been partially compensated by having the bappir as a source of starch. Bappir storage enabled the major ingredient to be widely distributed and made it possible to eat the bread directly if fresh malt was unavailable.

Impression of a lapis lazuli cylinder seal from the royal cemetery of Ur. Straws, necessary for drinking unfiltered beer, provide a means of penetrating the layer of solids that floats on the surface.

Although there was frequent contact between Mesopotamia and predynastic Egypt, it is not clear if the Egyptians learned their brewing practices from their distant Mesopotamian neighbors or if they independently invented their own technology. In investigating this connection, I found several similarities and differences that can be reconstructed from archaeological and other resources that address this question.

Another chapter in the early history of beer undoubtedly involves Egypt. Most archaeologists believe that the widespread contacts between Egypt and Mesopotamia were very ancient. About 5,000 years ago writing may have branched out from Mesopotamia to Egypt and many believe that beer did as well. However, this is complicated by the fact that the Egyptian beer reconstructed from the detailed pictographs and figurines included in many tombs and the translation of various hieroglyphic writings have all been quite consistent in depicting some important differences in brewing that are worthy of note. Generally these differences fall into two areas: (1) the use of different malting and mashing techniques and (2) the use of different additives to the beer for flavor and/or possible preservation.

Until just a few years ago in Egypt the making of *bouza* had existed as a tradition for probably the last 5,000 years. It is documented in the Zosimus papyrus and consisted of making partially baked breads that are scored into quarters, torn and dropped into the fermentation vessel with water. A number of years ago at a symposium on religion and food in Toronto Professor Sandborne Brown of MIT and I proposed that this method of making beer was ideal for saccharifying the starch to sugar if a combination of malt and barley flour were used to make the bread.

We reasoned that baking the barley into bread would be advantageous only if the bread were half-baked with the center being still-moist raw dough made from malted barley flour. This condition provides an excellent way to heat the mixture and is similar to the mashing step used in modern beer production, although today the temperature and duration of heat used for saccharification are incredibly precise.

PHOTO COURTESY OF THE UNIVERSITY MUSEUM, UNIVERSITY OF PENNSYLVANIA (NEG. # S35-134382)

In Egypt the traditional knowledge about time and temperature would not have been scientifically extracted. Therefore, the substitution of half-baked bread would compensate for the lack of this specific knowledge. The baking process itself could provide a visual indication of the appropriate amount of heat needed to optimize the conversion of starch to sugar. In other words, heating the bread while not deactivating the diastase enzymes would allow the process of sugar production to continue until the starch had been converted entirely. It is interesting to note the presence of beehive-shaped ovens with special indentations on the outside that presumably allowed the baker to watch the browning of the bread much more readily than when bread was placed inside the oven. Placing the bread on the outside and looking for a well-established stage of browning may be a nearly perfect way to control visually the amount of heat necessary for optimum saccharification without deactivating the diastase enzymes, as is the case for mashing in modern brewing technology. This same process was used in modern Egypt until just a decade or two ago when a variety of social forces made it no longer viable to make and sell bouza in the streets as had been done for countless centuries.

Several additives have been reported for use in the baking and/or fermentation process. They include mandrake, skirret weed (a licorice-flavored plant) and an "Assyrian" radish that is still found growing in the region today. Whether these were only flavoring agents or whether they also served preservative functions remain to be determined.

Whether or not these differences in baking and flavoring are sufficient to answer the question about the origins of Egyptian brewing practices is difficult to determine. The fact that baking barley into bread to be used in brewing was seen in both Mesopotamia and Egypt is a powerful argument for contact. However, the obvious single step efficiency of making one cake that is dropped into the brewing vat and is already saccharified is a strong argument in favor of some significant degree of independent technological invention. Because flavorings and additives may have been used in ancient Mesopotamia as well, we should reserve judgment on their significance other than to note the importance they may serve in a variety of pharmacological, preservative and flavoring contexts.

In the lowest register, a gazelle offers two beakers to a scorpion man. The beakers were presumably filled with beer from the jar with a stopper behind the gazelle. The use of beakers (as opposed to straws) indicates that the beer has been filtered.

Other exciting questions concern the variations of the yeast that were in use by both of these societies. There is little doubt that such sophisticated brewers must have had a number of yeasts that were used for different purposes and occasions. Given the ability to conduct DNA fingerprinting, it is only a matter of time before we will be able to accurately identify, and perhaps recreate, the yeast used and move one step closer to tasting the same beverages that an ancient Egyptian pharaoh or a potentate from the city of Ur of the Chaldees might have consumed through a golden straw!

PHOTO COURTESY OF THE UNIVERSITY MUSEUM, UNIVERSITY OF PENNSYLVANIA (NEG. # 58-22098)

AFRICAN SORGHUM BEER

By Bill Ridgely

Sorghum beer, also known as opaque beer, falls into a broad category of sub-Saharan African indigenous beverages sometimes referred to as SMM (sorghum/millet/maize) beers. The three grains are frequently used in combination to produce an effervescent, sour, gruellike beer common to the area.

Opaque beers are most commonly brewed with malt prepared from grain sorghum *(Sorghum bicolor).* The varieties of grain sorghum used are very similar and in some cases identical to those found in the United States. Varieties with a reddish skin or pericarp are invariably preferred for brewing.

Sorghum beer has been brewed at the village and tribal level since prehistoric times and on a large commercial scale since the early part of this century, primarily in Southern Africa. It plays an important role in the social fabric of the area and is nutritionally significant because it is an essential supplement to the daily diet. About 1.9 billion gallons (7.2 billion liters) of sorghum beer are consumed annually in South Africa alone, compared to 2.2 billion liters annually of "clear," or Western-style, barley beer. Average per capita consumption in South Africa approaches 47 1/2 gallons (180 liters) per year.

Whether brewed at the village or industrial level, the steps required to produce sorghum beer are the same. These are malting, sour mashing, boiling, sugar mashing, fermenting and straining.

The amount of malted grain required to produce the beer varies from roughly 1.6 to 3.2 pounds per gallon (180 to 360 grams per liter). This wide variation is because of inefficiencies in the malting and brewing process at the village level. Generally, village-level brewing requires larger amounts of grain while industrial-level brewing requires less.

VILLAGE BREWING

Batch size at the village level is roughly 25 to 50 gallons (100 to 200 liters), with the higher figure being the common standard. The grain sorghum is first malted by soaking in water for one to two days, draining, then germinating until the shoots reach three to five centimeters long. Germination is traditionally done on the ground under grass mats or dampened burlap bags. When germination is complete (usually two to four days depending on ambient temperature), the grain is uncovered and spread out in the sun to dry.

Homemade malt is still dominant in West, Central and East Africa, but village-level brewers in Southern Africa have been increasingly turning to commercial malt produced at any one of the 40 or so commercial floor maltings in the area. The process is similar to that used in home malting but on a larger scale. Instead of sprouting the grain on the ground, sloped concrete malting floors are used, normally out in the open, but sometimes under corrugated tin roofs to protect the grain from the elements. Damp burlap bags may be used to cover the germinating grain. After germination is complete, the malt is spread in the sun to dry, or as is common today, dried with warm air at 112 degrees F (50 degrees C).Then it is milled and sold in 2 1/5- to 132-pound (one- to 60-kilogram) packages.

To brew sorghum beer, the malt is pulverized and mixed with hot water to form a thin slurry. Most brewers then cook this slurry for 30 to 60 minutes, cool it to lukewarm and add a small amount of fresh uncooked malt for enzymatic action. The mash is then covered and left to stand overnight to acquire a *lactobacillus* infection and subsequent souring.

Women drinking beer in Sotho, 1967

PHOTOS COURTESY OF MILTON WATKINS (RESEARCHER OF AFRICAN INDIGENOUS BEER) WITH PERMISSION FROM THE NATIONAL CULTURAL HISTORY MUSEUM, PRETORIA, SOUTH AFRICA.

On the second day the sour mash is combined with additional water and grain. Historically the grain for this "starch addition" is sorghum (either malted or unmalted) or millet, although many modern village brewers and nearly all industrial-level brewers now substitute corn grits. The amount of water and grain added at this stage varies from brewer to brewer, but the resulting mixture is always boiled for two to seven hours in an iron pot or steel drum until it thickens considerably. Afterward it is transferred to a shallow plastic, metal or wooden vessel to cool, again an overnight process.

On the third day, the cooked mash is transferred to a fermenting vessel, and uncooked malt is added to provide additional fermentable sugar. Following this "sugar mash," spontaneous fermentation occurs through the action of wild, airborne yeast and yeast present in the uncooked malt.

The beer is left to ferment through the third and fourth days. The brewster tastes the beer during the fermentation period and adds additional malt if the beer lacks in taste or body. (In most indigenous cultures, brewing is performed strictly by women.) On the fifth day, the still-fermenting beer is strained and served. Traditional straining is done using grass or straw mats, although many modern brewers now use steel mesh screens fitted over their serving vessels.

Brewing the beer in Sotho, 1967

In some countries (Rwanda and Tanzania), village-brewed beer is transferred in bulk to a central marketplace for retailing. In others (Botswana, Zimbabwe and South Africa in particular), it is usually sold in the same compound where it is brewed, at the brewer's *shebeen* or beer bar.

As in most tribal cultures, a significant amount of ceremony and ritual accompany beer consumption at the village level. A small amount of fresh beer (often accompanied by snuff) is sacrificed to the ancestors at the altar of the brewer before the batch is distributed. In one ancient ceremony, young girls of the Venda tribe of South Africa bring fresh beer to the chief's house before their initiation ceremony. The chief must approve the beer before the ceremony can begin.

Traditional sorghum beer is pinkish-brown and gruellike in consistency because of the large amount of starch residue, yeast and other microorganisms present. It is unhopped, unpasteurized and has a sour flavor closely resembling yogurt. Alcohol content is 2 to 4 percent by volume, pH is 3.3 to 3.5 and the total solids are 4 to 10 percent. Acidity (as lactic acid) generally falls in the range of 0.3 to 0.6 percent.

Women threshing sorghum grain in Sotho, 1971

INDUSTRIAL BREWING

As the demand for sorghum beer rose at the beginning of the 20th century, processes for brewing on a large industrial scale were developed. These processes bore similarity to village-level production in the basic steps involved, but there were significant differences.The first was one of scale.

Today's commercial breweries generally brew in 128 to 230 barrel (150 to 270 hectoliter) batches, using modern stainless-steel steam-heated equipment. Output at a medium-sized sorghum beer brewery is 681,753 barrels (800,000 hectoliters) annually.

The quality and consistency of ingredients used is the second major difference. Commercial breweries use industrial sorghum malt, the highest quality available, produced in modern, highly mechanized indoor maltings. High-grade corn grits and pure yeast cultures also are used.

Industrial malting begins with a thorough washing of the grain sorghum followed by steeping in steel tanks for six to 18 hours. Because some of the sorghum varieties used in Southern Africa are of the bird-resistant type that contain 1 to 2 percent condensed tannins (birds dislike the tannic taste), industrial maltsters add a small dose (0.02 to 0.10 ppm) of formaldehyde to the steep to polymerize and hence activate the tannins, according to Keith Steinkraus. This formaldehyde steep takes place during the first four hours, after which the liquid is drained off and replaced by fresh water for the remaining steeping time. The formaldehyde process is unique to Southern Africa and is protected by South African patent. [We don't advise you to add any to your beer anyway. —Ed.]

Tsonga men drinking beer in Tsonga, 1981

After steeping, the grain is spread out in special malting boxes with perforated floors and turned regularly for consistent germination. When germination is completed, the sprouted grain is dried by blowing warm air through the malting floor. Sorghum malt is not kiln-dried because of the instability of its enzymes. The diastatic power normally falls in the range of 10 to 25 degrees Lintner, and the moisture content generally is less than 10 percent.

Several different methods are used for brewing sorghum beer at the industrial level. About 60 percent of production uses the "reef" process (named for the area where it originated, the gold-mining region of South Africa referred to as the "reef"). This process remains closest to the traditional home- and village-brewing method.

Each step in the reef process is carefully controlled. For souring, inoculation is accomplished using a starter from a previous batch. A temperature of 121 degrees F (49 degrees C) is maintained and pH is monitored (3.0 to 3.4 is the target) during the lengthy souring period that sometimes lasts up to 18 hours. Boil time is shortened through the use of pressure cooking. The boiled wort is cooled to about 140 degrees F (60 degrees C) with internal coils. Conversion malt is added, and the rate of sugar formation

Non-returnable cardboard and returnable plastic sorghum beer containers from South Africa.

is carefully regulated by pH monitoring. Some breweries supplement the sugar mash with industrial amylase enzymes of microbial origin.

When the sugar mash is completed, the wort is centrifuged and/or filtered, cooled to 83 degrees F (28 degrees C) and pitched with a pure culture of top-fermenting brewers yeast. Fermentation proceeds no longer than 24 hours. The beer is then packaged in one-liter cardboard milk-type cartons or plastic containers ranging in size from two to 50 liters. Because the beer is actively fermenting when sold, these packages must be carefully vented. Some of the beer (about 30 percent) is transferred to bulk containers (usually road tankers) for transport to beer halls that serve up to 5,000 customers from stainless-steel tanks.

Two other industrial brewing procedures, the "iJuba" process, (named for the brand produced by it), and the "Kimberley" process (named after the city in which it originated), also are used in the area. The former comprises about 30 percent of total production, the latter less than 10 percent.

In the iJuba process, the souring step is delayed until after boiling and sugar mashing are completed. The sugar mash therefore takes place at natural pH (5.0 to 5.5) rather than at low pH (3.8 to 4.0) resulting from the lactic souring process. Enzymes act more quickly, producing a thinner beer that is preferred by the primarily Zulu consumers who purchase the product. The souring step is accomplished by adding sorghum malt as the source of *lactobacilli* to the sweet wort. A sour mash is then carried out prior to yeast pitching.

In the Kimberley process the sugar mash also is done as a completely separate step at natural pH. However, a sour mash in the traditional manner is done at the same time in a separate facility. The sour and sweet worts are then combined prior to fermentation. The resultant thinner beer is similar to that produced by the iJuba process and preferred by certain African tribal groups.

Industrial sorghum beer has an alcohol content of 3 percent by volume (the legal South African limit), pH of about 3.5, total solids around 5.4 percent and acidity (as lactic acid) averaging 0.21 percent.

Nearly all commercially produced sorghum beer is consumed by the indigenous black population of sub-Saharan Africa. It is not unusual for a factory or mine worker to consume about 6 to 10 1/2 pints (three to five liters) of the beer daily. The dietary contribution of the beer is significant. It contains large quantities of thiamine, riboflavin and nicotinic acid, all of which reduce susceptibility to pellagra, a disease common in populations subsisting on maize. Unfortunately the percentage of maize adjunct used in commercial brewing is rising significantly. Forty years ago the sorghum malt-adjunct ratio was about 1 to 1. Today it is about 1 to 2. It is hoped that this practice does not contribute to a higher incidence of malnutrition in the area, as the low cost and traditional role of sorghum beer continues to ensure that the beverage will have a significant place in the culture for many years to come.

REFERENCES

Novellie, L., *Kaffir Beer Brewing — Ancient Art and Modern Industry*, Wallerstein Laboratory Communications, Vol. 31, 1968.

Steinkraus, Keith, Ed., *Industrialization of Indigenous Fermented Foods*, Marcel Dekker Inc., 1989.

Steinkraus, Keith, et al., *Handbook of Indigenous Fermented Foods*, Marcel Dekker Inc., 1983.

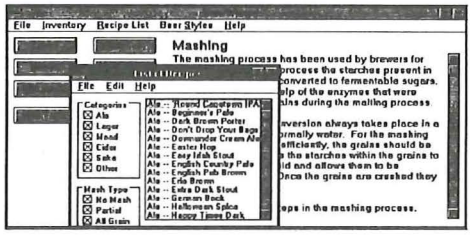
Taylor, J.R.N., "The Biochemistry of Sorghum Beer Brewing," Proceedings of the Second Scientific and Technical Convention, Institute of Brewing, Central & Southern Africa Section, Johannesburg, 1989.

Wood, Brian J.B., Ed., *Microbiology of Fermented Foods*, Vol. 1 and 2, Elsevier Applied Science Publishers, 1985.

Special thanks to Michel Vandenplas of Cape Town, South Africa, for his assistance and encouragement, and to John Taylor, head of the Department of Food Science and Cereal Foods Research Unit, University of Pretoria, Republic of South Africa.

PHOTO COURTESY OF UNIVERSITY OF PRETORIA, SOUTH AFRICA

BrewWizard



The Brewer's Encyclopedia

(Formerly ANTROM's Computerized Homebrewing Encyclopedia)

- ***Home Brewing Reference*** - *Fast Access to Over 120 Home Brewing Topics*
- ***Recipe Calculator*** - *Compute and Track: Bitterness, Color and More to Create Your Own New Beer Recipes or Use one of the Many Brewing Recipes Included*
- ***Beer Style Guide*** - *Match Your Recipe to one of Over 60 Beer Styles or Create Your Own New Styles*
- ***Home Brewing Inventory Control*** - *Helps you Keep Track of Your Brewing Supplies*

$59.00 (Free Shipping) for Full System or $10.00 for Interactive Demo (credited toward full system purchase)

To: ANTROM Associates
20044 Hob Hill Way
Gaithersburg, MD 20879-1307
Requires Microsoft(tm) Windows 3.1 or better
MD Residents please include 5% sales tax

Napa Fermentation Supplies

Quality Home Brewing Equipment and Supplies since 1983

Full line of brewing supplies
Free catalog
Mail and phone orders
Fast delivery

Napa Fermentation Supplies
P.O. Box 5839
575 Third St., Suite A
Napa, CA 94581

Retail Store Hours:
M-F 9 a.m. - 5 p.m.
Sat. 10 a.m. - 5 p.m.

Ph. (707) 255-6372
FAX (707) 255-6462
Out-of-state (800) 242-8585

BREWING

QUALITY BEERS

The Home Brewer's Essential Guidebook

Byron Burch

Second Edition now available!
132 pages - New Illustrations.
List price $5.95.

Wholesale Inquiries:

JOBY BOOKS
P.O. Box 512
Fulton, CA 95439
(707) 542-3001

Distributor List Available on Request

ElecTRIM®
Heating Tray
for constant fermentation temperature

Innovative, new heating tray from the manufacturer of the Thorne Electrim Mashing Bin. The ElecTRIM heating tray is specially designed for consistent fermentation temperature, with thermal insulated base, controlled heat; safe for glass carboys or plastic containers. ElecTRIM heating tray is easy to use and easy to clean. Just place your fermenter on the tray, plug in and switch on. ElecTRIM heating trays and mashing bins are available at your local homebrew shop.

Wholesale Distributor:
G.W. Kent, Inc.
Tel: 313-572-1300

Manufactured by:
Thorne Electrim
England

GRAIN BREWERS!

10, 15 or 20 GALLON - 3 VESSEL

GRAVITY-FEED BREWING SYSTEM

- STAINLESS STEEL
- 1 & 2 VESSEL SYSTEMS ALSO AVAILABLE

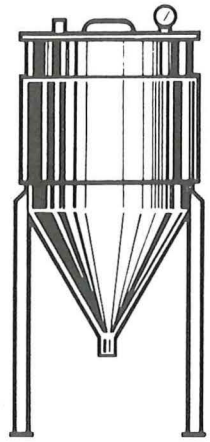
System shown includes Sparge Water Vessel, Mash-Lauter Vessel, and Boiling Vessel

We can customize your vessels to your specifications

B·I·T·O·A BREWING SYSTEMS BREWING·IS·THE·ONLY·ANSWER

NEW!

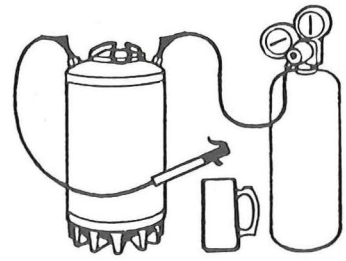
1/2 BARREL CYLINDROCONICAL FERMENTER



- Temperature Controlled
- Excellent For
- Yeast Propagation
- Test Batches

CALL **1 (206) 527-5047** For a quote

STAINLESS STEEL KEGGING SYSTEMS



3 gal. and 5 gal. kegs available

Eliminates bottling

We sell complete systems or parts

All parts are standard

BREWING STOVE

Portable propane stove

35,000 BTU output

12 x 12 inch cast iron grate

Rugged; well constructed

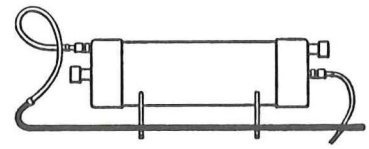
STAINLESS STEEL BREWING POTS

10, 15 and 20 gal. capacity

Heavy restaurant grade

Lid included

WORT CHILLER



High-grade copper coil contained in waterproof shell

Wort is cooled by flowing through copper coil while water flows through the unit and around the coil

Compact and efficient

Easily sterilized

Comes with all hoses and copper siphon tube

COMPLETE BREWING SUPPLIES & EQUIPMENT – FAST MAIL ORDER SERVICE

SEND $4.00 FOR COMPLETE CATALOG – DEDUCTIBLE FROM ORDER

BREWERS WAREHOUSE 4520 UNION BAY PL. N.E. SEATTLE, WA 98105 (206) 527-5047

TRES AMIGOS — HOMEBREWING IN OLD MEXICO

By Ralph Bucca

The concept of homebrewing in Mexico is far different from that in North America. First, it should be called village brewing because it is a group effort done on a regular basis collectively by many in the village. Also, the type of homebrew made is based on the local plants — there is no local homebrew shop. There is no bottling or storage because after the brew is fermented it is consumed. These brewers believe in freshness!

Mexicans have been homebrewing for at least 2,000 years, and beer is considered more than just a beverage. Homebrew is a food source providing needed vitamin B, and is part of valued religious and social rituals.

Three plants of Mexico account for the most commonly brewed beverages: agave to brew *pulque,* opuntia to brew *colonche* and maize to brew *tesguino.*

Much of Mexico is arid land occupied by plants that have specialized in survival under drought conditions. A complete Mexican industry has grown around one family of hardy desert plants — the agaves, which grow in very poor soil. The most extensive production is in the Hidalgo state and the states on the plateau surrounding Mexico City.

Temple to Pulque god, exterior view, Tepoztlan, Mexico

Temple to Pulque god, interior view, Tepoztlan, Mexico

AGAVE

Agaves, also known as century plants, grow from four to seven feet high and weigh from 1,800 to 3,000 pounds. The plants have about 15 to 30 leaves, six to 12 feet in length and about one foot wide. The flower stalks, as thick as a person's body, can be 40 feet high.

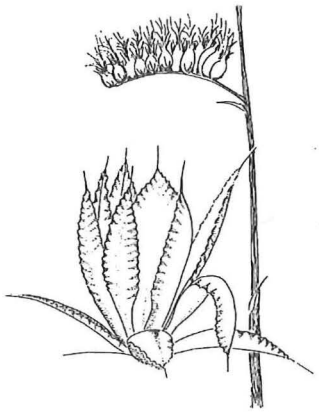
Several species, notably the maguey (*Agave americana*), are cultivated in plantations. After about eight years, when the plant is ready to throw up the flowering stalk the heart is slashed out and a cavity excavated in the stump. A gallon or more of a heavy sugar-bearing sap seeps into this well each day. Eventually a single plant may give 150 gallons before it withers and dies. The juice is collected and fermented into a murky brew called pulque.

The national drink of Mexico, pulque was inherited from the Aztecs. In pre-Colombian times, pulque had religious significance as an offering to the gods, particularly Mayahuel, the Aztec goddess of pulque. Ancient ruins can be found in Tepoztlan that were dedicated to the pulque deity. Upon the collapse of the Aztec empire the beverage lost its preeminence for religious rituals, but it remains a popular beverage today.

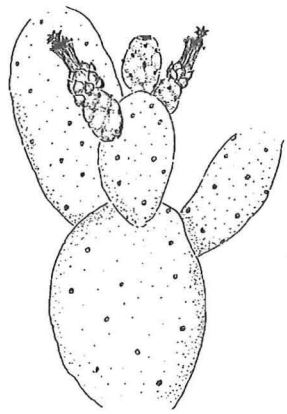
Peasants are the prime consumers, but the middle class also consumes pulque at birthdays, weddings, picnics and as accompaniment to local foods. It is drunk as a low-alcohol beverage and as a nutritional supplement because of its vitamin and protein content. Children at or under school age receive pulque three times a day, providing up to 12 percent of their daily calories and 3 percent of their protein requirements. Pulque is a white, viscous, acidic alcoholic beverage also known as *ocotli* or *huitzle* and is marketed under the trademarks Miel-Mex, Xochitl, Jarara, Malinche and Magueyin. Consumption is similar to that of draft beer. In Mexico City, the population of 10 million consumes about 1 million liters of pulque daily.

At agave plantations the juice collected is carried to the tinacales (fermenters), where it is fermented in open wooden, leather or fiberglass tanks that hold 175 gallons. Fermentation lasts from eight to 30 days because of temperature variations, seasonal changes or other uncontrollable factors. Agave juice is naturally inoculated from the previous fermentation. Tank volume is kept constant by removing quantities equal to those being added to allow a continuous production. It is impossible to bottle the spontaneously fermented pulque untreated because it never ferments completely under the above

PHOTOS BY RALPH BUCCA



CENTURY PLANT



COCHINEAL CACTUS

CORN

conditions. It is distributed commercially in 66-gallon (250-liter) wooden or fiberglass barrels by car, truck and railroad to the pulquerías which are special bars where the beverage can be consumed immediately or purchased to take home.

Pulque produced locally in Mexico has a sour-butter flavor, probably caused by the leather vats in which it is fermented and not an inherent flavor of the maguey sap.

There are two ways to make pulque depending on the ingredients available.

TRADITIONAL PULQUE

Ingredients for 1 gallon

1	**gallon maguey sap**
1	**Campden tablet**
	juice of 1 lemon
1	**teaspoon of pectic enzyme**
2	**pounds corn sugar**
	ale yeast

Mix one Campden tablet with sap. Twenty-four hours later add the lemon juice, pectic enzyme, corn sugar and yeast. Ferment for one to two weeks. Rack from sediment and consume.

For enough sap to produce one gallon of pulque, obtain three to five pounds of the thick agave leaves and stems. Chop them coarsely and pour one gallon of boiling water over them. Steep for a few days to make your own sap. Drain off one gallon of sap and follow the ingredients and methods for traditional pulque.

In addition to pulque, another beverage from the agave plant is *mezcal*. This is a tan-colored, sour beverage with an alcoholic content similar to beer. The core of the agave plant is stripped of its leaves which are cooked and filtered to yield a sugary pulp. The pulp is inoculated with a starter from a previous fermentation to begin the process.

NOPAL

Another indigenous plant of the American Southwest and Mexico is the nopal or tuna from the Nopalea genus (a member of the cactus family, cactaceae). It is most common in the Mexican states of Chihuahua, Sonora, San Luis Potosi and Zacatecas. The fermented beverage, which originated more than 2,000 years ago, is called colonche and probably gets its name from the cochineal insect that feeds on these plants.

The nopal cactus grows up to 12 feet high and eight inches in diameter, producing a red fruit two inches long. One of the more unusual commercial aspects of this cactus is dyemaking. About every four months the cochineal insects are collected from the cactus by brushing them into bags. Two dyes are produced, one by roasting the insects to get a silver-gray color and the other by pouring boiling water over the insects to produce red. This dye was used originally by the Aztecs for making body paint, but is now used in lipstick and other cosmetics. The cactus fruit is sold locally fresh or dried and is eaten raw or cooked.

A sweet syrup is formed from the fruit "miel de tuna" or tuna honey and simply fermented using some previously fermented colonche or pieces of the plant that harbor a slimy mass of bacteria and yeast. Colonche is red, and when a few hours old is still effervescent with a slight acid odor. After a few days it becomes acidic, like apple cider. One interesting side effect of consuming this beverage is the production of bright red urine.

COLONCHE

Ingredients for 1 gallon

1	**gallon cochineal fruit**
1	**pound corn sugar**
	ale yeast

Pick one gallon of cochineal fruit, usually found in early fall. Chop and boil with one gallon of water for one hour. Strain the liquid and ferment with ale yeast and one pound corn sugar. Rack in one week and bottle in another week.

MAIZE

Corn (*Zea mays*) is the most important cereal crop in the Western Hemisphere and has been growing here for thousands of years. It is a coarse annual plant of the grass family (Gramineae) that probably originated in tropical South America. It is the largest of the cereals, reaching anywhere from three to 15 feet in height. There are six types of modern corn, dent (*Z.m.* var. *identata*) being the main one used for the production of alcohol and other fermentation products.

Corn is the most important food crop of Mexico and is an integral part of the typical Mexican diet. It is only natural that it would also be used to produce a fermented beverage.

ILLUSTRATIONS BY MARIE ORLIN

Tesguino, of ancient Aztec origin, is a slurrylike alcoholic beverage, pale to yellow in color, prepared by the fermenting germinated maize or maize stalk juice. The name comes from the Nahuatl (Aztec) language and means heartbeat. Tesguino is consumed mainly by indigenous people such as the Yaqui, Tarahumara and Zapotec of northern and northwestern Mexico. The beverage also is used by the mestizo (mixed race people) of that area of Mexico.

Tesguino is quite similar to chicha, the fermented beverage of the Incas. However, tesguino can be made from cornstalks, while chicha is only made from germinated corn kernels.

In many ways making tesguino parallels making pulque. It is made and used mainly by the poor indigenous people as a nutritional source as well as an intricate part of their social and religious life.

Traditional tesguino brewers soaked 20 pounds of dry maize kernels in water for several days, drained and placed them either in baskets in the dark or in a hole in the ground until they fermented. Kernels germinated in the light produce green and bitter sprouts, while germination in the dark yields white sweet sprouts. The germinated kernels are ground in a stone mill and boiled in water until the mixture turns yellow (about eight hours). The liquid portion is then transferred to a clay pot and catalysts are added. The mixture is fermented for several days before consumption.

MODERN TESGUINO

Ingredients for 1 gallon

1	**pound malted yellow corn**
1 1/2	**gallons water**
6	**crushed allspice berries**
2	**cups brown sugar**
	ale yeast

Soak corn for one day in a dark container. Place in a colander and rinse three times daily until sprouted; allow a couple of days. Spread the corn on some newspaper to dry under sunlight.

Crush corn in a grain mill then mix with water in a brewpot. Let sit for 30 minutes and then bring to boil, add allspice to give some flavor to this relatively bland beverage. Boil for a couple of hours.

Allow to cool, drain off the liquid and pitch the yeast. Ferment for one week, rack into a secondary fermenter for one week. Bottle still or carbonate with corn sugar.

Traditionally, brewing tesguino with cornstalks involved macerating cornstalks (either fresh or dried) by pounding them in a depression in a rock with a club. They are placed on a sieve, water is slowly poured on the mashed stems and the juice is collected in a hollow pumpkin. The juice is mixed with water and boiled for several hours before adding any of the catalysts. The mixture ferments in a dark place for two or three days to a pleasant appearance before it is consumed.

MODERN CORNSTALK TESGUINO

Ingredients for 1 gallon

3	**cornstalks (approximately)**
1	**pound corn sugar**
	ale yeast

Obtain some fresh or dried cornstalks from a friendly farmer. Cut them into foot-long pieces and place in a sturdy container such as a five-gallon bucket. Pound them until they appear smashed up. Slowly add two gallons of hot water and let sit for an hour. Drain off the liquid and boil for two hours. When cool, add one pound corn sugar and ale yeast. Ferment three to four days, then consume.

REFERENCES

Elkins, Roy, *Worldwide Winemaking Recipes*, Amateur Winemaker, 1978.

Fowler, H. & Palmer, E., *Fieldbook of Natural History*, McGraw Hill, 1974.

Indigenous Fermented Food of Non-Western Origin, Chapter 9, Fermented Corn Products of Mexico.

Handbook of Indigenous Fermented Foods: Steinkraus, Keith, Editor 1983, Section 3, Indigenous Fermented Foods in which Ethanol is a major product. Chapter on Alcoholic Foods and Beverages.

400 RABBITS, OR AZTEC SOCIAL BEVERAGES AT THE TIME OF CONQUEST

By James Walton

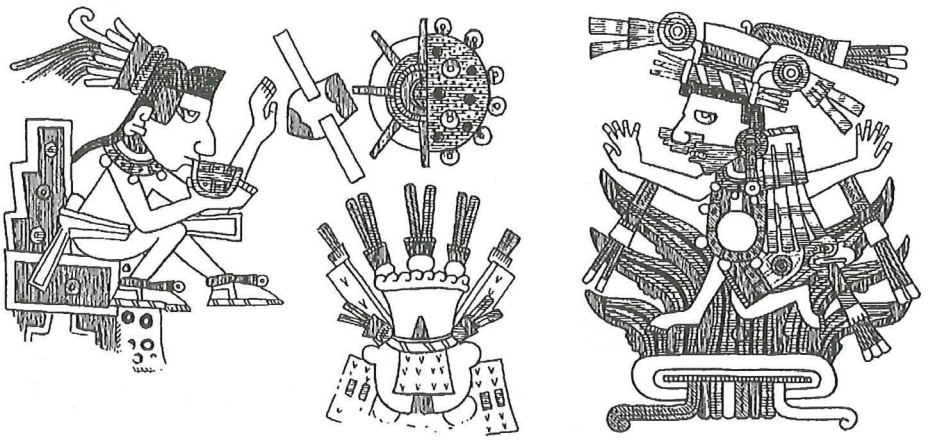
Hernándo Cortés arrived in the Aztec city of Tenochtitlan around 1520 and was amazed to find a civilization as complex and magnificent as his own. When invited to banquet with the ruler, Moctezuma II, the Spaniards were treated to a spectacle of music and dance and feasted on chocolate, partridge and turkey. Tobacco smoking already was known to Cortés from the Caribbean, but the Aztecs had many other foods and herbs to surprise their guests. The Spanish were especially intrigued by beverages of chocolate, or *cacao*. Their very preparation was dependent on class status and the rulers had a special etiquette prescribing their use. Some recipes may have included psychoactive agents such as *teonanacati*, the divine mushroom, but the majority of chocolate drinks were laced with chili peppers and the petals of fragrant flowers.

Ritual intoxication was an important feature of Aztec social life on all levels, and the preparation of maguey, a fermented beverage from the sap of the giant agave, was the alcoholic beverage of the masses. *Ocotli*, or *pulque*, was regulated by a pantheon of gods known collectively as the Centzon Totochtin — the 400 (or innumerable) Rabbits. This stemmed from the Mesoamerican image of a rabbit on the face of the moon fostering the notion that this sign ruled the night sky and ecstatic behavior. As in all other cultures, there was a thin line between ecstasy and licentiousness, and the 400 Rabbits had an alternative meaning best translated by the English expression, "three sheets to the wind."

In pre-Colombian Mexico, fermentation was believed to be a mystical process and, in addition to ocotli there were two types of fermented alcoholic beverages that are still ceremonially prepared today. In the north the Tarahumara tribe drinks huge quantities of *tesguino*, a fermented corn beer brewed in huge earthen pots. In the southern lowlands a ritual beverage is made by the Lacandone Maya called *balche*, which is honey fermented in a hollow log and flavored by the bitter bark of the balche tree. Because the taste is so bitter and emetic, the beverage is only prepared for special occasions, such as invoking the rain gods during a time of drought.

Following long tradition, Mexico City still has its pulquerías where pulque-ocotli is consumed by Nahuatl and Otomi Indians for refreshment. The original ceremonial function of this beverage has not been forgotten. Even today pulque brewing is accompanied by singing and incantations, reflecting the days when the fermentation of ocotli was ruled by the goddess *Mayahuel*, Lady of the Tortoise Throne and patroness of precious drink and childbirth. As the deity most involved with the creation of ritual libations, she was the chief of the 400 Rabbits. Even beverages prepared for domestic consumption were attended by considerable ritual and sacred songs. Ocotli is good for only about 24 hours before it degenerates into unpalatable slime. No drinking could occur in Aztec times without the collusion of Mayahuel's ladies who brewed this social beverage, often by beginning the fermentation process with their own saliva. Spanish chronicles report such frequent drinking for the innumerable Aztec festivals that ocotli-making must have burdened many women with full-time specialization.

Although drinking ocotli in the service of the gods was not considered to be a bad thing, licentious behavior was a clear and present danger to the Aztec social order. There are many reports of secular drinking and if this was taken to excess the Aztec state reacted with swift and decisive punishment. Public drunkenness was considered to be such an indecency that harsh penalties, increasing in severity according to rank, were meted out



Left to right: day god drinking pulque, Agave pot and Agave goddess

to offenders. A noble who couldn't hold his ocotli in public was put to death, while a tipsy *macehualli*, or common peasant, had his head shaved and his property confiscated. Repeat offenders were only given two strikes and then they were out — usually by the method of strangulation.

However, there was a prominent exception to these laws. A special dispensation to drink in public was given to those who had reached the age of an Aztec century, or a full calendar cycle (52 years to you and me). Perhaps the conditions of life were such that the elderly were honored for their sheer survival, but the Aztecs certainly recognized that lewd and violent behavior passes with youth while the aged usually conduct themselves with more dignity and containment.

Because I have recently completed one Aztec cycle I wanted to honor the occasion with a pre-Colombian beer. By chance I ran into Charlie Papazian at a local pub and we discussed my project over a couple of beers. Not knowing of any bottled beer that is based on foods of purely pre-Colombian origin, Charlie proposed fusing the European process of brewing beer with the Mesoamerican ingredients known to be the basis of their ritual beverages. We chose corn and honey plus chocolate and chili — the unlikely ingredients of *mole*, Mexico's national dish — to add to the standard hops, barley malt and sugar of a conventional beer. The resulting beverage was named after the Aztec lords and ladies of precious intoxication — the 400 Rabbits — and Mayahuel, the first Mexican brewer to transform the sap of a giant agave into a divine elixir.

Dance of the gods

ILLUSTRATION COURTESY OF TERRIFIC GLYPHICS

A RECIPE FOR A MESOAMERICAN AZTEC-STYLE ALE

BY CHARLIE PAPAZIAN

Inspired by a conversation on what it might have been like drinking the beer of the Aztecs, we concluded that surely the early inhabitants of Mesoamerica made beer and it is likely that corn, honey, chocolate, chili peppers and hallucinogens were the primary ingredients.

We left out the hallucinogens and added a relatively low dose of hops for bitterness, knowing full well that quite a bit of bitterness would come from the cocoa. We also used malted barley, because this is the 20th century and we wanted to start out with something that resembled modern-day beer while still paying tribute to the Aztec culture.

The beer is soothingly warm without burning. Szechwan chili pods have the effect of warming the back of your throat. The beer has a distinct but mild chocolate bitterness. Hops also contribute to the bitterness, but the overall character is rounded by the addition of the Belgian Special "B" malt. The corn and honey lighten the flavor, body and overall character of what would otherwise have been a much heavier bodied beer.

400 Rabbits is just the beginning.

400 RABBITS AZTEC-STYLE ALE

Mash-extract recipe for 5 gallons (19 liters)

For the mash

1 1/4 pounds (0.57 kilogram) pregelatinized corn flakes
2 1/4 pounds (1 kilogram) two-row American lager malt
1/4 pound (114 grams) Belgian Special "B" malt
1/4 pound (114 grams) chocolate malt

Add to the mash runoff

1 3/4 pounds (0.8 kilogram) light dried malt extract
1 pound (0.45 kilogram) honey
6 ounces (170 grams) cocoa powder
1/2 ounce (14.4 grams) crushed Szechwan chili pods (or other chilies to suit your taste)

And boil with hops

4.7 Homebrew Bittering Units (I used 1 ounce or 28.4 grams of 4.7 percent alpha acid American Crystal whole hops)
1/2 ounce (14.4 grams) American crystal hops for late kettle aroma hops

1/4 teaspoon Irish moss (15 minutes)
3/4 cup (178 milliliter) corn sugar (to prime)
ale or lager yeast — your choice

- **Original specific gravity: 1.044 to 1.048 (11 to 12 °B)**
- **Final specific gravity: 1.014 to 1. 018 (3.5 to 4.5 °B)**
- **IBUs: about 23**

A step infusion mash was used to mash the grains. Add 4 quarts (3.8 liters) of 130-degree-F (54-degree-C) water to the crushed grain, stir, stabilize and hold the temperature at 122 degrees F (50 degrees C) for 30 minutes. Add 2 quarts (1.9 liters) of boiling water and stabilize temperature at about 150 to 152 degrees F (66 to 67 degrees C) and hold for about 45 minutes. Temperature may be allowed to drop from 152 to 148 degrees F (67 to 64 degrees C) with no worrying. Then raise temperature to 160 degrees F (71 degrees C) and hold for 10 to 15 minutes to complete conversion.

After conversion, raise temperature to 167 degrees F (75 degrees C), lauter and sparge with 2 gallons (7.6 liters) of 170-degree-F (77-degree-C) water. Collect about 2 1/2 to 3 gallons (9.5 to 11.4 liters) of runoff and add the malt extract, honey, cocoa, chili pods, bittering hops and bring to a full boil.

After a total wort boil of 60 minutes turn off the heat, add the aroma hops, then strain and sparge into a sanitized fermenter to which you've added 2 gallons of water. It helps to prechill the water to 33 degrees F (1 degree C) before adding to the fermenter rather than simply using warmer tap water.

An IBU bitterness of about 23 was calculated for this recipe by making the following assumptions: (1) whole hops were used, (2) the wort boil was a concentrated boil with about 2 pounds (0.9 kilograms) of extract per gallon (3.8 liters) of liquid boiled and (3) 28 percent utilization was assumed for 60 minutes of boiling. Beginners and intermediate brewers should relax, don't worry and have a homebrew.

Bottle with priming sugar when fermentation is complete.

CINNAMON 'N SPICE

By Phil Markowski

Cinnamon, the "sweet wood," is one of humankind's oldest-known and most-valued spices. This dried bark of the cinnamon tree is essential to Asian and East Indian cuisine. It is familiar to Americans as a baking spice, holding a place in everything from breakfast pastry to apple pie.

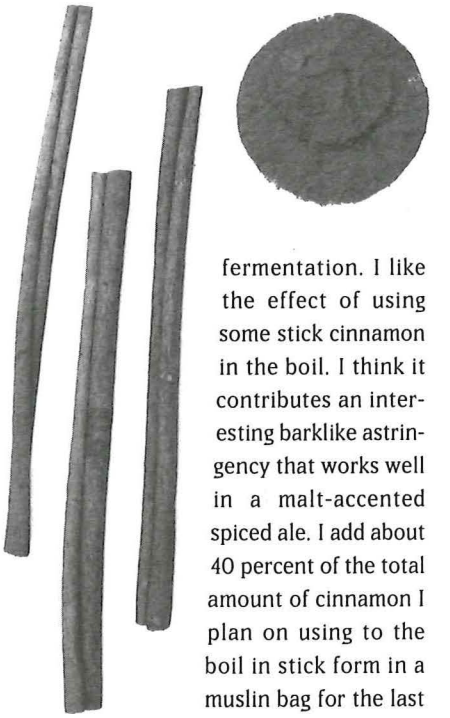
Cinnamomum zeylanicum is "true" cinnamon, the refined, delicately flavored bark native to Sri Lanka and southern India. *Cinnamomum cassia* primarily from Indonesia, is known as "bastard" or "false" cinnamon. Ironically, this is the bark most of us know as cinnamon because the less expensive *cassia* has almost entirely replaced *C. zeylanicum* in the United States market. The more discerning European and Mexican markets demand the true cinnamon and they make the distinction between cinnamon and *cassia*. The FDA, on the other hand, permits both *C. zeylanicum* and *C. cassia* to be classified as cinnamon. When I refer to cinnamon I am referring to *cassia* because this is the species ordinarily found in the U.S. market.

Cinnamon has been used medicinally to combat colds, digestive problems and menstrual cramps. The oil produced from cinnamon bark has proven antibacterial effects against such common microorganisms as *Escherichia coli, staphylococcus* and *Candida albicans*. (Note: Pure cinnamon oil is *very* irritating, and consumption is not advised.) Cinnamon has had an interesting but unappetizing application in the funeral pyres and temples of the Orient. It is said that its spicy odor counteracts the stench of burnt flesh.

The major constituents of cinnamon are volatile oils, tannins, mucilage, gum, sugars, resin, coumarin and calcium oxalate (familiar to brewers as beer stone). Cinnamon is available in stick form, lightly cracked as chips or ground to a powder.

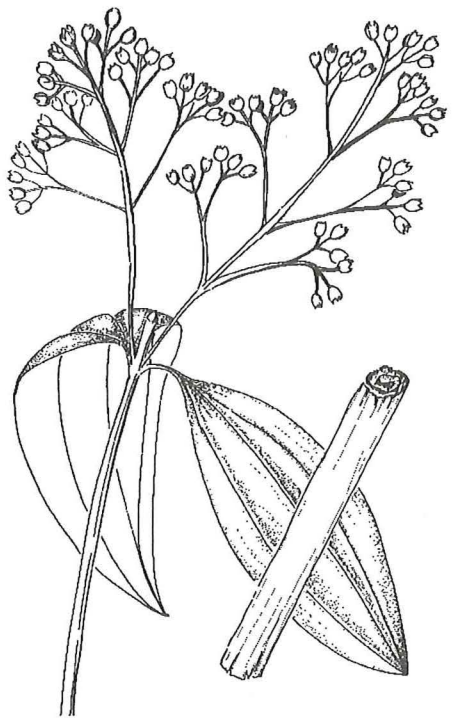
The use of cinnamon in brewing probably has origins in wassailing, the spicing or mulling of ale or wine as a part of the Christmas celebration in Europe. This association of cinnamon with Christmas has led to its use by homebrewers and microbrewers as a dominant spice in holiday ales. *Cassia* has a more intense odor and flavor as well as a higher essential oil content (the measure of spice intensity) so it probably is more desirable than true cinnamon for brewing.

For brewing, cinnamon can be added in the boil, during fermentation or post-fermentation. I like the effect of using some stick cinnamon in the boil. I think it contributes an interesting barklike astringency that works well in a malt-accented spiced ale. I add about 40 percent of the total amount of cinnamon I plan on using to the boil in stick form in a muslin bag for the last 30 minutes. The remaining 60 percent I add during the secondary fermentation as chips in a muslin bag. I recommend coarsely chopping stick cinnamon in a coffee grinder and then steeping the chips in a muslin bag in boiled water for 15 minutes before adding the steep to the secondary.



Like hops, cinnamon contains volatile aromatic oils that can be driven off by the boiling process. Adding most of the cinnamon post-fermentation best preserves the delicate flavors and aromatics. Because cinnamon does contain some oils, albeit modest amounts, I usually add some wheat malt to the grist of a spiced brew for additional protein to combat the detrimental effect the aromatic oils have on the beer's head-holding potential.

C. zeylanicum or true cinnamon, known in the trade as Sri Lankan cinnamon, is extremely scarce in the U.S. market. It can be found, sparingly, in some specialty spice shops: *C. cassia* is sold as cinnamon in supermarkets across the country. Ethnic grocery stores, Indian and Asian in particular,



cinnamon

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

offer *cassia* at a fraction of the cost of familiar supermarket brands.

Spiced Holiday Ale

Ingredients for 5 gallons

7 1/2	**pounds pale malt**
1 1/4	**pounds 40 °L crystal malt**
1/4	**pound chocolate malt**
1	**pound wheat malt**
26	**grams Perle hops, 5.8 alpha acid (90 minutes)**
1 1/2	**inch cinnamon stick (30minutes)**
2	**grams nutmeg, freshly ground (30 minutes)**
2	**grams ground mace (30 minutes)**
1	**inch vanilla bean (30 minutes)**
5	**grams cinnamon chips (add dry for aroma)**
3	**grams nutmeg, freshly ground (add dry for aroma)**
1/2	**inch split vanilla bean (add dry for aroma)**
	ale yeast
2/3	**cup corn sugar (to prime) or force carbonate**

- **Original specific gravity: 1.058 (14.5 °P)**

Single step infusion mash at 152 degrees F (67 degrees C), hold for one hour or until conversion.

These proportions of spice will produce a holiday ale of low to moderate spice intensity. If you like a lot of spiciness then don't be shy about doubling the above amounts to suit your taste.

References

Rosengarten, Frederick Jr., *The Book of Spices,* Livingston Publishing Co., 1969.

Mabey, Richard; with Duff, Gail; Michael, Pamela; McIntyre, Michael; Stevens, John, *The New Age Herbalist,* Macmillan Publishing Co., 1988.

Norman, Jill, *The Complete Book of Spices,* Viking Dorling-Kindersley Penguin, 1990.

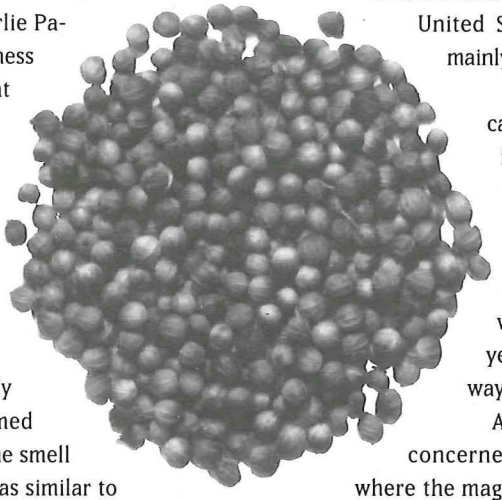
BEDBUG BEER? NO, CORIANDER BEER

By Carl Saxer

For me, homebrewing is an opportunity to drink beer styles that are difficult or impossible to find for sale locally. I don't brew many American light lagers or pale ales; there are many excellent examples of those styles as near as the local supermarket.

I prefer to brew the more obscure European styles and experiment with beers that don't really match any particular style.

Experimentation is how I began brewing with coriander. It started with a challenge from Charlie Papazian and a willingness to try something that seemed to go against the grain of the mainstream brewing mind-set.



Coriander (*Coriandrum sativum*) was named for the Greek word for bedbug, *koris*. Apparently the person who named coriander thought the smell of fresh coriander was similar to that of bedbugs. I don't think so, but then again I've never smelled a bedbug.

Coriander has been used for thousands of years. Coriander seeds have been found in funeral offerings in ancient Egyptian tombs. Greek and Roman physicians made medicine from it. It is described in the Old Testament as similar to the manna God showered upon the Israelites. The ancient Chinese believed coriander had the power to make humans immortal, and it is referred to as an aphrodisiac in the Arabian fantasy, *The One Thousand and One Nights*.

In modern times coriander's reputation is not so glamorous. Tea made from coriander seeds (technically these are the fruits) is thought to calm an upset stomach and cure flatulence. It is used in some modern medicines but only for flavoring and stomach-calming effects.

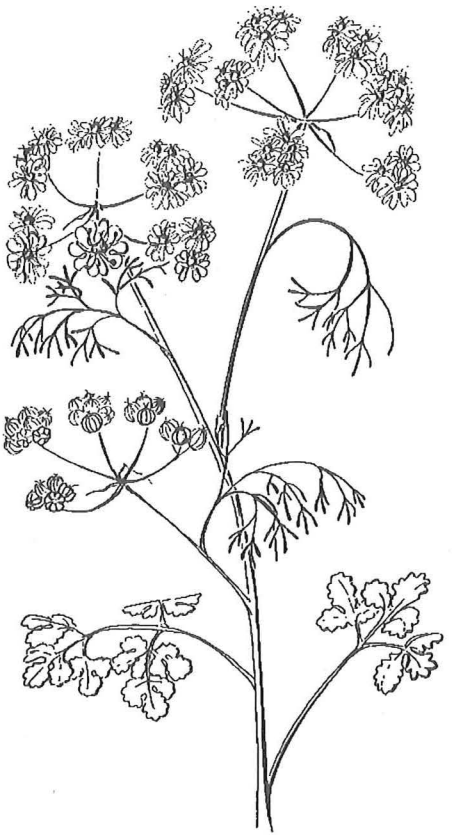
As a spice, coriander has found its way into almost every culture's food. In the Spanish cuisine the leaves of the coriander plant, cilantro, are used while the roots of the coriander plant are used in Thai cooking. Coriander seeds are quite aromatic and spice foods from the Americas to Spain, Central Africa, East India, Southeast Asia and China. They are also used to add flavor to liqueur, gin and beer.

Coriander is native to the eastern Mediterranean and southern European countries but is cultivated worldwide. In the United States it is grown mainly in South Carolina. In Florida, because of the Spanish influence, fresh cilantro is available in most markets year-round. The dried seeds store well for up to two years, so they are always available.

As far as beer is concerned, the seeds are where the magic is. The seeds of the coriander plant are yellowish brown, ribbed spheres about the size of small peppercorns. The seeds come whole (recommended) or ground. Freshly crushed coriander seeds are very aromatic and have a magnificent smell similar to anise and citrus. The amazing thing is that the smell of freshly crushed coriander is nothing like the aroma and flavor imparted to beer.

Because the histories of beer and coriander go back thousands of years, I have no doubt that someone was brewing with coriander a very long time ago. In the days before hops became accepted in brewing, herbs and spices were used extensively. Many blends of herbs and spices, known as gruit, were used to spice beer and ales. Spicing the beer helped to hide off-flavors from unsanitary brewing methods and spoilage.

In the 1700s coriander was quite popular in beer on both sides of the Atlantic. Coriander was one of the first cash crops to be raised by the American colonists. With cultivated hops having to be shipped from across the Atlantic to the colonies, it seems only natural that colonial brewers would choose to use a locally grown herb to spice their beers.



coriander

ILLUSTRATION BY MARIE ORLIN

In England, coriander beers had gained quite a following, too. I have found and brewed several 18th-century English coriander ale recipes that are excellent.

As the use of hops became more prevalent, the use of spices in beer began to fade. They faded in most countries except Belgium. At one time Belgium was a part of the Netherlands which had colonies in the Spice Islands. The exotic spices from these islands found their way into Belgian beers. Along with exotic spices, coriander, which grows wild in Belgium, was favored by Belgian brewers. The seeds from this plant helped to blend the flavors of the spices. As the use of spices and herbs in brewing fell out of favor in the rest of the world, the Belgians continued to brew with them for centuries. Belgian herb beers are known as *kruidenbier*.

Most brewing with coriander these days is happening in Belgium. Belgian white beers, known as Witbier in Flemish and *bière blanche* in French, are made from equal parts of unmalted wheat and malted barley with some oats added occasionally. They are lightly hopped, fermented with an aromatic yeast, soured with the addition of *lactobacillus* culture and spiced with Curaçao orange peels and coriander. The resulting beer is cloudy white with a greenish yellow tint and has a complexity of aromas and flavors that must be experienced to be believed.

Belgian white beers were almost lost as a style at the end of the 1950s except for the efforts of one man, Pierre Celis. In the 1960s, Pierre bought the De Kluis Brewery in Hoegaarden and started the revival of the style. The Brouwerij De Kluis is no longer owned by Pierre Celis, but it is still brewing some excellent beers with coriander. In addition to their Witbier, simply known as Hoegaarden (pronounced "who garden"), they also brew a high-gravity, all-malt version of the Witbier known as Hoegaarden Grand Cru, and a third coriander beer called Verboden Vrucht (Forbidden Fruit).

Lucky for us in the United States Pierre has moved to Austin, Texas, and has opened Celis Brewery. He is again brewing a Belgian-style Witbier, a Grand Cru and several other styles of beer that do not contain coriander.

So how did I start brewing with coriander? Well, I'll tell you a story about Roll Over Mr. Rogers.

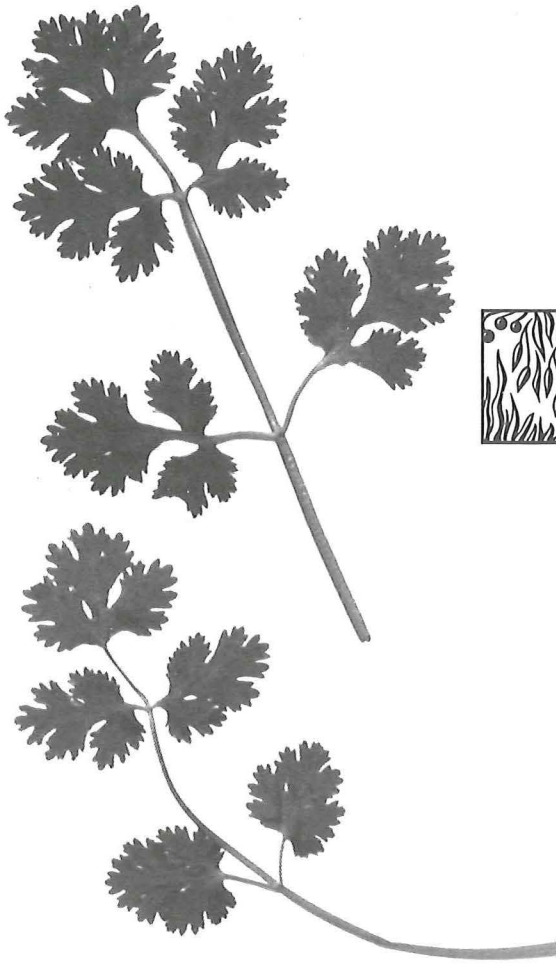
When I get my new issue of ***zymurgy*** in the mail I always turn first to Charlie Papazian's column, "World of Worts." Many of my favorite beers are brewed from adaptations of Charlie's recipes. In ***zymurgy*** Fall 1991 (Vol. 14, No. 3), the "World of Worts" recipe was called Roll Over Mr. Rogers, an intriguing coriander beer. Charlie wrote that he had begun the column seven times but was having trouble finding the right words to describe the beer. At the end of the article he issued a challenge: brew the beer then write to him and describe what it tastes like.

Roll Over Mr. Rogers is a deep coppery red lager that is similar to a Vienna. The coriander adds an aroma that is quite complex. The coriander seems to enhance the malty aroma and blend with the hop aroma to create something greater than the sum of the three parts. The flavor is slightly sweet, slightly caramel, slightly something else. The coriander is like a catalyst that brings out the flavors of the other ingredients and smoothes the transition from one flavor to the next as the beer flows across the tongue, ending with a clean refreshing finish.

I have experimented with coriander in many of my other recipes. In small amounts, about one-half ounce per five-gallons, coriander lends an unidentifiable complexity to the nose of English-style ales. In small amounts it adds that malty complexity that is so elusive in Oktoberfest-style beers. When used in larger amounts, two ounces per five-gallons, and allowed to lager for several months near freezing, beer with coriander picks up a tasty peppery tone.

Use coriander as you would flavoring hops. Crush whole seeds and add them to the last five or 10 minutes of the boil. I have tried different boiling times, but it seems that the desirable qualities of coriander are volatile and are driven off with longer boiling times. To change the character of the beer use more or less coriander but keep the boiling time between five and 10 minutes. I believe adding a few coriander seeds to the mash helps reduce the effects of hot side aeration. I also believe using coriander in the boil helps slow the process of oxidation in the finished beer.

My coriander beers tend to clear quickly and don't develop chill haze. It seems to me coriander has preservative and fining properties.



When I first brewed this beer some of my fellow homebrewers said, "Coriander? Why did you brew a beer with coriander in it? That's a sausage spice."

When that same beer won the blue ribbon for herb beers in the Sunshine Challenge that year, they drank their words.

Drink Your Words Lager

Ingredients for 5 gallons

6 3/5	**pounds unhopped gold liquid malt extract**
1/2	**pound 90 °L German crystal malt**
2	**ounces (6 HBUs) Hersbrucker hops, 2.9 percent alpha acid (60 minutes)**
1/2	**ounce Hersbrucker hops (15 minutes)**
2	**ounces crushed coriander seeds (10 minutes)**

1/2 ounce Hersbrucker hops (five minutes)
1/2 ounce Tettnanger hops (five minutes)
Wyeast No. 2124 Bohemian lager yeast
160 grams corn sugar (to prime)

- **Original specific gravity: 1.045**
- **Final specific gravity: 1.010**

Steep crystal malt at 150 degrees F (66 degrees C) for 30 minutes then remove. After the boil, strain wort into fermenter and pitch yeast when wort temperature is less than 75 degrees F (24 degrees C). Ferment at 50 degrees F (10 degrees C) if possible.

I believe that if more brewers knew about the wonderful aromas and flavors coriander offers it would be used much more often. Coriander has certainly earned a place of respect in my brewery.

References

Gilbertie, Sal, *Kitchen Herbs*, Bantam Books, 1988.

Jackson, Michael, *The New World Guide to Beer*, Running Press, 1988.

Jackson, Michael, *Michael Jackson's Beer Companion*, Running Press, 1993.

La Pensée, Clive, *The Historical Companion to House-Brewing*, Montag Publications, 1990.

Oxford Book of Food Plants, The, Oxford University Press, 1973.

Papazian, Charlie, *The New Complete Joy of Home Brewing*, Avon Books, 1991.

Papazian, Charlie, "World of Worts," ***zymurgy***, Fall 1991, Vol. 14, No. 3.

Rodale's Illustrated Encyclopedia of Herbs, Rodale Press, 1987.

Shaudys, Phylis V., *Herbal Treasures*, Garden Way Publishing, 1990.

Conversations with Charlie Papazian, AOB president, April 1992, June 1994.

Conversations with Luke Scott, owner of Hearts Liquor and Homebrew Supplies, 1992, 1993, 1994.

Conversations with Peter Camps, vice president Celis Brewery, May 1994.

BREWING WITH GINGER IS A SNAP

By Ted Bergin

"Ginger shall be hot i' th' mouth." These words, from Shakespeare's "Twelfth Night," speak volumes about the everyday use of ginger in beer. During the Elizabethan period, ginger and beer were as normal as hops and beer are now.

As recently as World War II, when the trade routes were severed, it was common in English pubs to have a container of powdered ginger at the bar for patrons to spice up their beverage of choice.

Unfortunately, ginger's common use did not translate into many writings on the subject. We do know that earlier alcoholic beverages laced with ginger include t'ej from Ethiopia, hydromel from Greece and the variety of mead known as metheglin from Wales. Whether for culinary, medicinal or spiritual reasons, ginger and brewing have a long and tasty history.

Although many historians believe that ginger originated in India and Southeast Asia, in general, historical writings give the origin to China. The use of ginger spread east as the centuries passed.

The origins of *Zingiber officinale* predate written history. As early as the 18th century B.C., the Shang dynasty held ginger in high repute and wrote of it in a text called "Seeking the Root of Sapors." Sapor now means "that which produces taste or flavor." The Shang knew of a valley far from their domain that produced the finest ginger root (actually a rhizome) available.

Spiritually, ginger was revered. Consumption was said to cleanse the body and make it ready to commune with gods and with ancestors. Some religious sects in ancient China would eat no other spices, as they could befoul the body. Confucius extolled the virtues of ginger and considered it so important that an exemption for its use was granted during times of fasting. Even today in rural China, peasants nail a race (section of dried ginger root) above the entrance to a home because it is purported to absorb evil spirits and thoughts, thus protecting a newborn child from harm.

Ginger is reputed to be a strong aphrodisiac. In China, the use of ginger was said to ensure a couple would conceive a male child to carry on the family name. In books of magic and folklore ginger isused in love potions and is associated with money, success and power.

In India, ginger was mainly used as medicine and was added to curries and other dishes as a means of getting the patient to take his or her medicine. As uses, varieties and quantities of ginger increased, Persian merchants saw a market in their home countries and further west and ginger found its way to Europe.

Much of the history of the Mediterranean revolves around the spice trade. Vast merchant empires rose and fell while dealing in spices, predominantly ginger, pepper, cinnamon and salt. Combined, these spices form an effective meat preservative. Their strong flavors also masked offensive odors found in improperly stored foods. Wild game also was improved with strong-flavored spices.

Medicinally, ginger has a long list of attributes including abatement of nausea, relief of flatulence and reduction of mucus (anticatarrhal). The skin contains a diuretic and stimulates the production of saliva. Ginger helps relieve menstrual cramps, aids in postpartum recovery and acts as a general blood cleanser. Other benefits include a broad spectrum of antibacterial and antifungal actions, a warming of the body and the ability to induce sweating (diaphoretic).

Little has been written about the use of ginger in the production of malt-based beer. Ginger beer, popular from the 1800s to the turn of the century, was actually ginger, lemon and cane sugar. Other recipes use it as one of many spices. These recipes date from as early as 1798 and are intriguing, at the very least. Variety in ingredients and techniques seems to have been the rule in the early years of brewing.

Ginger can be found in the produce section at most full-service grocery stores. Look for firm roots that smell gingery. The larger the better. You will need four to eight ounces for a five-gallon batch. Snap a nice-looking branch off and examine the break. It should be moist and smell strongly of ginger. Avoid races that have dried spots — these tend to be old. Freshness is everything.

To brew with ginger shred it (unpeeled) like you would cheese. I have used four

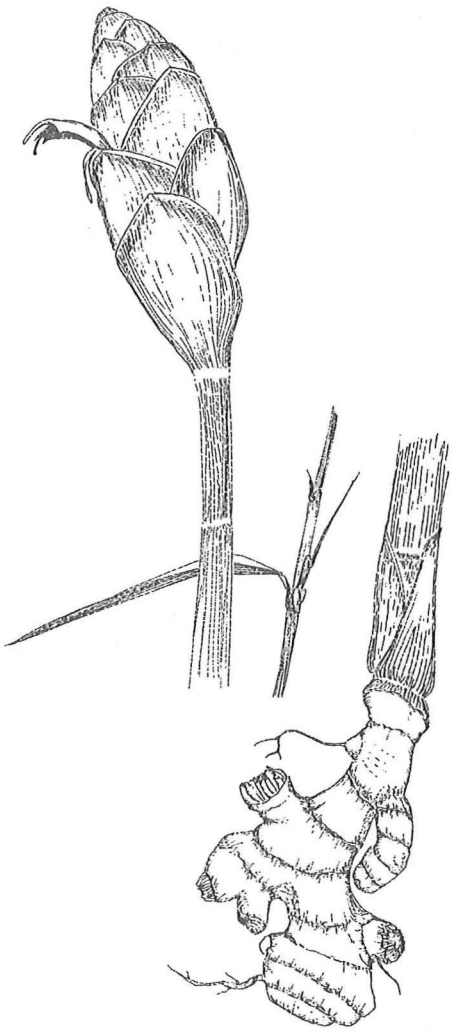
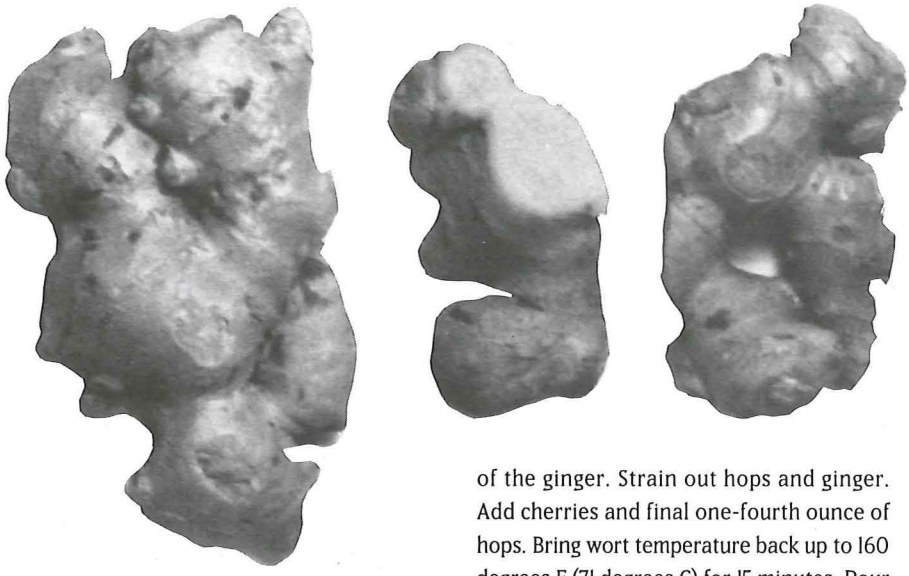


ILLUSTRATION BY MARIE ORLIN

ginger



ounces in the boil as I would with hops and added additional amounts to the primary. This works quite well. I hope to try "dry-hopping" with ginger soon. I suspect this will retain more of the volatile oils that are boiled off in other methods.

Ginger produces a light, refreshing flavor, whether in a light, amber or dark malt base. It will cleanse the palate leaving only a desire for more. Try a little ginger in your next brew.

Et Two Ginger

Ingredients for 6 gallons

- **2 cans John Bull unhopped amber malt extract**
- **1 pound crystal malt**
- **2 ounces Fuggle hops, 4.6 percent alpha acid**
- **6 ounces grated fresh ginger root**
- **4 to 5 pounds tart cherries**
- **ale yeast**

- **Original specific gravity: 1.038**
- **Final specific gravity: 1.008**

Steep crystal malt in one gallon of water until water begins to boil, then strain to remove grain. Add the remaining water, malt extract, one ounce hops and four ounces ginger. Bring to boil. Add one-fourth ounce hops every 15 minutes (three times) during the boil. At the final 15 minutes add the rest of the ginger. Strain out hops and ginger. Add cherries and final one-fourth ounce of hops. Bring wort temperature back up to 160 degrees F (71 degrees C) for 15 minutes. Pour everything into fermenter. Top with water to 6-gallon mark. Pitch yeast when cool. Rack after six or seven days. Bottle about two weeks later.

Very gingery, clean taste.

Jamaican Ginger Ale

A Boston Brewing Co. recipe that is no longer brewed.

Ingredients for 5 gallons

- **3 3/4 pound cane sugar**
- **3 3/4 ounce grated fresh ginger root**
- **1 ounce cream of tartar**
- **4 lemons, quartered (juice, seeds, rind and all)**
- **1 package ale yeast**

Combine ingredients and simmer 30 minutes. Cool to 62 degrees F (17 degrees C) and pitch yeast. Ferment for 24 hours and rack. Age until fermentation stops then bottle normally.

This brew was described to me as "fiery, very gingery, interesting, tart, spicy and god awful."

References

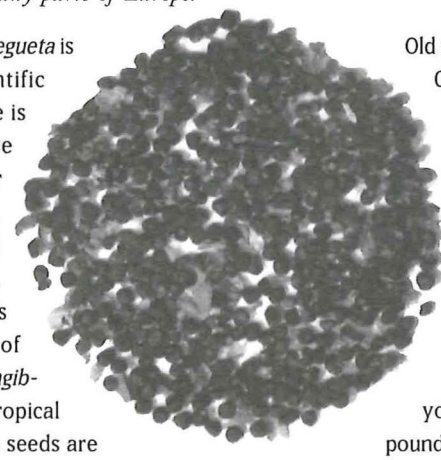
La Pensée, Clive, *The Historical Companion to House-Brewing*, Montag Publications, 1990.

ASSOCIATION OF BREWERS FILE PHOTOS

GRAINS OF PARADISE — PUT A LITTLE PARADISE IN YOUR BEER

By Randy Mosher

Grains of paradise are an exotic ingredient from the great Age of Spice, a time when black pepper was more costly than gold. Today they are seldom used except in their native West Africa, but they were once popular in many parts of Europe.



Aframomum melegueta is the official scientific name, but the spice is also called paradise seed, Guinea pepper (or Guinea grains), alligator pepper and Melegueta pepper. The spice is the seeds of a reedlike plant of the ginger family, *Zingiberaceae*, native to tropical Western Africa. The seeds are removed from the ripe fruit and dried before use. Related to cardamom, it does indeed share some cardamomlike aromatic qualities. The people of West Africa chew the fruit pulp and peppery seeds along with cola nuts, providing a mildly stimulating caffeine break.

The seeds themselves are brownish, irregularly shaped and about half the size of black peppercorns. The flavor is intense and complex. It may be described as an intensely hot white-pepper taste with a spruce-juniper aroma. Like pepper, it seems to be a spice that enhances other flavors. It seems not to have the lemony-minty flavor of coriander. Grains of paradise have been used recently as a high-class pepper alternative in the grinders of some pricey restaurants.

Grains of paradise were part of the vast brewing herbarium and, like many other spices, persisted long after hops had established domination as the herb of beer. They were a common adjunct to porter in the 18th and 19th centuries.

More recently, grains of paradise have been used in certain interpretations of Belgian white beers and in faro, sweetened diluted lambic.

One Belgian brewer uses them in the last five minutes of the boil to prevent too much of the delicate aroma from boiling away. They also may be combined with other spices and herbs in a vodka potion that may be filtered and added to the beer at bottling. As far as quantities go, they are best used in small amounts. Old recipes show rates between 0.07 ounce (2.1 grams) and 0.2 ounce (5.6 grams) per five-gallon batch.

You can't just go down to the grocery store and buy grains of paradise. Large spice houses that supply restaurants may be able to get them for you, but you may have to take a pound or whatever the minimum is. If you live in a city with a sizable African immigrant population, you may be able to find it at an African grocery, or purchase some through a restaurant. Indian or Thai groceries are other possible sources. There is no real substitute, but you might try an equal mix of juniper berries, white pepper and cardamom seeds.

Just to get you started here are a couple of recipes I snatched from an old recipe book, originally published in 1829, but with information gleaned from earlier works.

To Brew Windsor Ale

"Take 5 quarters of the best pale ale malt, Half a cwt. of hops, 8 lb. of honey, 1 lb. of coriander seed, half lb. of Grains of Paradise, half pound of orange peel, and two-and-a-half pounds of liquorice root ... six ounces of ground ginger, and six ounces of ground caraway seed.

"The drugs above mentioned are forbidden, under the penalty of two hundred pounds, and the forfeiture of all utensils; but of course private families are at liberty to use whatever they please. Nothing but malt and hops are permitted to public brewers, except the coloring extract; and the druggists who sell to brewers are subject to a penalty of five hundred pounds."

A modern homebrew interpretation of the above recipe from *Mackenzie's 5,000 Receipts* might be as follows:

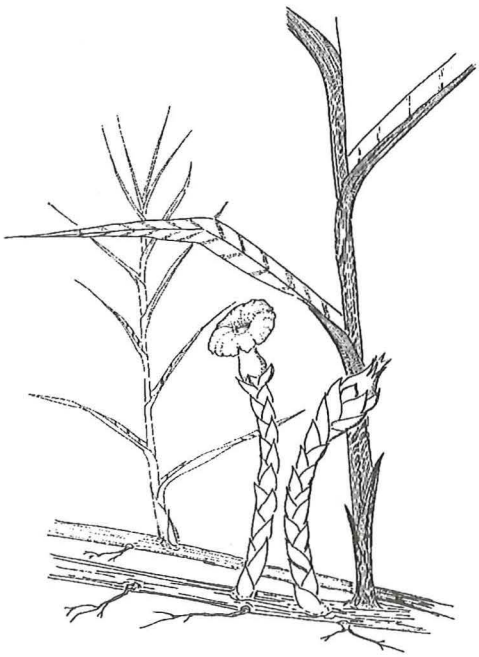


ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

Windsor Ale

Ingredients for 5 gallons

12	pounds pale ale malt (or 9 pounds pale extract syrup, 8 pounds if dry extract is used)
1	pound honey
3	ounces Goldings hops (1/2 ounce at 1 1/2 hour, 1 ounce at 20 minutes, 1 1/2 ounces at end of boil)
1/4	ounce coriander (five minutes)
1/8	ounce orange peel (five minutes)
1/8	ounce grains of paradise (five minutes)
1/2	ounce ground licorice root (five minutes)
1	teaspoon grated ginger (five minutes)
1	teaspoon caraway (five minutes)

Welch [sic] Ale (modernized)

Ingredients for 5 gallons

13	pounds pale ale malt (or 9 1/2 pounds pale extract syrup, 8 1/4 pounds if dry extract is used)
2	ounces Goldings hops (1/2 ounce at 1 1/2 hours, 1/2 ounce at 20 minutes, 1 ounce at end of boil)
1/2	cup molasses
1/4	ounce grains of paradise (five minutes)
1/4	ounce ground licorice root (secondary)

Precious little information was included with these recipes in the old book. Mash according to your whim. Traditional strong ale mash temperature is about 156 degrees F (69 degrees C). Dry-hop with licorice root.

References

Mackenzie's 5,000 Receipts, Troutman and Hayes, 1851.

THE STORY OF NUTMEG AND MACE

By Phil Markowski

The term real American *can only apply to those of us who have downed at least a dozen plain donuts in our lifetime. Beneath the surface of these greasy rings of dough lies the distinctive flavor of mace, the spice that makes plain donuts taste like plain donuts.*

Most of us have experienced the warm, spicy character of nutmeg in sauces, desserts and certainly in yuletide offerings of eggnog. The nutmeg tree, *Myristica fragrans*, is a strikingly lush evergreen native to the island of Banda in the Moluccas chain (also known as the Spice Islands) of the East Indian archipelago. It thrives in the warm and rainy tropics, reaching heights of 50 to 60 feet. This tree produces a fleshy apricot-like fruit containing a single oily brown seed known as the nutmeg. The nutmeg is contained within a thin shell wrapped by a bright yellow-to-red net-like aril known as the mace.

Nutmeg and mace trading dates back to the sixth century when Arab traders brought the spices from the Moluccas to Constantinople. By the end of the 12th century, nutmeg was well-known and coveted throughout Europe. In medieval England, one pound of nutmeg had the equivalent value of three sheep. In the 1500s the nutmeg trade was monopolized by the Portuguese and a century later was usurped by the Dutch, who still have a strong attachment to this spice. The Dutch dominated commerce until the British and French succeeded in planting nutmeg trees outside their native Moluccas. The French introduced nutmeg to Mauritius while the British brought nutmeg to China, Singapore, Trinidad and St. Vincent. The most successful transplants were the 18th-century plantings by the British on the island of Grenada. Today, Grenada is second only to Indonesia in worldwide production of nutmeg and mace. In the newly founded United States, the state of Connecticut was nicknamed the "Nutmeg State" when shady peddlers passed off hand-carved wooden "nutmegs" to gullible Yankee merchants who thought they were buying the real thing.

Nutmeg and mace are both recognized as having East Indian and West Indian varieties. Indonesia produces the bulk of the world's East Indian while Grenada supplies the West Indian. The East Indian varieties are said to have a more piquant character than the milder West Indian breed. East Indian has a higher essential oil content, hence its greater intensity. East Indian mace has a bright orange color as opposed to the pale yellow hue of the West Indian and it likewise has a higher essential oil content than the Granada-grown version. The milder West Indian is praised for its refined depth of character and is considered more desirable than the East Indian where subtlety of flavor is a concern.

Before spices are ready for the marketplace they must be dried to prevent fermentation (in this case spoilage). The traditional method is sun drying. Mace requires 10 to 14 days in sunlight to dry, changing from scarlet to yellowish-brown in the process. Nutmeg is dried while still in the shell for a period of four to eight weeks. Today mechanical dryers offer faster and more reliable processing. Nutmeg is available in whole form or powdered, when it takes on a tannish hue. Mace, in whole form, is referred to as "blades of mace" and is hard to find compared to the orangy powdered version.

Ground nutmeg and mace are readily available in supermarkets. Whole nutmeg is fairly common, but blades of mace are not so easily found. Whole spices ground just before use are always preferred for maximum character so they're worth seeking out. East Indian grocery stores offer the most economical buys of whole nutmeg and blades of mace (when you can find them).

Essential oil content in nutmeg ranges from 5 to 15 percent, fixed oils 25 to 40 percent with the fixed oils comprising myristic acid, oleic, palmitic, lauric and linoleic acids in addition to terpineol, borneol and terpenes (according to Richard Mabey). The myristic acid yields a toxic substance,

n u t m e g / m a c e

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

myristicin, that in high doses can lead to liver damage or, in excess, to death (according to Frederick Rosengarten).

The sensory characteristics of nutmeg and mace are similar because they originate from the same fruit. Each can be described as sweet, warm, highly aromatic (especially when freshly ground, as with any spice) and in essence, spicy. Mace has a somewhat more bitter character than the sweeter nutmeg and both have a faint waxy flavor probably because of the high fixed oil content.

Nutmeg and mace have been used medicinally to fight nausea, vomiting, flatulence, headaches and fevers; in short, it seems the treatment for almost every common malady. In fact, these spices were considered to be a virtual cure-all by 16th century Europeans.

Nutmeg is also purported to have hallucinogenic properties. "At so-called 'nutmeg parties,' (in the 1960s) beatniks and hippies sometimes eat two or three tablespoons of powdered nutmeg in an attempt to escape reality," writes Rosengarten. The use of nutmeg as a narcotic is said to be prevalent with some of the indigenous peoples of the Spice Islands as well as with prison inmates in the United States. Because of the well-known toxicity of large doses, a nutmeg hangover is said to be a hellish experience.

In his Old English epic, *The Canterbury Tales*, Geoffrey Chaucer refers to the 14th-century practice of mixing nutmeg with ale in the following passage: " ... *gynebred that was so fyn and licorys, and eek comyn, with sugre is trye, also of nutmuge put in ale.*" As for modern brewers, the addition of nutmeg to beer has holiday or winter implications, probably from the association with eggnog and mulled wine. This makes nutmeg and mace natural choices for brewing a holiday-type ale.

As with hops or any spice, nutmeg and mace can be added to the boil or post-fermentation, each method achieving different effects. For optimum results it is best to use freshly ground spices. When adding spices to the boil, I find that both nutmeg and mace retain their warming quality but lose their spiciness and both seem to be preserved when added late boil or post-fermentation. In light of the high proportion of fixed oils in nutmeg and mace, I think it is good practice to include an amount of a higher protein grain such as wheat malt or flaked barley to counteract the head-destroying oils that the spices contribute.

Pumpkin Ale

Ingredients for 5 gallons

8	pounds two-row malt
1	pound fresh pumpkin flesh, 1- to 2-inch cubes, seeds removed
1/2	pound 40 °L caramel malt
3	ounces chocolate malt
1 1/2	ounce Hallertauer hop pellets (20 to 25 IBUs, for bittering)
1	2-inch cinnamon stick (30 minutes)
1 1/2	grams freshly ground nutmeg (15 minutes)
1 1/2	grams freshly ground mace (15 minutes)
1	gram powdered ginger (15 minutes)
	Wyeast No. 1056 ale yeast
4	grams cinnamon chips (dry spice)
2	grams freshly ground nutmeg (dry spice)
2	grams freshly ground mace (dry spice)
1 1/2	grams sliced ginger root (dry spice)

- **Original specific gravity: 1.054 (13.5 °P)**

Steam pumpkin for 10 to 15 minutes or until tender. While pumpkin is steaming, mash in grains at 152 degrees F (67 degrees C). Add pumpkin to mash when tender. Allow mash to sit for one hour and 15 minutes at 152 degrees F (67 degrees C). Sparge as usual.

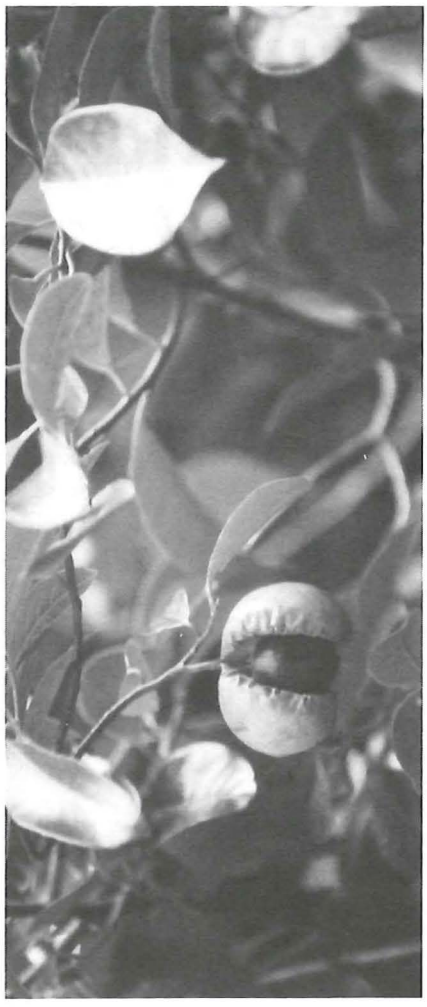


PHOTO BY CHARLIE PAPAZIAN

References

Mabey, Richard; with Gail Duff; Pamela Michael; Michael McIntyre; John Stevens. *The New Age Herbalist*, Macmillan Publishing Co., 1988.

Rosengarten, Frederick Jr., *The Book of Spices*, Livingston Publishing Co., 1969.

SPRUCING UP YOUR HOMEBREW

By Chip Jarry

If you truly appreciate a fine hand-crafted beer, you probably love to experiment and try new things. Those of you who watch Ren and Stimpy on TV may have heard of one of my favorite beers. Remember the episode about the "Royal Canadian Kilted Yaksmen"? You may recall a scene where our heroes hoist giant frothy mugs of spruce beer. That's right, spruce beer!

Cones more than 1 1/4 inches long, scales stiff, cones fall upon ripening

red spruce

Cones less than 1 1/4 inches long, scales stiff, old cones remain on tree for years

black spruce

My first exposure to spruce anything was spruce soda, or soda épinée, which is commonly sold in supermarkets in Quebec and New Brunswick. I love it — turpentine soda! So when I first found one of Charlie Papazian's spruce beer recipes I had to try it. It was great and I've been hooked ever since.

Spruce beer, according to Carl Forget in *Dictionary of Beer and Brewing* (Brewers Publications, 1988), is a beery beverage indigenous to North America and Northern Europe. It is made from malt or molasses, other sugars and spruce tips or extract of the buds and cones of the tree. It is also known as black beer.

In his book *Wines and Beers of Old New England* (Hanover New Hampshire University Press, 1978), Sanborn Brown points out that in colonial times "beer" was defined as unhopped and "ale" was defined as not being hopped. Hops grow wild in New England, but are not readily found everywhere. The settlers discovered that spruce was a useful substitute for hops, primarily as a preservative. The beer was prized as a protection against scurvy and because it was very tasty; it became popular in the 17th and 18th centuries. Traditionally, farmers made spruce beer in the spring from the fresh shoots of the black or red spruce, substituting fresh spruce shoots for dried hops. When Captain James Cook landed in New Zealand in 1769 spruce beer was made for the crew. Even Benjamin Franklin had a famous recipe for spruce beer.

Commercial examples of spruce beer are scarce, and I have yet to taste one. Occasionally Anchor Brewing Co. will turn out a spruce beer, and Mather's of Leeds, West Yorkshire once used spruce as an ingredient in their Black Beer, but has not done so since 1903.

How does spruce beer taste? Great! Generally, if white bread and light American lagers are your preference you won't like it. My wife says it tastes like the water in the bottom of the Christmas tree stand. (How would she know?) The reactions of friends who have tasted the beer spanned the spectrum. Charlie Papazian describes spruce beer as tasting similar to unsweetened Pepsi with a beery taste.

The majority of the spruce beers I've tasted are similar in appearance to porter, usually a deep reddish brown with a thick creamy head. The spruce aroma is evident, though not overwhelming, and some of the malt aroma comes through. I recall the sweet smell of a pine grove on a warm summer day. The taste is an interesting and complex mix of flavors including spruce and malt, plus slightly sweet, tart and spicy flavors. You don't expect to taste any sort of pine in a food or beverage so your first reaction is to reject it. But take another sip. It grows on you quickly. Most interesting is the balance between the sweet malt and the spruce.

A spruce is not a spruce is not a spruce. To make great spruce beer you need the shoots of the black or red spruce picked in early spring. Below are some descriptions to help identify the trees you need. Black and red spruce are very similar in appearance to hemlock, which should be avoided, though it is not poisonous. Hemlock trees never grow on high mountain slopes where the spruces thrive. Hemlock needles tend to be flat and have two silvery lines on the underside. Also, spruce tends to retain its cones during the winter while the hemlock will drop its cones. (Note: Ingesting large quantities of sawdust, balsam [resin] and even needles may cause dermatitis.)

Black spruce (*Picea mariana*) grows in bogs and wet soils from Newfoundland to Labrador and Alaska to northern New Jersey, northern Pennsylvania, Michigan, northern Minnesota, southern Manitoba and British Columbia.

Twigs and buds of the black spruce are hairy. Needles are short, mostly one-fourth to seven-sixthteenth inches long (although some sources say they can be up to 1 1/2 inches), four sided, sometimes blue green with a white powder. The cones are only three-fourths to 1 1/4 inches long and gray-brown

ILLUSTRATIONS BY MARIE ORLIN

in color with scale edges rather ragged. Cones usually remain on the trees for several years. Black spruce grows 25 to 30 feet high with a diameter of one to two feet. Similar species are red and white spruce (white spruce has hairless twigs and grows mostly on uplands).

Red spruce *(Picea rubens)* grows in well-drained soils from Nova Scotia and southern Quebec to northern New Jersey, northeastern Pennsylvania and eastern New York state. Also in the mountains from western Maryland and West Virginia to western North Carolina and eastern Tennessee.

Red spruce twigs and buds are typically hairy. Needles are one-half to five-eighths inches long and curve upward, are four sided and dark green or yellow-green in color. The cones are 1 1/4 to two inches long and reddish brown in color with scale edges smooth. Cones fall off of tree soon after maturity. Red spruce grows 60 to 70 feet high with a diameter of one to two feet.

To make spruce beer you have two basic options, hopped or unhopped. You'll need a source of spruce, either fresh shoots, homemade spruce extract or commercial extract available at homebrew shops. If you use a commercial spruce essence you will need from one to two ounces per five-gallon batch. I recommend staying on the conservative side.

To make spruce extract simply take a large handful of green shoots, picked in early spring, and cover with water in a saucepan. Boil until the water is pungent, strongly flavored and reddish brown. Strain and boil to half the original volume. Store in a sterilized bottle and keep refrigerated for use year-round. Use directly in the brewpot as you would hops, boiling for about an hour.

Yule Ebb Tide

This recipe fared well in the AHA 1993 National Homebrew Competition. Give it a try.

Ingredients for 5 gallons

1	**ounce spruce essence**
3 1/3	**pound can Munton and Fison unhopped dark extract**
3	**pounds Munton and Fison unhopped dark dry malt extract**
2	**ounces German Hallertauer hops, 3.5 percent alpha acid (10 HBU)**
1	**teaspoon Irish moss (15 minutes)**
	Whitbread dry ale yeast
3/4	**cup priming sugar**

Boil 5 gallons of water, all malt extract, hops and spruce essence for one hour. Strain off hops and Irish moss as you rack into primary fermenter. Top up to 5 gallons. Pitch yeast when cool. Ferment one week in the primary, two weeks in secondary. Let it age — the taste will improve significantly in two to six months.

Ben and Sam's Colonial Brew

This recipe has no hops and was intended to replicate a colonial-period style. The beer is on the sweet and malty side, as you would expect. Very nice.

Ingredients for 5 gallons

	large handful (a tightly packed cupful) of freshly picked new-growth spruce tips
6 2/3	**pounds unhopped dark malt extract**
1	**teaspoon Irish moss (15 minutes)**
	Red Star ale yeast
3/4	**cup priming sugar**

Boil 5 gallons of water, all malt extract and spruce for one hour. Strain off spruce tips and Irish moss as you rack into primary fermenter. Top up to 5 gallons. Pitch yeast when cool. Ferment one week in the primary, two weeks in secondary. Let it age — the taste will improve significantly in two months.

References

Brown, Sanborn, *Wines and Beers of Old New England*, Hanover New Hampshire University Press.

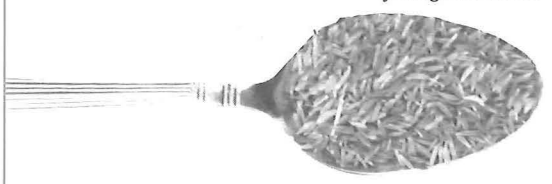
Franklin, Ben, *Benjamin Franklin on the Art of Eating*, Princeton, 1958.

SPICE YOUR BEER WITH CURRY

By Brian Kelly

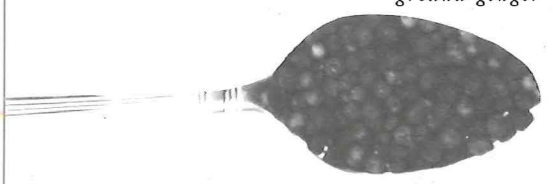
Being a spicy food fan, when I encountered spiced beer I naturally thought of curry. When I asked about curry spice in beer, no one knew of it, not even Charlie Papazian. So I set out on my own to concoct a curry beer based on what I knew about curry brewing and cooking.

fenugreek seeds

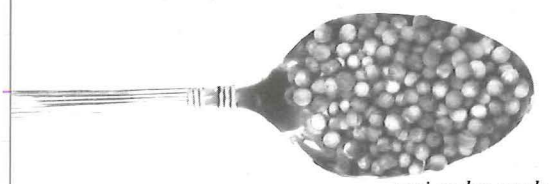


cumin seeds

ground ginger

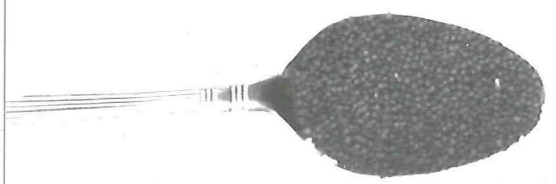


black peppercorns



coriander seeds

ground turmeric



mustard seeds

Using curry is a complex undertaking because it is not one spice but many. An endless array of combinations and proportions form the basis for a style of cooking that appears in the cuisine of many Eastern nations.

So what is curry? Well, it is not curry powder. Curry powder is a preground mix of spices that is usually stale when you buy it. Real curry, as it evolved in India before spreading throughout much of Asia hundreds, if not thousands, of years ago, is a blend of aromatic herbs and spices that form the basis for a currying or stewing sauce in which meat and/or vegetables are cooked slowly to absorb maximum flavor.

Indian cooking is as varied and complex as French or Chinese cooking, if not more so. Curry recipes have their origin in feasts for royalty that took days to prepare, involved the labor of hundreds of people and lasted for several days.

Curry is as old as the land from which it came. It is likely that curry sprang from a lush nation that had far more than the usual variety of native plants. Many of the plants used in curry today are native to India, or that area of the world. As curry began to spread from India to the rest of Asia, each area incorporated its native herbs and spices. While some of the ingredients in curry are fairly constant from area to area, other ingredients are unique to a particular locale. For example, coconut may appear in curries of Thailand and Sri Lanka but rarely in India.

Real curry uses different blends for each recipe. The flavor of preground curry powder cannot equal freshly prepared curry. Many ingredients are seeds, and deterioration of the essential oils begins as soon as they are ground. For this reason, curry should be prepared and ground fresh for each recipe. To develop maximum flavor, it is important to pan roast the spices before you grind them. There are many options for grinding, but don't use anything with porous stone, grinding wheels or metal plates like a grain mill or a coffee grinder because you'll risk having the curry flavor taint the other things you grind. Tradition requires a mortar and pestle, but a blender, food processor or a small grinder with a metal chamber and blades work well. Be sure to rinse and wash utensils after grinding.

The following spices are common in curry: turmeric, fennel, fenugreek, coriander, cumin, black pepper, chilies (green and red), chili powder (cayenne), ginger, cloves, cinnamon, cardamom and mustard. Other ingredients vary by region, with the ones listed above being the principal ingredients generally available in the United States.

A list of curry ingredients follows:

Fenugreek
(Trigonella foenum-graecum)

Fenugreek, a member of the pea family (*Leguminosae*), is a small, flat, brownish beige seed with a wonderful mild aromatic nature. It has a slightly bitter flavor and should be used with restraint. Fenugreek is used in imitation maple flavor. Made into a tea it is an aid to digestion.

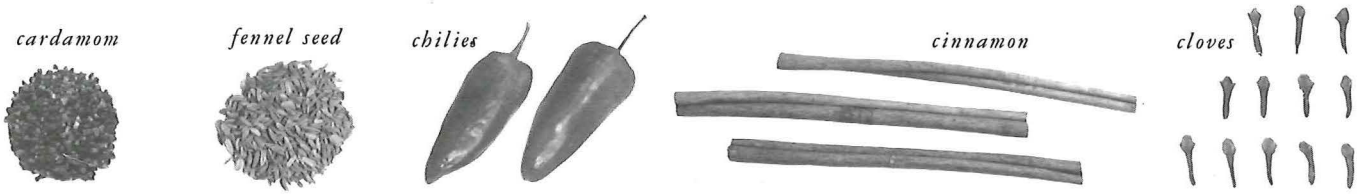
Cumin
(Cuminum cyminum)

Another Middle East native, cumin is an annual whose seed has a highly aromatic and pungent flavor somewhat reminiscent of caraway seed. Black cumin, a member of the buttercup family (*Ranunculaceae*), is much milder and should be avoided in favor of the tannish brown *C. cyminum.*

Ginger
(Zingiber officinale)

Ginger root is another vital curry ingredient that has already found wide use in beer. Ginger adds a dryness and bitterness to beer in addition to its wonderful flavor. This tropical plant is Asian in origin, but now grows worldwide in warm climates and is available in supermarkets everywhere.

ASSOCIATION OF BREWERS FILE PHOTOS



Black pepper
(Piper nigrum)

Black pepper is the world's most important spice. Native to India and the East Indies, this climbing vine has a long history. Black pepper was one of the earliest trading commodities between the orient and Europe. Now it is grown all around the world.

Coriander
(Coriandrum sativum)

The leaves of this plant are called cilantro and are popular in Mexican dishes, whereas coriander usually refers to the seeds. Both the seed and the leaves are used in curry. The seed is a base spice in curry and appears in most curry recipes. Coriander is native to the Middle East and is said to have been grown in the Hanging Gardens of Babylon. Mildly pungent and aromatic, the seeds are used in more conventional spiced brews.

Turmeric
(Curcuma longa)

Also known as *haldi* (an Indian word), turmeric is the dried rhizome of a plant belonging to the ginger family *(Zingiberaceae).* It is bright yellow and is used as a powerful dye. It is what makes salad-style mustard yellow. Turmeric is native to India and widely available. In Indian markets and sometimes others, it may be purchased as a whole dried root, though there is no advantage to this. Its flavor is quite mild.

Mustard seed
(Brassica hirta, white, *and B. nigra,* black)

Members of the cress family, (*Cruciferae*) black mustard has seeds that are reddish to black whereas those of white mustard are yellow to orange. They are native to Eurasia, but now grow throughout North America and Europe. The black seed is much more aromatic and pungent than the white seed.

Cardamom
(Elettaria cardamomum)

The world's second most expensive spice (after saffron), cardamom is a tropical plant of the ginger family native to India and Sri Lanka. The seedpod contains a few black seeds that decrease in potency when released from the pod. Cardamom is available ground, but it is tepid compared to the whole seed freshly ground.

Fennel
(Foeniculum vulgare)

A member of the carrot family (*Umbelliferae*) as are cumin, coriander and anise, fennel is the greenish gray seed (shaped like a barleycorn) that you see in Italian sausage. It has a licoricelike flavor. Fennel should be purchased as a seed and freshly ground after pan roasting.

Chilies
(Capsicum annuum, C. frutescens, etc.)

There are many varieties of chilies in the world. To use in curry, select a variety that gives you the desired effect — the right amount of heat and chili flavor. For a recipe calling for green chili use Sandias and Anaheims, both are widely available. Jalapeños can be added or substituted depending on the heat desired. When a mild red chili is called for, any good whole red chili or powder may be used. For more heat, the Mexican pequin pepper may be used, as can cayenne. Be careful when adding chili. Too much heat appeals to hard-core chili heads like me, but entering a beer like this in competition can be a sobering experience. Judges don't take too kindly to having their palates messed up for a half hour.

Cinnamon
(Cinnamomum zeylanicum)

Cinnamon comes from the inner bark of a tree of the same name and is a member of the laurel family. Originating in Sri Lanka (formerly Ceylon), the tree now grows in Madagascar, South India, the West Indies and the Seychelles.

Cloves
(Syzygium aromaticum)

Native to the Moluccas or Spice Islands, cloves now grow in Madagascar, Tanzania and the West Indies. The plant is evergreen and a member of the myrtle family (*Myrtaceae*). The clove is an unopened flower bud.

Many other ingredients are found in curries, but most aren't useful in beer because of their subtle flavors.

Health-food stores or ethnic markets can often provide the best and freshest selection of spices. Supermarkets tend to have racks and racks of preground spices that may have been sitting there since the Last Supper. Seeking out a good spice source is worth the time.

Buy the whole spice and grind only what you need. Before grinding, pan toast whole dry seeds to bring out their flavor. This process is similar to toasting malt. For the small quantities you will typically use in a beer recipe, a small frying pan will do. Turn the stove to medium heat and place the pan on the burner. When the pan heats up, add the seeds. When toasting mustard seed cover the pan because the seeds will pop. Stir or shake constantly to avoid burning. When the seeds have a toasty brown color they are ready to be ground and used. Roast and grind spices in a well-ventilated area.

It is wise to make a tea of a proposed blend if you are trying something new. I boil a gallon of water and use one-fifth the amount of the curry blend I am considering using in a five-gallon beer recipe. (Obviously, this can be scaled down if you want to work with smaller quantities.) Pan roast the spices prior to grinding, add them to the boiling water and boil for about 10 minutes. Taste the tea. Is it overpowering, or wimpy? How would it taste in conjunction with beer? Would it obliterate the malt? These are

questions to consider when developing a recipe. A five-gallon mistake can get expensive. A general rule is the more aromatic and pungent the curry blend, the darker and more robust the malt bill should be.

The spice mixture should be added loose during the last 10 or 15 minutes of the wort boil. If the spices have been properly ground to a coarse powder, any mixture that makes it into the primary should settle to the bottom of the fermenter.

When designing recipes, strive for balance between spices. Too much of any one spice gives a quirky, eccentric character at best. Well-balanced curry, like a well-balanced beer, is a real pleasure on the palate.

The following recipe was my second attempt at a curry beer.

Bombay Brown Porter

Ingredients for 5 gallons

10	pounds English two-row malt
1	pound 60 °L crystal malt
1/4	pound roasted barley
1/4	pound black patent malt
1	pound chocolate malt
2	pounds rice syrup
4	ounces dextrin powder
1/2	tablespoon cayenne pepper (use caution with this ingredient)
2	tablespoons cardamom seeds
1	tablespoon fenugreek seeds
3	three-inch cinnamon sticks
12	cloves
1	tablespoon turmeric powder
2	ounces Hallertauer hops, 4 percent alpha acid (60 minutes)
1	ounce Hallertauer hops, 4 percent alpha acid (two minutes)
1	tablespoon gypsum
	Wyeast No. 1338 or 3056 liquid yeast

- **Original specific gravity: 1.062**
- **Final specific gravity: 1.022**

Mash malt 1 1/2 hours (or until conversion) at 157 degrees F (69 degrees C). Sparge with five gallons of 170-degree-F (77-degree-C) water for 20 minutes. Boil 1 1/2 hours. While boiling, pan roast cardamom, cinnamon (broken into smaller pieces), fenugreek and cloves, then grind. Add all spices with about 15 minutes left in boil.

I used two yeasts, Wyeast European Ale No. 1338 and Bavarian Weissen No. 3056, each restarted from previous batches. With the flavor from curry, I think yeast selection is relatively unimportant. Primary ferment was seven days and secondary was two weeks.

Curry beers seem to take a while before the best flavor is reached. For best results, I advise conditioning for two to three months before drinking. For this reason, I think it is wise to brew a slightly higher than normal alcohol content. Prior to adjusting the alcohol strength my beers were a little strident. The spices tend to blend better with age.

There is no limit to what you can do with curry in beer. Indeed, the possibilities of different spices are only beginning to be explored. So risk something. Dare to give your taste buds a real wake-up call.

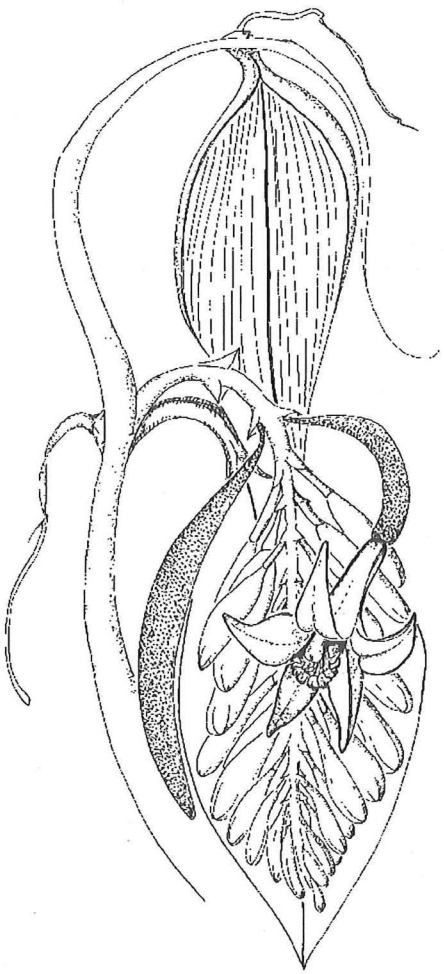
PLAIN OLD VANILLA

By Phil Markowski

Vanilla, the most generic of flavorings and perhaps the most underrated, hardly seems as exotic as it must have around 1520, when one of Cortés' conquistadors discovered the emperor Montezuma drinking chocolatl, *a drink made from cacao beans, corn, ground vanilla pods and honey.*

The Aztecs called the vanilla pods *tlilxochitl* and they used vanilla as a flavoring, a source of perfume, a medicinal tonic and a gift to their emperor for centuries before the Spanish "discovered" the fragrant dried beans. The Spanish, taken by this new flavoring, called it *vaynilla*, a word derived from the Spanish *vaina* which means pod, and brought the beans home to Europe.

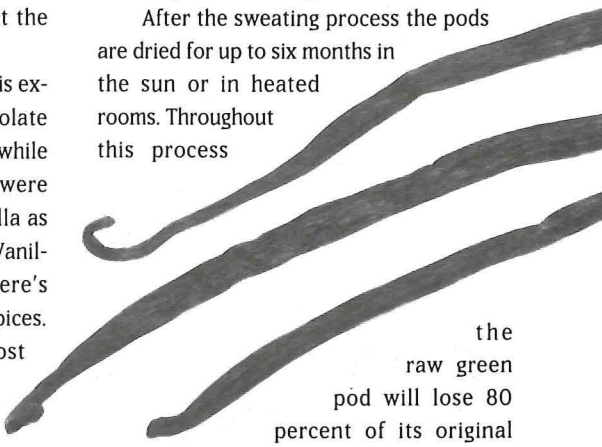
The Europeans quickly embraced this exotic new spice as a flavoring for chocolate and for scenting tobacco. The English, while not famous for their culinary savvy, were the first Europeans to recognize vanilla as an exquisite flavoring in its own right. Vanilla probably is the Western Hemisphere's greatest contribution to the world of spices. Today we know vanilla as the foremost flavoring in ice cream, milkshakes, pudding, and as an essential additive in baking and chocolates.



v a n i l l a

Vanilla planifolia is a climbing, thick-stemmed vine of the orchid family (*Orchidaceae*). It is native to the rain forests of southeastern Mexico, Central America, the West Indies and northern South America. In the wild it can reach heights of 80 feet or more as it clings to tall forest trees. The plant produces a slender fleshy green pod known as the vanilla bean. This pod has no flavor when picked, but must undergo an extensive fermentation or curing process to develop its distinctive fragrant character. In the commercial process, the beans mature on the vine for a period of four to nine months, are picked before fully ripe then are put into the fermentation process.

The traditional method of curing is both complicated and time-consuming. The process begins with the "sweating period." The green pods are spread out in the sun for several hours until hot, then covered with a blanket and allowed to sweat overnight. The cycle repeats for 10 to 20 days until the pods are pliable and deep brown in appearance. During the sweating process an enzymatic breakdown produces a white crystalline compound known as *vanillin*. Vanillin is not present in the raw bean, only in the cured bean. It is the substance responsible for the characteristic tobaccolike spicy sweetness we know as vanilla. In the highest quality beans the vanillin is actually visible on the surface of the cured pod as a whitish powder resembling fine cane sugar.



After the sweating process the pods are dried for up to six months in the sun or in heated rooms. Throughout this process the raw green pod will lose 80 percent of its original weight. This laborious curing process is largely responsible for the high cost of whole vanilla beans. Modern methods have shortened the curing times but the process remains labor-intensive.

The first vanilla beans brought to Europe and the East originated in Mexico. That country enjoyed a monopoly on vanilla bean production from the 1500s until the 1840s when vanilla plantings in European colonies finally became successful. Although plantings were attempted years before, they didn't produce pods. The problem was solved in 1836 when a Belgian botanist named Charles Morren perfected a hand-pollination method that is still in commercial use today. This naturally led to plantings in many European colonies, most notably in the former French colony of Madagascar, now the world's leading producer of vanilla beans. Mexico, Indonesia and Tahiti also are major producers.

The expense of whole vanilla beans has spawned an industry dedicated to isolating synthetic vanillin from less expensive sources that have included pine tree sap, sugar, wood pulp and coal tar! Synthetic vanillin, labeled imitation vanilla, is naturally less expensive

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

than the real thing. It is missing certain secondary compounds that contribute to the complexity of natural vanilla. Vanilla extracts, obtained from hydroalcoholic extraction of the beans, are quite commonly used and can be of excellent quality. The beans are finely chopped and placed in a warm alcohol-water solution (minimum 35 percent alcohol) that is percolated through the beans until the maximum amount of flavor has been extracted. Pure vanilla extracts are of good quality and their use is prevalent in the United States. Vanilla essence is an extract fortified with a distillate of the dark resins inside the beans. It is generally considered less desirable than a good-quality pure extract. Actual whole vanilla beans are easily found and are considered well worth the expense by discerning chefs.

I know of no documented historical use of vanilla beans in brewing. However, the flavor of vanilla is not altogether foreign to beer. The compound vanillic acid is produced by the breakdown of phenolic acids present in malt and phenolic compounds produced by some strains of yeast. Some Bavarian Weizenbiers have vanilla notes that are detectable in a sea of phenolic compounds. The compound vanillin is a constituent of new oak. Therefore, a beer aged in oak can actually pick up some vanilla character from the wood. Although probably considered an off-flavor in many beer styles, a hint of vanilla character added to a holiday ale or a Belgian abbey-style dubbel seems like a nice touch.

Given the high quality of some vanilla extracts, they are a viable alternative to using whole vanilla beans. When brewing 500-gallon batches of Holiday Ale at New England Brewing Co., I find extracts a little easier to work with. Even then, I can't resist the romance of adding some whole vanilla beans to the brew. For five- or 10-gallon batches using one-half of a true vanilla bean (typically four to five inches in length) can give a noticeable flavor to the brew.

I like adding some bean to the boil and some bean post-fermentation. In both cases I split the bean lengthwise to expose the dark resin caked with tiny black seeds. I place the split bean in a muslin bag with other spices and add to the last half-hour of the boil. When adding dry spices to the secondary, first pasteurize the spice mixture in a muslin bag by boiling five minutes then letting it steep in the pot for an additional 10 minutes. Then add the mixture (including the broth) directly to the secondary for 10 to 14 days. An added benefit to using extract is that you can add more vanilla flavor *after* secondary fermentation if your previous additions don't suit your taste. Keep in mind a little vanilla goes a long way.

References

Mabey, Richard; with Gail Duff, Pamela Michael, Michael McIntyre, John Stevens; *The New Age Herbalist,* Macmillan Publishing Co., 1988.

Norman, Jill, *The Complete Book of Spices,* Viking Dorling-Kindersley Penguin, 1991.

Rosengarten, Frederick Jr., *The Book of Spices,* Livingston Publishing Co., 1969.

POTIONS!

By Randy Mosher

You are no doubt familiar with the common ways to add herb and spice flavors to your beer. Adding flavorings to the boil and/or during fermentation is relatively straightforward and these methods generally work well, but there are a couple of weak points.

Herbs and spices added during wort boiling are sanitized by the heat, but that same heat can modify and drive off some of their precious aromas. Primary fermentation generates prodigious quantities of CO_2 that carry spice aromas out of the beer along with it. Consequently the amount of flavor persisting into the finished beer is difficult to predict. And, of course, there is no way to go back to the boil to add more if the quantity is not sufficient. This is especially critical in beers such as Christmas ales where having a perfectly balanced blend of ingredients makes all the difference. Herbs and spices added during fermentation may not solubilize well, and if added during the primary are affected by the same problem of aroma loss as those added in the boil. Plus there is always the potential for contamination by anything added to the fermenting beer.

There is another method that I have been using for several years now — potions.

Potions are nothing more than the use of a friendly solvent, alcohol, to sterilize and solubilize the flavorful components of spices and herbs. Fortunately, most of these aromatic compounds are soluble in alcohol, often more so than in water. When the flavors have been dissolved, the mixture is filtered and added to the beer during the secondary fermentation or prior to bottling.

The first step in the process is to buy a big jug of the least expensive vodka you can find. Not feeling shameful is actually the most difficult part of this flavoring method. More expensive brands may make you feel better (and your wallet lighter) but they add nothing in terms of quality from my experience.

Once obtained, curtains drawn, you can put this cheap-yet-magical substance to work in the service of brewing. Put the herbs and spices you wish to use into a beaker or wide-mouthed jar. Use a little more than you think you'll actually need for the batch of beer. Pour a quantity of vodka into the same container, about double the volume of the seasonings. Tightly cover and allow this to soak for at least a week. Shake it every day or two if you like. The actual soaking time can be much longer, but the mixture matures pretty well in a few weeks and doesn't change much after that. Be sure to carefully measure the quantities of herbs and spices added, so you can repeat the recipe in case you win best of show. A gram scale works best, but dry measures serve well if there is no alternative.

PHOTO BY VICKI HOPEWELL

After a week taste it, or better, add a few drops to a beer. Scrutinize the mixture for balance, flavor and depth. Now is the time to add more cloves, pepper, ginger or whatever you think it will take to finesse the mixture. Add these as desired and allow to sit for a few more days. You can fine-tune the potion endlessly if you want.

The next step is filtration. The simplest method is to use a funnel and coffee filter. This removes nearly all of the spices, leaving just a bit of dusty stuff that settles right out with the yeast in the bottle. I recommend a funnel with shallow ribs on the inside designed for use with filter paper (or coffee filters). The ribs raise the paper and allow the liquid to flow more freely than in a smooth funnel. If you need finer filtration for some reason, various grades of filter paper and more sophisticated gizmos are available from scientific supply houses.

I usually add the potion to the beer at bottling, although you can just as well add it toward the end of secondary fermentation. If the beer is to be kegged rather than bottled, it is best added when the beer is racked into the keg.

At some point you need to do a test to decide how much of the potion to add for the best flavor. Many chemicals taste very different depending on the specific concentration present. Small changes in quantity can translate into large changes in taste. I have found during these tests that there is a sharp transition between not enough and too much, with only a very small range of just right in the middle.

The dose-testing procedure is as follows: get a pipette or small syringe graduated in some small amount such as 1/10 milliliter. You also will need a small measure, such as a shot glass, and calibrate it with a line indicating one ounce (this assumes you are keeping track of your batches by gallons; if you are using liters, use a similar metric quantity — 25 or 50 milliliters).

You can use either a small amount of the intended beer for the test or one that is similar. Although the stand-in beer won't be the real thing it will be fully carbonated, greatly affecting the flavor. I have done it both ways with good results. Pour an ounce of the beer into the shot glass. Withdraw a small amount of the potion into the pipette taking a wild guess about how much to start with and add it to the shot glass. Stir well with an inert stirrer and taste. Too much? Not enough? You just have to tinker until you get it right.

Once you have determined the 10ths of a milliliter-per-ounce ratio all that remains is to scale it up. Get out the pocket calculator and do the arithmetic: 1 ounce X 128 (ounces per gallon) X 5 (gallons in batch) = 640 ounces per batch. If the dosing test determined that 0.2 milliliter was the correct amount for one ounce, multiply 0.2 milliliter X 640 and you get 128 milliliters of potion that must be added to match the small-scale test. If the beer is a strong one intended for long aging you might bump up the quantity a bit to compensate for the inevitable fading of flavor that comes with extended time in the cellar.

One obvious question is how much alcohol gets added to the beer with this method. The answer depends on the quantity and strength added, but it really doesn't amount to much. In a five-gallon batch, 16 ounces of 80-proof vodka will add 1 percent of alcohol. Some alcohol is lost to evaporation during the soaking period, so it may end up being a little less. This shouldn't affect things too much, but be aware that in beers with higher than 7 percent alcohol, priming may be slowed down a bit. If in doubt, you can always cut back the priming and add Champagne yeast when you bottle. [Adding Champagne yeast, which is more alcohol-tolerant than most yeasts, to a high-alcohol beer at bottling time can result in overcarbonation. —Ed.]

In addition to homemade potions, commercial liqueurs may be used as a source of exotic flavorings in beer. I have had very good results with triple sec (orange liqueur) and crème de cacao (chocolate). Spices may be added to these using the same method as with the vodka. Fruit-flavored brandies often have rather elegant fruit character and also work well, especially when some real fruit is used along with the brandy. I have used as much as a full 750-milliliter bottle of liqueur in a five-gallon batch of beer.

Keep in mind that the liqueurs contain a certain amount of sugar that must be considered as priming material. You can determine the quantity of sugar present by measuring the specific gravity of the liqueur. (Alcohol is lighter than water, so the specific gravity will be lower than if you had a solution of sugar in water.) By subtracting the effect of the alcohol, which is a clearly labeled quantity, you can determine the amount of sugar present. These numbers will get you in the ballpark: for 80-proof add 20 °Plato to the measured gravity; for 60-proof add 15 °Plato; for 40-proof add 10 °Plato. Once you've added the appropriate number of degrees Plato to compensate the alcohol, it is simple to calculate the amount of sugar present. Because degrees Plato are a measure of the percentage of sugar, just multiply the degrees Plato (as a decimal: 10 °Plato = 0.10) times the weight of the liqueur. You can weigh the stuff or calculate it. A 750-milliliter bottle of pure water weighs 26.7 ounces, which is probably a good figure to use since the lighter weight of the alcohol about cancels out the added weight of the sugar. Multiply the weight by the degrees Plato (10 °Plato= 0.10), 26.7 X 0.10 = 2.7 ounces (net weight) of sugar present in the liqueur. Subtract this from the weight of the sugar with which you intended to prime. It may be useful to know that a cup of corn sugar is roughly equal to 6.7 ounces by weight.

There are a number of commercially prepared flavoring extracts meant for preparing homemade liqueurs. Home wine and beer shops often carry these products in all common liqueur flavors. Many, like hazelnut and crème de cacao, are difficult to extract on your own and are well worth using. Some brands and flavors are better than others and some contain oil that may cause head retention problems. Be sure to check out the one you plan to use with the small-scale test discussed above. Watch carefully for deleterious effects on the head, especially with orange-flavored varieties.

Christmas Ale

This beer is a moderately hopped dark "white" beer with complex malt character and brown color. Spice flavor is very soft and round with nothing sticking out. I used East Indian coriander, which is paler and more oblong than the common grocery-store variety and has a milder, less resiny taste.

Ingredients for 5 gallons

7	**pounds U.S. two-row lager malt**
1 1/2	**pounds U.S. six-row lager malt**
1 1/2	**pounds German or Belgian two-row Munich malt**
1 1/2	**pounds six-row pale malt, roasted 70 minutes at 350 degrees F (177 degrees C)**

2 1/2	pounds unprocessed oats, in husk
4	pounds wheat (malted or unmalted)
1	pound imported pale crystal malt
1	ounce chocolate malt
1/4	ounce Styrian Golding hops (90 minutes)
1/4	ounce Northern Brewer hops (90 minutes)
1/2	ounce Styrian Golding hops (30 minutes)
1/2	ounce Northern Brewer hops (30 minutes)
1	ounce crushed coriander (30 minutes)
1	ounce East Kent Goldings hops (10 minutes)
1	ounce East Kent Goldings hops (end of boil)
	liquid altbier yeast
1/2	cup corn sugar (to prime)

- **Original specific gravity: 1.083**
- **Bitterness: 45 IBU (estimate)**
- **Color: 30 °SRM (estimated)**

Cook oats and wheat like you would rice, until tender. If oatmeal and flaked wheat are substituted, they may be added directly to the mash without precooking. Mash at 152 to 155 degrees F (67 to 68 degrees C) for one hour. Be sure to mash-out at 170 degrees F (77 degrees C) before sparging. This will help keep the rather gooey mash flowing smoothly. Do not let the sparge bed get below 165 degrees F (74 degrees C) during sparging or it will stiffen up.

Spice Potion

12 1/2	ounces of the following mixture added at bottling:
250	milliliters crème de cacao
600	milliliters Curaçao or triple sec
50	milliliters Benedictine liqueur
1/4	teaspoon black pepper, cracked
1	teaspoon vanilla extract
2	teaspoons *cassia* buds (try a Chinese market; use cinnamon if *cassia* buds are not available)
1/4	ounce orange blossom petals or orange blossom water*
1/4	teaspoon aniseed
1/2	star of star anise
3	ounces cracked coriander

*Try Middle Eastern or Mexican markets to locate orange blossom petals or blossom water.

Mix all ingredients for the spice potion and allow to sit two weeks or more before filtering. This spice mixture will work with any kind of brown beer with 1.050 or higher original gravity.

The possibilities for potion concocting are endless. The best thing is that they let you "try before you buy," reducing the risks associated with such bold new territory. You can even dose a bottle or two and continue to nurture the seasoning elixir, which will last indefinitely. And what to make? How about a dark and dangerous Pirate Stout, filled with such exotic ingredients as galingale root and grains of paradise. Or a fresh, ethereal springtime ale with honey, heather, sweet woodruff and basil. Maybe your taste leans toward a medieval gruitbeer with wild rosemary and sweet gale. And if you come up with something really weird, save a bottle for me.

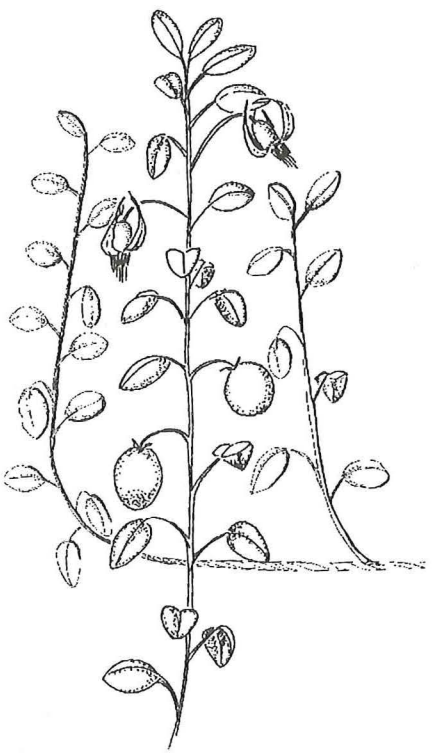
CRANBERRY BEER

By Chip Jarry

Picture a hot dry summer day, your throat is parched and dusty and your brow is covered with perspiration. Then imagine quenching your thirst with a tall, cool, refreshingly tart cranberry beer. Cranberries and beer were made for one another. In addition to being a thirst quencher and an excellent appetizer, this is a great table beer that complements chili, smoked foods, Tex-Mex and yes, even turkey.

Cranberries add a refreshing zing to beer, somewhat reminiscent of a Berliner Weisse. The unique tartness of cranberry balances especially well with the light crisp characteristics of wheat, as well as the sweetness of malt. The aroma is faintly sour and cidery, with the cranberry barely coming through the aroma of the malt, hops and characteristics of some of the yeasts used.

Cranberries add some reddish tinge to the beer's appearance, but most beers end up in the golden to medium amber color range.



cranberry

Large cranberry (*Vaccinium macrocarpon*) is a creeping shrub. The leaves are small, wedge-shaped to round, blunt-tipped, evergreen, flat or with slightly rolled edges, slightly whitened or pale beneath. The leaves are about one-fourth to five-eighths inches long. The stems are slender and pinkish flowers appear June through August. Fruits are red or dark red, seven-sixteenths to thirteen-sixteenths inches in size and are ready for harvest September through November. The cranberry can be found growing wild in boggy locations from Newfoundland to Washington state and as far south as Arkansas. The major growing areas are Massachusetts, New Jersey, Wisconsin, Washington, Oregon and parts of Canada.

Cranberries can only grow in a special combination of factors including acid peat soil, an adequate supply of fresh water and a prolonged growing season that stretches from April to November. Contrary to popular belief, cranberries do not grow in water. Instead, they grow on vines in beds layered with sand, peat, gravel and clay. These beds, commonly known as bogs or marshes, were originally made by glacial deposits. According to Ocean Spray there are more than 100 varieties of cranberries but only four — Early Black, Howes, McFarlins and Searles — account for most of the cranberries in North America.

Now that you are armed with this information you could go out and start picking. However, your best bet to find quality cranberries quickly is in the produce or freezer section of your favorite grocery store. Fresh cranberries are available in stores from mid-September through December and are available frozen throughout the year.

According to Sanborn C. Brown in his book *Wines and Beers of Old New England,* the colonists made alcohol from just about anything that would ferment, including the sap of maple and black birch trees, cornstalks, apples, honey, grapes, corn, molasses, plus various other berries and fruits. But there is no mention of cranberries in beer.

The only use I could find anywhere is Samuel Adams Cranberry Lambic. Despite the label it's not a lambic, but it does have cranberries and is mighty tasty! It usually shows up in liquor stores in September.

Both of the recipes provided contain wheat malt. Other recipes using 100 percent malted barley seem to hide the unique qualities of the cranberry. The light, refreshing nature of the wheat lends itself well to the addition of fruit because it tends to complement rather than overpower.

To prepare cranberries for use in the recipes below, place fresh or frozen cranberries (do not thaw first) in a food processor, chopper or blender and finely grind or purée. Add the resulting purée to the brewpot for the last 30 minutes of the boil.

All-grain brewers can substitute two-row barley and wheat malt for the extracts. Target original specific gravities are between 1.045 and 1.050.

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

Scott's Cranberry Wheat

Recipe courtesy of Scott Keefe from Worcester, Mass.

Ingredients for 5 gallons

- **1 1/2 pounds fresh or frozen whole cranberries**
- **7 pounds Ireks Bavarian Weizenbier 100 percent wheat extract**
- **1 tablespoon Irish moss (15 minutes)**
- **14 grams Glenbrew Secret Brewers yeast (1 packet)**
- **3/4 cup corn sugar to prime**

Prepare cranberries as described above. Bring to a boil all malt extract and cranberry purée and boil for 30 minutes. Force cool, then strain off any sediment and Irish moss as you rack into primary fermenter. Top up to 5 gallons and pitch yeast. Ferment one week in the primary, two weeks in a carboy. Replacing the Glenbrew yeast with Wyeast Bavarian Weizen yeast produces a smoother, fruitier and better-balanced beer.

Please note the Ireks extract is 100 percent wheat. Also, this recipe contains no hops, and you might think you would encounter stability problems but this beer is so delicious it will not be around long enough to develop any problems. The tantalizing sourness reminds me of Berliner Weisse without the cranberries. Enjoy!

Giving Thanks Cranberry Beer

Ingredients for 5 gallons

- **6 2/3 pounds Northwestern Weizen extract**
- **1 ounce German Hallertauer hops, about 5 HBUs (45 minutes)**
- **1 ounce Tettnanger hops, about 6 HBU (45 minutes)**
- **1 1/2 pounds fresh or frozen whole cranberries (30 minutes)**
- **1 tablespoon Irish moss (15 minutes)**
- **Wyeast Bavarian Weizen yeast**
- **3/4 cup corn sugar to prime**

Prepare cranberries as noted above. Boil 5 gallons of water, the malt extract and hops for 45 minutes. Add cranberry purée and boil for 30 minutes. Force cool, then strain off any hops and Irish moss as you rack into primary fermenter. Top up to 5 gallons and pitch yeast. Ferment one week in the primary, two weeks in secondary.

This beer is fuller, less tart and better balanced than Scott's Cranberry Wheat. The malt extract Northwestern's Weizen (65 percent wheat and 35 percent barley) is sweeter and less dry than the Ireks 100 percent wheat, which balances well with the addition of hops. You'll pick up spicy and fruity hints from the hops and yeast in both the aroma and the palate. This beer more closely resembles Samuel Adams Cranberry Wheat.

References

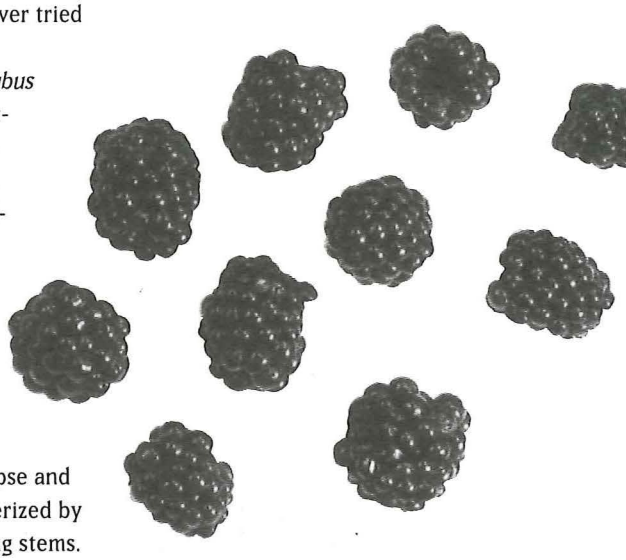
Brown, Sanborn, *Wines and Beers of Old New England*, Hanover New Hampshire University Press, 1978.

BREW BLACKBERRY BEER

By Bob Barson

In my profession as a bartender I get to talk to many people about beer. During the course of these conversations I usually mention my homebrewing activities and the subject of fruit beers always comes up. Most people are surprised that beers with fruit even exist, but anyone who has ever tried one enjoys it.

Blackberries are of the genus *Rubus* and are grown throughout the United States. There are about 10,000 acres under blackberry cultivation. The growing season is longest in California where it stretches from May to November. For those of us living in the Midwest, we are fortunate enough to have the most consistent crops with a growing season from July to September.



Blackberries are a common copse and hedge plant. The bush is characterized by prickly, erect, semierect or trailing stems. The leaves have usually three or five oval, coarsely toothed, stalked leaflets, many of which persist through winter.

Blackberries have been used medicinally in tea as a cure for constipation.

There are many varieties of blackberries and blackberry hybrids. There are at least 14 blackberry-raspberry hybrids alone. Keriberries (*R. moluccanus*) are larger, rounder, more tart and have fewer seeds than blackberries. The Navajo berry is deep black in color with an in-between flavor, not too tart or sweet.

Blackberries start out red to maroon in color and are harvested when the cells are black. When fully ripe they lose some of their tartness. It is best to use fresh berries in beer because frozen berries usually are over ripe.

Now that I have satisfied some of the scientific curiosity that so many homebrewers have, let's talk about beer! While there is no historical use of blackberries in brewing, we all know Belgian brewers have been using raspberries, cherries and peaches in beer for many years. Usually the fruits are used in lambics, but a very good kriek (cherry beer) is made on a base of Liefman's brown ale. Homebrewers, being an adventurous group, have put together some very interesting combinations — black raspberry imperial stout, cherry stout, cherry wheat cream ale and even a raspberry mocha stout! When using any fruit in brewing it is always best to use the fresh product, but you also need the juice to impart flavor to the beer. The freezing process naturally breaks the skin so freezing the fresh fruit saves a lot of time and mess.

Remember when using fruits, especially blackberries, that you still want your brew to taste like beer, not wine. One-half to one pound of fruit per gallon is enough for most beers. Blackberries are more tart than other berries, so keep the quantities down.

When hopping a fruit beer, low alpha-acid, aromatic varieties such as Saaz, Goldings or Cascades are best because they have pleasant aromatic qualities. High alpha-acid bittering hops tend to have rougher aromatic qualities that can overwhelm the aroma of

blackberry

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

the fruit. Dry-hopping is a good way to aromatize, especially with blackberries because they are very aromatic to begin with.

Traditionally the fruit is added to the wort during the secondary fermentation. This method can be very tricky for homebrewers because the fruit will always rise to the top of the wort during fermentation. If you use this method, be sure to have a lot of head space in your fermenter (at least one-third the volume) and use a large blowoff tube that completely fills the neck of the carboy fermenter. An alternative (to avoid clogs) is to use a wide-mouth fermenter such as a bucket or stainless-steel pot with the lid on loosely. While blackberries are small, the seeds and broken fruit will easily clog any small opening, such as an airlock, ensuring a sticky mess to clean up. I know from experience. My own method is to add the thawed berries to the wort at the end of the boil. I steep the cold fruit for about 30 minutes. This also helps bring the wort down to pitching temperature. I then add the wort to a plastic fermenter. While I prefer to use a glass carboy for primary fermentation, I use plastic for fruit beers because it provides more head space during fermentation, preventing the airlock from clogging with fruit that rises to the top.

Although the initial fermentation can be quite volcanic, the more complex sugars in the fruit take some time to ferment out completely. After bottling, resist the temptation to consume your brew too soon. Fruit beers are best after 12 months in the bottle.

Triple B Blackberry Ale

6	**pounds Munton and Fison plain light dry malt**
1	**pound CaraVienne malt**
1	**pound 120 °L crystal malt**
1	**ounce Saaz hops, 3.1 percent alpha acid (90 minutes)**
1/2	**ounce Hallertauer-Hersbrucker hops, 2.9 percent alpha acid (60 minutes)**
4	**pounds blackberries (20 minutes), after the boil**
1	**teaspoon Irish moss (15 minutes)**
1	**ounce Cascade hop pellets, 4.9 percent alpha acid (dry hop)**
4	**ounces 100 percent Dextrin powder**
14	**grams Whitbread dry ale yeast**
1	**teaspoon ascorbic acid at bottling**
750	**milliliters LeRoux blackberry brandy to prime**

- **Original specific gravity: 1.068**
- **Final specific gravity: 1.010**

Mash grains in oven at 150 degrees F (66 degrees C) for 45 minutes. Primary ferment in plastic at 70 degrees F (21 degrees C), secondary ferment in glass at 64 degrees F (18 degrees C).

Acknowledgments

Thanks to Tom Corneill of Corneill & Sons Produce Co. in Chicago for his astounding encyclopedic knowledge of blackberries. I could not have written this article without him.

ROMANCING THE RASPBERRY

By Byron Burch

raspberry

Raspberries, like blackberries, boysenberries and loganberries, are brambles of the genus *Rubus*. The distinction that separates raspberry species from their close relatives is not an immediately obvious characteristic such as color. From appearance alone, in fact, it might be hard to tell a red raspberry from an unripe blackberry. What distinguishes raspberries from other brambles is actually a physical difference. When picked, the raspberry comes away clean leaving its central core behind. Raspberries grow in many places around the world, with wild strains being extremely widespread.

When most people think of raspberries, the red raspberry comes to mind. There are two ancestral strains: European (*R. idaeus*) and native American. When raspberries are used in brewing light-colored beers the drinker usually will anticipate something of a reddish cast, and may even be disappointed if it isn't there.

For coloring, you might consider the purple-flowering raspberry (*R. odoratus*), typically used for decorative purposes because it is not as sweet or fine-flavored as other species. A better choice is its close cousin the black or blackcap raspberry (*R. occidentalis*), which is similar in color to the blackberry.

Golden raspberries, which may be variants or cultivars of red raspberries, not only have a distinctive color but can be sweeter than red raspberries.

Raspberry plants have long been considered medicinal, with references going at least as far back as Pliny (A.D. 23-79). The leaves and roots are used to make tea.

In brewing, however, it is not usually the medicinal value of an ingredient that concerns us, except when talking about alcohol, of course. What we are normally interested in is the effect of the ingredient on the appearance and flavor profile of the beer.

When it comes to that, few, if any, fruits, berries, herbs or spices have as wide an appeal as do raspberries.

The appeal of raspberries doesn't seem to rest on any single characteristic, though aromatic components play the largest part. One of the first impressions given by raspberries is caused by the extraordinarily perfumy, fresh raspberry aroma, at once fruity, floral and sweet, almost musky. In a raspberry wine or mead, where the berry characteristics stand more or less alone, it is this incredible "nose" that is most memorable after the fact.

Accompanying these aromatics is a fruitiness of flavor that seems to range from sweet to tart without losing anything in the process. Compared to the richness of its aromatics, the flavor is quite straightforward, lean and spare.

The same spareness could be a useful distinction when comparing the raspberry to some of its close relatives, such as blackberries and especially boysenberries. Those berries have more depth to their lushness, but the characteristics of raspberries seem lighter and more ethereal.

If the primary charm of the raspberry is contained in its aroma, when using these berries in brewing they should be treated so their aromatics are preserved as much as possible. The two most common options are flavor extraction by boiling and pulp fermentation.

Boiling has advantages in terms of sanitation and color extraction. Boiling of any length, however, will tend to produce a raspberry jam flavor, one of the world's best flavors if you are well-stocked with peanut butter, but in no way will such a cooked flavor do justice to a full dose of fresh raspberry aroma. Boiling also can set the pectins and cause a hazy brew.

I find the best raspberry character is produced by fermenting beer "on the pulp." This style of fermentation involves smashing the berries to break the skin and adding them to the wort just prior to fermentation. The fruit remains in the fermenter for four to six days of action, being pushed down into the liquid twice a day. The pulp is then removed, squeezed slightly and discarded.

An easy way to do this is to tie the smashed berries loosely in a nylon straining

ILLUSTRATION BY MARIE ORLIN
PHOTOS BY TIM SPOSATO

bag, so removal consists of picking up the bag, squeezing it slightly to let any trapped juice flow out and tossing out the berry pulp. I typically ferment in a stainless-steel pot with the lid on and rack after four or six days. I don't recommend a carboy/blowoff tube, clogs are dangerous and messy.

Freezing does not destroy the flavor or aromatics of raspberries. This has two advantages: First, if you are growing your own berries and have only a small amount ripening at a time, simply pick the few ripe ones and collect them in a plastic freezer container. Store frozen until you get enough to use. Second, frozen berries are cold. You can add them to your wort right at the end of the boil to speed up the chilling. If the berries are tied loosely, the surfaces will be effectively sanitized by exposure to boiling wort, and with speedy wort cooling little of the fresh raspberry character will be lost.

Raspberry flavors are extremely versatile, fitting well into several kinds of beers, not to mention meads and fruit wines. Commercially, of course, the first uses that come to mind are the serving of raspberry syrup with Berliner Weisse and the refermentation of lambics with raspberries to make the framboise style. Though the effects are quite different, in both cases the raspberry flavor adds interest to otherwise austerely sour beers. In the case of Weissebiers, of course, you simply add the syrup to taste. If you are trying your hand at duplicating a Lindeman's-style lambic, use up to 19 or 20 pounds of berries in five gallons of beer for your cask refermentation.

I have seen raspberries integrate quite nicely into several styles of homebrew. German-style Weizens and Dunkel Weizens are naturals, but pale ales and other beers work as well.

Depending on what you're after, the amount of berries used can vary widely. You may use only one, two or three pounds in a beer of ordinary strength (1.040 to 1.050), in order to preserve subtlety and merge the berry overtones into the overall profile of the beer. Such would tend to be my normal approach. On the other hand, you could use 10 pounds of berries or more if your goal is a real berry blast.

Personally, I believe the ultimate use of raspberries is in the very black beers, the porters and stouts that frequently blend chocolate, coffee and other roasty overtones. This should be no surprise, given the long-standing propensity of dessert chefs worldwide to combine raspberry, chocolate and coffee flavors in wildly romantic ways.

Note that, as with other dark beers, you should use water high in temporary (but not permanent) hardness. The alkalinity of the water helps neutralize the extra harshness of the roast (burnt) grains. This is even more necessary when using raspberries because they contribute additional acidity to the beer.

Here is the recipe for my October 1993 effort (my personal favorite to date). I estimate the total amount of temporary hardness from my well water and the added chalk (calcium) to be at least 200 parts per million.

"Gospodi Pomilui" Raspberry Imperial Stout

Ingredients for 5 gallons

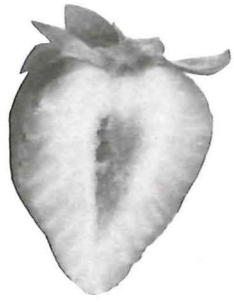
- **5 pounds Beverage People™ extra dark dry malt**
- **3 1/2 pounds Beverage People™ amber dry malt**
- **1 pounds chocolate malt**
- **8 ounces U.S. two-row malt**
- **8 ounces Belgian CaraVienne malt**
- **8 ounces 40 °L crystal malt**
- **8 ounces 20 °L crystal malt**
- **4 ounces 90 °L crystal malt**
- **4 ounces 10 °L Munich malt**
- **3 pounds Meadmakers Magic™ Canadian clover honey**
- **2 pounds The Beverage People™ dry rice extract**
- **1 pound Lyle's Golden Syrup (or additional honey)**
- **2 1/2 ounces lactose**
- **1/4 teaspoon powdered chalk (calcium)**
- **2 ounces Eroica hop pellets, 74 IBU (75 minutes)**
- **6 pounds red raspberry purée (or 7 pounds crushed berries)**
- **1 quart Pasteur Champagne liquid yeast starter**

- **Original specific gravity: 1.110**

Stir grains into 10 quarts of 160-degree-F (71-degree-C) water and mash for 60 minutes. Sparge with four gallons water.

BREW STRAWBEERIES

By Mike Stiles



The wildwood strawberry, *Fragaria vesca*, was mentioned in Greek and Roman times but was not cultivated until the Middle Ages as far as is known. A very sweet and small berry, this species was, and still is, abundant throughout Europe.

Strawberries had an enigmatic quality and were taboo to eat in ancient Greece. They were purported to have various medicinal properties in Roman times, and in the Middle Ages treated everything from gout to gum disease. There were very few "gum gardeners" back then, so rubbing a lotion made from strawberry juice on the gums to tighten loose teeth was the next best thing.

Indians in North America cultivated a fruited strawberry, *F. virginiana*, that was first noted in the early 1600s. A French explorer/spy, Captain Amédée Frézier (1682-1773), discovered another large variety, *F. chiloensis*, while on a mission to locate Spanish fortifications in Chile in the early 1700s. The modern cultivated strawberry, *F.* x *ananassa*, is a hybrid of *F. virginiana* and *F. chiloensis* developed by Antoine Duchesne in France in the 1760s. *F.* x *ananassa* is self-fertile and needs no interplanting with other species.

The cultivated strawberry is a hybrid of two highly variable species and can be grown successfully in extremes from irrigated desert to areas of high rainfall, from sea level to two miles high, and from cold tundra to the tropics. In the United States, 130,000 acres are devoted to commercial strawberry production. California's 8,000 acres produce one-quarter of the world's strawberry crop. Strawberries are usually picked before they are ripe, then shipped. The farther they are shipped, the earlier they are picked. Strawberries do redden when harvested early but won't attain their fullest flavor potential and will have a lower vitamin content. Thus, strawberries that are available in the winter in the United States from Chile tend to be on the tart side.

Sweetness of berries is a function of light intensity. Eight hours of light each day at a temperature less than 59 degrees F (15 degrees C) produces the sweetest fruit. Fertilization and soil composition also affect sweetness. Soils receiving potash and nitrogen produce fruit that is sour while berries from superphosphate and nitrogen are the sweetest. It is theoretically possible to cultivate a tart strawberry that could be used in a lambic-style beer similar to the traditional use of raspberries and cherries.

To retain maximum sweetness and vitamin content, strawberries should be picked when they are deep red in color. The sweetest, ripest berries come from local producers, some fresh frozen brands (unsweetened) or from your garden. Strawberries can be grown in patches or borders in your yard, a strawberry barrel or jar, strawberry pyramid, planter or greenhouse. Each plant can produce from one to five quarts of berries, depending on growing conditions. Strawberries should be planted in the early spring after any chance of frost except in coastal California, the South and the Southwest, where they should be planted in the fall. In Florida they may be planted in winter.

Information on the historical use of strawberries in beer is scarce. Russ Schehrer in ***zymurgy*** Summer 1992 (Vol.15, No.2) says strawberries were used in beer in South America called *fruitillada*.

I know of two commercial examples of strawberry beer. Strawberry Blond is brewed by the Belmont Brewery in Long Beach, Calif., by Brewmeister Malcolm McDonald with a water-based strawberry extract. (Fruit extracts that are based on corn syrup or propylene glycol tend to produce several undesirable aromas and flavors.) The second is a strawberry wheat brewed by Breckenridge Brewery in Denver, Colo. Head brewer Todd Usry uses fresh frozen strawberry purée added in the boil, three quarters of the way through fermentation and in the conditioning tank.

The delicate strawberry flavor/aroma necessitates using two to 2 1/2 pounds of berries per gallon of wort in order for their flavor to be expressed in the finished beer. Light malts are better than amber to bring out the flavor and aroma of the berries. Lighter beers also will exhibit a pinkish to light red coloration in the head. Dark and roasted malts should not be used because the fruit will be overwhelmed by their flavor and aroma. A

strawberry

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

small quantity of 10 °L crystal malt may be used to increase the body and head retention; for example, one-half pound per five gallons. A strawberry brew makes an excellent dessert beverage. It also goes well with an appetizer of Havarti cheese and sourdough bread.

The vitamin C content of strawberries is second only to black currants among fruits. Vitamin C is an antioxidant and will help keep the beer from producing unwanted oxidation flavors and aromas.

Fresh strawberries contain 17 milligrams of vitamin C per ounce, slightly less for fresh frozen. This gives 272 milligrams per pound of strawberries. Theoretically, using 2 1/2 pounds per gallon of beer would give 680 milligrams per gallon. Assuming 100 percent vitamin extraction, this results in 5.3 milligrams of vitamin C per ounce of beer. One 12-ounce glass of strawberry beer would contain 63.6 milligrams of vitamin C and satisfy the U.S. RDA of 60 milligrams per day. Unfortunately for brewers, not all of the vitamin C is extracted from the fruit; some gets bound with oxygen in the beer and the various heat processes destroy some of the vitamins.

The recommended hop rate is typically less than the normal rate for any light ale or lager because the bitterness doesn't go well with the fruit flavors and aromas.

I prefer ale yeast (Wyeast No. 1.056) to lager yeast because the fermentation begins and ends faster, reducing the chance of infection, plus the finished product is ready for consumption earlier. I have yet to try a strawberry lambic, but to do this I would use a tart crop of berries picked early, with 30 to 40 percent unmalted wheat and lambic yeast cultures.

Strawberries may be pasteurized at 150 to 160 degrees F (66 to 71 degrees C) for 15 to 20 minutes before fermentation. Care must be taken not to let the temperature rise above 180 degrees F (82 degrees C) or the pectin in the berries will set and the finished product will never clear. The wort is cooled to 160 degrees F (71 degrees C), the berries added and the temperature brought back up to 160 degrees F (71 degrees C) for 15 to 20 minutes. Add strawberries to the fermenter after hulling and quartering. Alternatively, they may be blended or run through a juicer.

Fresh berries may be added to the primary provided they are ripe and clean, and you are using a healthy yeast culture. Strawberries may also be added to the secondary, resulting in a healthy secondary fermentation. Strawberries contain fermentable sugars that result in a vigorous, volcaniclike fermentation. For this reason, a plastic fermenter should be used if the berries are added to the primary or the secondary. The plastic lid can be forced off during peak fermentation causing strawberry-colored ooze to run down the side of the fermenter so it is necessary to choose a spot that can be cleaned easily. An alternative is to use a 1 1/4-inch outside diameter blowoff tube.

Strawberry Fields For'Aler

Ingredients for 4 1/2 gallons

6	**pounds light dry extract**
1	**pound liquid wheat extract**
1	**pound light clover honey**
1	**ounce Centennial hops, 10.1 percent alpha acid (30 minutes)**
1	**ounce Centennial hops, 10.1 percent alpha acid (20 minutes)**
1	**ounce Tettnanger hops, 3 percent alpha acid (five minutes)**
10	**pounds of strawberries, pasteurized for 20 minutes at 160 degrees F (71 degrees C)**

Wyeast No. 1.056 American ale yeast in a starter

- **Original specific gravity: 1.048**
- **Final specific gravity: 1.010**

After about one week of primary fermentation, rack to a secondary glass carboy for clearing, then keg or bottle the beer. Rack at least twice to remove the berry remains. I start with 4 to 4 1/2 gallons of wort, add 2 to 2 1/2 pounds of strawberries per gallon to a 6 1/2 gallon plastic fermenter and end up with around 4 gallons of beer.

References

Darrow, George M., *The Strawberry History, Breeding, and Physiology,* Holt, Rinehart and Winston, 1966.

Hendrickson, Robert, *The Berry Book,* Doubleday, 1981.

Jackson, Michael, *The New World Guide To Beer,* Running Press, 1988.

Papazian, Charlie, *The Complete Joy of Home Brewing,* Avon Books, 1984.

Wright, D. Macer, *Gardening With Strawberries,* Drake 1973.

OPTIONS FOR ADDING FRUIT

By Al Korzonas

Some fruit beer recipes call for adding the fruit at the end of the boil, some to the primary and others to the secondary. Many recipes suggest the fruit be pulverized before use (actually this will make racking more difficult) when cutting the fruit into small pieces is sufficient, and others suggest using whole fruit. Which procedures are best and what are the factors brewers should consider when adding fruit to beer?

Three main things must be considered when making fruit beers: (1) blowoff, (2) maintaining aromatics and (3) sanitation.

Blowoff

A five-sixteenths-inch outside-diameter blowoff tube, as is often recommended in brewing texts, can clog even when used for fermenting a regular beer without all the fruit pulp that will be carried up in the kraeusen. An oversized, three-fourths-inch outside-diameter blowoff tube won't clog with regular beers, but has been known to clog when used with fruit beers. The safest alternative is to use a 1 1/4-inch outside-diameter blowoff tube, which is nearly certain to remain clear regardless of the amount of blowoff that is created.

Maintaining Aromatics

Fruit flavors are mostly just aromas. Our tongues sense only sweet, salty, sour and bitter, but our noses can distinguish thousands of aromas. What identifies most fruits is their aroma. Adding fruit at the end of the boil will reduce the aromatics because most will be boiled away. Adding fruit to the primary also will reduce the potential aromatics because the carbon dioxide emitted carries with it much of the aromatics. To maximize the aromatics you gain from fruit, they should be added to the secondary after the primary ferment has subsided, minimizing the amount of scrubbing of fruit (hop, herb, or spice for that matter) aromatics caused by evolving CO_2. Some CO_2 will be produced from the fermentation of the fruit sugars, but much less than from the primary ferment.

Sanitation

Adding fruit at the end of the boil solves the problems of sanitation, but also sets the pectins that make the beer permanently cloudy and adds a cooked-fruit flavor. The cloudiness often is referred to as pectic haze. Pectic enzyme can be used in the fermenter to reduce this haze, but the cooked fruit or jamlike flavors will not be removed.

Adding fruit to the primary or secondary means that you will have to sanitize it somehow. Again, boiling is a possibility but you have the same problems as noted before. One alternative is to put the fruit in water, heat to 150 to 160 degrees F (66 to 71 degrees C), rest for 15 to 20 minutes and then drain the water.

Another way to sanitize the fruit is to use Campden tablets or metabisulfites. Typically one tablet per gallon of fruit juice is used. Sanitation occurs as a result of the sulfur dioxide gas that is produced. This will dissipate in about 24 hours at which time the juice is ready to be added to the fermenting beer. The disadvantage with using Campden tablets and metabisulfites is that they add sulfites to the finished beer and cause allergic reactions in some people. Some brewers have reported elevated sulfur aromas in beers made with metabisulfites — it could be a matter of varying sensitivity.

Blanching is another possibility but the user must walk a fine line between the risk of infection (too short a time, too cool a temperature) and the risk of setting pectins (too long a time, too hot a temperature). The fruit is first frozen (which helps break open juice "sacks" in the fruit) and then dipped for a few seconds in boiling water. Unblemished fruit (no cuts or insect marks) is best because you are only sanitizing the outside of the fruit. Blanching fruits like raspberries and blackberries is problematic because dipping the frozen fruit in the boiling water releases the juice, so brewers should be prepared to add the blanching water to the beer or lose much of the juice.

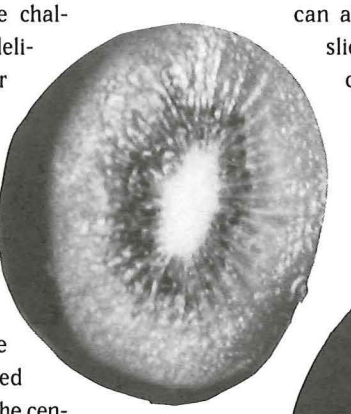
Commercially made fruit juices are a possibility and don't have to be sanitized, but make sure the juice is preservative free. Some preservatives can kill your yeast. Read the label for juice content also. Many cherry juices, for example, are mostly white grape juice with only a small amount of cherry juice.

Finally, fruit extracts recently have become available to homebrewers. Many of these, despite claiming to be made from 100 percent real fruit, add medicinal or unpleasant bitter flavors to the finished beer. Try adding a few drops of the extract with an eyedropper to a glass of relatively neutral-tasting finished beer to see if the flavors added are what you want before you commit a full batch.

GET A FRUIT KICK FROM KIWI

By Kevin Johnson

I was inspired to make kiwi fruit ale because I imagined it would be perfect for those hot summer days, and for the challenge of balancing the fruit's delicate flavors with the subtle beer qualities of malt and hops.



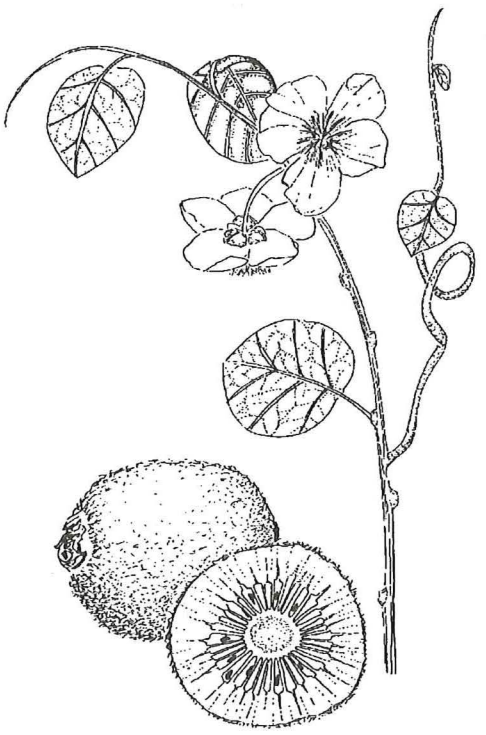
Kiwi fruit (*Actinidia deliciosa*) is native to the Yangtze Valley in China. There are about 50 species, but only a few are grown for edible fruit. Originally (in English) called the Chinese gooseberry, kiwi was imported to New Zealand at the turn of the century. All of the New Zealand varieties are descended from the first seeds brought from China. The deciduous fruiting vines that produce kiwi fruit grow vigorously to a height of 30 feet. Kiwi fruit is now exported not only from New Zealand but also from Kenya, Italy, Israel and California.

Kiwis are about the size of a hen's egg and have a brown hairy skin. Inside is a vivid green flesh, all of which is edible. In cross section, a decorative pattern of lighter-colored rays is interspersed with numerous small dark seeds radiating from the center. Kiwi fruit has a berrylike flavor, tangy and tart with a strawberrylike aftertaste. It's a refreshing, delicate flavor and can be eaten on its own or combined with other fruits in salads or desserts.

When picking kiwi fruit, choose firm, plump fruits that are unblemished. They should give slightly when squeezed if they are ripe, although they can always be ripened in a warm place in a paper bag. When very ripe they can be peeled with the fingers or with a very sharp knife. If the skin does not come off easily, dip the fruit in boiling water for a few minutes. The riper the fruit the more sweet and less tangy it becomes. Don't use kiwi fruit if the flesh is dark green or bruised; this indicates over ripeness. Kiwi fruit has a long shelf life if stored properly. It will last for weeks when refrigerated and can be maintained in good condition in a cool place without refrigeration. Kiwis can also be frozen whole or sliced and stored in airtight containers.

Because kiwi fruit has a delicate and tangy flavor, I recommend matching it with a beer that is light in color, medium-bodied, sweet in maltiness and not too aggressively hopped, especially in the finishing hops. I wanted an ale that wasn't so fruity it ended up tasting like a soft drink, even though I have been criticized for not having the kiwi fruit flavor reach out and grab you by the throat. A blast of fruit would upset the delicate balance of the malt, hops and fruit throughout the profile of the beer. Your beer is the vehicle for whatever fruit you choose and should accent the fruit flavors from aroma to aftertaste. Adding too much kiwi will throw off the overall balance and the beer will become too tart and tangy.

To achieve the malt profile, I add a small amount of malted wheat because it brings out the aroma and flavor of the fruit and helps with head retention. I use 10 °L crystal malt to increase maltiness and not affect the color profile of the finished beer.



kiwi

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

Kiwi Fruit Ale

Ingredients for 6 1/2 gallons

9	pounds American two-row malt (Klages)
1	pound malted wheat
1	pound American 10 °L crystal malt
1/4	pound light, raw, unfiltered honey
1	ounce Cascade hops, 6.1 percent alpha acid (60 minutes)
1	ounce Hallertauer hop pellets, 4.3 percent alpha acid (30 minutes)
1	teaspoon Irish moss (15 minutes)
1	ounce Hallertauer hop pellets (end of boil)
5	pounds kiwi fruit, peeled and diced
	Wyeast No. 1056 American ale yeast
2	tablespoons Sparkolloid® powder (a settling agent)
5	ounces (by weight) corn sugar (to prime 5 gallons)

- **Original specific gravity: 1.055**
- **Final specific gravity: 1.011**

Use soft filtered water with no water treatment. A four-step mash gives me better conversion of my malt and a more complex flavor profile.

Heat to 115 degrees F (46 degrees C) for 20 minutes, 125 degrees F (52 degrees C) for 20 minutes, 145 degrees F (63 degrees C) for 20 minutes and 156 to 157 degrees F (69 degrees C) for 35 minutes. Heat to 168 degrees F (76 degrees C) and sparge with 170-degree-F (77-degree-C) water.

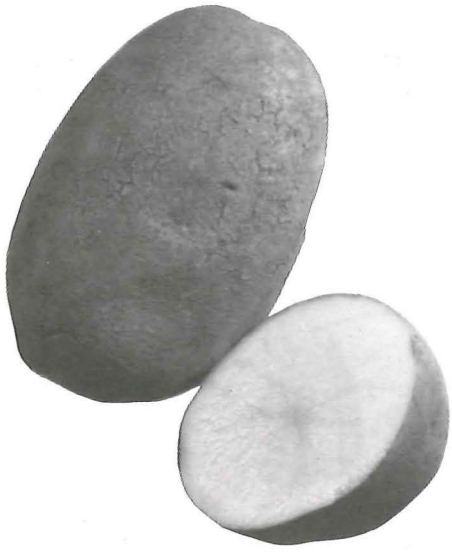
Add the honey at the beginning of the boil. To prepare kiwi, peel the fruit and dice small enough to fit into your primary fermenter (size is an issue if using a glass carboy). Add the kiwi at the end of the boil along with your finishing hops and turn off the heat. Let stand covered for five minutes, then cool. Fruit and trub will account for between one and 1 1/2 gallons, so you will have enough beer to rack into a five-gallon carboy for further aging in secondary. Aerate and pitch Wyeast American ale No. 1056 for a fruity, dry finish and a neutral, clean overall flavor.

Primary fermentation should take from 14 to 18 days or until kiwi fruit is fully fermented. It will have risen to the top of the fermenter and be a light pasty green. Dissolve Sparkolloid® powder in 1 1/2 cups boiling water and immediately put in secondary fermenter. Rack beer into the secondary fermenter with the still hot Sparkolloid® solution and age for two weeks before bottling. Age in the bottle one month before consuming. Alcohol is about 6.0 percent by weight.

This ale ages very well, retaining the kiwi flavor, and actually improves as the flavors blend and mellow. Kiwi fruit seems to preserve the overall beer quality because the ascorbic acid prevents oxidation. Hold some beer back and check periodically as it ages. You'll have a very refreshing, pleasant beer for months to come.

THIS SPUD'S FOR YOU — POTATOES AS A BREWING ADJUNCT

By Brad Kraus



potato

Potatoes, the humble yet noble tuber (*Solanum tuberosum*, a member of the nightshade family *Solanaceae*), originated on the western coast of South America and were first cultivated by the Incas 2,000 years before Columbus set sail. This staple food of the high mountain people was believed to have healing properties. Raw slices were attached to broken bones, placed against the head to cure aches and eaten with other foods to stop a stomach ache. The Incas rubbed it on their bodies to heal skin diseases and carried slices to prevent arthritis. Spanish explorers soon learned of the potato's value as food and packed them aboard to feed the sailors of ships hauling gold and silver back to Spain.

The French botanist Carolus Clusius (1526-1609) claimed it was good for health and increasing sexual desire. Peasants, however, feared the new plant would make them weak and cause disease. During the 1600s, herbalists promoted the potato for its medicinal qualities while downplaying its use as a food. In 1744, Frederick II of Prussia commanded the peasants to plant potatoes and provided them the seed stock.

England didn't produce potatoes in any quantity until the late 1700s. The Irish were the first to accept the potato, while the English decried it as common. The opposite was true in Europe where peasants thought it a luxury food not for them. That changed with the industrial revolution, when potatoes became the cheapest source of food for poor factory workers. The Irish took to growing the potato because their crops and livestock were ruined by the savage enforcement of British rule during the reign of Elizabeth I. The tubers were easy to grow and prepare and took less space than other crops. By 1801, nine-tenths of the Irish had replaced their old diet of meat, milk and oatmeal with one based on potatoes. The Irish population peaked at more than eight million in 1840, but recurring blights in 1845, 1846, 1848 and 1849 caused the Irish potato famine in which two million people died and another one million fled their homeland.

The potato was slow to be accepted as a food, so its use as an adjunct in alcoholic beverages has a scant history. That vodka in Lithuania, Poland and Russia is made from potatoes is well-known, but in truth whatever is cheap and plentiful, whether it be grain or potatoes, is used to make this spirit. Potatoes were used to make illegal alcoholic beverages during Prohibition and in prisons because of the plentiful supply and easy access. These beverages had more in common with wines because of their alcoholic strength and lack of malt in the recipes as well as the incorporation of fruit. As a brewing adjunct, potatoes were considered during World War I and II because of shortages of basic brewing ingredients. The Germans despaired of their use during World War I because of the effects on flavor (or lack of it) and odor. It was again considered in the United States during World War II, but was not deemed acceptable because of the problems of scant supply, transportation, storage and spoilage.

A new interest in potato beers has come about through the efforts of homebrewers and small commercial brewers alike. Terry Dennis, brewmaster at the Table Rock Brewpub and Grill in Boise, Idaho, first made a spud beer as a homebrewer and entered it as an American light lager in the 1987 Dixie Cup Competition in Houston, Texas. He also had some for the Ida Quaffers Homebrew Club annual picnic in 1987 and drew the attention of the local press and potato growers. For the past three years, Terry has made a 10-barrel batch to sell at the Table Rock Brewpub and Grill in Boise.

John Zappa, brewmaster at Point Brewing Co., Stevens Point, Wis., has been making Spud

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTOS

Premier Beer since 1989. It is made in honor of the Spud Bowl, the first game of the season for the University of Wisconsin at Stevens Point. Proceeds from sales go to the rural scholarship and athletic funds. Wynkoop Brewing Co. in Denver, Colo., brewed a Kölsch-style potato beer during the summer of 1993, according to brewer Kyle Carstens. It was brewed for the Colorado Potato Growers Association from Colorado russet potatoes in a 20-hectoliter batch.

Potatoes are useful as an adjunct because of their considerable starch content. They contain only 100 calories per 100 grams (four ounces) and are 20 to 25 percent carbohydrates. Potatoes contain no fat, very little sodium and less than 2 percent albuminoids (proteinic substances) thereby avoiding the haze problems those substances can cause in making beer.

Potatoes in America can be divided into four basic categories: russet, long white, round white and round red. The russet Burbank potato, also known as russet or Idaho, is long, slightly rounded and has a brown, rough skin and numerous eyes. Named for its developer, horticulturist Luther Burbank, its low moisture content and high starch content make it the choice for baking, frying and as an adjunct. Long white potatoes have a similar shape to russets, but they have thin pale gray-brown skins with very small eyes. They are sometimes called white rose or California long whites, after the state where they were developed. They are the second best choice for adjunct material. Round white and round red potatoes, both medium-sized, are almost identical except for the color of their skins. Commonly referred to as boiling potatoes, they have a waxy flesh that contains less starch and more moisture than the previous two varieties and are less useful as an adjunct.

Potato flour, also known as potato starch, is another useful form of potatoes. This is a gluten-free flour made from cooked, dried and ground potatoes. This is interesting because the Incas had a similar product they called *chuno,* probably the first freeze-dried food. They spread the potatoes on the ground and left them to freeze overnight in the dry, cold high mountain air. The next day they stamped out the moisture with their bare feet. They repeated the process for four or five days until all the moisture was gone and they had a fine white flour. This flour was a staple and could be stored for years. Before you run out and buy those instant potato flakes or buds, look carefully at the ingredient list. More than likely they contain preservatives that you don't want in your beer. The only other form of potato products readily available are frozen cut varieties that would save all that peeling. Again, I warn you to look at the ingredient list before you use them.

The impact of the potato on the flavor of the beer is minimal, I believe. While the literature I researched said German brewers found the effects on taste to be deplorable, I believe this to be from the lightness of flavor and body that the adjunct imparts. I personally have experienced off-flavors from the potato when used peel and all, and highly recommend only peeled potatoes be used. I also recommend only white-fleshed potatoes be used to minimize any effect darker ones might have. Though I wonder about those purple Peruvian potatoes, hmm?

Potatoes are readily available raw at almost any grocery store in America. Frozen varieties can be found in the freezer section of most large grocery stores. Potato flour or starch is most easily found in health-food stores, though some dried products are available in grocery stores as well. But again I emphasize, read the ingredient list before you buy.

Potatoes are perishable and should keep up to two weeks in a cool, dark, well-ventilated place. Warm temperatures promote shriveling and sprouting. Avoid potatoes that are wrinkled, sprouted or cracked. Prolonged exposure to light will create a green tinge caused by the alkaloid solanin, which can be toxic if eaten in quantity. The potato can be used if the bitter green portion is cut off. Potato starch can be stored easily for long periods of time if it is kept in a sealed container in a cool, dry place.

To effectively use potatoes as an adjunct, they must first be cooked to gelatinize the starches, unless potato flour is used. Two brewers I talked to who used raw potatoes used a russet variety and cut them up in some fashion. Kyle Carstens of Wynkoop Brewing said they heated "a bunch of French fries" to 160 degrees F (71 degrees C) before adding them to the mash. They used 200 pounds in a 20-hectoliter batch. Wynkoop Brewmaster Russ Schehrer said it made a somewhat glutinous mass that plugged the false bottom and stuck to the sides of the tun. Kyle didn't believe they got much yield out of the potatoes.

Terry Dennis of Table Rock Brewpub said he uses another method before precooking the potatoes. He creates "starch worms," essentially thin shreds of peeled potato, and soaks them in cold water with some amylase enzyme overnight at 35 degrees F (2 degrees C). Refrigerating potatoes does cause them to become quite sweet, though they have a tendency to turn dark. Terry then brought the potato shreds to a temperature above 150 degrees F (66 degrees C) and added them at the end of the mash, stirring them into only the top third of the mash to prevent the clogging problems experienced in the lauter-tun. He used 100 pounds in a 10-barrel batch for an original specific gravity of 1.042.

John Zappa of Point Brewing used potato starch. He cooked an unspecified amount with some of the malt in their adjunct cooker before adding it to the step infusion mash. The gelatinization temperature range for potato is reported to be 133 to 156 degrees F (56 to 69 degrees C) and therefore potato starch should not require precooking. Potato starch is reported to be readily converted in infusion mashes at a 20 percent replacement rate. But whatever John did, he did right, because the Spud Premier Beer I had was a great American lager.

The bottom line for brewing with raw potatoes is to peel, cut and cook them before adding to the mash. I would venture to say that cooking them with some of the malt probably is an unnecessary step. If you do not like the idea of boiling the potatoes in a sufficient amount of water to add as a second infusion, then the easiest way to cook them is in the microwave. And above all, do not mash your potatoes before mashing them. You will end up with a stuck sparge and one heck of a mess to deal with. Potato starch or flour, on the other hand, is the easiest to use, just stir into the mash with your malt. I would only recommend using potatoes in an all-mash recipe and only at a 20 percent replacement rate. Here's to mashing *with* potatoes!

American Lager "Spudweizer"

Ingredients for 5 gallons

- **7 pounds American two-row pale malt or 7 pounds total American two-row and six-row pale malt mixed**
- **1 pound potato starch**
- **1 ounce Hallertauer or Tettnanger hops, 4 percent alpha acid (90 minutes)**
- **1 ounce Hallertauer or Tettnanger hops, 4 percent alpha acid (five minutes)**
- **lager yeast**

- **Original specific gravity: 1.046**
- **Final specific gravity: 1.008 (your results may vary)**

Mash malt and starch at 151 degrees F (66 degrees C) for 60 minutes. Sparge, then boil wort for 90 minutes. Cool, oxygenate and ferment with lager yeast at 45 to 50 degrees F (7 to 10 degrees C) until finished. Rack and lager at 32 degrees F (0 degrees C) for three weeks.

Dry Stout "Paddy's Black Spud"

Ingredients for five gallons

- **9 pounds American two-row pale malt**
- **3 pounds potatoes, peeled**
- **1 1/2 pounds roasted barley**
- **1/2 pound 40 °L caramel malt**
- **3/4 ounce Bullion hops, 11 percent alpha acid (90 minutes)**
- **3/4 ounce Bullion hops, 11 percent alpha acid (45 minutes)**
- **3/4 ounce Kent Golding hops, 5 percent alpha acid (end of boil)**
- **ale yeast**

- **Original specific gravity: 1.056**
- **Final specific gravity 1.012 (your results may vary)**

Peel, cut or shred potatoes and boil in enough water to cover until cooked through. Mash malt at 146 degrees F (63 degrees C) for 30 minutes. Add potatoes to mash with enough boiling water to raise mash temperature to 154 degrees F (68 degrees C) and mash an additional 30 minutes. Try to keep potatoes in top third of mash to help prevent a stuck sparge. Sparge, then boil wort for 90 minutes. Cool, oxygenate and ferment with ale yeast at 65 to 68 degrees F (18 to 20 degrees C).

References

Briggs, Hough, Stevens and Young, *Malting and Brewing Science*, Vol. I, 2nd Ed., Chapman and Hall, 1981.

Herbst, Sharon Tyler, *Food Lover's Companion*, Barron's, 1990.

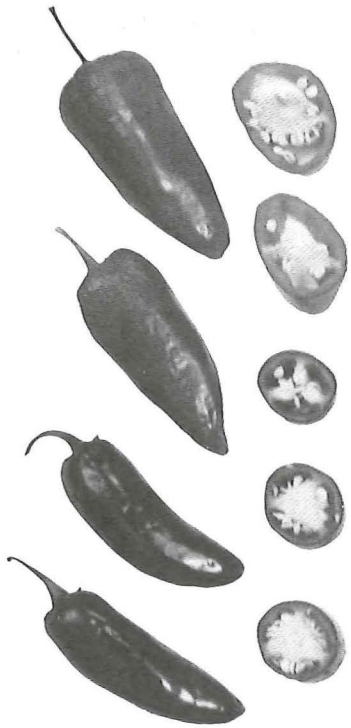
Meltzer, Milton, *The Amazing Potato*, HarperCollins, 1992.

Pennington, Jean A.T., *Bowes and Church's Food Values of Portions Commonly Used*, 15th Ed., Harper and Row, 1989.

"Treatise on War Time Brewing Materials," Research Division, J.E. Siebel Sons' Co., 1943. (My heartfelt thanks to Mr. Walter Swistowicz of the Siebel Institute for this one!)

TURN UP THE HEAT WITH CHILIES

By Ronald B. Moucka



As I embarked on my first chili beer, "why" was the question I heard most. "Why on earth would you want to put a chili pepper in beer? Fruits, even spices, but peppers?" I was beginning to have second thoughts. Was beer for starting fires or putting them out? "Jalapeños," one brewer said. "That's all you need to know, jalapeños." Unfortunately, that *was* all I knew. I realized I had better do a little research.

The chili pepper is fruit of the *Capsicum annuum,* an annual plant native to the northern portions of South America and member of the nightshade family *(Solanceae). Capsicum* is from the Greek *kapto,* to bite. The jalapeño is one of several peppers in the largest of pepper species. Several of the smaller, hotter chilies, such as the Tabasco pepper, belong to *C. frutescens.* Then there are *C. chinense, C. pubescens, C. baccatum* and a number of others.

Pepper terminology is confusing, to say the least. Many people consider all sweet varieties to be peppers and all hot varieties to be chilies. Many peppers have one name when fresh and another when dried. In Britain, peppers are classified by size, heat and origin. Americans usually classify by variety, of which there are hundreds.

Peppers have been a staple in the human diet for thousands of years. Seeds found in the neolithic caves of the Tamaulipas mountains of Mexico show evidence that peppers were collected and eaten by American Indians more than 8,000 years ago. Years later, Christopher Columbus was credited with introducing the chili pepper to Europe, having brought peppers back from his voyage in 1492. So enthralled were 15th-century Europeans with this new fruit that it was soon claimed as a cure for a wide range of conditions including indigestion and respiratory problems, infertility, inflammation, arthritis, strained muscles, toothaches, diarrhea and alcoholism.

Peppers are grown everywhere from window sills and patios to large commercial farms. They thrive in hot, tropical and subtropical climates and prefer full sun. Harvesting in the Northern Hemisphere is in August and September, although commercially grown peppers are available throughout the year. Peppers are produced and consumed throughout the world, but seem to be especially popular in hot climates where, oddly enough, their consumption has a cooling effect. The Hunan and Szechwan regions of China use chilies in stir-frys, while Southeast Asian cooks favor green chilies in soups. Thai curries are always abundantly flavored with green or red chilies.

Fortunately, most supermarkets stock at least a few fresh varieties of chilies, such as Anaheim, jalapeño and serrano. Many are available in dried, pickled and canned forms. Most peppers are available year-round, although some less-common varieties may be in short supply during the off-season.

There are more than 200 different varieties of chili peppers, of which more than 100 are indigenous to Mexico. With any luck, your local store provides a little explanation with each variety that mentions something about Scoville Units. Scoville Units are to peppers what alpha acid units are to hops. They were invented by a pharmacist named Wilbur Scoville in 1912 to measure the amount of capsaicin, an odorless, colorless chemical that puts the hot in hot peppers. Capsaicin is present in the seeds, veins and skin in varying amounts depending on species and state of ripeness. A Scoville pungency of 20,000 means that a sample diluted one part to 20,000 parts first in alcohol, then in sugar water, gives a threshold "bite" to three out of five people tasting a five-milliliter sample of the final solution. Hardly a scientific method of grading peppers, but until recently the only one we've had.

High-pressure liquid chromatography recently has been introduced as an instrumental method of grading peppers and is far more accurate than the subjective Scoville method, although the Scoville method is still the primary one used. Scoville Units range from 0 for

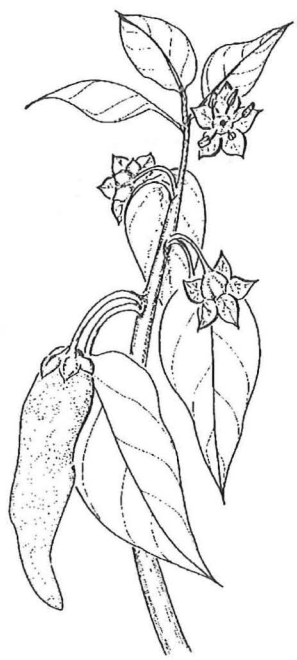
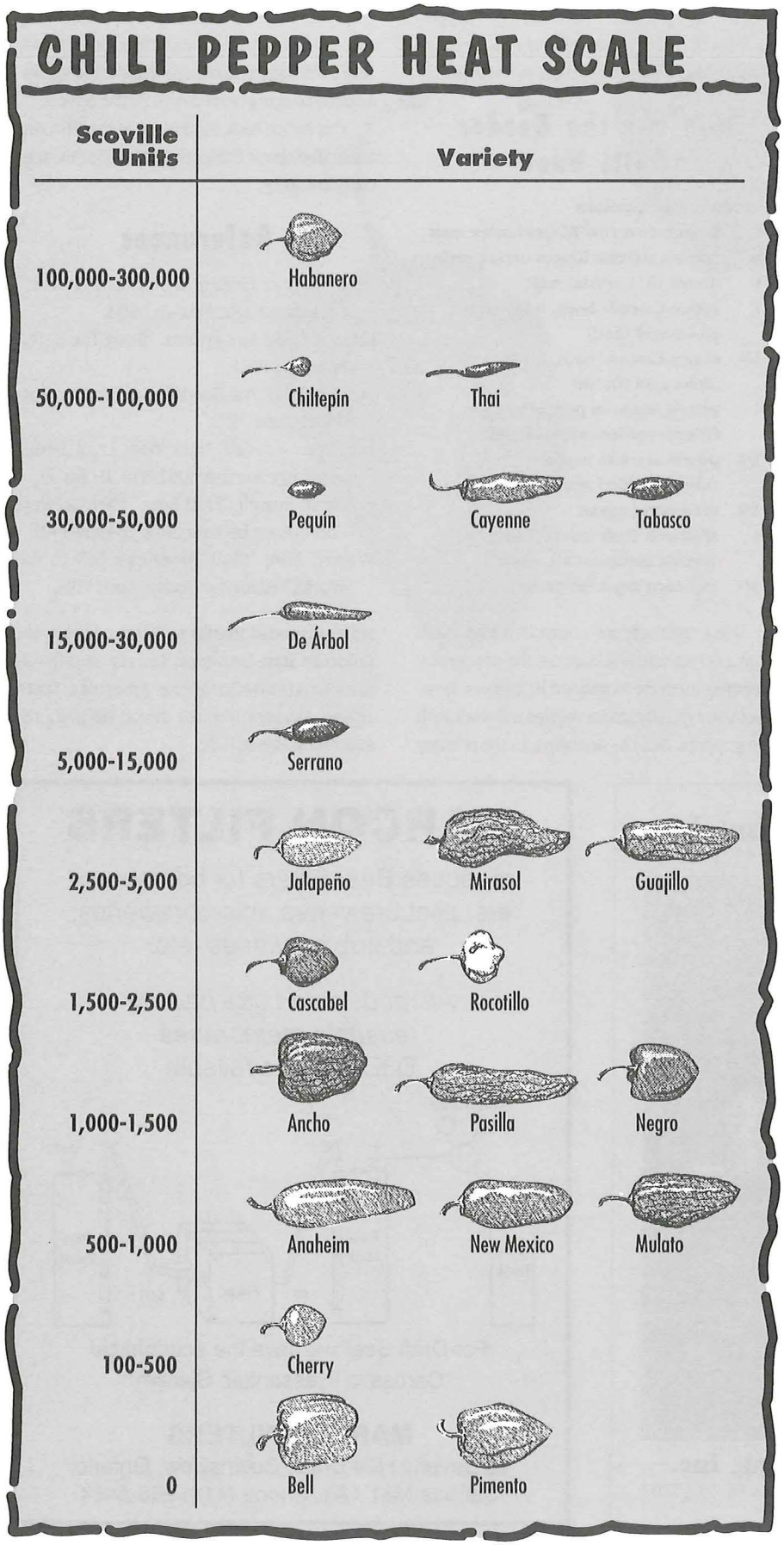


ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO



ILLUSTRATIONS BY JOHN MARTIN

the tame bell pepper to more than 300,000 for the nearly toxic habanero. I recommend a more civilized Anaheim (500 to 1,000 Scoville) for flavoring and a jalapeño (2,500 to 5,000) or serrano (5,000 to 15,000) for extra "zing." Make sure your peppers are firm and plump. Reject peppers that are soft, wrinkled or have blemishes.

Chilies should be handled very carefully with rubber gloves. The hot stuff (capsaicin) remains on your fingers and under your nails for hours, and if you get it in the wrong place you'll wish No More Tears was a pepper, not a baby shampoo.

So why are peppers so popular now? Why does salsa outsell ketchup in the United States? One reason could be the health benefits of peppers. One small green pepper provides more than twice the recommended daily allowance of vitamin C. Peppers also contain small amounts of the antioxidant vitamin E, iron and potassium and are a good source of dietary fiber. The capsaicin in peppers is a natural anticoagulant. Research has shown that pepper eaters suffer from fewer blood clots than those who don't eat peppers. Additionally, and perhaps most compellingly, is the natural pepper high some people experience when eating them. It is theorized that this could be caused by endorphins (natural painkillers) released by the brain in response to the burning sensation in your mouth. So does this mean that if I make my chili beer hot enough, I could double my pleasure? Don't go overboard though, preliminary studies by epidemiologists from Yale University and the Mexican National Institute of Public Health indicate "heavy" hot chili pepper consumers are 17 times more likely to have stomach cancer than those who don't eat hot peppers at all. The capsaicin may be a carcinogen.

Armed with pepper knowledge, I was ready to approach some local brew experts on the subject of chili beer. Russ Schehrer, brewmaster at Denver's Wynkoop Brewery, has long been rumored to have made the first commercially available chili beer. Russ suggested that I not boil or even steep the chilies. Too much stove heat will break down the flavor and heat-producing chemicals. Instead, he suggests the chilies be added to the fermenter. Russ suggests using a light lager or ale for your chili beer. The more flavorful, robust dark beers could result in conflicting tastes.

Brad Page, brewmaster at Fort Collins' CooperSmith's Brewpub and winner of silver (1991) and bronze (1992) medals in the herb/spice category at the Great American Beer Festival℠ for his Sigda's chili beer, imparted this valuable piece of information: "Put a big can of chilies in for each barrel of beer." Brad has always been one for precise measurements. Jim Parker, publisher of the *Rocky Mountain Brews* and owner of Mountain Tap Tavern in Fort Collins, said simply, "Roasted. You must roast the peppers first." Many farmers markets sell fresh roasted peppers. To roast them yourself, broil until they are black, then peel the skin off. It is a good idea to roast in a well-ventilated area.

A number of my sources said the addition of peppers at any stage will impart enough oils to destroy head retention. I knew this was a possible side effect of brewing chili beers, but one that Ed Chilleen of Ed's Original Cave Creek Chili Beer seems to have solved. Unfortunately, that solution remains a trade secret.

As with any fruit beer, a chili beer should be lightly hopped with only about a third of your normal bittering hops and little or no flavoring or finishing hops. So how does one create a beer with a taste somewhere between a bell pepper beer and the incendiary effects of a Molotov cocktail? Here's a recipe to get you started.

Run For the Border Chili Beer

Ingredients for 5 gallons

- **5 pounds two-row Klages barley malt**
- **6 pounds six-row Klages barley malt**
- **1 pound 10 °L crystal malt**
- **1 ounce Cascade hops, 6.1 percent alpha acid (boil)**
- **1/4 ounce Cascade hops, 6.1 percent alpha acid (finish)**
- **1 pound Anaheim peppers (sliced, seeded and steamed)**
- **1/4 pound serrano peppers (sliced, seeded and steamed)**
- **1/4 teaspoon gypsum**
- **1 teaspoon Irish moss (15 minutes)**
- **Wyeast European ale yeast**
- **3/4 cup corn sugar (to prime)**

Use a temperature-controlled step mash with a 60-minute boil. Sanitize the peppers by steaming them thoroughly for 10 minutes. However you typically steam veggies will work with the peppers. Add the Anaheims to the primary fermenter for one week. Rack into a secondary and add the serranos for another week. Prime with corn sugar and condition for three weeks. Additional aging helped mellow the flavors.

This recipe took third place at the AHA National Homebrew Competition in 1993 in the specialty category.

References

"Hot Peppers Linked to Stomach Cancer," *Berkshire Eagle*, Feb. 26, 1994.

Kitsock, Greg, *BarleyCorn*, "Bring The Heat," February 1994.

Midgley, John, *The Goodness of Peppers*, Random House, 1993.

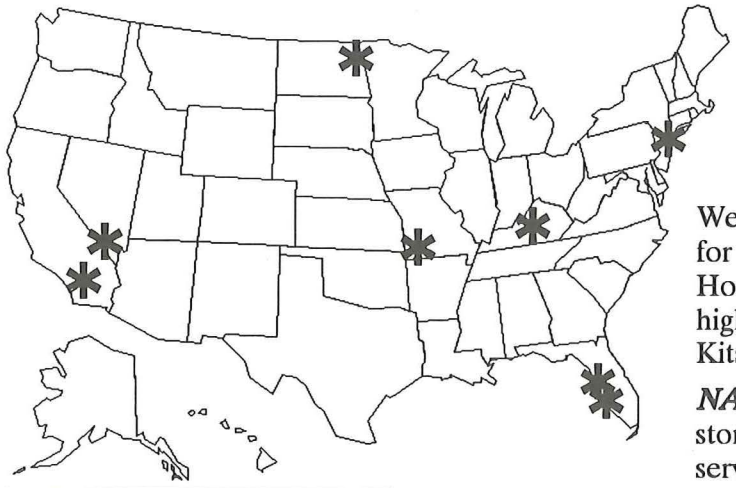
Schehrer, Russell, "Fun With Fruit Beer," ***zymurgy*** Summer 1992 (Vol. 15, No. 2).

Schehrer, Russell, "Fruit Beer," Microbrewers Conference Lecture, New Orleans 1993.

Wilder, Ann, "Chili: America's Gift to the World," *Barbecue Today*, April 1994.

Note: A special thanks to Suzanne Johnson, Colorado State University Library, and Geraldina Cristantiello of the American Spice Trade Association for their help in researching this article.

ASSOCIATION OF BREWERS FILE PHOTO



The Home Brewery™

We have led the Homebrewing Hobby for over 10 years with Yellow Dog and Home Brewery Malt Extracts, super-high quality Home Brewery Ingredient Kits, and many other unique products!

NATIONWIDE SHIPPING and eight store locations help us to give great service to our customers.

Give us a call or visit one of our 8 full-service stores!

Ozark, Missouri	(800) 321-BREW
No. Las Vegas, Nevada	(800) 288-DARK
Bogota, New Jersey	(800) 426-BREW
Brooksville and Tampa, Florida	(800) 245-BREW
Bardstown, Kentucky	(800) 992-BREW
Grand Forks, North Dakota	(800) 367-BREW
San Bernardino, California	(800) 451-MALT

FREE
32-Page
CATALOG
1-800-321-BREW

What Cabernet Sauvignon grapes are to red wine, Maris Otter barley is to ale malt.

Maris Otter is a rare, old fashioned two-row barley, low in yield per acre and tough to grow. Seasoned brewers still insist on the delicious, rich, plump, nut-like character and the finesse that the variety gives their pale and brown ales, porters, stouts and barley wines. Crisp Malting Ltd. of Great Ryburgh continues to contract with local Norfolk farmers to supply them this extraordinary barleycorn. Crisp maintains one of the few remaining traditional floor maltings in England. Their fine pale, crystal, and dark malts are now available to micro- and home brewers in the U.S. and Canada through Liberty Malt Supply Company and their retail agents.

LIBERTY EST 1921 MALT SUPPLY SEATTLE-USA
PIKE PLACE MARKET
ALL RIGHTS RESERVED © 1990

Dealer inquiries welcomed

LIBERTY MALT SUPPLY COMPANY

☆ America's finest selection of malt ☆ Founded in 1921 ☆

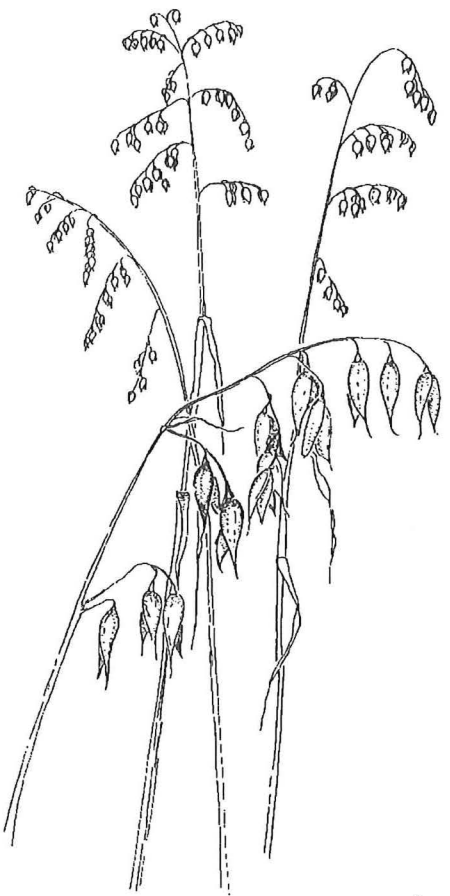
1418 Western Avenue, Seattle, WA 98101— Tel. 206-622-1880 Fax 206-622-6648

Crisp Maris Otter won 1st place at this year's National Malting Barley Competition.

Oats: The Right Grain to Brew!

By Michael Matucheski

Oats, *Avena sativa*, the stuff of porridge, cookies, fiber therapy and horse feed, have been cultivated nearly as long as other major grains, although their exact origins remain more or less obscure. For centuries, because of their coarse, fibrous nature, oats have been relegated to animal feed. Oats also play a small but vital role in the human household where their use has been primarily for gruel and as an extender, as in meatloaf, breads and yes, even beer. Oats' ability to grow on the poorer soils better than other grains at least provided some sustenance for the poorest people who would eke out some sort of beer from it in addition to the thrice-daily porridge. Still, as brewing history goes, oats remain a fringe grain and, while no extant examples of an all-oat beer exist, there are several famous beers that owe some of their peculiar characteristics to this chewy grain.



oats

ILLUSTRATION BY MARIE ORLIN

The earliest documented use of oats, most likely, was in Flanders (a region of Belgium) beers in the early 1300s, as pointed out by Pierre Rajotte in *Belgian Ale* (Brewers Publications, 1992). Some brewers of the Antwerp style added wheat and/or oats to their barley beers also. Later there was a beverage called *uytzet* made from barley malt, raw wheat and oats that apparently evolved into what we know today as Belgian Wit (white or Bière Blanche), a style that was extinct by the late 1950s but later revived by Pierre Celis in Hoegaarden Wit. Today there are numerous examples of white beers in Belgium where the style is most popular. It also is brewed in Texas where Pierre Celis is spreading his gospel.

There are a few other examples of beers that employ oats, most notably Samuel Smith's Oatmeal Stout from Yorkshire, England, and Young's Oatmeal Stout from London. These are the opposite flavors from the light and spicy Belgian whites. Oatmeal stout exhibits all the darkness, fullness and roastiness of a true stout, but is tempered with the smoothing chewiness of oats.

Other oat beers that have existed include the White Summer of the Belgian settlers in rural Door and Brown counties of northeastern Wisconsin and the farmer brews among some Norwegians in Dane County in southern Wisconsin.

Oats are a cereal grain of the grass family like barley and the other major bread and brewing grains. Commercially it is raised on a large scale using the most modern agribusiness methods. While it is much easier to purchase than to grow yourself, if you do happen to have a bare patch of lawn you could sow yourself some not-so-wild oats.

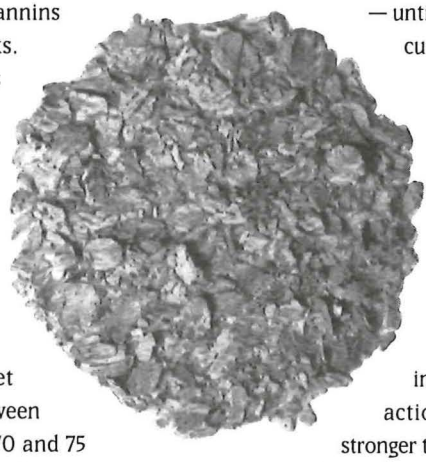
Oats add creaminess and a certain oiliness to oatmeal stouts and other dark beers. In Belgian whites they contribute an oily sheen and a spicy flavor. Practically speaking, oats are an excellent filtering medium in Belgian whites because of all the raw wheat in the mash. I have even used oats in lambic-style beers when I was short of barley malt and the resulting clarity was unexcelled.

Oats are 61 percent starch, 14 percent protein and 0.9 percent oil and fat, according to Ray Spangler in *Brew Free or Die* (Brewers Publications, 1991). The oil contained in the husk has been the bane of brewers over the centuries, so the use of whole oats or oat malt has been limited primarily to those few idiosyncratic Belgian brewers and some adventurous homebrewers. Mary Anne Gruber of Briess Malting has tried to malt oats on occasion but has come up with only a floating mass of slime because the kernels swell until they explode. On a homemalting scale this is less of a problem, although peculiarities do exist.

Commercially the form of oats most commonly available to the brewing industry is pre-gelatinized oatmeal flakes. Standard rolled oats will do in a pinch. Oat flour, steel-cut (sliced rather than rolled) and hulled oats can be found in most natural food stores. Whole oats can be purchased at rural feed mills and through some garden seed companies.

Oatmeal is the easiest of the processed oat products to use. Simply mix the flakes with the barley or other crushed malts for mashing. Oat flour should be carefully sifted over the already doughed-in malts to prevent caking or lumping. Raw oats, whether in

whole, hulled or steel-cut form, need to be milled to a medium-to-coarse grist for the best possible yield of extract. Keep the grist on the coarse side to minimize the formation of haze in the resulting beer and the excessive leaching of tannins from overground husks.



Crushed raw oats should be cooked at 185 to 194 degrees F (85 to 90 degrees C) for 15 minutes to gelatinize the starches. ("Quick-oats" do not have to be precooked.) Use about two quarts of water per pound of oats. Let this porridge cool to between 158 and 167 degrees F (70 and 75 degrees C), depending on the temperature of the main barley malt mash. Add the oats to the main mash a little at a time to prevent scorching and excessive oxidation.

Since oat malt is not commercially available, you'll have to make it yourself. This is easier than it sounds. First, locate a source of seed oats; likely bets will be a local feed mill or a friendly farmer. Next, steep or soak about 10 pounds of grain in a five-gallon bucket fitted with a spigot. Change the steep water every eight to 12 hours for a total of 48 hours.

Transfer the wet grains to either a pile, washtub or larger bucket to give the grains room to grow. Rootlets should be visible within 24 hours. Turn the pile frequently to mix in oxygen and allow carbon dioxide and the heat of germination to escape. Keep the moisture content of the pile as even as possible. Turning helps maintain the moisture equilibrium, but in some cases it is necessary to add a sprinkling of water. It is especially important to turn oats more often than barley, wheat or rye because oats tend to mold and darken easier. Check the acrospire or shoot along the slightly rounded side of the kernel (under the husk), for growth. When it has reached three-fourths the length of the grain, usually after four or five days, the green malt is ready to be kilned or dried.

The green oat malt can be dried in a number of ways. On a small scale, it can be dried on cookie sheets in an oven set on very low with the door ajar. A food dehydrator works very well or you can even dry the malt on screens in the attic with a help of a fan to evaporate the moisture. Keep the temperature below 150 degrees F (66 degrees C) — from 90 to 120 degrees F (32 to 49 degrees C) is best to maintain the viability of the enzymes — until the grain is nearly biscuit-dry. Drying times will range from six to 12 hours. Once the malt is dry, allow it to cool, rub and sift off the rootlets and store in an airtight container until needed.

I have found no great advantage in aging oat malt. The enzyme action seems to be much stronger the fresher the malt. Now that we have some malt, let's put it to work.

For me, the most famous and satisfying beer that employs oats is the Belgian white style. While there are numerous variations and complications of the style, brewing it can be kept very simple. The recipe below mimics the original Hoegaarden or its Texas twin, Celis White, very well.

Traditional Belgian White Beer

Ingredients for 5 gallons

4	**pounds pale malt**
4	**pounds wheat malt or raw wheat**
1	**pound oat malt or raw oats**
1/2	**ounce Saaz or Hallertauer hops (90 minutes)**
1	**ounce coriander seed**
1/2	**ounce dried orange peel (ideally Curaçao or bitter orange)**
	Belgian white yeast starter or Chico ale yeast (in a pinch)
3/4	**cup corn sugar or 2 quarts fresh wort (to prime)**

- **Original specific gravity: 1.048**
- **Final specific gravity: 1.012**

Infusion mash at 153 to 158 degrees F (67 to 70 degrees C) for three hours. Mash-out at 170 degrees F (77 degrees C). Sparge with 173- to 177-degree-F (78- to 81-degree-C) sparge water and collect 6 to 7 gallons of sweet wort. Add the hops and half of the coriander seed at the beginning of the boil. Add the remaining coriander seed and the dried orange peel at the end of the 90-minute boil. Chill the wort quickly.

Pitch the Belgian white or Chico ale yeast starter. Ferment at 60 degrees F (16 degrees C) until the primary fermentation subsides, then rack to the secondary. Bottle or keg after a month or so. Condition at least two weeks. Serve at 50 degrees F (10 degrees C). When young, this beer is very cloudy with a lot of orange peel aroma if you used sweet orange. Later it develops a brilliant sheen with a flavor well-seasoned by coriander.

Door County White Summer Beer

Door County White Summer Beer is a rustic version of the traditional Belgian white beers, and was made by the Belgian farmer settlers of northeastern Wisconsin near the hamlet of Brussels. I discovered this beer while doing research on Belgian farmsteads through material on loan from the Belgian Archives at the University of Wisconsin-Green Bay. It is a cloudy, slightly lactic beer made for soothing the thirsts of summer.

Ingredients for 5 gallons

4	**pounds pale malt**
2	**pounds wheat malt**
3	**ounces Fuggles hops (75 minutes)**
2	**ounces Goldings hops (15 minutes)**
	Chico ale yeast starter
3/4	**cup corn sugar or 2 quarts fresh wort (to prime)**

- **Original specific gravity: 1.060**
- **Final specific gravity: 1.014**

Infusion mash overnight at 153 to 158 degrees F (67 to 70 degrees C). Don't worry if the temperature drops a bit overnight, but try to keep the mash as warm as possible. Sparge with the 177-degree-F (81-degree-C) water to collect 6 to 7 gallons of sweet wort. Chill as rapidly as possible, and pitch the yeast at 70 degrees F (21 degrees C). Ferment in primary as usual at ambient cellar temperature. Rack to secondary for at least one month, maybe two, then bottle. This beer is very slow to clear and never really gives up its haze. At two months it resembles some English best

ASSOCIATION OF BREWERS FILE PHOTO

bitters and after six months there are hints of Belgian-Trappist tendencies. All in all, a very interesting beer.

Oatmeal Stout

This is probably the beer most people think of when oats are mentioned. After all, oatmeal is in the name.

Ingredients for 5 gallons

- **7 pounds pale malt**
- **2 pounds oats**
- **1/2 ounce hops, your choice (90 minutes)**
- **Belgian white or Chico ale yeast starter**

- **Original specific gravity: 1.036**
- **Final specific gravity: 1.012**

Infusion mash at 153 degrees F (67 degrees C) for four to six hours. Mash-out at 170 degrees F (77 degrees C). Sparge with 173-degree-F (78-degree-C) water to collect 6 to 7 gallons of sweet wort. Boil with the hops for 90 minutes. Chill as rapidly as possible, but don't worry — early Belgian immigrants used the springhouse. Pitch the yeast at 70 degrees F (21 degrees C). Ferment the primary at cellar temperatures (the 50-degree-F or 10-degree-C vicinity). Bottle without any priming sugar after the primary subsides and the beer "clears." Condition in the bottle at least two weeks. After a month or two it is even tastier.

Oat Sheaf Special

This beer is the end product of a late-night discussion of some esoteric beers with my Norwegian-American fellow traveler, Mark Kessenich, now of Moen Creek Homestead at Mt. Horeb, Wis. Actually, it's more my fancy, my notion of what Mother Necessity would bestow on the harried homesteader.

Ingredients for 12 gallons

- **15 pounds pale malt**
- **15 pounds oat malt**
- **1 pound chocolate malt**
- **2 pounds oatmeal**
- **1 1/2 ounces Fuggles hops (75 minutes)**
- **1/2 ounce Goldings hops (15 minutes)**
- **English ale yeast starter**
- **3/4 cup corn sugar to prime**

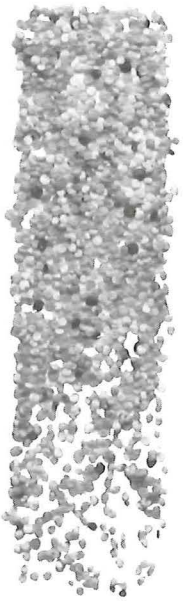
- **Original specific gravity: 1.050**
- **Final specific gravity: 1.018**

Infusion mash at 153 degrees F (67 degrees C) for three hours. Mash-out at 170 degrees F (77 degrees C). Sparge with 177-degree-F (81-degree-C) water to collect 6 to 7 gallons of sweet wort. Remove hot break, and chill as rapidly as possible. Pitch the ale yeast at 70 degrees F (21 degrees C). Ferment at that temperature, racking when the primary subsides. Condition in secondary for one month then bottle. Age two weeks before sampling. Chocolate malt combined with oatmeal gives this version of oatmeal stout a very rich, smooth and creamy texture.

So there you have it! Now you can have your cookies and your beer, too! Oats, they're not just for breakfast anymore — they're simply the right thing to brew.

QUINOA — GRAIN OF THE '90S

By Mary Samuels



I've never been able to resist a dare. I remember as a child I was dared to climb just about every tree in the neighborhood and after a while I got to the top of most of them until I had grown quicker than the trees' ability to hold me.

So when I was leafing through Charlie Papazian's *The New Complete Joy of Home Brewing* (Avon Books, 1991) and saw his statement on page 265, "Quinoa, Tef, Buckwheat, Dinkel, Amaranth — These grains and others have continued to allure me as a homebrewer ... Dare I say, 'Be the first on your block ... ,'" I saw it as the next in the long line of dares I've taken over the years.

Quinoa (KEEN-wah), a goosefoot (*Chenopodium quinoa*) native to the Andes with small greenish flowers, is cultivated for its edible seeds. Before I started brewing with it I did a little research. I was familiar with quinoa from having enjoyed it at a health food convention I attended, but had not considered it a mashable, fermentable grain.

Quinoa seeds are small, somewhat cylindrical in shape and about one-eighth inch in all dimensions. Seeds vary in color from pale yellow to grayish-tan and are quite hard when raw. Quinoa has been cultivated in the Andes for hundreds of years, and has been successfully grown in parts of the United States and Canada.

quinoa

Quinoa is 50 percent higher in protein than rice and has about half the calories (69 *vs.* 112 per one-half cup cooked), is high in vitamins E and B-complex, has 10 times the amount of iron as corn or wheat and can be a major source of calcium and potassium for dietary as well as brewing purposes. Quinoa is different from other grains in that it contains no gluten. A nutritious mixture of proteins, gluten is a major component of most other grains, and the property of grain to which many people are allergic. For its high-protein, low-fat and gluten-free properties, quinoa has been called "the grain of the '90s."

As a food, quinoa can be enjoyed in just about any dish in which you use rice or bulgur wheat, such as tabbouleh, and can be toasted for a nice nutty flavor. One important note is to rinse it thoroughly in two or three changes of water before cooking to remove saponin, which naturally coats the seeds and can make them taste bitter.

The most likely sources of quinoa are your local health-food store or the gourmet section of larger grocery stores.

Having recently read George Fix's article, "Cereal Grains: Barley, Maize, Rice and Wheat" in ***zymurgy*** 1985 Special Issue (Vol. 8, No. 4), I knew I had several choices regarding how to go about mashing and brewing my quinoa beer.

In deciding what mash method to use, I considered decoction, with which I have experience and actually prefer, and infusion mashing. I chose infusion so I could distinguish the flavor quinoa might contribute to the beer without the consideration of flavors contributed by the decoction boils.

In determining a grain bill based on probable extract yield and target specific gravity, I decided on no more than half quinoa and the remainder pale two-row malt. For later brews, I might consider using more than half quinoa and substituting six-row pale malt for its higher enzyme content.

To highlight the flavor contributed by the quinoa, I decided to hop conservatively, using only enough bittering hops to balance what I expected to be sweetness offered by the quinoa, along with minimal flavor and aroma hops.

I decided on a moderate-gravity beer in the range of 1.040 to 1.045, using equal parts of quinoa and pale malt, and made the following assumptions for my five-gallon batch:

Ingredient	Specific gravity: points per pound per gallon	Effective yield: 80%
Pale malt	35	28
Quinoa	18	14.4

The assumption of 18 specific gravity points per pound per gallon for quinoa is based on its caloric and carbohydrate content relative to rice, which has a predicted points per pound per gallon rating of 36. The 80 percent mashing efficiency is a conservative estimate for my equipment, with which I usually achieve an efficiency of about 85 percent.

These assumptions give the following amounts of grains and their respective contribution to the specific gravity of the wort:

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

Ingredient	Amount (in pounds)	Total specific gravity points
Pale malt	5.25	147
Quinoa	5.25	76
Total	10.50	223

Dividing the 223 total specific gravity points by the five gallons of water gives a predicted specific gravity of 1.045, just what I wanted!

Given its high protein content, the protein rest was conducted at 122 degrees F (50 degrees C) for one-half hour, perhaps avoiding hazy beer later on and certainly providing the yeast with additional nutrients. The saccharification temperature was 153 degrees F (67 degrees C) to produce a beer with greater body and a somewhat reduced alcohol content.

With these considerations in mind, here is my recipe:

Pride of the Andes

Ingredients for 5 gallons

- **5 1/4 pounds pale malt**
- **5 1/4 pounds quinoa (rinsed)**
- **1 ounce Hallertauer hops, 5.2 percent alpha acid (60 minutes)**
- **1/2 ounce Hallertauer hops, 5.2 percent alpha acid (30 minutes)**
- **1/2 ounce Tettnanger hops, 4.8 percent alpha acid (finish)**
- **Wyeast No. 2206 Bavarian lager yeast**
- **1 1/4 cup light dry malt extract (to prime)**

- **Original specific gravity: 1.045**
- **Final specific gravity: 1.012**

Boil quinoa for 30 minutes with 3 1/2 gallons of water to yield 3 1/2 gallons boiling water and (very) gelatinized quinoa. Lots of little ringlets (the husks of the grain) will be present. Mash-in grain with boiling water and quinoa, adjust pH to 5.3 with lactic acid, stabilize at 122 degrees F (50 degrees C) and hold for 30 minutes in an insulated box. Temperature at end of rest should be 119 degrees F (48 degrees C).

Raise temperature to 153 degrees F (67 degrees C), place the mash in an insulated box and check conversion and temperature at 15-minute intervals. Maintain 153-degree-F (67-degree-C) temperature. My conversion was complete after 45 minutes. Sparge at 170 degrees F (77 degrees C) with water adjusted to pH 5.5 with lactic acid. Collect six gallons.

The mash and sparge yielded six gallons of wort with a specific gravity of 1.035 which, when boiled down to five gallons, came out to be about 1.045.

During the sparge, I was amazed at the time it took for the wort to become clear of chaff, because the hulls of the quinoa, the little white ringlets, insisted on slipping through the one-eighth-inch holes in my double-bucket lauter-tun. The spent grain had a curiously slimy texture to it, and I began the boil with some trepidation (but no worries!), wondering if any vestige would come through in the wort.

The aroma of the boiling wort was unusual: slightly pungent and with a hint of nuttiness that I could only attribute to the quinoa. The wort exhibited an unusually large hot break, leaving behind what appeared to be huge amounts of precipitate. (I swirled the wort and let the trub settle prior to running it through my BruCo counterflow wort chiller into a 7 1/2-gallon plastic fermenter.) I use a copper tube with holes drilled in it on the outflow tube to aerate the wort.

I decided on Wyeast Bavarian lager yeast because I had another brew with similar grain and hopping characteristics (except for the quinoa, of course). I pitched the yeast from a starter into the 65-degree-F (18-degree-C) wort and set it on my back porch to begin fermenting (winters in western Washington are mild and very conducive to natural lagering).

Ferment it in the primary for seven days then rack into a six-gallon carboy for secondary fermentation and lagering. I was again amazed at the amount of sediment, consisting of cold break material as well as spent yeast and other materials. Quinoa is high-protein stuff! I wondered about the effectiveness of the protein rest, whether I had let it rest long enough and whether the beer would turn out hazy.

I bottled the beer after a secondary ferment/lagering of six weeks, priming with 1 1/4 cup of light dried malt extract. Most of the bottles went back on the porch for bottle lagering, but I kept a couple of them in the basement so they would condition more quickly. Specific gravity at bottling was 1.012, about what I was hoping for.

After two weeks I opened the first bottle. It poured with a fine-textured medium head that settled to one-half inch after a few moments and stayed that way to the bottom of the glass. It was slightly hazy, but no greater than I had experienced in other brews at this age. The color was golden with a slight brownish tint. The sliminess I noted in the spent grains was not detectable, either in the beer itself or in the bottle sediment.

There was no evidence of esteriness, but there was a curious pungency reminiscent of Celis Grand Cru in both aroma and taste. The Tettnanger aroma was evident without being overpowering, with mild hop bitterness and flavor. The body of the beer was just what I was hoping for, slightly heavy on the palate but with a good clean finish and a mildly malty aftertaste.

The remaining bottles lagered on the back porch for eight weeks before I sampled one of them. The effect of the longer aging was to mellow the brew. The pungency and hop bitterness were now well-balanced against the sweetness of the quinoa. The haziness completely cleared.

Next time I brew with quinoa, I will use a higher proportion of it to the malted barley. I will use six-row pale malt to take advantage of its higher enzyme content and ensure a complete mash. A finer "mesh" in my lauter-tun, or perhaps a grain bag in the bottom of it, to filter out those curious little ringlets of husk from the quinoa would be an improvement.

An ale might be good with quinoa, because I think the esteriness of a warmer fermentation might nicely balance against the pungency the grain seemed to produce in the beer. The otherwise subtle flavor of the grain lent itself nicely to the hops I chose for the brew, but I might try some East Kent Goldings in an ale, just to stay somewhat in the style of an English bitter. However, dark roasted grains, if used to any more than a small degree, could overpower the delicate flavor of the quinoa.

Quinoa presents some interesting challenges to the brewer: a high-protein, moderately starchy grain, it can be used to diversify your brewing repertoire from the usual malted-barley-and-wheat regime to which most of us are accustomed.

References

Fix, George, "Cereal Grains: Barley, Maize, Rice, and Wheat," ***zymurgy*** 1985 Special Issue (Vol. 8, No. 4).

Papazian, Charlie, *The New Complete Joy of Home Brewing*, Avon Books, 1991.

Richard, Lucie, "The Quinoa Cometh," *Chatelaine*, Jan. 1992 .

Sokolov, Raymond, "The Barley Eaters of Zumbagua," *Natural History*, July 1992 .

(Author not listed), "Quinoa, The Healthful Grain," *Better Homes and Gardens*, Dec. 1992.

A Cereal Called Rye

By Ray Daniels

The word "cereal" generally conjures up images of milk-soaked golden toasties mingled with fruit as a breakfast food. Indeed, for today's consumer, most widely grown agricultural cereals — corn, rice, wheat, oats and even our beloved barley — do see action on the breakfast table. At the same time, you can find all these same cereals used in commercial beers that can be found in most good urban beer outlets.

Until recently, rye has gotten little respect among brewers — and breakfast cereal makers. Yet only a little research shows that rye holds a definite place in the production of alcoholic beverages in many cultures. In addition, the adventurous beer drinker of the 1990s can attest to a growing presence of rye among American microbrews.

But micros still face limitations on their brewing process and in the palates of their customers that keep them from fully exploring the vistas of opportunity offered by rye. Once again, it falls to the homebrewer to recreate the styles of old and explore new worts.

rye

Rye (*Secale cereale*) is a cereal grain crop grown in many parts of the world but most commonly in Eastern Europe. Rye will grow where other crops fail: in sandy or rocky soil, cool climates and high altitudes. In fact, rye is rarely grown in fertile soil as these plots are reserved for less robust crops.

Like wheat, rye produces a huskless grain. Long and thin, nearly to the point of sharpness, the kernel is easy to distinguish from other cereal grains. Rye grain may range in color from gray-green to a light reddish-brown. The same variety of rye can vary in color even from field to field in the same region. In the past, 25 to 35 percent of the grains have been sterile and would not germinate. This made rye problematic for farmers who had to seed heavily and for maltsters and brewers who desired a consistent product.

While very little rye is grown today for brewing purposes, maltsters are able to acquire sources with germination levels of at least 92 percent, according to Mary Anne Gruber at Briess Malting in Wisconsin.

Traditionally, rye has been grown for baking and livestock feed. Billy goats are sometimes fed rye because its high concentration of vitamin E is believed to increase potency. But in most applications, rye rarely constitutes the only grain used. In breadmaking, the heavy, dark rye flour is mixed with wheat flour, even for the darkest breads. As a livestock feed, rye is generally mixed with other grains.

Classic Rye Beverages

The blending of rye with other grains for the production of human and animal foodstuffs carries over into the use of rye in the production of alcoholic beverages. One need only compare rye bread to a wheat loaf to understand the potent flavors captive in this hearty dark grain. As a result, rye plays a secondary or supporting role in most beverages where it appears.

Until recently, finding beerlike beverages that use rye required a careful search of the nooks and crannies of European culture. Among the examples are kvass and sahti — traditional brews that survive today. (Sahti is featured elsewhere in this issue.)

Kvass is indigenous to the Eastern European regions that still account for production of nearly 90 percent of the world's rye. It has long been a product of the farm household, and some commercial breweries still make it in the former Soviet Union.

According to one chronicler who visited a Russian brewery on the Sea of Okhotsk (1,200 miles north of Japan), kvass is still made routinely there. The report, filed by Wade Hampton Miller of Anchorage, Alaska, says that kvass is made using 15 kilograms of rye and 30 kilograms of barley per 1,000 liters of water. This is about six ounces of grain per gallon, or less than two pounds for a five-gallon batch!

Not surprisingly, this recipe produces a very low-alcohol drink that is consumed by all ages in Russia. Hampton reports that in summertime tank trucks filled with kvass roam the city like ice cream trucks, stopping every block to dispense kvass by the ounce into the vessel of your choosing.

To say that this drink must be consumed fresh is an understatement. Reportedly, the low level

ILLUSTRATION BY MARIE ORLIN

of carbonation present in the drink is the result of the continuing fermentation of the product.

While no hops are used in the Russian kvass, acids added to provide balance contribute some flavor components. The brewery in question actually produces two different types of kvass by using different acids for flavoring. One employs lactic acid and the other, according to Hampton, used "ascorbic acid derived from lemons." While you do get ascorbic acid (also known as vitamin C) from lemons, it is not usually employed as a flavoring agent. A more likely candidate might be citric acid, which can also be derived from lemons and is commonly used for flavoring.

I've collected a couple of other recipes for kvass over the years, both based on rye bread as a key fermentable ingredient. These farmhouse recipes also rely on other ingredients for balance and flavoring, one calling for two lemons plus other spices and another specifying the generous use of raisins and dark molasses.

The obscure uses of rye in European brewing today may not be indicative of past practice. Recent research reported by Dick Cantwell in ***zymurgy*** Summer 1994 (Vol. 17, No. 2) describes some brewing practices from the 15th through 17th centuries in Western Europe — especially in Dutch and Flemish areas.

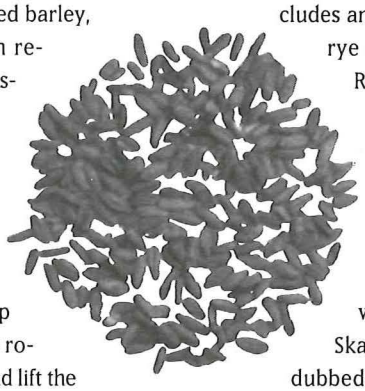
Rye is a frequently reported ingredient throughout the period. One historical author discusses the making of beers from individual grains and comments, "Beer made from rye, if done right and carefully dealt with, will give a good taste, depending on purity... ." The earliest reference to rye reported by Cantwell is a 1497 recipe from Leiden that specifies rye for 40 percent of the grist with 37 percent barley and 23 percent wheat.

Modern Rye Brews

Cantwell's research on Dutch and Flemish brewing practices led to production of a special beer at the Pike Place Brewery last year. His Speltsbier included barley, wheat, oats, rye and spelt — a variety of wheat used in the brews of ancient Egypt, circa 4000 B.C.

Schierlinger brewery from Europe began producing a rye beer in 1988. This beer, called simply Roggenbier, or rye beer in English, comes straight from Bavaria.

Schierlinger Roggenbier is brewed to a moderate gravity of about 1.048 with 60 percent of the grist coming from rye. That is the highest proportion of rye reported in any of the modern recipes reviewed for this article. Of course, the rest is malted barley, although Michael Jackson reports that half of this is crystal rather than pale malt.



To avoid the potential problems of a stuck runoff often encountered with rye, the Schierlinger brewery takes heroic measures in the lauter-tun: they keep the grain bed shallow, use rotating lauter knives to cut and lift the grain bed, and apply positive CO_2 pressure to the tun to hasten the flow through the bed. All of this following a double decoction mash.

Jackson reports that this beer is fermented with the same wheat beer yeast used for the brewery's more traditional weizen products. His description of the flavor provides an excellent introduction to the flavors of rye beers: "a typically phenolic, acidic 'wheat beer' aroma; a distinctly dry, grainy texture; a soft, rounded, fruity, spicy palate, finishing with a rye bitterness."

No one in America has built a CO_2-pressured lauter-tun dedicated to rye brewing, but that hasn't stopped experimentation. Cantwell's research has already resulted in a new concoction this year that he calls "Mud in Yer Rye." Brewed at Big Time Brewing Co. in Seattle, this brew clocked in at 14 °Plato (1.056) with a base of two-row malt barley, about 6 percent Munich malt, 11 percent flaked rye and 2 percent roasted rye from Germany. Cantwell describes the ale-fermented result as having "good mouthfeel from the beta-glucans, some sweetness and that indefinable rye flavor that is just there." He credits the roasted rye with contributing more complexity and some dryness to the beer.

Cantwell's predecessor at Big Time, Ed Tringali, helped brew the Speltsbier at Pike Place and also created the first rye beer at Big Time. Tringali's Hefe-Ryzen includes 8 percent rye with the balance of the grain bill coming from pale and Munich malt.

Other commercial brewers experimenting with rye include Teri Fahrendorf at Steelhead Brewery in Oregon, Larry Bell at Kalamazoo Brewing Co. in Michigan and Bob Rowland with Rowland's Calumet Brewing Co. in Wisconsin.

Fahrendorf has included rye in a number of brews including a Rye Bock with 25 percent rye, a Harvest Rye that reportedly includes an even higher proportion of rye and a raspberry rye beer. Rowland's rye beer with 15 to 20 percent rye and about 2 percent crystal malt was reportedly the most popular beer at this year's Wisconsin Microbrewers Festival. And Bell, along with specialty brewer Rob Skalla, recalls a beer they dubbed Golden Rye that included rye malt and flakes for a total of 25 to 30 percent rye. Bell describes the resulting beer as "hauntingly good."

Adding Rye to Recipes

In small quantities, say 10 percent or less of the mash, rye may contribute little more than some fullness in mouthfeel and a distinct dryness in the finish. But increase the quantity and rye can deliver flavors that affect the entire beer. Brewers most often describe this character as "spicy," with the modifiers of phenolic and minty sometimes applied. In my own latest effort, a strong ale with 25 percent rye, the character of this grain comes out somewhat piney, almost like a wintergreen extract. At these higher proportions, the spicy dryness of rye is sustained and it can provide a nice counterbalance to the malt.

Most brewers, at home and in commercial practice, start out with a modest addition of rye to a recipe they already know well. Most add 8 to 20 percent rye for a pale beer in their first effort. As a homebrewer, however, Grant Johnston took a different approach. He started with two-thirds rye and decided it was just too intense. He decreased the amount of rye in steps before finally settling on 20 to 22 percent as the ideal concentration in a pale beer. Of course, bigger and darker beers can accommodate even greater proportions of rye. One example is Johnston's American Dark Rye beer (recipe follows).

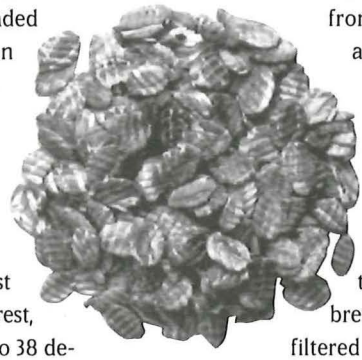
Generally, brewers have three choices for the form of rye: malted rye, flaked rye and torrefied rye. Malted rye differs little from any regularly malted product. It is soaked and germinated then dried. Grinding this product will

ASSOCIATION OF BREWERS FILE PHOTO

probably require some adjustment to your grain mill. You want to break open the kernel more than you would with barley to expose as much of the endosperm as possible. The flaked and torrefied products are processed to make the starches in the grain more accessible. Torrefied grain is made when moist grain is subjected to high heat. It pops open, much like popcorn, to expose the endosperm and provide a ready path for water and enzymes to enter. This technique breaks up the matrix of the endosperm, rupturing the cell structures and making starch much more accessible for mashing. The flaked rye, which seems to be the favorite these days, is pre-cooked to gelatinize the starch and then rolled into flakes. This treatment makes the starches in rye very accessible and easy to convert during mashing. According to Gruber at Briess, the flakes just "disappear" in the mash. She says their test brews with these three forms show little difference in performance, but the rye flavor was more accentuated with the flaked product.

Another product available to homebrewers and microbrewers is the roasted rye used by Cantwell in his most recent rye beer. Liberty Malt and Supply in Seattle imports this grain from Bavaria. Roasted darker than chocolate malt but not as dark as roast barley, it contributes color as well as some additional rye complexity.

The challenge in brewing with rye is its stickiness. Like wheat and unmalted barley, rye contains high levels of beta-glucans. Because they are not degraded by normal saccharification enzymes, the stickiness of beta-glucans can cause a slow or even stuck runoff at lautering time.



Of course, one option for addressing this problem is to include a beta-glucan rest in your mash sequence. This rest, at 95 to 100 degrees F (35 to 38 degrees C), depends on the presence of some two- or six-row malted barley to provide the enzyme beta-glucanase. Although this type of rest works well with wheat beers, only one brewer I talked to has tried this approach for rye.

While the Schierlinger brewery in Bavaria goes to extremes to sustain a good runoff while lautering a grist with 60 percent rye, American experience indicates success with other options.

All brewers I talked with use less than 50 percent rye in their recipes and many use 20 percent or less. At these small proportions, the impact on mashing and sparging is considerably less.

Among both microbrewers and homebrewers experienced with rye, the use of a single temperature infusion mash was common when working with rye. The temperatures for these mashes were generally at 152 to 158 degrees F (67 to 70 degrees C). No one who mashed rye this way reported problems with runoff — even in the one case where the proportion of rye approached 50 percent of the grist. One tip mentioned is to add additional mash water because of the large amount that rye will absorb.

Rowland, who includes rye to 15 or 20 percent of the grist, uses beta-glucan and protein rests in his mash sequence. He claims that the secret to avoiding a stuck mash is to keep two or three inches of sparge water standing above the grain bed during recirculation and lautering. I have always followed this practice and rarely have any trouble with runoff — regardless of the mash composition — so this may be the key.

During a rye brew boil, you will find evidence of the beta-glucans. In most cases a gummy, sticky film will form on the top of the boil. In homebrewing, we can just skim this off; microbrewers and pubbrewers find it will settle after whirlpooling.

Beer clarity is another problem with rye. Although my latest rye beer suffered from the lack of an Irish moss addition during the boil, I still found it exceedingly difficult to clear. After more than a year of both room temperature and cold aging, I finally filtered it to get an attractively clear product. Most brewers just serve the beer unfiltered as they would a wheat beer and use the distinct appearance as a way of announcing the presence of rye.

Although rye presents some potential difficulties in brewing, they are no greater than those found in working with wheat. The reward lies in the unique characteristics and flavors contributed by rye — flavors that can reward you with some of your most enjoyed and highly praised beers.

I'll start the recipe section with my favorite, a beer I call "Ancient Ur-Bock." According to Jackson, the earliest bock beers probably were strong ales brewed from mixed fields of grain. Thus, because of nature's ways rather than man's designs, the grist for these nascent bocks included not only barley, but wheat, rye, oats and other grains as well.

To approximate this approach, I decided to brew a strong, modestly hopped ale with a grist that included large portions of wheat and rye.

Ancient Ur-Bock

Ingredients for 3 gallons

7 1/2	**pounds pale ale and Pilsener barley malt (45 percent)**
5	**pounds wheat malt (30 percent)**
4	**pounds rye malt (25 percent)**
1 1/2	**ounces Northern Brewer hops, 7.5 percent alpha acid (45 minutes)**
1 1/2	**ounces Hersbrucker hops, 2.9 percent alpha acid (20 minutes)**
1	**ounce Saaz hops, 3.1 percent alpha acid (four minutes)**
	Wyeast German ale yeast

- **Original specific gravity: 1.074**
- **Final specific gravity: 1.018**

Mash at 148 degrees F (64 degrees C) for almost two hours and then sparge using pH-adjusted water (aim for pH 5.5). Ferment in the primary for seven days, in secondary for 14 days and age for a year or more in the bottle.

For the last six months this beer was lagered at 33 degrees F (1 degree C) and it is wonderfully drinkable. It displays a clean spicy flavor with minty, piney tones. It has a super creamy head and evident alcoholic strength. The spicy dryness of the rye provides a very nice balance to the malt sweetness. In total, it gives the impression of a liqueur or a distilled spirit. (I'm thirsty just writing about it!) Although aging has certainly improved this beer, it was a pleasant, if intense drink at earlier points in its life. I'm already plotting the next batch, although this time I think I'll try the rye flakes.

Fellow Chicago Beer Society beer geek Tony Babinec has a nice recipe for exhibiting the character of rye in an easy-to-make ale format.

ASSOCIATION OF BREWERS FILE PHOTO

Summer Rye Ale

Ingredients for 5 gallons

6	**pounds U.S. two-row barley malt**
1 1/2 to 2	**pounds rye malt**
25	**IBUs hops (brewer's choice)**
	Wyeast European or German ale yeast

- **Original specific gravity: 1.045**

The range of values for the rye component would put this recipe at 20 to 25 percent rye, very close to what Grant Johnston describes as his ideal. If you don't like the flavor at first, let it mature for five to six weeks and give it another taste. Often the flavors of rye will mellow some with modest aging.

Johnston, a brewer at Marin Brewing Co. in California, has homebrewed extensively with rye. One of his favorite recipes is a variation on his American Dark Wheat that took first place among wheat beers in the AHA 1989 National Homebrew Competition.

Here's what the recipe would look like with rye substituted for the wheat:

American Dark Rye

Ingredients for 5 gallons

5	**pounds malted rye (48 percent)**
4	**pounds pale malt (38 percent)**
3/4	**pound Munich malt (7 percent)**
1/2	**pound 40 °L crystal malt (5 percent)**
2	**ounces chocolate malt (1 percent)**
2	**ounces roast barley (1 percent)**
1	**ounce Tettnanger hops (60 minutes)**
1/2	**ounce Hallertauer hops (30 minutes)**
1/3	**ounce Tettnanger hops (finish)**
1/3	**ounce Hallertauer hops (finish)**
	Chico ale yeast

- **Original specific gravity: 1.048**

Johnston recommends a single infusion mash at 156 to 158 degrees F (69 to 70 degrees C). My only thought on this one is that it looks awfully tasty.

You can see a couple of approaches to rye beers from these recipes. Generally, you can substitute rye for wheat or for a portion of the base malt in any recipe to create an interesting and tasty new creation. For those of you with an urge to experiment, there is fertile ground here. Go forth and brew.

References

Cantwell, Dick, "Brew Art History — Dutch Brewing in the 17th Century," ***zymurgy*** Summer 1994 (Vol. 17, No. 2).

Britannica, 13th Edition, 1954.

DeClerck, Jean., *A Textbook of Brewing*, Chapman and Hall, 1957.

Edgar, David, "Winners Circle," ***zymurgy*** Spring 1989 (Vol. 12, No. 4).

Hayden, Rosanna, "Brewing with Rye," *BrewingTechniques*, Vol. 1, No. 3.

Hind, H. L., *Brewing Science and Practice*, Chapman and Hall, Circa 1950.

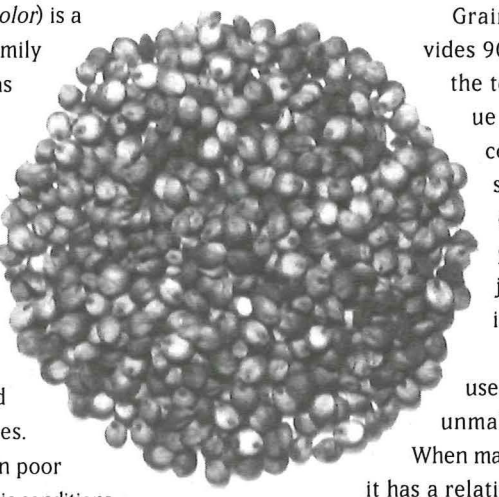
Jackson, Michael, *Michael Jackson's Beer Companion*, Running Press, 1993.

Miller, Wade H., "A Visit to a Russian Brewery," *All About Beer*, Vol. 13, No. 4.

Sorghum

By Bill Ridgely

Sorghum (*Sorghum bicolor*) is a plant of the grass family with a long history as one of humankind's earliest cultivated crops. Several varieties of sorghum are used for food (both human and animal stock), papermaking, alcohol products, brooms and numerous other uses. Sorghum grows well in poor soil and semiarid climatic conditions, so its importance to the agricultural base of the world's producing areas is significant.



Sorghum is a plant similar to maize (corn) that grows one to five meters tall. Some varieties produce lateral branches called suckers when growing close to the ground. In dry weather sorghum leaves roll up to reduce water loss. The seed grains are derived from large, compact flower clusters and are colored red, white, black or yellow depending on the variety.

The varieties of sorghum fall into four main categories: grain, sweet, grass and broomcorn. Of these only the grain sorghums are of major interest to brewers, although the stalk of the sweet sorghum is used to produce a molasseslike syrup commonly found in North America. This syrup can be added to wort as a fermentable sugar although, like molasses, it has a fairly strong flavor that can overwhelm other desirable beer flavors. The grass and broomcorn varieties of sorghum are used entirely for forage and broommaking, respectively.

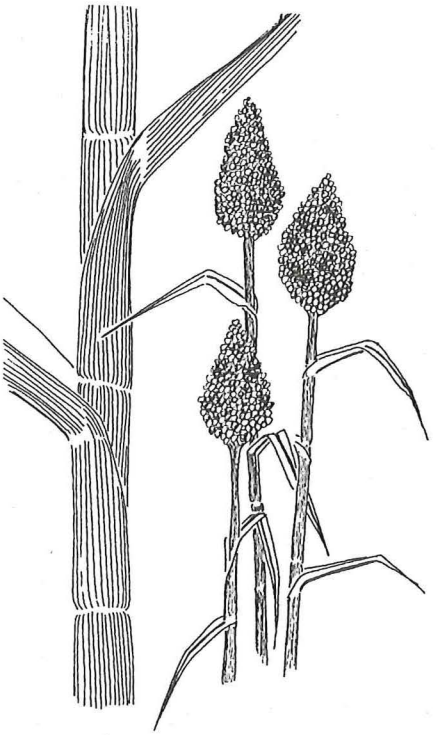
Grain sorghums comprise seven main varieties and numerous hybrids. Of these, the most important from the brewer's perspective are *kaoliang* grown in China, *feterita* native to the Sudan, and *caffrorum* grown throughout Africa, India and North America. A North American hybrid is known as blackhull.

Grain sorghum provides 90 to 95 percent of the total nutritive value of maize. A more complete comparison with some common brewing grains and adjuncts is detailed in Table I.

Sorghum can be used either malted or unmalted in brewing. When malted (germinated), it has a relatively low diastatic (enzymatic) power of 20 to 25 degrees Lintner. (By comparison, DeWolf-Cosyns pale ale barley malt is rated about 60 degrees Lintner, Klages-Harrington two-row pale malt at 135 degrees Lintner and wheat malt at 160 degrees Lintner). Current theory holds that a diastatic rating of at least 20 degrees Lintner is required for malted grain to convert its own starch, so sorghum malt, being very close to the minimum, needs to be mashed very carefully to convert without additional enzymes (from some barley malt, for example). The primary enzymes produced during malting of sorghum are alpha-amylase (60 to 70 percent) and beta-amylase (30 to 40 percent).

Grain sorghum (in particular a "birdproof" strain developed in the United States and exported to southern Africa) also has a high polyphenol (tannin) content, so its use as an adjunct in brewing "clear" barley beer is somewhat limited. However, methods are being developed to reduce the level of polyphenols (for example, the use of small amounts of formaldehyde in the malting process — see the article on sorghum beer elsewhere in this issue). Use of grain sorghum as a commercial brewing adjunct in clear beer has been increasing in major sorghum-growing countries such as Mexico and Nigeria.

In areas where malted sorghum is used as a primary brewing ingredient (such as southern Africa), the amount of fermentable



sorghum

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

Table 1 (Drake 1989)

Grain	Protein (g/100g)	Carbohydrate (g/100g)	Total Fat (g/100g)
Sorghum	11.30	74.63	3.30
Barley	12.48	73.48	2.30
Maize (grits)	8.80	79.60	1.20
Millet	11.20	72.85	4.22
Oats	16.89	66.27	6.90
Rice (white)	7.13	79.95	0.66
Rye	14.76	69.76	2.50
Wheat (red spring)	15.40	68.03	1.92

sugars extracted is relatively small while the amount of unconverted starches and tannins is high. The resulting beers are opaque and cloudy and have an alcohol content of 3 percent by volume or lower. The beers are traditionally soured through the action of lactic acid bacteria.

For the homebrewer, grain sorghum can be used as a brewing adjunct either in its malted or unmalted state. If unmalted, it should be crushed and boiled prior to use to gelatinize the starches. If malted (see article on sorghum beer for malting procedure), it can be crushed and added to a mash of barley malt and other adjuncts. Because of its high tannin content, sorghum is best used as an adjunct in intentionally cloudy beers such as Bavarian weizens or Belgian witbiers, or in very dark opaque beers such as stouts. In Nigeria, for example, sorghum is used as an adjunct in the brewing of Guinness Foreign Extra Stout.

References

Drake, Dennis L., et al., *Composition of Foods: Cereal Grains & Pasta*, USDA Agriculture Handbook 8-20, 1989.

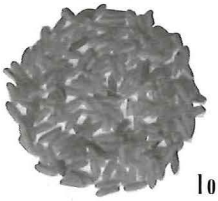
Hulse, J., et al., *Sorghum and the Millets*, Academic Press, 1980.

Steinkraus, Keith, et al., *Handbook of Indigenous Fermented Foods*, Marcel Dekker Inc., 1983.

The Long and Short of Brewing with Rice

By Jackie Keith

rice extract



long grain rice

short grain rice

rice

Rice is one of the principal food crops of the world, the major part of the diet of about half the world's population. The bulk is consumed in Asia. The food value of rice is roughly 80 percent starch, 12 percent water and 8 percent protein. While it contains less protein than wheat, rice protein is the more complete of the two.

Milling is the process that removes the hulls in preparation for cooking. White rice is produced by removing the bran coat which contains important vitamins and minerals. In order to make up for this, millers "enrich" white rice with other vitamins and minerals. Brown rice retains the natural bran coat.

Rice has long been used in Asia for saké and rice wine. In the mid-19th century rice and corn came into common usage in North American commercial brewing to overcome difficulties with the domestic six-row barley of the time (rice being considered the premium of the two adjuncts). Its use has become the norm in America and throughout many parts of the world.

Rice (*Oryza sativa*), the variety most often used for food, is an aquatic cereal grass. Rice plants grow from two to six feet tall with long pointed leaves. The flower head produces 50 to 300 flowers. Rice requires moderate temperatures and must be irrigated if rainfall is not sufficient.

Records show that rice probably originated in Southeast Asia. From there rice was taken to Europe, the West Indies and South America. It arrived in North America in the late 1600s and South Carolina led production for 200 years. After that, cultivation spread throughout the Southeast, Illinois, Virginia and then to Texas and California.

Rice is used as an adjunct by many commercial breweries. Three forms of rice can be used: flakes, grits or whole rice. Flakes are gelatinized and may be added directly to the mash — an easy method for homebrewing. Grits and whole rice must be cooked first. Brewers use the broken pieces of rice that don't survive the milling process. This fraction is typically endosperm only. Brewers can also use short- or long-grain rice, but long-grain rice should be milled first. George Fix, in "Cereal Grains: Barley, Maize, Rice and Wheat" from ***zymurgy*** 1985 Special Issue (Vol. 8, No. 4), recommends mashing rice plus 10 percent of the grain bill with water on a 2-to-1 basis. He recommends mashing in at 110 degrees F (43 degrees C) and raising the temperature to boiling over one hour then boiling for five minutes. Extra water may be needed. The rice mash should be added to the main malt mash just prior to raising that temperature to 155 degrees F (68 degrees C) and held until conversion.

Rice syrup and dry rice extract are easiest for the partial mash or extract brewer. My preference is the dry rice extract — it's readily available and easy to store and measure. I've yet to find a source for flakes.

Rice has a crisp, dry flavor described as almost neutral and snappy. The flavor is most evident in Budweiser. It makes for a light-bodied easy-drinking beer. Rice also lowers proteins and polyphenol content by diluting the proteins and free amino acids in the wort, thus reducing the risk of haze in the finished beer.

Rice fits in well when it comes to duplicating certain styles, such as American lagers, Scandinavian Pilseners and cream ale. It can also be used quite successfully in specialty beers. Once, while making a raspberry beer, I realized I only had half the amount of wheat extract needed, so I substituted dry rice extract. It added a brut effect like that of a raspberry Champagne while retaining the integrity of a beer. I've also found rice lends itself very nicely to a ginger ale.

Jefferson Davis Ginger Ale

Ingredients for 5 gallons

5	**pounds Klages malt**
1/2	**pound English crystal malt**
5	**cups dry rice extract**
1	**pound light brown sugar**
3/4	**ounce Bullion hop pellets, 8.8 percent alpha acid (45 minutes)**
1	**tablespoon Irish moss (15 minutes)**

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTOS

1/2 ounce Kent hop pellets, 5 percent alpha acid (five minutes)
1 1/4 ounces grated ginger root (one minute)
Wyeast No. 1098 British ale yeast

- **Original specific gravity: unknown**
- **Final specific gravity: 1.012**

Mash grains with six quarts 150-degree-F (66-degree-C) water for one hour. Sparge with four gallons of 170-degree-F (77-degree-C) water. Ferment 15 days at 64 degrees F (18 degrees C). Force carbonate in keg.

Dutch Boy

Ingredients for 5 gallons

8 pounds Klages malt
1/2 pound light German crystal malt
4 cups dry rice extract
1 ounce Perle hop pellets, 8.1 percent alpha acid (45 minutes)
1 tablespoon Irish moss (15 minutes)
1/4 ounce Hallertauer hops, 3.8 percent alpha acid (five minutes)
1/4 ounce Saaz hops, 4.2 percent alpha acid (five minutes)
1/4 ounce Tettnanger hops, 4.6 percent alpha acid (five minutes)
Wyeast No. 2042 Danish lager yeast

- **Original specific gravity: 1.044**
- **Final specific gravity: 1.010**

Mash with 8 1/2 quarts 150-degree-F (66-degree-C) water for 90 minutes. Sparge with 4 gallons of 165-degree-F (74-degree-C) water. Ferment 30 days at 50 degrees F (10 degrees C) then 30 days at 40 degrees F (4 degrees C). Force carbonate in keg.

References

Eppard, Tobin L., "Brewing with Adjuncts" and "Cereal Mashing," ***zymurgy*** 1993 Special Issue (Vol. 16, No. 4).

Fix, George, "Cereal Grains: Barley, Maize, Rice and Wheat," ***zymurgy*** 1985 Special Issue Vol. 8, No. 4).

Miller, David, *The Complete Handbook of Home Brewing*, Storey Communications Inc., 1988.

World Book Encyclopedia, Volume 16, World Book-Childcraft International, 1978.

Brew with Wild Rice

By Jerry Bourbonnais

North American wild rice is an annual aquatic grass more closely related to cereal grains such as barley, oats and corn than to actual rice (*Oryza sativa*). (Manchurian wild rice, *Zizania latifolia*, is a perennial.) There are four known species in the United States and Canada with a number of varieties identified. The two most prevalent are *Z. aquatica* and *Z. palustris*. From a culinary standpoint there appears to be little difference between the two. As there is no beer-related research to consult, I will assume there is no difference to the brewer, either. There also is a paddy-grown commercial variety of wild rice that is considered inferior by food purists. You can sample each and draw your own conclusions. For reasons of simplicity, this article is devoted primarily to the naturally occurring lake and river varieties.

wild rice

Being an annual, wild rice is propagated from seed. It grows in shallow areas of lakes and rivers. In April, after winter dormancy, the seed germinates underwater producing a single leaf and stem. As more leaves grow, the tops float on the surface. By late August the rice begins to ripen. The small-grained rice along rivers or sandy lake bottoms ripens earliest.

Wild rice grows over much of the United States and Canada but is most prevalent in the central regions of each country. Minnesota and Wisconsin are the leading natural wild rice producers in the United States.

Wild rice is a staple food for American Indians. Archaeological records indicate the Anishinaabeg (Ojibwa) Indians of the Great Lakes region were harvesting wild rice as long as 2,500 years ago. The Indian word for wild rice is *mahnomem* or *menominee*, hence the plethora of cities, rivers and lakes in the Great Lakes region bearing these names. When the harvest and processing are completed a great feast is held to celebrate the year's bounty. Wild rice also has spiritual and ceremonial significance in Indian culture. Legend has it the Anishinaabeg were once an East Coast people who made a great journey to a land where food grew abundantly in the water. When they reached that land, they would find a home. This land was the Great Lakes region and the food was wild rice. For the Anishinaabeg, wild rice is considered a gift from the Great Spirit.

Demand has been greater than supply of naturally grown wild rice for many years. This has spurred the development of commercially grown wild rice that is cultivated in large quantities in man-made paddies. Commercially grown wild rice accounts for more than 75 percent of the total harvest.

The use of wild rice by people of Western culture has been largely similar to that of rice. It is used as a side dish for meats and as a component in soups and casseroles (known in Minnesota as "hotdish").

Two people in a small boat or canoe harvest wild rice. One poles or paddles while the other "flails" the wild rice. Using two sticks the ricer bends the stalk over the boat and gently taps to knock off the ripe grains. The unripe grains are left on the plant for later harvest, to be eaten by wild animals and to seed next season's crop. Wild rice beds are visited every two or three days until the harvest is complete. Even with these careful procedures the majority of the wild rice is not harvested.

Today most wild rice, even traditionally harvested rice, is processed by large commercial processors in four steps. Naturally grown rice is kept separate from paddy rice but is processed by the same methods. There are, however, some stalwarts who insist on traditional processing methods. The four steps are the same no matter what equipment is used or what volume is processed — curing, parching, threshing and winnowing.

Curing involves placing the wild rice on a dry flat surface, usually a concrete floor or plastic tarp. The grains are placed several layers deep and turned occasionally to avoid heating, much like the drying process for barley and other small grains.

Parching is done in metal containers

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

rotated over a gas or wood flame. The parching process helps loosen the husk from the grain, furthers the drying and gives the grain some of its characteristic nutty flavor.

Threshing removes the grain from the husk. It is done in rotating drums fitted with rubber-shod paddles. The traditional Anishinaabeg danced on the grains.

Winnowing separates the grain from the chaff. It is done in a fanning mill or simply by tossing the grain into the air with a blanket. In this method, the wind carries off the husks and other chaff while most of the heavier grains fall back to the blanket.

I would like to regale you with great old stories about traditional brewing with wild rice. However, as best as I can determine there is no historical record of this occurring. American Indian communities have no brewing traditions and apparently wild rice was considered by European descendants to be too valuable as food to use in brewing. Most likely prohibitive costs prevented its use. As for homebrewing, no luck there, either. I brewed my first batch in April 1986. When I was contemplating brewing with wild rice I consulted some homebrewing "graybeards" about how to use wild rice in beer. None had ever considered or heard of such a thing. So, as far as I know, I am the first person to brew with wild rice. (I'm sure this article will turn up some folks whose wild rice brews predate mine.)

How does the addition of wild rice affect the character of beer? Like most cereal-base adjuncts, it appears to add sugars without adding much in the way of body. You wind up with similar potency but a lighter body than a similar all-barley brew. The sweet, nutty flavor characteristic is the other main contribution. However, as with most aromatics, this seems to be lessened over the course of fermentation. I have found it helpful to assist the wild rice with some specialty grains to maintain this nutty flavor.

Preparation is similar to any other cereal adjunct. Cook the wild rice in water until it is gelatinous, then add it to the barley and mash by your preferred mashing method. I usually use a step infusion mash with a protein rest. I use wild rice for about one-fourth to one-third of the total grist, and expect lack of enzymes would be a problem at higher levels. I have used both American six-row and two-row (primarily Klages) for the main barley component with equal conversion success. As I stated earlier, there is no beer-related research on wild rice that I was able to find, so any scientific evidence I give you is purely anecdotal. I have found that it is possible to "malt" wild rice. However, whether or not this would yield any useful enzymes (or anything else useful for that matter) is anyone's guess. I will probably try it someday just to see what happens.

The first commercial brewery to use wild rice was the James Page Brewery, Minneapolis, Minn. Page originally had two rice brews but recently reformulated his bock recipe, removing the wild rice component.

Boundary Waters Amber Lager is a light amber lager brewed with six-row, 10 °L crystal and Munich malts to an original specific gravity of 1.046 (11.5 °Plato). The recipe calls for 10 percent wild rice and uses 18 to 20 IBUs of Chinook and Cascade hops. Brewer's flavor comments: Clean lager with nutty malt flavor. Author's tasting notes: Sweet, malty aroma, gold color, flavor follows aroma, sweet, malty, nutty with some caramel flavor, well-balanced malt and hops, no hop flavor, light lingering hop bitterness, medium-bodied.

Boundary Waters Bock, an American bock with a unique Minnesota character, uses six-row, 50 °L crystal and Munich malts to achieve an original specific gravity of 1.052 (13 °Plato). The brew is 5 percent wild rice and uses Chinook and Hallertauer hops. Author's tasting notes: Sweet, caramely malt aroma with some hops, medium brown color, sweet caramely flavor with some flavor hops, well-balanced malt to hops, medium-bodied, finishing hops nice but probably inappropriate for style.

Capitol Brewing Co., Middleton, Wis., sells Gartenbrau Wild Rice Beer, a demented Pilsener (honest, that's what they told me). It is brewed with six-row and specialty malts with 10 to 20 percent of the grain bill being wild rice for an original specific gravity of 1.048 (12 °Plato). The recipe includes 25 IBUs of Cascade, Cluster and Willamette hops. Brewer's flavor comments: Nutty, meaty. Author's tasting notes: Malty aroma with a touch of hops, gold color, sweet, nutty, malt flavor, hop flavor evident, good malt-to-hop balance, hop bitterness lingers, medium-bodied.

I have brewed several batches of Jerry's Wild Rice Beer and consider it a work in progress. However, I will share the recipe I liked best and that brought the highest number of compliments.

Jerry's Wild Rice Beer

Ingredients for 5 gallons

4	**pounds Klages malt**
3	**pounds wild rice**
1/5	**pound chocolate malt**
1/5	**pound 10 °L caramel malt**
1/5	**pound Vienna malt**
1/2	**pound CaraPils malt**
1	**ounce Cascade hops, homegrown, alpha acid unknown (60 minutes)**
1/4	**teaspoon Irish moss (15 minutes)**
1/2	**ounce Hallertauer hops (five minutes)**
1	**quart Wyeast No. 2124 Bohemian lager yeast culture**

Cook wild rice in 1 gallon water until gelatinous. Add to barley and 1 1/4 gallon of 140-degree-F (60-degree-C) water in brewpot and hold for 30 minutes. Add 1 1/2 gallons boiling water, stabilize at 152 degrees F (67 degrees C) and hold for 30 minutes. Raise to 158 degrees F (70 degrees C) and hold for 30 minutes. Raise to 170 degrees F (77 degrees C). Sparge with 4 1/2 gallons of 170-degree-F (77-degree-C) water. Boil for one hour then cool and pitch yeast. Ferment at lager temperatures if possible. If not, substitute Wyeast European ale yeast (No. 1338) and brew as an ale. (Or relax and use the yeast and method of your choice.)

Wild rice is a grain with a respected cultural and culinary history albeit a short brewing history. This, of course, allows for those great pioneers of brewing, homebrewers, to define and refine its use in beer. Wild rice as an adjunct could be used in any number of ways. It could possibly even be malted and used as the main ingredient. Let your imagination be your guide.

References

Dore, William, *Wild Rice,* Canada Department of Agriculture, 1969.

Fruth, James, *Harvesting Wild Rice,* James Fruth, 1980.

DNR Reports, Wild Rice, Minnesota Department of Natural Resources, 1979.

Regguinti, Gordon, *The Sacred Harvest*, Lerner Publications Co., 1992.

Schulz, Bruno, *The Wild Ricer's Guide,* Bruno Schulz, 1979.

Various Authors, *Kelliher/Waskish Wild Rice Festival Cook Book,* publisher and date unknown.

MAKE MINE WITH MOLASSES

BY CORY BAILEY

Slow, sticky sweet molasses is an intriguing brewing ingredient. Molasses, or in Britain, treacle, is a dark, thick syrup obtained during the process of sugar production from sugar cane or beet sugar juice. The juice is boiled until the sugars crystallize then is put through a centrifuge to extract the sugar crystals. The syrup that remains is molasses.

The syrup is produced in different grades. The highest grades are edible, light in color and contain about 90 percent total sugars, dry weight. Industrial, or blackstrap, molasses is the lowest grade and is the product of reprocessing light molasses to extract more of its sugar. Blackstrap, which is thicker, darker and more strongly flavored than "edible" molasses, contains about 50 percent total sugars, dry weight. Edible molasses is used in table syrup blends, as a sweetener and flavoring in cooked and baked foods, and as the basis for the manufacture of rum. Blackstrap molasses contains about 2.8 percent protein, as well as small amounts of ash, minerals and vitamins, and is an important constituent of animal feed. It also serves as a nutrient substrate in yeast cultivation as well as in the production of vinegar and citric acid.

Beet sugar molasses has a lower sugar content than cane sugar molasses and a less palatable taste. The best-known use for molasses is the production of rum. In this process molasses is watered down and allowed to ferment then is distilled to produce a clear liquid that is aged in oaken casks.

Rum, and thus molasses, were very important in our country's early development. The rum industry developed in conjunction with the growth of sugar plantations in the West Indies. The English were the first to adopt the drink. Its name may be derived from a Devonshire word, rumbullion, meaning a great tumult. Beginning in the 17th century, distilleries operating in New York and New England produced rum from West Indian molasses (British held, of course). Traders used rum profits to buy slaves in Africa; the slaves were sold in the West Indies for cargoes of molasses that became New England rum.

The Molasses Act, passed by the British Parliament in May 1733, imposed taxes on molasses, rum and sugar imported into British North America from foreign sources. It was designed to encourage Britain's North American colonists to use sugar products from the British Caribbean islands. North Americans, who profited from a lucrative trade with the French West Indies, resorted to smuggling to avoid compliance with the act. It thus contributed to the disputes that eventually led to the American Revolution. Can you imagine how different the revolution might have been if it had started out with the Boston Rum Party rather than the Boston Tea Party? We could be eating tea and crumpets even now!

One can see how easily the use of molasses could enter the beer brewing process. The most famous beer using treacle is Old Peculier brewed by Theakston in North Yorkshire, England. My recipe follows. With an original gravity of 1.060, Old Peculier is considered among the lesser of the old ales. Yorkshire's thirsty drinking habits, however, can render such a brew lethal. Legend has it that locals in Masham, where it is brewed, called the beer "lunatic broth." Perhaps this is due simply to the imbibing of more alcohol than one can tolerate. Or it could be a specific effect of the molasses. Could the name "lunatic broth" and the word rum from rumbullion meaning "a great tumult" be a coincidence? Perhaps. At any rate, molasses adds a wonderful flavor to beer.

Molasses is fermentable to a variable degree, depending on the type. The addition to beer will certainly lend a great deal of color and flavor. Because of the strong flavor associated with the unfermentable portion of molasses, its use should be limited. For example, one cup per five gallons will be perceived easily by most people. Its contribution

sugar cane

ILLUSTRATION BY MARIE ORLIN
ASSOCIATION OF BREWERS FILE PHOTO

to homebrew can be described as rich and buttery. It can contribute a certain pleasantness to beer, but in excess can overwhelm the palate and detract from the drinkability.

All molasses contains a varying degree of aromatics that contribute to flavor. The lighter "edible" molasses contains a higher sucrose (with some fructose and glucose) content while the darker blackstrap molasses contains less sugar but more aromatics.

Molasses should be boiled with the wort or water before being introduced to the fermenter. For carbonation one cup of molasses may be substituted for three-fourths cup of corn sugar in five gallons of beer at bottling time.

Theakston's "Old Peculier"

Ingredients for 5 gallons

- **12 pounds British two-row barley (extract brewers substitute 9 pounds light or amber extract)**
- **8 ounces 40 °L crystal malt**
- **8 ounces crushed roasted barley**
- **2 pounds dark brown sugar**
- **2 ounces Fuggles hops, 4 percent alpha acid (60 minutes)**
- **8 to 9 tablespoons lactose**
- **3 ounces blackstrap molasses (if not available at the grocery store, try a health-food store)**
- **ale yeast, preferably Wyeast No. 1028 English ale**

- **Original specific gravity: 1.060**

Mash grains at about 156 degrees F (69 degrees C). Extract brewers should steep the crushed specialty grains and remove them from the wort just prior to reaching the boiling point. Old Peculier is not known for a great hop aroma so the entire hop bill should be added early in the boil.

The following recipe results in a very flavorful beer, moderately hopped, that can be enjoyed after dinner or mowing the lawn.

May Day English Brown

Ingredients for 5 gallons

- **9 pounds Klages (extract brewers substitute 6 3/4 pounds light or amber extract)**
- **1 1/2 pounds crystal malt**
- **2 ounces black patent malt**
- **1 cup molasses (reduce amount if blackstrap is used)**
- **1/2 ounce Chinook hops, 12 percent alpha acid (60 minutes)**
- **3/4 ounce Fuggles hops, 4 percent alpha acid (five minutes)**
- **3/4 ounce Fuggles hops, 4 percent alpha acid (steep at end of boil)**
- **Wyeast No. 1056 in 12-ounce starter**

- **Original specific gravity: 1.052**

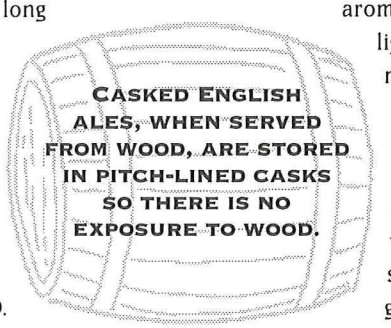
Use the same brewing procedure as above.

MIMIC CASK AGING WITH WOOD CHIPS

BY RON PAGE

If Harry Houdini had been a homebrewer instead of an escape artist, he might have spent his final years trying to reconnect with the lost flavors of ales past instead of trying to contact the lost soul of his departed mother. His seances and wooden coffins might have been the steaming vapor of hop oil and oaken casks. He might even have found what he was looking for.

The mystical marriage of wood and fermented beverages has a long and complicated history. The practice of storing and moving wine and beer in wooden casks made its appearance in Europe in the first century B.C. in the territories of the Celts and of the Illyrians. Pliny the Elder (A.D. 23 or 24-79) states that "in the neighborhood the Alps people put beer or wine into wooden casks and closed these round with hoops." Casks were certainly cheaper, less breakable and much larger than the earthenware amphorae used by the Greeks and Egyptians to store their liquids.



CASKED ENGLISH ALES, WHEN SERVED FROM WOOD, ARE STORED IN PITCH-LINED CASKS SO THERE IS NO EXPOSURE TO WOOD.

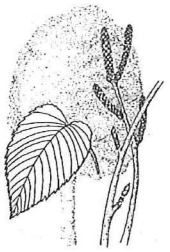
Today few brewers outside the traditional European and British enclaves have the time, patience, knowledge or inclination to age and store fermented beer in wooden vessels. Compared to stainless steel, wooden barrels are expensive, prone to bacterial infection, breakable and generally a nuisance. Much of the literature, technique and survival of cooperage owes its thanks to the wine industry, which to this day insists on the traditional use of oak casks to ripen its finest products.

Most brewers use lined wood casks which don't impart any flavor or aroma. Beers with wood flavor include some Flanders beers, like Rodenbach, and some lambics, like Cantillon or Boon.

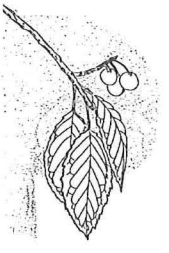
When wine or beer is stored for an extended length of time in unlined oak barrels, several physical and flavor changes occur. Since the barrel is a semipermeable membrane, it allows water and alcohol to escape. Expect to lose about 5 percent volume per year. The actual humidity of the cellar plays a significant role in the rates at which alcohol and water are lost. At roughly 60 to 65 percent relative humidity, both are lost at about the same rate. If the storage area is more humid, alcohol is lost more rapidly than water and the alcohol percentage of the beverage tends to decrease. However, if the humidity is less than 60 to 65 percent, the percentage of alcohol in the beer increases. Sort of brings new meaning to the concept of "dry" beer.

As for the flavors imparted to beer or wine by oak, the most significant are the aromatic compounds, called lignins, and the wood tannins (phenolic compounds) that are extracted into the beverage. In the wine world oak tannin contributes to the wine's flavor and tends to soften with aging. All-grain brewers know the taste of tannin from oversparging their grain, among other things, and it generally is not considered as desirable in beer as in wine. More important are the lignins that contribute the vanillin, syringaldehyde and other compounds responsible for the aromatic development. Vanillin is a particularly interesting flavor and is most easily sampled in many of the inexpensive and wonderful red wines of the Spanish Rioja district. The species of oak also affect the relative amounts of extract, phenolics and aromatic characters. American oak, predominately *Quercus alba* (white oak) tends to have a higher bouquet and stronger oak aroma (lactone).

If you choose to use barrels for aging your beer, there are many decisions to make. First you must decide whether to use American white oak or the more subtle French Limousin oak *(très cher!)* Also, the size and age of the barrel make a huge difference in how long you leave your beer in contact with the wood. At one end of the spectrum is a brand new barrel that could completely change the flavor of the product in a week. At the other end is a used bourbon barrel that could take months or even years to significantly alter the flavor because the interior is charred and little wood is exposed. The liquid in the barrel must be monitored constantly by taste and racked immediately once the desired flavor is reached. Extreme care must be taken

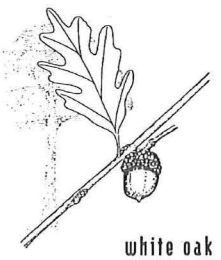


black birch



sweet cherry

beech



white oak

ILLUSTRATIONS BY MARIE ORLIN

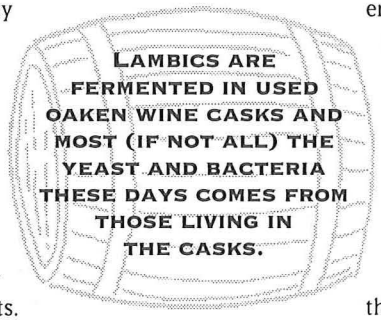
to avoid oxidation with each cellar operation, and the barrel must be topped up with some reserve beer as samples are drawn or natural evaporation occurs.

All of this seems about as much trouble as escaping from a locked safe while bound hand and foot, but the good news is there is an alternative available to those who want the flavor of wood without the hassle of barrel aging.

Everyone has heard of Budweiser's famous "beechwood aging" process, whereby the green beer is aged in stainless-steel tanks on beechwood chips at the reported rate of about one pound per barrel. What you may not know is that this was once a fairly common practice in many turn-of-the-century American breweries. Blueprints of old-time breweries sometimes featured whole floors of "chip tanks." There is no reason why the average homebrewer, being the experimental creatures we are, cannot mimic the barrel-aging process with the use of wood chips in our own cellars.

It has been claimed that chips improve the fermentation rate, aid the settling of yeast and colloidal substances and improve the physical stability of the final beer. *The Practical Brewer* (Master Brewers Association of the Americas, 1977) reports that "at Budweiser the beechwood chips that are added to the kraeusen tank are about two feet long, four inches wide and one-quarter-inch thick when new. They are manually placed in the tank to a depth of three or four feet. They must be removed after each tank drop, washed and sterilized prior to installation in another tank. The chips increase the surface area of the tank, thereby allowing a more complete fermentation with flocculent yeasts. They also slow the mixing of the kraeusen beer with the fermented beer, resulting in more complete end fermentation and certain flavor effects. It is claimed that there is no flavor extracted from the chips themselves." Perhaps this is because beechwood has lower tannin levels than white oak, and because the beechwood chips are sterilized in boiling water prior to use. At the New England Brewery I use about one-half pound per barrel of newly split kindling-size pieces of oven-toasted beechwood in our heavily hopped Gold Stock Ale. Many customers swear they can taste the wood, but that's usually after I've told them it was in there. The power of suggestion is sometimes an important ingredient .

Beechwood aging is part of Anheuser-Busch's secondary fermentation. All of its beers are beechwood aged on a layer of chips in the bottom of the lager tanks. The chips have been cleaned before use, and provide more surface area for the action of the yeast, which settles on the chips and continues to work until the beer is completely fermented.



I believe American beech (*Fagus grandifolia*) or European beech (*F. sylvatica*), a hardwood common to the eastern half of the United States and all of Western Europe, would have had more impact on the beverage/cooperage industry except that it is quite prone to water-based decay, hence its limited use for barrels. The flavor of beech is more subtle and less astringent than the oaks, although when I toast the wood in the oven to sterilize it, the house fills with a unique and spicy Bordeaux-winelike scent that tastes wonderful in lighter beers. I thought if beech worked so well compared to white oak, then perhaps there were other commonly available hardwoods that could be used in aging homebrew. I decided to set up an experiment using four different common hardwood chips. I aged three different types of beer: a 1.036 (9 °B) light German lager, a 1.048 (12 °B) red ale and a 1.056 (14 °B) oatmeal stout, with each of the different types of wood. A subjective sensory evaluation follows.

Besides white oak and beech I chose black birch (*Betula lenta*), the origin of the sweet sap for birch beer; and black cherry (*Prunus serotina*), mainly because it is quite common in Connecticut and is one of the more beautiful woods with which to work.

Homebrewers, in addition to being experimental, can sometimes be quite foolish in the pursuit of liquid perfection. I say this as a warning against running outside and chopping down every kind of tree growing in the yard and sticking it in your beer. Many woods, especially of the tropical variety, contain allergenic, irritating and poisonous substances within their cell walls. It is best to stick with woods that have a long history of use as containers or utensils for food and drink. Some other woods that have possible application are sycamore (*Platanus occidentalis*), which is quite tasteless, odorless and tough (sometimes used for butchers' blocks). Many old brewery tanks in the days before stainless steel were fashioned from redwood (*Sequoia sempervirens*) or southern cypress (*Taxodium distichum*). Sugar maple (*Acer saccharum*), used for rolling

PHOTO COURTESY OF ANHEUSER-BUSCH

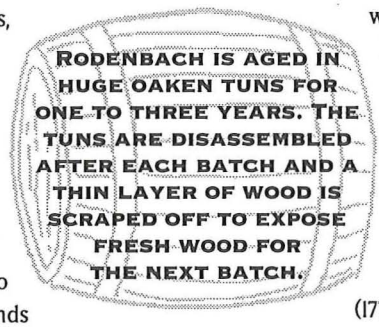
On stump, clockwise from top left: beech, white oak, cherry and birch wood chips

pins, and American basswood (*Tilia americana*) are two other neutral-tasting woods on the opposite end of the tannic spectrum from white oak. Samples from the American chestnut tree (*Castanea dentata*) — although the tree itself, tragically, is virtually extinct — sometimes exist in old barn beams or paneling. Because the tannin in chestnut bark was once a principle ingredient in the tanning of animal hides, it should be approached with caution.

There are a few factors to consider when deciding how much wood to use per five-gallon batch. Commonly quoted amounts range from one to four ounces. Much depends on the size and surface area of the chips in question — one big hunk weighing a quarter of a pound presents much less surface area than a handful of thin shavings weighing the same amount. One trick vintners use when adding oak chips to wine is to experiment with a small portion of the batch, say 10 percent, then blend as desired. If you are using wood chips mainly for their physical properties in regard to the fermentation process, you probably would want to use a milder flavored wood and leave it in the tank for a longer period of time. Fresh oak chips, on the other hand, contribute most of their flavor in less than a week, and can force an early racking. In addition, I see no reason why two or more different woods could not be used in the same batch. This is a creative art, and basically you'll just have to experiment if you want to find out how much and what type of wood tastes best to you.

Most well-stocked homebrew shops carry white oak chips. If you are familiar with the trees mentioned here, there is always the possibility of a midnight raid on the old wood pile. If you know the lumber itself, many examples can be had free in the form of shipping pallets. Cabinetmakers who work with cherry and birch could perhaps be persuaded to swap some end cuts for a few bottles of homebrew. Most woodworking supply shops carry a product called beechwood biscuits, a compressed oval of pure beech. They are sold in bags of a hundred or so and are used for joining in place of dowels. (The #20 biscuit fits quite nicely through the neck of a carboy.) Just make sure the wood you collect has not been treated with chemicals like glues and preservatives.

I added about five grams of oak, cherry, beech or birch to separate 12-ounce bottles of filtered carbonated commercial beer and allowed them to sit for 2 1/2 weeks. In addition, a plain control sample was retained. This dosage is quite high, equaling about 9 1/2 ounces of wood in a typical five-gallon batch, but time was short and I wanted to exaggerate the results. The wood was sterilized on a tray in the oven at 350 degrees F (177 degrees C) for about one hour. Alternate sanitation methods include steaming or pouring boiling water over them, but I believe these methods remove much of the tannin from the lumber. Another advantage to the oven method is the roasty flavor contributed by toasting the wood. Following are my conclusions:



(1) At the high dosage used, most of the beers exhibited a harsh, astringent characteristic that was almost unpleasant. By watering the samples with the control beer, my recommended starting rates of "dry-chipping" would be one to two ounces per five-gallon batch for oak and beech, and two to three ounces for cherry and up to four ounces for birch depending on the final sweetness desired.

(2) Birch seemed to add the most distinct varietal aroma and flavor. A light, delicate, American-type beer would taste very refreshing with a bit of birch, while a stout could lean toward the flavor of good old-fashioned root beer with a high dosage.

(3) Cherry was the most interesting in the light-colored beers, exhibiting a tart, wild bite that would be great in a strong, blond Belgian ale.

(4) Beech seemed to contribute the least in aroma and might be useful to add to underhopped beers where it would help increase the feeling of bitterness and slight astringency.

(5) White oak should be reserved for ciders and the strongest, blackest, most intense bottle-conditioned ales. It probably would take the longest to soften and mature.

I have experimented with smoking wet chips in my Brinkman smoker for a couple of hours and adding them to finished carbonated keg beer to produce a very fine and natural rauch-type beer without mashing smoked grains.

I hope that I have at least started to unravel some of the knots regarding the mostly forgotten practice of mingling wood flavors with beer. If I hear from Houdini at my next brewing séance, I'll let you know if he liked the taste.

References

Anderson, Stanley and Dorothy, *Winemaking: Recipes, Equipment, and Techniques for Making Wine at Home*, Harcourt Brace Jovanovich, 1989.

Master Brewers Association of the Americas, *The Practical Brewer*, 1977.

Muscatine, Amerine and Thompson: Editors, *The Book of California Wine*, University of California Press/Sotheby Publications, 1993.

Schiffer, Nancy and Herbert, *Woods We Live With*, Schiffer Limited, 1977.

PHOTO BY RON PAGE

ABOUT THE AUTHORS

Cory Bailey has been brewing since 1987, and all-grain brewing since 1989. He took second place in the porter category at the AHA 1990 National Homebrew Competition. Cory has been the "fearless leader" of ZZ Hops (Zion Zymurgists Homebrew Operative Society) homebrew club of Salt Lake City, Utah, for the last three years. He now lives with his wife and two children in Scottsdale, Ariz., where the summer is hot and the skiing is lousy.

Bob Barson, a homebrewer since 1988, has won ribbons in competitions for fruit beers as well as first place in the AHA 1992 National Homebrew Competition in the specialty beer category. He is a past president of the Chicago Beer Society and coordinator for the 1994 Midwest Brewfest in Chicago.

Ted Bergin, a carpenter in Cincinnati, Ohio, has been an avid homebrewer for three years. He continues to experiment with new recipes and enjoys competing in homebrew competitions.

Jerry Bourbonnais was born and raised in Milwaukee, Wis. For the last 14 years he has worked for the Minnesota Department of Natural Resources. A homebrewer since 1985, he is co-founder and current president of the Boreal Bottlers Home Fermenters Association. Jerry and Steve Benson have co-hosted the "Brewpot" show on KAXE radio in Grand Rapids, Minn., for eight years.

Ralph Bucca has been an active zymurgist for 20 years, stalking wild meads and wines. A member of BURP, he brews normal and abnormal beers. He was AHA 1988 Meadmaker of the Year. Ralph and his family live on three acres near The Chesapeake Bay in Southern Maryland.

Byron Burch, of Santa Rosa, Calif., is proprietor of The Beverage People, author of *Brewing Quality Beers* (Joby Books, 1986), AHA 1986 Homebrewer of the Year and AHA Meadmaker of the Year in 1992 and 1994. Brewing beer and mead in addition to winemaking, writing, teaching new brewers and working at The Beverage People keep him busy year-round.

Ray Daniels has been homebrewing since 1989. He is a National BJCP judge, a frequent ribbon-winner in homebrew competitions and a regular contributor to ***zymurgy***. His goal for the next year is to start a new craft beer brewery in Chicago.

Caroline Duncker started brewing beer in 1992 when she was bribed by a friend to help bottle. She especially enjoys brewing and drinking mead. As the AHA assistant, Caroline partakes in the professional aspect of homebrewing.

Lanny Hoff is an avid homebrewer, fly fisherman and bicyclist who has worked in a homebrew shop and teaches the art of homebrewing to hundreds of eager, aspiring brewers.

Chip Jarry of Leicester, Mass., is a Certified BJCP judge, owner of Homebrewer's Market in Leicester and sales manager for radio stations WGFP-AM and WXXW-FM.

Solomon H. Katz, Ph.D., is a leading specialist on the evolution of the human diet, particularly early beer and brewing culture and technology, at the University of Pennsylvania and the World Food Museum. His studies led to new interpretations of recent archaeological finds and help explain the importance of brewing in early civilizations. His work with Anchor Brewing Co. led to the formulation of Ninkasi, a beer made from traditional Mesopotamian ingredients and procedures.

Jackie Keith is a native of Louisville, Ky. He is a pediatric phlebotomist whose more interesting jobs included skycap and bartender. His hobbies are fishing, horse racing, homebrewing and collecting local beer memorabilia. An avid homebrewer for the last four years, he dabbles in cider, mead and fruit wine and hopes to pursue a career in the brewing industry.

Brian Kelly lives in Denver, Colo., where he manages a bicycle shop. He has been brewing for more than three years and, as far as he has ascertained, he brewed the first curry-spiced beer, the award-winning Maharajah Coconut Curry Wheat.

Finn Knudsen earned his masters of science in chemical engineering from the Royal Technical University of Denmark. Since his undergraduate years, Finn has worked in breweries around the world including Tuborg Breweries, Copenhagen, Denmark; Rainier Brewing Co., Seattle, Wash.; Molson Breweries, Montréal, Canada; and Coors Brewing Co., Golden, Colo. Finn was responsible for the research and development of the Universal Tank (UniTank) concept and its application around the world. He is currently the president of Beverage Consult International Inc. in Colorado, (the regional office of All Saint's Brands) and is working on an upcoming Brewers Publications Classic Beer Style Series book, *American Lager*, scheduled for release in 1995.

Al Korzonas, a National BJCP judge, is a technical editor for ***zymurgy***. He contributes to several brewing magazines, club newsletters and electronic forums. An electrical engineer by trade, Al works as a software developer for AT&T Bell Laboratories to support his homebrewing habit. He is an active member of the Chicago Beer Society, Brewers of South Suburbia and the Urban Knaves of Grain homebrewing clubs. As if all that didn't take up too much potential brewing time, Al also owns Sheaf and Vine Brewing Supply in Countryside, Ill.

Brad Kraus of Santa Fe, N.M., is brewmaster at Rio Bravo Restaurant and Brewery in Albuquerque and former brewmaster of Santa Fe Brewing Co. He has been a homebrewer for 12 years and is a Master BJCP judge.

Håkan Lundgren is president of the Swedish Homebrewers Association and a member of the Fermentation Army homebrew club. A homebrewer for six years, Håkan was the 1991 Swedish Homebrewer of the Year. He is a safety manager at Scandinavian Airlines in Stockholm. With Svante Ekelin he has written a book, *Olbryggning (Beer Brewing — a Handbook for Homebrewers)* (Bibo, 1993).

Phil Markowski began homebrewing in the summer of 1984. In 1989 he traded a career in electronic engineering for microbrewing and co-founded the New England Brewing Co. in Norwalk, Conn., with Richard and Marcia King. A trip to Belgium in 1992 rekindled his interest in brewing as a hobby. When not brewing Phil enjoys watching foreign films, gardening and restoring antique radios at his home in Wilton, Conn.

Michael Matucheski has been a homebrewer for 18 years and a scratch brewer for the last 14. He hopes to open his own microbrewery that uses only organically grown ingredients.

Randy Mosher is a beer author/lecturer and free-lance graphic designer. A National BJCP judge, Randy began brewing in 1984. He has made presentations to a number of national and regional homebrew conferences, including three engagements at AHA National Homebrewers Conferences. He is author of *The Brewer's Companion* (Alephenalia Publications, 1994), an advanced homebrew reference guide. He is also the creator of two beer-recipe formulation aids: Dr. Bob Technical's Amazing Wheel of Beer and The Incredible Hop-Go-Round.

Ron Moucka lives with his brewpartner/wife Bonnie in Fort Collins, Colo. He is an accredited tax adviser and financial planner by trade, and a homebrewer of three years by choice.

Ron Page has earned the title of New England Homebrewer of the Year for five consecutive seasons and won numerous ribbons in AHA National Homebrew Competitions since 1986. A member of the Boston Wort Processors, Ron is a brewer at the New England Brewing Co. in Norwalk, Conn. He lives in Middletown where he grows exotic chili peppers, writes a regular column for *Ale Street News* and operates a part-time woodworking business designing and building Victorian era bars and furniture.

Charlie Papazian, Association of Brewers president, is founder of the American Homebrewers Association and author of *The New Complete Joy of Home Brewing* (Avon Books, 1991) and *The Home Brewer's Companion* (Avon Books, 1994).

Phil Rahn has been homebrewing for 19 years. He is a Certified BJCP judge and enjoys the challenge of brewing any beer style, particularly traditional types such as steinbier. Phil lives in Cordova, Tenn., and is a product development representative for the Monsanto Agricultural Group.

Mary Samuels lives in the Pacific Northwest where she took up brewing after sampling some of the area's finer microbrews. A computer systems analyst by profession and an admitted hop-head, Mary is the section leader of the general homebrewing section of the Bacchus Wine and Beer Forum on CompuServe. She gives out "advice to the beerlorn," answering questions from Forum members worldwide on topics both technical and aesthetic. Her user ID is: 76460,724.

Carl Saxer, a Certified BJCP judge, is a power plant laboratory technician for the Orlando Utilities Commission. He analyzes and operates water treatment and environmental protection systems at the Stanton Energy Center in Orlando, Fla. He has been brewing beer for four years, making mead for one year and plans to brew saké in the near future.

Mike Schaefer is an architect who has been brewing on the side for about six years. He is a proud member of the Brewtown Brewmasters of Milwaukee and is prepared to graciously accept any reader's offer to pay his expenses to travel to Finland to learn more about (and consume) sahti.

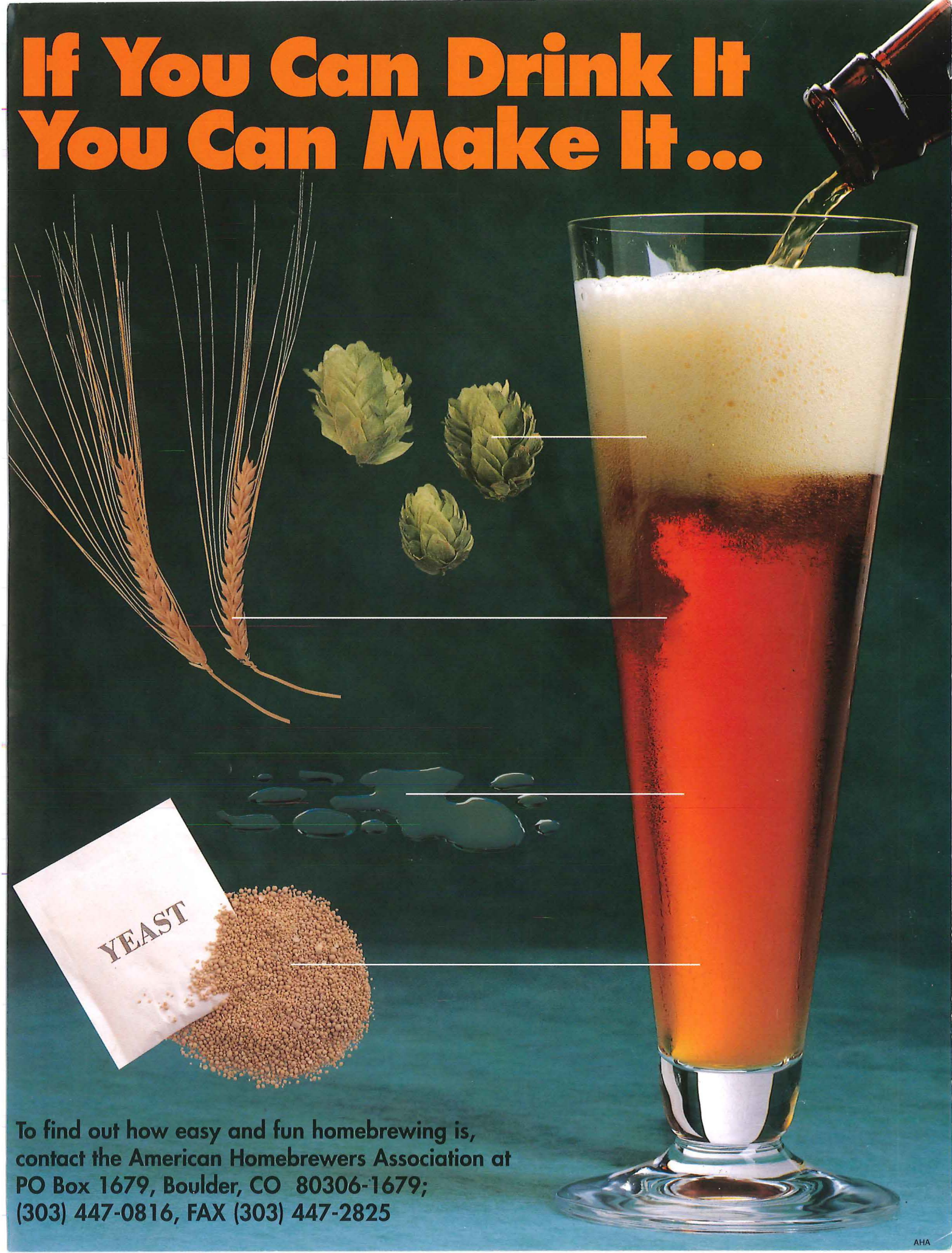
Chuck Skypeck is a key player in bringing real beer to the Deep South. He is co-owner and brewer for Boscos Pizza Kitchen & Brewery, Tennessee's first brewpub. Chuck, a National BJCP judge, is a technical sales representative for Diversified Metal Engineering Brewing Services. In addition, he writes a regular column on brewing for *Southern Draft News*.

Mike Stiles is a dentist who has been homebrewing for more than three years. His sons, Justin and Drew, enjoy helping with homebrewing by adding the hops. He is a member of the Boulder, Colo., homebrew club, Hop, Barley and the Alers.

James Walton has a master's degree in museum studies (anthropology section) from the University of Colorado at Boulder. He is a professional jewelry designer and manufacturer and an art dealer specializing in Native American and pre-Columbian art. As a hobby he pursues archaeological and archaeoastronomy interests in the American Southwest and Mexico. He is the author of several articles on the astronomy of the Anasazi and the ancient Maya.

Bruce Williams entered the homebrew business in 1972 when he was 12 by starting a Saturday job in his father's Glenbrew shop in Glasgow, Scotland. After 15 years Bruce built the business into a multimillion dollar retail, wholesale and manufacturing company. The idea to brew a commercial heather ale resulted from a fascination for Scottish brewing history and the desire to revive a piece of culture that had been repressed for 300 years.

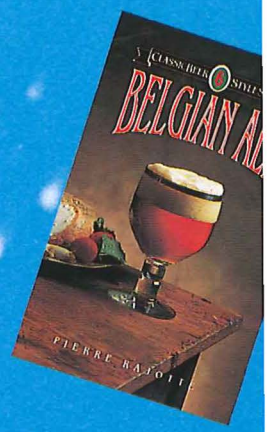
If You Can Drink It You Can Make It...

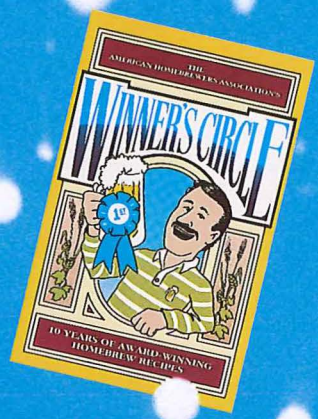


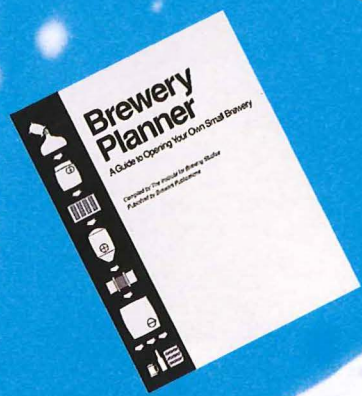
To find out how easy and fun homebrewing is, contact the American Homebrewers Association at PO Box 1679, Boulder, CO 80306-1679; (303) 447-0816, FAX (303) 447-2825

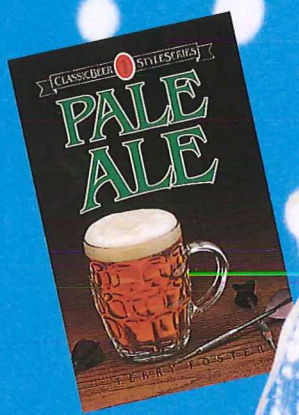
AHA

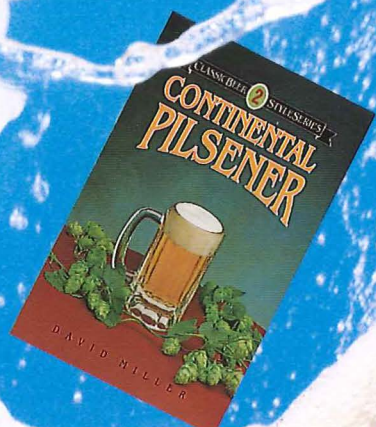
GET BREWING

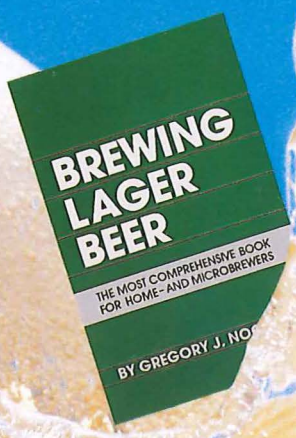












Brewers Publications publishes the complete spectrum of books for homebrewers, professional brewers and beer enthusiasts.

Brewers Publications
PO Box 1679
Boulder, CO 80306-1679
(303) 546-6514 FAX (303) 447-2825
Call or write for a free catalog.

WINNERS CIRCLE

James Spence

Welcome to the best of 1994! With 3,060 beer, mead, cider and saké entries, the American Homebrewers Association 1994 National Homebrew Competition was the largest yet — 100 times larger than the very first national competition in 1979. In all, 16,758 homebrews have been judged in 16 years of competition.

Jim Liddil was named 1994 Homebrewer of the Year on June 24 at the AHA 1994 National Homebrewers Conference in Denver, Colo. His "Wild Pseudo-Lambic" used 12 different strains of microflora to produce an exotic and tasty gueuze-style beer. Jim wins an all-expense-paid trip to the Great American Beer Festival℠ XIII Oct. 21 and 22 in Denver.

Michael Byers of Santa Cruz, Calif., won this year's Ninkasi Award with two first-place beers. The prize, sponsored by Pete's Brewing Co., earns Michael name recognition on each bottle of Pete's Wicked 1995 seasonal brew developed from his recipes, plus a short course at Siebel Institute of Technology and attendance at the first brewing of Pete's Wicked seasonal brew, all courtesy of Pete's Brewing Co. The award is given to the brewer who earns the most points in the Competition's beer categories. Six points are awarded for each first place, three for each second and one for each third.

Martin Stokes of Old Town, Maine, became 1994 Cidermaker of the Year with his "New England Cider" that took more than two years to brew, Dale Howell of Wellington, Fla., won 1994 Sakémaker of the Year, and Byron Burch won 1994 Meadmaker of the Year.

Solidifying a true dynasty, the Sonoma Beerocrats of California claimed the Homebrew Club of the Year trophy for the ninth consecutive year. The Boston Wort Processors placed a distant second, while the Ann Arbor Brewers Guild of Michigan tied with Colorado's Hop Barley and the Alers for third place. As with the Ninkasi Award, a club earns points based on the number of awards its members win — six points for first, three for second and one for third — in all categories of the Competition.

Brew away! These are all gold-medal-winning recipes, with the exception of the brown ale category where no gold medal was awarded. We printed Russ Levitt's silver-medal winner instead. Have fun, brew well, laugh a lot and don't worry if your beers don't come out quite the way you think these did. That's the way things are sometimes.

BARLEY WINE

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Edme Ltd., Mistley, Manningtree, England

DAVID M. WEST, BILL PANKRATZ
MILFORD, MICHIGAN
"SPRING HEAVEN"
BARLEY WINE

Ingredients for 10 gallons

30	pounds Munton and Fison pale malt
3 1/2	pounds Munton and Fison crystal malt
5	pounds Munich malt
2 1/2	pounds CaraPils malt
3	ounces Chinook hops, 11.3 percent alpha acid (60 minutes)
1	ounce Cascade hops, 5.9 percent alpha acid (60 minutes)
2	ounces Cascade hops, 5.9 percent alpha acid (20 minutes)
3	ounces Cascade hops, 5.9 percent alpha acid (finish)
4	ounces Cascade hops, 5.9 percent alpha acid (dry)
	Wyeast No. 1338 European ale liquid yeast
	force carbonate in keg

- Original specific gravity: 1.090
- Final specific gravity: 1.020
- Boiling time: 60 minutes
- Primary fermentation: three weeks at 68 degrees F (20 degrees C) in glass
- Secondary fermentation: two months at 38 degrees F (3 degrees C) in stainless steel
- Age when judged (since bottling): 18 months

Brewers' specifics

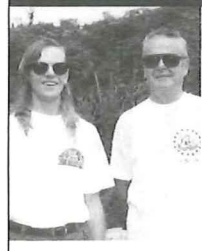
Mash grains for 90 minutes at 150 to 155 degrees F (66 to 68 degrees C).

Judges' comments

"Flavor hops seem a bit too intense. Cut back on ending hops some, or just age this another couple of months. Cascade hops aplenty. Could cut back some to allow more malt to come through."

"A hint of licorice in the finish. Hop bitterness, flavor and malty sweetness all nicely balanced."

BELGIAN AND FRENCH ALE



GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Manneken-Brussel Imports, Austin, Texas

SHAWN BOSCH, JOSEPH BOSCH
WADING RIVER, NEW YORK
"ICY HOLLOW BROWN ALE"
FLANDERS BROWN

Ingredients for 5 gallons

4	pounds Belgian two-row pale malt
2	pounds Belgian Special "B" malt
1	pound Belgian aromatic malt
1	pound Munich malt
2	pounds light dry malt extract
1	pound dark brown sugar
1	ounce Cascade hops, 5.7 percent alpha acid (75 minutes)
1/2	ounce Liberty hops, 4.6 percent alpha acid (10 minutes)
1/2	ounce Liberty hops, 4.6 percent alpha acid (finish)
	yeast culture from bottle-conditioned Belgian brown ale
3 1/4	ounces dextrose and 10 ounces kraeusen (to prime)

- Original specific gravity: 1.071
- Final specific gravity: 1.024
- Boiling time: 90 minutes
- Primary fermentation: one week at 68 degrees F (20 degrees C) in glass
- Secondary fermentation: seven weeks at 68 degrees F (20 degrees C) in glass
- Tertiary fermentation: three weeks at 68 degrees F (20 degrees C) in glass
- Age when judged (since bottling): six months

Brewers' specifics

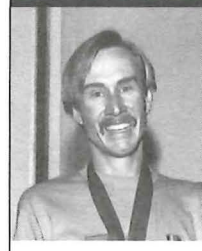
Mash grains for 15 minutes at 123 degrees F (51 degrees C). Raise to 152 degrees F (67 degrees C) for 60 minutes. Raise to 170 degrees F (77 degrees C) for 15 minutes.

Judges' comments

"Beautiful tart and refreshing sourness with good malt roundness. Slightly high conditioning is not unpleasant. A lovely, almost Rodenbach-like beer with plenty of refreshing, slightly sour-cherry palate."

"Slightly too brown, use less crystal or dark malt. Nice aroma, good sourness. A little too sweet and malty. Very drinkable."

BELGIAN-STYLE LAMBIC



GOLD MEDAL AND 1994 HOMEBREWER OF THE YEAR

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by L.D. Carlson Co., Kent, Ohio

JAMES LIDDIL
TUCSON, ARIZONA
"WILD PSEUDO-LAMBIC"
GUEUZE

Ingredients for 5 gallons

6	pounds Briess Wiezen malt extract
4	ounces old hops, variety unknown (60 minutes)

Yeast and bacteria strains:

2	strains of *Kloeckera apiculata* (yeast)
4	strains of *Dekkera bruxellensis* (yeast formerly known as *Brettanomyces bruxellensis*)
4	strains of *Dekkera anomola* (yeast formerly known as *Brettanomyces lambica*)
1	strain of *Saccharomyces cerevisiae* (Williams Brewing Burton ale yeast)
1	strain of *Pediococcus damnosus* (bacteria)
1	cup corn sugar (to prime)

- Original specific gravity: 1.045
- Final specific gravity: 1.008
- Boiling time: 60 minutes
- Primary fermentation: four months in plastic
- Secondary fermentation: four months in plastic
- Age when judged (since bottling): seven months

Judges' comments

"Nice! Full of 'horse blanket' and other classic aromas for style. Somewhat bitter, although doesn't taste like hops. Acidity restrained. Just a little rough, young. Very good attempt at the style, but tastes like it could use another year in the bottle."

"Good nose. Outhouse, musty. This is good. Good lactic, good finish, nice complexity, nice balance of flavors. Time will improve this."

BROWN ALE

SILVER MEDAL

(NO GOLD MEDAL AWARDED IN CATEGORY)

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Premier Malt Products, Grosse Pointe, Michigan

RUSSELL LEVITT
BLOOMINGTON, INDIANA
"GET YOUR THUMB OUT OF YOUR BUTT"
ENGLISH BROWN

Ingredients for 12 gallons

16	pounds pale ale malt
1	pound dextrin malt
5 1/4	ounces Special "B" malt
5 3/4	ounces Belgian biscuit malt
4 1/2	ounces aromatic malt
4 1/2	ounces CaraMunich malt
4 3/4	ounces Munich malt
1	pound wheat malt
3	ounces black patent malt
5 1/3	ounces CaraPils malt
1 1/2	ounces Goldings hops (60 minutes)
1	ounce Goldings hops (30 minutes)
1/2	ounce Goldings hops (20 minutes)
	Wyeast No. 1028 liquid yeast culture
	force carbonate in keg

- **Original specific gravity: 1.046**
- **Final specific gravity: 1.011**
- **Boiling time: 75 minutes**
- **Primary fermentation: three weeks at 64 degrees F (18 degrees C) in glass**
- **Age when judged (since bottling): 2 1/2 months**

Brewer's specifics

Mash grains for one hour at 153 to 154 degrees F (67 degrees C). Sparge with 170-degree-F (77-degree-C) water.

Judges' comments

"Minimal sweetness fades quickly. Out of balance toward hop end. Nice effort! Need more malty sweetness for this style and a little more hops would make this a great brown. Keep trying!"

"Nice lingering sweet malt flavor, probably accentuated by the DMS. Aftertaste astringent and roasty. A good effort, but a short, non-vigorous boil or slow wort cooling produced the detraction of DMS. Roast grain flavor a bit overdone and led to the astringency."

"Some sweetness initially but fades quickly. Some astringency. Beer needs more malty sweetness in finish. Fairly good beer."

ENGLISH-STYLE PALE ALE

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Wynkoop Brewing Co., Denver, Colorado

MIKE HARPER
OAKDALE, CALIFORNIA
"WHITE OAK ALE"
INDIA PALE ALE

Ingredients for 5 gallons

7	pounds American light extract
3	pounds Klages malt
1	pound 20 °L caramel malt
4/5	ounce Chinook hops, 12.5 percent alpha acid (60 minutes)
7/10	ounce Chinook hops, 12.5 percent alpha acid (30 minutes)
2	ounces Cascade hops, 7.8 percent alpha acid (dry)
	Wyeast No. 1056 liquid yeast culture
	force carbonate in keg

- **Original specific gravity: 1.061**
- **Final specific gravity: 1.020**
- **Boiling time: 60 minutes**
- **Primary fermentation: one week at 65 degrees F (18 degrees C) in glass**
- **Secondary fermentation: three weeks at 65 degrees F (18 degrees C) in glass**
- **Age when judged (since bottling): two months**

Brewer's specifics

Steep grains for 60 minutes at 160 degrees F (71 degrees C).

Judges' comments

"Nice full flavor; maltiness a bit too dominant for style. Increase hop bitterness considerably; alcoholic strength could be more evident. Tasty beer but not in style — I think this beer would do better as an ESB. A different yeast (one that is more attenuative) or a less dextrinous wort would make this an IPA."

"Good hop flavor and bitterness. Maltiness rounds out the palate. Alcoholic and warming, but not overdone. Could use some more bitterness for this style. Reminds me of Anchor Liberty only not as bitter."

AMERICAN-STYLE ALE

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Northwestern Extract Co., Brookfield, Wisconsin

JOHN M. ARENDS
CALISTOGA, CALIFORNIA
"VINCE'S PALE"
AMERICAN PALE ALE

Ingredients for 10 gallons

18	pounds two-row malt
1	pound 30 to 37 °L British crystal malt
1	pound 20 °L crystal malt
1	pound 10 °L Munich malt
1	pound red wheat malt
1/2	ounce Chinook hops, 11.3 percent alpha acid (60 minutes)
1/2	ounce Chinook hops, 11.3 percent alpha acid (30 minutes)
3	ounces Cascade hops, 6 percent alpha acid (30 minutes)
2	ounces Cascade hops, 6 percent alpha acid (two minutes)
3	ounces Cascade hops, 6 percent alpha acid (dry)
	Wyeast No. 1056 liquid yeast culture
1 1/2	cups corn sugar (to prime)

- **Original specific gravity: 1.054**
- **Final specific gravity: 1.010**
- **Boiling time: 75 minutes**
- **Primary fermentation: 14 days at 68 degrees F (20 degrees C) in glass**
- **Secondary fermentation: eight days at 68 degrees F (20 degrees C) in glass**

Brewer's specifics

Mash grains for 75 minutes at 154 degrees F (68 degrees C). Sparge with 180-degree-F (82-degree-C) water.

Judges' comments

"Hops and malt tumble together on palate to really come alive and explode. Good balance, good conditioning. Very drinkable."

"Appropriate hop bitterness. Blends nicely with malt. Slight oxidation gives a little harshness to bittering hops. Clean, crisp and satisfying. Hops are perfect. Slight oxidation, but otherwise look out Sierra Nevada."

ENGLISH BITTER

GOLD MEDAL

AHA 1994
NATIONAL
HOMEBREW
COMPETITION

Category award sponsored by
Alternative Beverage, Charlotte, North Carolina

MICHAEL BYERS
SANTA CRUZ, CALIFORNIA
"BE BOP BITTER"
ENGLISH EXTRA SPECIAL BITTER

Ingredients for 5 gallons

12 1/4	pounds two-row malt
1 2/5	pounds Belgian CaraVienne malt
9/10	pound 30 to 37 °L British malt
1/3	pound Belgian CaraMunich malt
1/8	pound Belgian Special "B" malt
9/10	ounce Kent Goldings hops, 5.4 percent alpha acid (60 minutes)
1 3/10	ounces Kent Goldings hops, 5.4 percent alpha acid (30 minutes)
	Special London liquid yeast culture
	force carbonate in keg

- Original specific gravity: 1.070
- Final specific gravity: 1.020
- Boiling time: 60 minutes
- Primary fermentation: one week at 68 degrees F (20 degrees C) in stainless steel
- Secondary fermentation: two weeks at 32 degrees F (0 degrees C) in stainless steel
- Age when judged (since bottling): 2 1/2 months

Brewer's specifics

Mash grains for 60 minutes at 156 degrees F (69 degrees C).

Judges' comments

"Malty sweet, low hop bitterness. Great beer! Needs a bit more hop bitterness to balance the malt."

"Appropriate ESB taste. This is a good job of balance. Very nice job. True to style in almost every way — try to get a touch more bitterness next time."

"Good beer. Maltiness correct. Hops lacking for ESB category. Hop it up next time."

SCOTTISH ALE

GOLD MEDAL

AHA 1994
NATIONAL
HOMEBREW
COMPETITION

Category award sponsored by
Something's Brewing, Burlington, Vermont

MICHAEL BYERS
SANTA CRUZ, CALIFORNIA
"WHAT'S UNDER THE KILT?"
SCOTTISH HEAVY

Ingredients for 5 gallons

5	pounds British pale malt
12	pounds Belgian Pils malt
1	pound, 3.5 ounces CaraVienne malt
1	pound, 3.5 ounces 40 °L crystal malt
10	ounces Belgian Special "B" malt
4/5	ounce Kent Goldings hops, 5.6 percent alpha acid (60 minutes)
3/10	ounce Kent Goldings hops, 4.9 percent alpha acid (30 minutes)
	Scotch ale liquid yeast culture
	force carbonate in keg

- Original specific gravity: 1.086
- Final specific gravity: 1.030
- Boiling time: 60 minutes
- Primary fermentation: one week at 60 degrees F (15.6 degrees C) in glass
- Secondary fermentation: two weeks at 32 degrees F (0 degrees C) in stainless steel
- Age when judged (since bottling): 2 1/2 months

Brewer's specifics

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

Judges' comments

"Scottish ale! All style descriptors present in a well-balanced and well-rounded flavor. Outstanding effort. Recipe formulation, alcohol, sweetness, balance all fine. Who are you?"

"Pears, delicious. Peaty, hint of smoke. Rich malt. The Scottish ale multiflavors are all good. Rounded and delicious."

"Beautiful malty sweetness. Hops present but perfect for style. Slight estery flavors blend very well with the malt and hops. Excellent balance! Outstanding beer! Can't give you any tips on how to improve this beer because I don't think it can be improved."

PORTER

GOLD MEDAL

AHA 1994
NATIONAL
HOMEBREW
COMPETITION

Category award sponsored by
The Cellar, Seattle, Washington

DAVID A. LOSE,
GLENN KLEIN, DALE DOCKINS
SEBASTOPOL, CALIFORNIA
"JIM BOB PORTER"
ROBUST PORTER

Ingredients for 5 gallons

6	pounds amber malt extract
4	pounds dark malt extract
1/2	pound chocolate malt
1/2	pound dark caramel malt
2	ounces Cluster hops (45 minutes)
1	ounce Cascade hops (10 minutes)
13	small pieces of natural licorice
	Chico ale liquid yeast
3/4	cup corn sugar (to prime)

- Original specific gravity: unknown
- Final specific gravity: unknown
- Boiling time: 60 minutes
- Primary fermentation: one week in stainless steel
- Secondary fermentation: two weeks in glass
- Age when judged (since bottling): four months

Brewers' specifics

Steep grains for 10 minutes at the end of the boil.

Judges' comments

"Lots of black malt, rich flavor. Moderately high hops. Well-balanced. Too much carbonation. Clean. High alcohol (try a less attenuative yeast). Slight esters with warming. This is good beer. A real robust porter."

"A very full robust porter. Mellows as it sits in glass. Full-bodied, don't add any more! A very nice drinking beer."

ENGLISH AND SCOTTISH STRONG ALE

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Wine & Hop Shop, Denver, Colorado

BOB GORMAN
WALTHAM, MASSACHUSETTS
"FLAMING SCROTUM"
ENGLISH OLD ALE/STRONG ALE

Ingredients for 7 3/4 gallons

16 1/2	pounds Briess two-row malt
2 1/2	pounds DeWolf-Cosyns Munich malt
1 1/2	pounds Munton and Fison crystal malt
1/2	pound DeWolf-Cosyns aromatic malt
1	pound Ireks German wheat malt
2	ounces Kent Goldings hops, 5 percent alpha acid (60 minutes)
3/5	ounce Galena hops, 13 percent alpha acid (60 minutes)
1	ounce Kent Goldings hops, 5 percent alpha acid (30 minutes)
1	ounce Fuggles hops (15 minutes)
1	ounce Cascade hops (five minutes)
	Boston Brewery ale liquid yeast culture
	force carbonate in keg

- Original specific gravity: 1.076
- Final specific gravity: 1.025
- Boiling time: 120 minutes
- Primary fermentation: one month
- Age when judged (since bottling): 17 months

Brewer's specifics

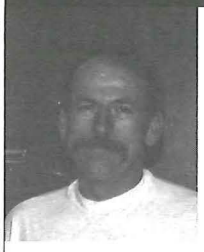
Mash-in at 154 degrees F (68 degrees C). Temperature may be allowed to drop to 150 degrees F (66 degrees C) over 90 minutes. Raise to 168 degrees F (76 degrees C) for 20 minutes. Sparge with 7 gallons of water.

Judges' comments

"Complex, some fruitiness, resinous, thick, almost syrupy or honeylike. Some residual sweetness. Complex interaction of malt, hops, fruit, honey. Slight huskiness or astringency in the aftertaste. This is good, the best we've had yet. Well done, good job."

"Rich complex blend with diacetyl/butterscotch elements nicely integrated. Smooth lingering caramel aftertaste. An excellent, well-balanced brew that leaves a clean, smooth aftertaste. No ragged edges. Jolly good!"

STOUT



GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Alternative Garden Supply, Streamwood, Illinois

JAMES A. GEBHARDT
FARGO, NORTH DAKOTA
"RAPID RUN STOUT"
IMPERIAL STOUT

Ingredients for 5 gallons

10 3/4	pounds six-row malt
6	pounds Briess dark malt extract syrup
1/2	pound chocolate malt
1 1/4	pound 80 °L crystal malt
1/2	pound black patent malt
1/4	pound black barley malt
1/4	pound wheat malt
1/2	pound special roast malt
1/4	pound CaraPils malt
2	ounces Bullion hops, 10.1 percent alpha acid (60 minutes)
2 1/2	ounces Cluster hops, 7 percent alpha acid (30 minutes)
3	ounces Mt. Hood hops, 2.3 percent alpha acid (two minutes)
1/2	ounce Cascade hops, 5 percent alpha acid (two minutes)
	Irish ale yeast and Champagne yeast
3/4	cup dextrose (to prime)

- Original specific gravity: 1.105
- Final specific gravity: 1.030
- Boiling time: 60 minutes
- Primary fermentation: 30 days at 60 degrees F (16 degrees C) in glass
- Age when judged (since bottling): five months

Brewer's specifics

Mash grains for 90 minutes at 150 degrees F (66 degrees C).

Judges' comments

"Alcohol evident (very!). Bitter but not any hop flavor. Very slight malt sweetness. Roast malt. Needs more late addition hops for hop aroma and flavor. Bitterness is OK or perhaps a little high."

"Sweet with some licorice. Alcohol evident. Maltiness and bitterness very much there. A big beer with lots of malt and hops. Balance leans a bit toward the hops side."

BOCK

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Washington Hop Commission, Yakima, Washington

DAVID M. COOKE, JAMES PRINCE
YORKTOWN, VIRGINIA
"HALLUCINATOR"
DOPPELBOCK

Ingredients for 5 gallons

3 1/3	pounds Munton and Fison amber malt extract syrup
3 1/3	pounds Munton and Fison light malt extract syrup
3	pounds Laaglander extra light dry malt extract
1	pound Laaglander amber dry malt extract
2	pounds 50 °L crystal malt
1/2	pound 338 °L chocolate malt
2	ounces Saaz hops, 3.5 percent alpha acid (60 minutes)
1	ounce Saaz hops, 3.5 percent alpha acid (five minutes)
	Wyeast No. 2206 Bavarian liquid yeast
1 1/4	cups Laaglander extra light dry malt extract (to prime)

- Original specific gravity: 1.081
- Final specific gravity: 1.022
- Boiling time: 60 minutes
- Primary fermentation: eight days at 50 degrees F (10 degrees C) in glass
- Secondary fermentation: 39 days at 50 degrees F (10 degrees C) in glass
- Age when judged (since bottling): 3 1/2 months

Brewers' specifics

Steep grains for 60 minutes at 160 degrees F (71 degrees C).

Judges' comments

"An obvious metallic character — maybe from hops? Sweet, malty, a bit of roastiness comes through. Nice, carbonation feel. Perhaps a bit bitter on finish. Metallic character moderates after first sip. Good maltiness, you got that perfect."

"Malty, roasty, sweet, low hop bitterness. Conditioning OK. Sherrylike. Balance toward malt finish. Warming/alcoholic. Watch for falling goats! This beer might be a little old, but it's the best so far. Try to get less yeast in the bottle and you'll have a great one."

BAVARIAN DARK

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Crosby and Baker, Westport, Massachusetts

JOHN RITTENHOUSE
FOLSOM, CALIFORNIA
"BACKYARD BROWN"
MUNICH DUNKEL

Ingredients for 5 gallons

10	pounds light malt extract
1	pound Munich malt
1	pound pale malt
1/2	pound 120 °L crystal malt
1/4	pound chocolate malt
2	ounces Hallertauer hops, 3.7 percent alpha acid (60 minutes)
1	teaspoon Irish moss (15 minutes)
1	ounce Hallertauer hops, 4.6 percent alpha acid (10 minutes)
1	ounce Hallertauer hops, 4.6 percent alpha acid (finish)
	Wyeast Bavarian lager liquid yeast culture
3/4	cup corn sugar (to prime)

- Original specific gravity: 1.080
- Final specific gravity: 1.040
- Boiling time: 60 minutes
- Primary fermentation: two weeks at 40 degrees F (4 degrees C) in glass
- Secondary fermentation: two weeks at 65 degrees F (18 degrees C) in glass
- Age when judged (since bottling): four months

Brewer's specifics

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

Judges' comments

"Beautiful, malty, chocolatey palate. Clean. Hop bitterness appropriate. A wonderful beer! I'll take a case."

"Good malty chocolate flavors. Back off on the flavor hops. I like this. Would be even better without the hop flavor and aroma."

"Big roasty caramel malt character. Balance seems fine. Sweetness lingers. Excellent beer, but lacks the big aroma that should go with it."

GERMAN LIGHT LAGER

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Briess Malting Co., Chilton, Wisconsin

KEITH WEERTS
WINDSOR, CALIFORNIA
"FALLEN OAK DORTMUND"
DORTMUND/EXPORT

Ingredients for 11.5 gallons

7	pounds Klages malt
16	pounds German Pils malt
2 4/5	ounces Saaz hops, 5 percent alpha acid (60 minutes)
3	ounces Saaz hops, 2.4 percent alpha acid (60 minutes)
1 1/5	ounces Saaz hops, 2.4 percent alpha acid (30 minutes)
3/5	ounce Saaz hops, 5 percent alpha acid (15 minutes)
1 1/5	ounces Saaz hops, 2.4 percent alpha acid (finish)
	Wyeast Czech liquid yeast culture
	force carbonate in keg

- Original specific gravity: 1.051
- Final specific gravity: 1.018
- Boiling time: 90 minutes
- Primary fermentation: 10 days at 45 degrees F (7 degrees C) in glass
- Secondary fermentation: 35 days at 33 degrees F (1 degrees C) in glass
- Age when judged (since bottling): 2 1/2 months

Brewer's specifics

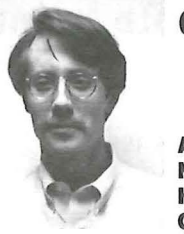
Mash grains for 20 minutes at 122 degrees F (50 degrees C). Raise to 144 degrees F (62 degrees C) for 25 minutes. Raise to 154 degrees F (68 degrees C) for 30 minutes. Sparge with 8 gallons of 175-degree-F (79-degree-C) water.

Judges' comments

"Alcohol warmth evident. Malt aftertaste really nice, no big defects. Too much hop bitterness. Real nice beer, just on the high side of bitterness for style."

"Just a bit too bitter for style. Very tasty beer, just a bit too highly hopped."

CLASSIC PILSENER



GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by California Concentrates, Acampo, California

ALAN PAGLIERE
ANN ARBOR, MICHIGAN
"FIRST PILSNER II"
BOHEMIAN PILSENER

Ingredients for 5 gallons

10	pounds Ireks two-row German Pilsener malt
1/2	pound CaraPils malt
1 3/5	ounces Saaz hops, 3.9 percent alpha acid (60 minutes)
1/4	ounce Saaz hops, 3.9 percent alpha acid (50 minutes)
9/10	ounce Saaz hops, 3.9 percent alpha acid (30 minutes)
1 1/2	ounces Saaz hops, 3.9 percent alpha acid (five minutes)
	G.W. Kent Yeast Lab No. L31 liquid yeast culture
3/4	cup corn sugar (to prime)

- Original specific gravity: 1.050
- Final specific gravity: 1.012
- Boiling time: 90 minutes
- Primary fermentation: four days at 46 to 52 degrees F (8 to 11 degrees C) in plastic
- Secondary fermentation: 23 days at 42 to 52 degrees F (6 to 11 degrees C) in glass
- Age when judged (since bottling): six months

Brewer's specifics

Mash grains for 30 minutes at 131 degrees F (55 degrees C). Raise to between 153 and 155 degrees F (67 and 68 degrees C) for two hours. Raise to 168 degrees F (76 degrees C) for five minutes. Sparge with 168-degree-F (76-degree-C) water for boil volume of 4 gallons. After boil top up to 5 gallons with preboiled water.

Judges' comments

"Mild malt flavor finishes with nice clean hop flavor. Could use more malt and hops for style. Otherwise nicely balanced. Malt should predominate. Very nice, pleasant beer but lacks that malt flavor and hoppy finish of a classic Pils. Good job."

"Lightly malty, delicate palate. Good malt and hop flavor, perhaps a tad too bitter. Some malt graininess is missing here. Nice drinking beer. Maybe just a tad hoppy and dry for style and lacking palate fullness."

"Nice hop flavor and bitterness balanced with the malt quite well. Could use a bit more maltiness, but within style. Nice job. Absolutely beautiful appearance."

AMERICAN LAGER

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Brewski Brewing Co., Culver City, California

JEFFREY CYPERT
ROSS, TEXAS
"CLARABELLE'S CREAM ALE"
CREAM ALE

Ingredients for 6 gallons

6	pounds Alexander's pale malt extract syrup
1 1/2	pounds Briess pale malt
1/2	pound Belgian biscuit malt
1	pound flaked maize
1	ounce Hallertauer hops, 4.2 percent alpha acid (60 minutes)
	Wyeast No. 1056 American ale liquid yeast culture
	force carbonate in keg

- Original specific gravity: 1.050
- Final specific gravity: 1.010
- Boiling time: 75 minutes
- Primary fermentation: seven days at 58 degrees F (14 degrees C) in glass
- Secondary fermentation: seven days at 65 degrees F (18 degrees C) in glass
- Tertiary fermentation: 14 days at 36 degrees F (2 degrees C) in stainless steel
- Age when judged (since bottling): three months

Brewer's specifics

Mash grains for 60 minutes at 120 degrees F (49 degrees C). Raise to 148 degrees F (64 degrees C) for 15 minutes.

Judges' comments

"Light malt flavor. Little hop flavor, but clean. No off-tastes. Very clean, delicate effort. No obvious faults. Could use a touch more hops in boil to balance."

"Creamy, very sweet. Need to balance with more hops. Good finish. Very candy sweet, adjust the hopping rate."

VIENNA/OKTOBERFEST/ MÄRZEN

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by F.H. Steinbart Co., Portland, Oregon

BYRON BURCH, DAVE WOODRUFF
SANTA ROSA, CALIFORNIA
"'PROTECTION OF THE HOLY VIRGIN' OCTOBERFEST"
OKTOBERFEST/MÄRZEN

Ingredients for 10 gallons

10	pounds two-row lager malt
6	pounds German Pilsener malt
2	pounds toasted malt
2	pounds German Munich malt
2	pounds Belgian Munich malt
3	pounds CaraPils malt
1	pound 60 °L caramel malt
2	ounces 20 °L caramel malt
7/10	ounce Perle hops, for 10.64 IBUs (60 minutes)
2	ounces Hallertauer hops, for 7.42 IBUs (30 minutes)
1 1/5	ounces Hallertauer hops, for 2.23 IBUs (five minutes)
	Wyeast No. 2206 Bavarian lager liquid yeast culture

- Original specific gravity: 1.065
- Final specific gravity: unknown
- Boiling time: 90 minutes
- Primary fermentation: 10 days at 46 degrees F (8 degrees C) in glass
- Secondary fermentation: three days at 60 degrees F (16 degrees C) in glass
- Age when judged (since bottling): three months

Brewers' specifics

Single decoction mash at 150 degrees F (66 degrees C) for 90 minutes.

Judges' comments

"Rich malt character and sweetness up front. Very clean. Sweetness lingers and detracts. Alcohol is nice. Very nice clean lager. Good job. The malt character is full and rich, but the sweetness lingers too much."

"Good malty taste, a little too sweet. Very clear. Good color. Little head, undercarbonated."

GERMAN-STYLE ALE

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by The Beverage People, Santa Rosa, California

BILL MURPHY
BROOKLINE, MASSACHUSETTS
"KÖLSCH 45"
KÖLSCH

Ingredients for 3 gallons

5	pounds Belgian Pils malt
1/2	pound wheat malt
1	ounce Hallertauer hops, 4 percent alpha acid (45 minutes)
1/4	ounce Hallertauer hops, 3 percent alpha acid (15 minutes)
1/6	ounce Hallertauer hops, 3 percent alpha acid (five minutes)
	German alt liquid yeast culture
2 3/4	ounces dextrose to prime

- Original specific gravity: 1.045
- Final specific gravity: 1.010
- Boiling time: 90 minutes
- Primary fermentation: two weeks at 60 degrees F (16 degrees C) in glass
- Secondary fermentation: two weeks at 60 degrees F (16 degrees C) in glass
- Age when judged (since bottling): three months

Brewer's specifics

Mash grains at 125 to 130 degrees F (52 to 54 degrees C) for 25 minutes then raise to 150 degrees F (66 degrees C) for 75 minutes, then to 165 to 170 degrees F (74 to 77 degrees C) for 10 minutes.

Judges' comments

"Slightly fruity, very clean, flavor of hops lingers nicely. Very subtle maltiness. Could be a little fresher but understandably so. This is very well-made and appropriate in all aspects of the style. Well done."

"Good restrained fruitiness. Good effort."

FRUIT BEER

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by The Purple Foot, Milwaukee, Wisconsin

ALLEN E. BAVRY, JR.
SARASOTA, FLORIDA
"CHERRY PIE"
FRUIT BEER

Ingredients for 5 gallons

10	pounds two-row Klages malt
2	pounds rolled wheat malt
10	pounds fresh sour cherries
1	ounce Saaz hops, 3.5 percent alpha acid (60 minutes)
1	ounce Saaz hops, 3.5 percent alpha acid (two minutes)
	Whitbread ale yeast
3/4	cup corn sugar (to prime)

- Original specific gravity: 1.064
- Final specific gravity: 1.015
- Boiling time: 60 minutes
- Primary fermentation: five days at 78 degrees F (26 degrees C) in glass
- Secondary fermentation: 14 days at 78 degrees F (26 degrees C) in glass
- Age when judged (since bottling): 11 months

Brewer's specifics

Mash grains for 30 minutes at 122 degrees F (50 degrees C). Raise to 154 degrees F (68 degrees C) for 30 minutes. Sparge with 170-degree-F (77-degree-C) water. Rack beer over cherries in secondary fermenter.

Judges' comments

"Cherry tart. Well-balanced. Very good!"

"Nice clean sour cherry flavor. Dry finish, a little astringent. Great beer! Good balance. Fruit character is strong but blends well."

"Cherry is evident, nice sour finish. Very nice sour cherry. Good balance. Great job."

HERB BEER

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Marin Brewing Co., Marin, California

DAN RABIN, GABRIELLA HESS
BOULDER, COLORADO
"CHAUTAUQUA HOLIDAY ALE"
HERB BEER

Ingredients for 6 gallons

8	pounds Alexander's pale malt extract syrup
2	pounds dark dry malt extract
2	ounces Northern Brewer hops, 7.4 percent alpha acid (60 minutes)
1	ounce Willamette hops (15 minutes)
	pinch Irish moss (15 minutes)
1	pound honey
8	medium oranges (peel only, grated)
3 1/2	ounces finely chopped ginger
7	3-inch cinnamon sticks
1	tablespoon whole cloves
1/2	tablespoon ground coriander
	Wyeast No. 1056 liquid yeast culture
1	cup corn sugar (to prime)

- Original specific gravity: 1.052
- Final specific gravity: 1.020
- Boiling time: 60 minutes
- Primary fermentation: one week at 65 degrees F (18 degrees C) in glass
- Secondary fermentation: four weeks at 65 degrees F (18 degrees C) in glass
- Age when judged (since bottling): 6 1/2 months

Brewers' specifics

To make a spice tea, boil 1 gallon of water, turn off heat, add honey, orange peel and all spices. Cover and steep for one hour at 180 degrees F (82 degrees C). Add to boiled wort.

Judges' comments

"Effervescence on tongue. Nice marriage of spices. They all blend together with one spice dominating. Sweet finish. A great beer to sip by the fireplace."

"Rich spices, some malt sweetness. Little or no hops, which is fine. Beer is almost hidden by spices. Balance is toward the spices. I would prefer cutting back just a little, although this is a very nice combination of spices."

"Very spicy. Possibly a lot of ginger and orange peel. The herbs are balanced really well. Great brew. Lots of spices makes this interesting and tasty. Very drinkable. Keep up the good work."

"This is a smooth brew that goes down easy and is followed by some very nice spice flavor. The aftertaste is packed with clove and some ginger. Very clean. I enjoyed this brew. It was smooth, tasty and left my mouth with a wonderful spicy aftertaste. Good job!"

SPECIALTY BEER

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Homebrew Headquarters, Dallas, Texas

PAUL SULLIVAN
BROOKLYN, NEW YORK
"FOREPLAY"
CHOCOLATE AND RASPBERRY PORTER

Ingredients for 10 gallons

20	pounds Briess two-row malt
2	pounds 60 °L crystal malt
1	pound Briess chocolate malt
1/2	pound Briess black patent malt
12	ounces Bakers chocolate
1 1/2	ounces Cascade hops, 6 percent alpha acid (90 minutes)
1	ounce Cascade hops, 6 percent alpha acid (40 minutes)
	Wyeast No. 2206 liquid yeast culture
1/2	ounce Chambord raspberry liqueur added to each bottle
	force carbonate in keg

- Original specific gravity: 1.054
- Final specific gravity: 1.015
- Boiling time: 90 minutes
- Primary fermentation: 10 days at 68 degrees F (20 degrees C) in glass
- Secondary fermentation: two weeks at 40 degrees F (4 degrees C) in keg
- Age when judged (since bottling): four months2

Brewer's specifics

Chocolate added to boil.

Judges' comments

"A nice balance of chocolate and raspberry in aroma. A subtle chocolate note is the first flavor, followed quickly by a rich raspberry character. The maltiness hides behind the raspberry. Some astringency in the finish. A very pleasing blend of flavors, lots of complexity."

"Bitter chocolate. Very smooooth! Marshmallows, blackberry, low hop bitterness for porter. What a great dessert beer. Just delicious. Nice job."

SMOKED BEER

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Jim's Homebrew Supply, Spokane, Washington

MORRIS SCHADEMAN
PORTLAND, OREGON
"OLD SMOKIE"
PEAT-SMOKED SCOTTISH WEE HEAVY

Ingredients for 10 gallons

25	pounds pale malt
5	pounds Vienna malt
1/2	pound black patent malt
1	pound peat-smoked malt
1	ounce Chinook hops (90 minutes)
2	ounces Chinook hops (30 minutes)
	Wyeast liquid yeast

- Original specific gravity: 1.090
- Final specific gravity: unknown
- Boiling time: 90 minutes
- Primary fermentation: seven days at 60 degrees F (16 degrees C) in glass
- Secondary fermentation: three weeks at 60 degrees F (16 degrees C) in glass
- Age when judged (since bottling): four months

Brewer's specifics

Mash grains for 60 minutes at 155 degrees F (68 degrees C). Double mash – also makes 5 gallons of 1.052 original gravity beer.

Judges' comments

"Sweet, smoky, alcoholic. Smooth. Good balance. A slight ashy coating of the tongue in the aftertaste. Great beer, but the aftertaste goes out of balance."

"Good smoke flavor. Very slight astringency in background. Very good, tastes like a smoked Belhaven."

"Sweet, burnt malt and licorice flavors. Alcohol is there. Has a bitter aftertaste. Slight sulfur, but beer is good. Slight sour taste."

CALIFORNIA COMMON BEER

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Anchor Brewing Co., San Francisco, California

WALTER DOBROWNEY
SASKATOON, SASKATCHEWAN
"STEAMER"
CALIFORNIA COMMON BEER

Ingredients for 5 gallons

9	pounds Harrington two-row malt
4	ounces Munton and Fison crystal malt
4	ounces German dark crystal malt
4	ounces Carastan malt
4	ounces biscuit malt
1	ounce Northern Brewer hops, 7.5 percent alpha acid (70 minutes)
1/2	ounce Cascade hops, 5.8 percent alpha acid (25 minutes)
1/2	ounce Northern Brewer hops, 7.5 percent alpha acid (10 minutes)
1/2	ounce Northern Brewer hops, 7.5 percent alpha acid (two minutes)
1/2	ounce Northern Brewer hops, 7.5 percent alpha acid (dry)
1/2	ounce Cascade hops, 5.8 percent alpha acid (dry)
	Brewers Resource CL-690 yeast culture
	force carbonate in keg

- Original specific gravity: 1.051
- Final specific gravity: 1.011
- Boiling time: 70 minutes
- Primary fermentation: five days at 62 degrees F (17 degrees C) in glass
- Secondary fermentation: 12 days at 62 degrees F (17 degrees C) in glass
- Age when judged (since bottling): six months

Brewer's specifics

Mash grains for 60 minutes at 152 degrees F (67 degrees C).

Judges' comments

"Nice malt up front with hops close behind. Carbonation level good. Maybe a touch more caramel? Aftertaste a bit short. Very nice beer! Could drink this all day. Might benefit from slightly more malt character in nose and flavor."

"Hop bitterness in aftertaste okay. A little sourness. Malt character is not evident. Malt/hop balance needs some adjustment. Good color and carbonation. Body increase would help – needs higher mash temperature."

"Malt and hops evident. Well-balanced. Very good, drinkable. Balance in taste is good. Aftertaste smooth. Aroma is good. Malt is evident."

WHEAT BEER

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Tabernash Brewing Co., Denver, Colorado

THOMAS J. O'CONNOR III, M.D.
ROCKPORT, MAINE
"THREE YEAR WEIZENBOCK"
GERMAN-STYLE WEIZENBOCK

Ingredients for 6 gallons

6 2/3	pounds Ireks wheat malt extract syrup
3 1/2	pounds Ireks Pilsener malt
1/2	pound light crystal malt
1/2	pound maltodextrin
1/2	ounce Stryian Goldings hops, 5.3 percent alpha acid (60 minutes)
1/2	ounce Saaz hops, 3.1 percent alpha acid (60 minutes)
1.2	ounce Saaz hops, 3.1 percent alpha acid (15 minutes)
	Wyeast No. 3068 liquid yeast culture
1	cup corn sugar (to prime)

- Original specific gravity: 1.060
- Final specific gravity: 1.020
- Boiling time: 60 minutes
- Primary fermentation: 21 days at 60 degrees F (16 degrees C) in glass
- Secondary fermentation: five days at 60 degrees F (16 degrees C) in glass
- Age when judged (since bottling): 4 1/2 months

Brewer's specifics

Mash grains for 15 minutes at 130 degrees F (54 degrees C). Raise to 158 degrees F (70 degrees C) for 55 minutes.

Judges' comments

"Astringent/drying from alcohol. Licorice in aftertaste. Could have more malt sweetness in flavor. No clove or banana. Drinkable, but needs more malt to add to flavor and body."

"Malty as appropriate. More of a licorice aspect than clove or banana. Very good, lacking only the intensity of phenol and esters that can be achieved."

"Maltiness there, caramelly, alcoholic, underlying medicinal/phenolics that detract. No much spiciness/cloviness. Some sourness OK. Medicinal phenols detract from an otherwise very good beer. Seems to have deteriorated with age."

TRADITIONAL MEAD

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by
Havill's Mazer Mead Co., New Zealand

**ANDREW LA MORTE,
SUSANNE PRICE
LITTLETON, COLORADO
"IT'S MY FIRST MEAD"
STILL MEAD**

Ingredients for 10 gallons

35	pounds clover honey
2 1/2	teaspoons acid blend
4 1/2	teaspoons yeast nutrient
2	teaspoons Irish moss
	Lalvin 1118 yeast

- Original specific gravity: 1.140
- Final specific gravity: 1.068
- Primary fermentation: six weeks at 68 degrees F (20 degrees C) in glass
- Secondary fermentation: nine months at 65 degrees F (18 degrees C) in glass
- Age when judged (since bottling): six months

Brewers' specifics

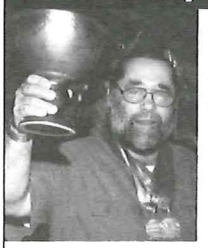
Heat honey and water to 170 degrees F (76.7 degrees C) for 30 minutes. Oxygenated with pure oxygen for 15 minutes.

Judges' comments

"Pleasant, vinous and sweet. No major angularities or detractors. Might need a bit of acid in finish, but that's subjective. Very nice dessert mead. May lack a bit of complexity, but really clean and drinkable. Good job."

"Light body. Very sweet all the way around. Clean flavor. Not as complex as I would like. Nothing to cry about, though. Nice flavor, easy to drink. No major flaws in taste."

MELOMEL, CYSER, PYMENT, BRAGGOT



GOLD MEDAL AND 1994 MEADMAKER OF THE YEAR

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by
National Honey Board, Longmont, Colorado

**BYRON BURCH
SANTA ROSA, CALIFORNIA
"ANOINTING OIL"
STILL MEAD**

Ingredients for 11 gallons

36	pounds Meadmakers Magic™ Canadian clover honey
10	gallons water
10 1/2	ounces fresh-squeezed lime juice
5	ounces tartaric acid
4	ounces The Beverage People™ yeast nutrient for meads
1	ounce The Beverage People™ pectic enzyme
1	tablespoon Irish moss
5	millimeters lime oil
20	grams The Beverage People™ Prise de Mousse wine yeast

- Original specific gravity: 1.108
- Final specific gravity: unknown
- Boiling time: five minutes
- Primary fermentation: two weeks at 75 degrees F (24 degrees C) in glass
- Secondary fermentation: two weeks at 75 degrees F (24 degrees C) in glass
- Age when judged (since bottling): four months

Judges' comments

"Nice honey flavor. Lime is present but more would be better. Very slight spritz. Good acidity to balance sweetness. More lime and this could score higher. A very good, clean, well-made mead. I personally believe this would be a better sparkling product."

"Slight carbonation gives a very nice mouthfeel. Lime comes through to balance the sweetness. Great job. Subtle lime. More bottle age will improve this tremendously. Excellent job. Terrific balance. A little more lime might make its presence better felt, but a terrific job nonetheless. Perhaps 5 percent more lime."

"Light lime nose. Honey/lime/acid balance is fine. Clean and to the point."

"Wonderful balance of honey and citrus fruit. The acidity is very nicely counterpointed. Excellent overall impression. Except for a little unexpected CO_2 this was great. I'd actually carbonate a little more on purpose."

METHEGLIN, HIPPOCRAS

GOLD MEDAL

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by
Home Wine and Beer Trade Association

**KEVIN STILES
OREFIELD, PENNSYLVANIA
"HYPOCRITE'S HIPPOCRAS"
STILL MEAD**

Ingredients for 1 gallon

2	pounds clover honey
18	fluid ounces Alexander's Gamay Beaujolais wine concentrate
1	teaspoon cinnamon
1	teaspoon ginger
1	teaspoon orange peel
1	clove
2	teaspoons malic acid
2	Campden tablets
	Red Star Prise de Mousse yeast

- Original specific gravity: 1.095
- Final specific gravity: 1.000
- Primary fermentation: 13 days at 72 degrees F (22 degrees C) in glass
- Secondary fermentation: 5 1/2 months at 72 to 53 degrees F (22 to 12 degrees C) in glass
- Age when judged (since bottling): 4 1/2 months

Judges' comments

"Very astringent. Grape is there. Nice warming in aftertaste, reasonable balance. This is a fascinating beverage! So many things going on. Tannins/astringency too much, but time will help. I don't think clove adds here."

"Honey is subtle but there. Cinnamon, clove and alcohol combine to tickle the palate like pepper. Grapes give a pleasing tannic finish and add that wonderful color. Sweetness, acidity and body are just right to accentuate the spices. Experiment with a different honey to further increase the aroma and deepen the flavor. I'm raving over this one! Congrats!"

"Big alcohol up front. Warming. Nice grape that gets overwhelmed by cinnamon first, then the rest of the spices. Nice medium dryness that carries in the warm, lingering alcoholic finish. Nice job! I like the complexity and the honey-grape combination. I never really found the ginger or clove. You may increase them slightly next time."

CIDER

GOLD MEDAL AND 1994 CIDERMAKER OF THE YEAR

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Lyon's Brewery of Dublin, Dublin, California

MARTIN STOKES
OLD TOWN, MAINE
"NEW ENGLAND CIDER"
NEW ENGLAND STYLE

Ingredients for 7 gallons

6	gallons sweet apple cider (from farmers market)
6	12-ounce cans frozen apple juice concentrate (different brands)
3	pounds cane sugar
1/2	teaspoon Fermax yeast nutrient
1/2	teaspoon Williams yeast nutrient
2	teaspoons pectic enzyme
1/2	teaspoon tannin
20	saccharin tablets
	Acid blend to reach 4 parts per thousand tartaric acid
4	ounces Wines Inc. liquid isinglass finings
1	can frozen apple concentrate (to prime)
6	ounces cane sugar (to prime)

- **Original specific gravity: 1.072**
- **Final specific gravity: 0.993**
- **Primary fermentation: four months at 64 degrees F (18 degrees C) in glass**
- **Secondary fermentation: six weeks at 64 degrees F (18 degrees C) in glass**
- **Age when judged (since bottling): 14 months**

Brewer's specifics

Dissolve sugar, 4 cans frozen apple concentrate, yeast nutrients, pectic enzyme, tannin and saccharin in 6 gallons unpasteurized sweet cider. Measure acid content and adjust to 4 ppt tartaric acid (if necessary) with acid blend. Ferment in 7-gallon glass carboy.

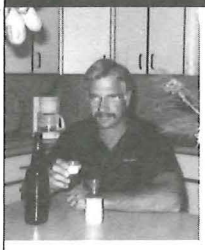
After four months, rack off heavy sediment, add liquid isinglass finings, top up to volume with 2 cans frozen apple concentrate and boiled, cooled water.

Judges' comments

"Nice apple aroma. Golden, deep yellow, nicely sparkling. Excellent balance, full body, good long dry finish that lends to a round tannin/alcohol finish. The only fault is that the flavor could be more complex — try raisins or brown sugar — *not* a major fault. I like it!"

"Good apple aroma, noticeable alcohol and nice balanced aroma. Medium golden color, clarity is OK. Off-dry to medium sweet. Acid and tannins blend well. Full body. Alcoholic, but well incorporated into flavor profile. A pleasant, refreshing drink. Nice aromas and flavors. A good example of the New England-style cider. Good job!"

SAKÉ



GOLD MEDAL AND 1994 SAKÉMAKER OF THE YEAR

AHA 1994 NATIONAL HOMEBREW COMPETITION

Category award sponsored by Momokawa Sake Ltd., Forest Grove, Oregon

DALE HOWELL
WELLINGTON, FLORIDA
"SAKÉ"
SAKÉ (JAPANESE RICE BEER)

Ingredients for 3 gallons

10	pounds California Pearl or short grain rice
2	20 ounce cups Cold Mountain Rice Koji
3 3/4	gallons water
3/5	teaspoon winemaker's yeast nutrient
	pinch Epsom salts
1 1/4	teaspoon Morton Salt Substitute
	Wyeast sake yeast

Brewer's specifics

2 1/2	cups cold water
3/4	teaspoon yeast nutrient and
	pinch Epsom salts
1/2	cup less 1 teaspoon koji

Day 1. Combine 2 1/2 cups cold water, 3/4 teaspoon yeast nutrient, pinch Epsom salts and 1/2 cup less 1 teaspoon koji ingredients and chill to 40 degrees F (4 degrees C). Wash and soak 1 1/2 cups rice for 18 hours at 40 degrees F (4 degrees C). Steam rice for 45 minutes and combine with the cold koji mixture. Stir for 30 minutes or until a creamy texture is achieved. Cover and store at 74 degrees F (23 degrees C) for 2 days. Stir the mixture twice a day.

Day 2. Cool koji to 50 degrees F (10 degrees C) and add yeast. Do not stir. Cover and let stand for 12 hours at 50 degrees F (10 degrees C).

Day 3. Raise to 74 degrees and stir yeast into mixture. Keep at 74 degrees F (23 degrees C) and stir twice a day for 3 days and once a day for three more days. Cool to 50 degrees F (10 degrees C) and let stand for five days.

Day 13. Dissolve 1 1/4 teaspoon Morton's salt substitute in 2 3/4 cups water and chill. Wash and soak 2 1/2 cups rice for 18 hours. Add 1 cup koji to starter 18 hours before next rice addition.

Day 14. Steam rice and add chilled water mixture. Let cool to 85 degrees F (29 degrees C) and add starter. Mix thoroughly, with clean hands, for 30 minutes. Cover and keep at 70 degrees F (21 degrees C). Stir every two hours for 12 hours.

Day 15. Stir at 12 hour intervals for 48 hours. Wash and soak 6 cups rice for 18 hours. Add 1 1/2 cups koji to main ferment 18 hours before next rice addition.

Day 17. Steam rice and add 8 3/4 cups of 40-degree-F (4-degree-C) water. Mix and add to mash. Mix for 30 minutes. Stir once after 12 hours. Wash and soak 5 pounds rice for 18 hours. Add remaining koji to mash and stir, when you set rice to soak (18 hours before addition).

Day 18. Steam rice and add to 5 quarts chilled water. Mix and add to mash. Stir once after 12 hours and chill to 50 degrees F (10 degrees C). Stir twice a day for one day. Volume is now 5 gallons. After 10 days, rack to secondary, press rice to extract all liquid and attach a fermentation lock. Store at 50 degrees F until fermentation stops. Cap, and let stand for 10 days. Then, strain and rack. Fine with Sparkolloid. Let stand for 21 days at 40 degrees F (4 degrees C). Rack again, and pasteurize at 140 degrees F (60 degrees C) for five minutes. Cap and store for one month at 50 degrees F (10 degrees C). Bottle and pasteurize at 140 degrees F (60 degrees C) for 15 minutes. Cap when cool.

Judges' comments

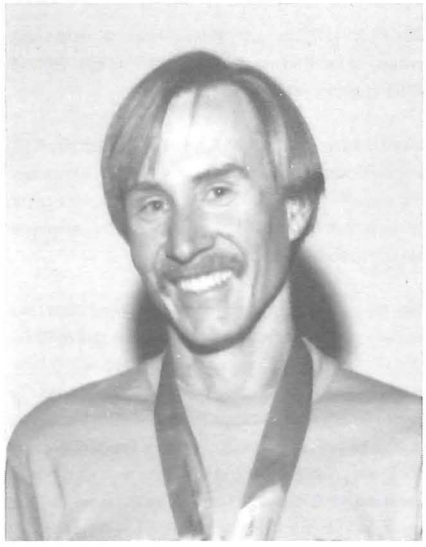
"Very well-balanced flavor, long alcohol expression at the end. Nice balance of koji and acidity. A very good saké overall. I like the long tail and alcohol finish flavors."

"Very well-balanced. The finish is a bit acidic, but has a nice tail. Very pleasant."

"Very clean. Low acid. Nice body. Very well-made saké."

"Some koji, fairly alcoholic. Nice aftertaste. Good alcohol for genshu. Work on acidity a bit and color."

"Koji flavor predominates. Slight acidic flavor. Nice job."



1994 HOMEBREWER OF THE YEAR

JIM LIDDIL, TUCSON, ARIZ. AWARD SPONSORED BY MUNTON AND FISON OF ENGLAND AND THE GREAT AMERICAN BEER FESTIVAL℠

By Caroline Duncker

JIM LIDDIL started brewing 2 1/2 years ago when he received a kit for Christmas from his wife. A toxicologist in a research lab at the University of Arizona, Jim took to the science of brewing right away. In the last few years he has had a chance to culture yeast, including *Kloeckera apiculata, Dekkera bruxellensis, Dekkera anomola, Saccharomyces cerevisiae* and the bacterium *Pediococcus damnosus* that he used in his winning lambic-style beer.

The beer, "Wild Pseudo-Lambic," was closed-fermented to isolate the microflora he was trying to produce from other strains. Still, he didn't know what to expect. "It was a pretty straightforward recipe with wheat extract, but you never know with bacteria and yeast. The pitching rates are variable and experimental. I am attracted to this style because of the experimentation involved and, of course, because I like the taste," Jim says.

At the time it was judged, the lambic had aged 8 1/2 months prior to bottling and another six months in the bottle. Conditioning temperatures were not a concern. "Warmer temperatures in the summer and cooler temperatures in the winter are good for lambic," Jim says. However, French oak casks are on his wish list for future lambic ferments.

Jim's advice for homebrewers who are just beginning, "You cannot rush a lambic. People should try a lot of different commercial styles of lambic, especially Frank Boon's lambics [from Brouwerij Boon in the Senne Valley, Lembeek, Belgium], which are fairly representative of what you may end up with." He recommends reading Jean-Xavier Guinnard's *Lambic* (Brewers Publications, 1990) and being active in the Lambic Digest, an on-line discussion of the Belgian style. He credits Mike Sharp, Lambic Digest coordinator, for being influential in his brewing.

Jim brews a lambic every six months. Although it's a time-consuming process, he benefits from the experimentation, research and guesswork. He could attempt to reproduce a recipe yet end up with entirely different results. The beer might be too acidic or too plain, without the right balance of flavors. The bacteria and yeast require specific environmental conditions for growth. And because it's so difficult to reproduce a recipe, batches often are blended.

"The way to a perfect lambic is not an easy path. Believe me, just because I brewed the best-of-show winner doesn't mean I know the path to the Holy Grail," Jim says. "Even those who have been making lambics for awhile still have much to learn. Plus, in any competition a certain amount of luck is involved."

He hopes lambics will become more popular as homebrewers experiment and add to the art. "It's interesting to have a lambic win best of show since it's not a prevalent style, nor is it well known." As a Recognized BJCP judge, he is hopeful that more judges will specialize in the style and make an effort to learn from commercial examples.

Jim has no thoughts of going professional. He likes to homebrew and wants to keep it that way! He thanks his wife, Nancy Mason-Liddil, for getting him involved and for putting up with all his homebrewing. Jim will receive an expense-paid trip to the 1994 Great American Beer Festival℠ Oct. 21 and 22, in Denver, Colo., as part of his award.

ILLUSTRATION BY TIM SPOSATO
PHOTO BY RICHARD J. LUBRANT

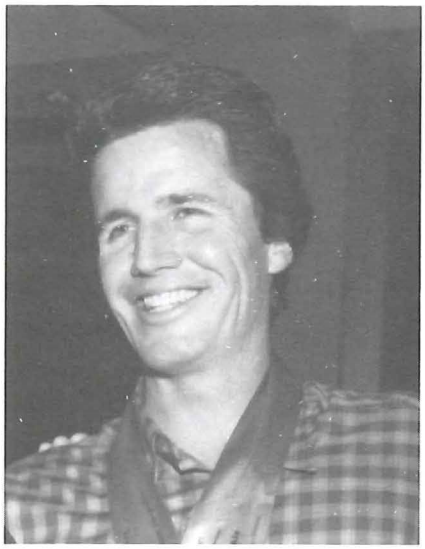
MICHAEL BYERS' attraction to British styles is apparent with gold medals in both the Scottish Ale and English Bitter categories of the 1994 Competition. He and his wife, Juliet, like European beers and have traveled extensively throughout Europe visiting Plzeň, Dusseldorf, London and Belgium.

Michael started brewing in 1985 while living in San Diego near the ocean, a key part of his life. Nine years later, now living in a cramped apartment in Santa Cruz, Michael overlooks the bay and listens to the sea lions while he brews on the deck. Thanks to three refrigerators he can brew throughout the year. One is kept at 32 degrees F (0 degrees C) for storage, another is kept at various temperatures depending on the recipe and a half fridge stores a yeast collection. He has a gravity-fed three-tier modified-keg brewing system. The top keg is for hot liquor, the middle for mashing and lautering and the third is the brew kettle. He is grateful to Juliet for sacrificing living space to accommodate his brewing equipment.

Michael credits his success to the Sonoma Beerocrats and their free flow of information. He recommends clubs to all brewers who want to share their passion for beer. "Find a club that is serious about brewing and seeks a balance between tasting different styles and dispersing technical information," he says. He also recommends keeping an accurate beer log and not drinking while brewing to ensure accuracy. Michael attributes his ability to duplicate beers successfully to these rules. A Certified BJCP judge, graduate of the Siebel Institute and former student at the University of California at Davis, Michael is serious about brewing.

He has considered brewing professionally, having already accumulated 10 days of experience with Paddy Giffen of Marin Brewing Co. and Randy Grimp of Napa Valley Brewing. Michael prefers the microbrewery environment to the brewpub because he believes he would be able to concentrate more on brewing than running a restaurant. The demands of professional brewing would change his hobby into a job, but he is ready to make that move. He works part time as an assistant brewer for Seabright Brewery in Santa Cruz.

Michael almost did not enter his beers in the National Homebrew Competition because he didn't know if they were good enough to compete, but now he is glad he did! As the Ninkasi winner, one of Michael's recipes will be brewed by Pete's Brewing Co. as a Pete's Wicked seasonal brew. Michael will receive name recognition on every bottle of Pete's seasonal beer. Pete's Seasonal brew will debut in spring 1995. He is excited by the award and the opportunity to brew with Pete's Brewing Co.

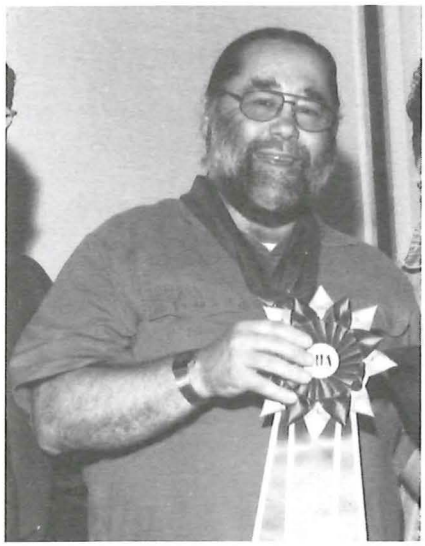


1994 NINKASI BREWER

MICHAEL BYERS,
SANTA CRUZ, CALIF.
AWARD SPONSORED BY
PETE'S BREWING CO.

By Caroline Duncker

ILLUSTRATION BY VICKI HOPEWELL
PHOTO BY RICHARD J. LUBRANT



It was déjà brew for **BYRON BURCH**. He was named Meadmaker of the Year for the second time. No other brewer in the history of the AHA National Homebrew Competition has achieved such an accomplishment. But don't single him out as a mead guy. Byron also won Homebrewer of the Year in 1986. That's another record broken, because no other brewer has won both Meadmaker of the Year and Homebrewer of the Year awards in the 15-year history of the National Homebrew Competition. How does Byron brew so consistently well?

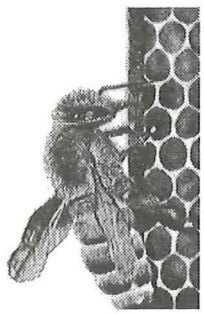
He has been a homebrewer and winemaker since the 1970s. He believes his winemaking skills carry over to the art of meadmaking, giving him an advantage. Plus, he has all the right brewing gear, including an insulated shed that houses brewing equipment and a refrigerator that can store 12 kegs. He uses a three-stage gravity-flow system for brewing beer and a brew kettle with a spigot on a 140,000 BTU burner for brewing mead.

Although Byron was introduced to mead through friends, he didn't start making it until 1982. He was a bit intimidated by the time it took for meads to develop to their full potential. Friends like Charlie Papazian, Paddy Giffen and Mark Hillestad were convinced that mead was the nectar of the gods, but it took awhile before Byron started listening.

Byron had a good feeling about "Anointing Oil," his winning lime melomel, a "delicate, nicely balanced mead with lime overtones." He used fresh lime juice and Canadian clover honey from a local distributor and boiled for five to 10 minutes to aid clarification. Brewed in September 1993, bottled in March 1994 and stored it at 35 degrees F (2 degrees C), the mead was prime for the Competition. "It is a type of mead that is ready fast, an anomaly compared to other meads. As it carbonates over time it may dry out and change. I am glad the Competition occurred before it had a chance to carbonate," Byron said.

Byron says he has not yet mastered meadmaking, "It is too new, there is so much to learn still." To improve meadmaking abilities, he recommends reading as much beer and wine literature as possible. The basic acid test, sugar and alcohol levels are akin to winemaking, and Charlie Papazian's *The Complete Joy of Home Brewing* (Avon Books, 1984) links mead and beer. Byron has long suspected that when honey became scarce (after candle making declined) meadmakers interested in those flavors transferred them to spice wines and liqueurs. He thinks today's Drambuie and Irish Mist may be good representations of how mead once tasted. Testing these commercial liqueurs may give brewers insight into meadmaking.

Byron brews throughout the year. September and October are dedicated to winemaking. From late October through April he brews different styles of beer and spends summer months brewing mead. He usually brews four meads during the course of the summer and has been known to brew 150 gallons of beer during a winter. Practice makes perfect.



1994 MEADMAKER OF THE YEAR

BYRON BURCH, SANTA ROSA, CALIF. AWARD SPONSORED BY HONEYMOON MEAD CO.

By Caroline Duncker

ILLUSTRATION BY VICKI HOPEWELL
PHOTO BY RICHARD J. LUBRANT

MARTIN STOKES has been brewing beer and cider for 23 years. He started in Scotland, where he had plenty of exposure to fine beer, cider and single malt scotch, another of his favorite beverages. After getting tired of carrying carboys and kegs up and down stairs to his basement, Martin built a brewery kitchen in the cellar. He has two sinks, two refrigerators, a stove, workbench and a plastic water cooler for mashing and lautering.

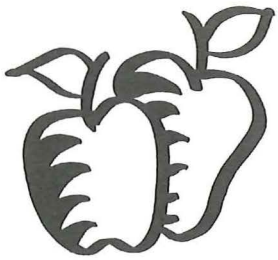
Martin brews irregularly — whenever he runs out! "Inevitably, I get so busy I don't think I have the time to brew. When I realize I am almost out of beer, I brew for the next five or six weekends. I mash one beer one weekend, rack it the next weekend while mashing another batch. The third weekend is spent bottling the first beer and racking the second while mashing the third, and so on. At this point, you either have enough beer or you can't keep this up."

He formulates recipes for his once yearly cider brew a number of ways: by making them up on his own, using old recipes from his log or using "Winners Circle" recipes from ***zymurgy*** as a base and modifying them. He brews six-gallon batches, kegging five gallons and bottling the other gallon for competitions.

A Certified BJCP judge, Martin brewed his winning cider, "New England Cider," two years ago. He shopped at several booths in the local farmers market to find apples with the strong flavor he desired. Martin never boils his cider because he uses the yeast found on the apples. For the past four years all his ciders were naturally fermented and, as AHA 1994 Cidermaker of the Year and awards from other competitions show, he has good results with this method.

Martin adds an additional one to 1 1/2 cans of frozen apple juice concentrate for an intense apple flavor in his cider. "I wanted more of an apple taste, and the frozen juice concentrate achieves this." He uses cane sugar to boost the specific gravity between 1.050 and 1.055. "I always heard that sugar adds a cidery taste to beer, so why not add it to cider!" Martin muses. He adds two or three tablets of saccharin to take out the acid bite.

For beginning cidermakers, Martin recommends reading any cider books you can get your hands on. "Cidermakers must balance the flavor and acidity. It is also essential for tannins to be present for the right bite. It helps to use a flavorful juice and, although it isn't cider, adding honey makes a wonderful drink."



1994 CIDERMAKER OF THE YEAR

MARTIN STOKES, OLD TOWN, MAINE
AWARD SPONSORED BY LYONS BREWERY OF DUBLIN

By Caroline Duncker

ILLUSTRATION BY VICKI HOPEWELL
PHOTO BY RICHARD J. LUBRANT

1994 SAKÉMAKER OF THE YEAR

DALE HOWELL, WELLINGTON, FLA. AWARD SPONSORED BY MOMOKAWA SAKE LTD.

By Caroline Duncker

DALE HOWELL describes his winning ginsu-style saké as his easiest batch. "Everything went smoothly and just fell into place," Dale said. Keeping meticulous records and following the advice of others help him brew better. He credits Fred Eckhardt's pointers as a boost to his own sakémaking.

In the two years he has been homebrewing he has experimented with beer, cider, mead and saké. He has a designated refrigerator for each passion. "I started making saké because I love Japanese food. I wanted to have a drink that would complement the fine cuisine," he said.

In March 1993, when Charlie Papazian visited the Palm Beach Draughtsman, Dale's homebrew club, he tasted Dale's saké then asked for more! Charlie encouraged Dale to enter the National Homebrew Competition. Dale was excited by Charlie's response. "I entered this batch in the Nationals because everyone in the homebrew club seemed to like it, and it had the slight banana flavor that is desired in saké."

Making saké from rice and rice koji, a fungus that converts rice starch to sugar and, at the same time, ferments the sugar into alcohol, is a labor-intensive process, according to Dale. He uses Kokuho rice from California and makes his own koji starter.

The moto yeast mash starter takes two weeks at room temperature. Temperature is an important element in making good saké. Yeast is added to the koji and rice mixture and then chilled to 50 degrees F (10 degrees C). After two weeks the yeast has done its job and Dale increases the volume of the mash threefold. After four days, he has five gallons of mash that will ferment for three weeks at 40 degrees F (4 degrees C).

At that point the saké is racked and pressed. Dale uses a fruit press inside a nylon bag. After pressing, three gallons of saké are left to ferment by *lactobacillus* infection. The saké sits three weeks at 40 degrees F (4 degrees C) while the sediment settles out. The volume reduces all the time. After racking for the third time, little sediment remains and it is ready to bottle and pasteurize. The whole process takes about three months. In Dale's opinion, "Mashing is the hardest part because you have to stir every two hours for 12 hours and then every 12 hours for three days."

Dale encourages beginning homebrewers to resist being intimidated by saké recipes. "It is an interesting process. You will learn a lot, and hopefully understand what is happening at every stage." He thinks it takes a few years to get a full grasp of sakémaking. Dale brews beer just about once a week, saké four times a year, mead twice a year and cider once a year.

TOP PHOTO COURTESY OF DALE HOWELL
SAKÉ PHOTO BY VICKI HOPEWELL

HOMEBREW CONNECTION

THESE FINE RETAIL SHOPS ACROSS NORTH AMERICA OFFER HOMEBREWING INGREDIENTS AND SUPPLIES. PLAN TO VISIT THEM WHEN YOU ARE IN THE AREA.

ARIZONA

Brewmeisters Supply Co.
3522 W. Calavar Rd.
Phoenix, AZ 85023
(602) 843-4337

CALIFORNIA

Barley and Wine Home Fermentation Supply
1907 Central Ave.
Ceres, CA 95307
(209) 538-BREW; (800) 500-BREW

Bencomo's Homebrew Supply
1544 N. Palm
Fresno, CA 93728
(209) 237-5823

The Beverage People
840 Piner Rd., #14
Santa Rosa, CA 95403
(707) 544-2520; (800) 544-1867

Bliss Brewing Co.
PO Box 179
Yucca Valley, CA 92286
(619) 365-1082; (800) 470-BREW

Brew Mart
1630 F St.
Eureka, CA 95501
(707) 445-4677 (HOPS);
(800) 286-2739 (BREW)

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

Dennis Maxwell's Labels and Ts Etc.
650 Flinn St., Unit 4
Moorpark, CA 93021
(805) 529-9292; FAX (805) 529-9294

Doc's Cellar
470 Price St.
Pismo Beach, CA 93449
(805) 773-3151

Fermentation Frenzy
991 N. San Antonio Rd.
Los Altos, CA 94022
(415) 941-9289

Great Fermentations of Marin
87M Larkspur
San Rafael, CA 94901
(415) 459-2520; (800) 570-BEER

Home Brew Mart
5401 Linda Vista Rd., Suite 406
San Diego, CA 92110
(619) 295-2337

The Home Brewery
738 S. Waterman Ave., #B-28
San Bernardino, CA 92408
(909) 888-7746; (800) 451-MALT

HopTech
3015E Hopyard Rd.
Pleasanton, CA 94506
(510) 426-1450; (800) DRY-HOPS;
FAX (510) 736-7950

Napa Fermentation Supplies
PO Box 5839
575 Third St., Suite A
Napa, CA 94581
(707) 255-6372; (800) 242-8585

Oak Barrel Winecraft Inc.
1443 San Pablo Ave.
Berkeley, CA 94702
(510) 849-0400

Portable Potables
1011 41st Ave.
Santa Cruz, CA 95062
(408) 476-5444

R & R Home Fermentation Supplies
8385 Jackson Rd.
Sacramento, CA 95826
(916) 383-7702

Santa Cruz Homebrew
616 California St.
Santa Cruz, CA 95060
(408) 459-0178

South Bay Homebrew Supply
PO Box 3798
Torrance, CA 90510
(310) 517-1841

COLORADO

Brew Ha Ha!
708 Eighth St.
Greeley, CO 80631
(303) 356-1566; (800) 257-1566

The BREW-IT Co.
120 W. Olive St.
Fort Collins, CO 80524
(800) 748-2226; (303) 484-9813

Doc's Brew Shop
3150-B1 S. Peoria
Aurora, CO 80014
(303) 750-6382

Front Range Bierhaus
3117 N. Hancock Ave.
Colorado Springs, CO 80907
(719) 473-3776

Highlander Home Brew Inc.
151 W. Mineral Ave., Suite 113
Littleton, CO 80120
(303) 794-3923; (800) 388-3923

The Homebrew Hut
555 1 Hwy. 287
Broomfield, CO 80020
(303) 460-1776

Liquor Mart Inc.
1750 15th St.
Boulder, CO 80302
(303) 449-3374; (800) 597-4440

Old West Homebrew Supply
301 B East Pikes Peak Ave.
Colorado Springs, CO 80903
(719) 635-2443; (800) ILV-BREW

Silverthorne Homebrewers Supply
301 Lagoon Lane
PO Box 978
Silverthorne, CO 80498
(303) 468-8330

What's Brewin'
1980 8th St.
Boulder, CO 80302
(303) 444-9433

Wine & Hop Shop
705 E. 6th Ave.
Denver, CO 80203
(303) 831-7229

The Wine Works
5175 W. Alameda Ave.
Denver, CO 80219
(303) 936-4422

CONNECTICUT

B.Y.O.B. Brew Your Own Beer
283 Whisconier Rd.
Brookfield, CT 06804
(203) 775-9020

Brother Logan Home Brewing Supplies
60 Jerry Daniels Rd.
Marlborough, CT 06447
(203) 295-8620

The Mad Capper
PO Box 161
Glastonbury, CT 06033
(203) 659-8588

S.E.C.T. Brewing Supply
c/o SIMTAC
20 Attawan Rd.
Niantic, CT 06357
(203) 739-3609

Wine and Beer Art of Smith Tompkins
1501 E. Main St., Route 202
Torrington, CT 06790
(203) 489-4560

DELAWARE

Wine Hobby USA
2306 W. Newport Pike
Stanton, DE 19804
(302) 998-8303; (800) 847-HOPS

FLORIDA

Brew Shack
4025 W. Waters Ave.
(Waterside Plaza)
Tampa, FL 33614
(813) 889-9495; (800) 646-BREW

The Home Brewery
416 S. Broad St.
PO Box 575
Brooksville, FL 34601
(904) 799-3004; (800) 245-BREW

GEORGIA

Brew Your Own Beverages Inc.
20 E. Andrews Dr. N.W.
Atlanta, GA 30305
(404) 365-0420; (800) 477-BYOB

Wine Craft of Atlanta
5920 Roswell Rd.
Parkside Shopping Center
Atlanta, GA 30328
(404) 252-5606

ILLINOIS

Chicago Indoor Garden Supply
297 N. Barrington Rd.
Streamwood, IL 60107
(708) 885-8282; (800) 444-2837

Chicagoland Winemakers Inc.
689 W. North Ave.
Elmhurst, IL 60126-2132
(708) 834-0507

Crystal Lake Health Food Store
25 E. Crystal Lake Ave.
Crystal Lake, IL 60014
(815) 459-7942

Evanston First Liquors Homebrewing
1019 W. Davis St.
Evanston, IL 60201
(708) 328-9651

Fleming's Winery
RR 2 Box 1
Oakwood, IL 61858
(217) 354-4555; (800) 832-4292

Home Brewing & Wine Making Emporium
28 W. 685 Rogers Ave.
Warrenville, IL 60555
(708) 393-2337; (800) 455-BREW

Home Brew Shop
307 W. Main St.
St. Charles, IL 60174
(708) 377-1338

Leisure Time Pet & Hobby
123 S. Mattis
Country Fair Shopping Center
Champaign, IL 61821
(217) 352-4007

Lil' Olde Winemaking Shoppe
4 S. 245 Wiltshire Lane
Sugar Grove, IL 60554
(708) 557-2523

Old Town Liquors
514 S. Illinois Ave.
Carbondale, IL 62901
(618) 457-3513

Sheaf & Vine Brewing Supply
Inside Mainstreet Deli & Liquors
5425 S. LaGrange Rd.
Countryside, IL 60525
(708) 430-HOPS

You-Brew
Country Food & Liquor
19454 S. Route 45
Mokena, IL 60448
(708) 479-2900

KANSAS

Bacchus & Barleycorn Ltd.
8725 Johnson Dr.
Merriam, KS 66202-2150
(913) 262-4243

CJ's Beer & Wine Hobby Shop
539 E. Santa Fe
Olathe, KS 66061
(913) 764-5717; (800) 858-0664

KENTUCKY

The Home Brewery
1446 N. 3rd St.
Bardstown, KY 40004
(502) 349-1001; (800) 992-BREW

Nuts N Stuff Inc., Bulk Foods
2022 Preston St.
Louisville, KY 40217
(502) 634-0508; (800) 867-NUTS

Winemakers Supply & Pipe Shop
9477 Westport Rd.
Westport Plaza
Louisville, KY 40241
(502) 425-1692; (800) 641-1692

MAINE

The Purple Foot Downeast
116 Main St., Dept. Z
Waldoboro, ME 04572
(207) 832-6286

MARYLAND

Bierwerks Inc.
T/A Elsie's Gourmet German Delicatessen
8141 Telegraph Rd.
Severn, MD 21144
(410) 551-6000; (800) 619-6660

Brew N' Kettle
1000 Light St.
Baltimore, MD 21230
(410) 783-1258; (800) 809-3003

Brew Masters Ltd.
12266 Wilkins Ave.
Rockville, MD 20852
(301) 984-9557; (800) 466-9557

Cellar Works
at Fullerton Liquors
7542 Belair Rd.
Baltimore, MD 21236
(410) 665-2900

The Flying Barrel
111 S. Carroll St.
Fredrick, MD 21701
(301) 663-4491

Happy Homebrewing Supply Co.
Wicomico Shoppers Bazaar
Rt. 13, (just south of Salisbury)
Fruitland, MD 21826
(410) 651-9795

Maryland Homebrew
9009-D Mendenhall Ct.
Columbia, MD 21045
(410) 290-FROTH

MASSACHUSETTS

Barleymalt and Vine
26 Elliot St.
Newton, MA 02161
(800) 666-7026

Barleymalt and Vine
@ The Wine Vault
Route 126 and 9
Framingham, MA 01701
(508) 875-6980

Barnstable Brewers Supply
Windmill Square, Route 28
PO Box 1555
Marstons Mills, MA 02648
(508) 428-5267

Beer and Wine Hobby
180 New Boston St.
Woburn, MA 01801
(617) 933-8818; (800) 523-5423

Boston Brewers Supply Co.
48 South St.
Jamaica Plain, MA 02130
(617) 983-1710

Dutch Treat
739 N. Main St.
West Bridgewater, MA 02379
(508) 583-6670

The Hoppy Brewer Supply Co.
550 Central Ave.
Seekonk, MA 02771
(508) 761-6615

The Keg & Vine
697 Main St.
Holden, MA 01520
(508) 829-6717

The Modern Brewer Co.
2304 Massachusetts Ave.
Cambridge, MA 02140
(617) 868-5580; 800-Send-Ale

Stella Brew Homebrew Supply
16 State Rd., Rt. 20
Charlton City, MA 01508
(508) 248-6823; (800) 248-6823

Stella Brew Homebrew Supply
197 Main St.
Marlboro, MA 01752
(508) 460-5050; (800) 248-6823

The Vineyard — Home Brewers And Vintners Supply Shop
123 Glen Ave.
PO Box 80
Upton, MA 01568
(508) 529-6014; (800) 626-2371

MICHIGAN

Brew & Grow
33523 W. 8 Mile, #F-5
Livonia, MI 48152
(313) 442-7939

True Brew Homebrewing Supply Co.
PO Box 125
Algonac, MI 48001
(810) 794-1038

Wine Barrel Plus
30303 Plymouth Rd.
Livonia, MI 48150
(313) 522-9463

MINNESOTA

Brew-N-Grow
8179 University Ave. N.E.
Fridley, MN 55432
(612) 780-8191

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

MISSOURI

The Home Brewery
S. Old Highway 65
PO Box 730
Ozark, MO 65721
(417) 485-0963; (800) 321-BREW

Johnny Brew-Meister's
Crossroads West Shopping Center
2101 W. Broadway
Columbia, MO 65203
(314) 446-8030;
FAX (314) 446-8031

St. Louis Wine & Beer Making
251 Lamp & Lantern Village
St. Louis, MO 63017
(314) 230-8277

Winemaker's Market
4349 N. Essex Ave.
Springfield, MO 65803
(417) 833-4145

Witt Wort Works
1032 S. Bishop Ave.
Rolla, MO 65401
(314) 341-3311

MONTANA

Homebrew Etcetera
2143 Hwy. 2 W.
Libby, MT 59923
(406) 293-4942

NEVADA

The Home Brewery
4300 N. Pecos Rd., #13
North Las Vegas, NV 89115
(702) 644-7002; (800) 288-DARK

NEW HAMPSHIRE

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

Brewer & Associates/
Maine Hopper
112 State St./PO Box 6555
Portsmouth, NH 03801
(603) 436-5918

Granite State Natural Food Inc.
164 N. State St.
Concord, NH 03301
(603) 224-9341

RCA Distributors (East Coast)
10 North St.
North Walpole, NH 03609
(603) 445-2018; (800) RCA-BREW

The Seven Barrel Brewery Shop
Colonial Plaza,
Exit 20, Interstate 89
W. Lebanon, NH 03784
(603) 298-5566

The Stout House
Eastern Slope Plaza
North Conway, NH 03860
(603) 356-5290; (800) 842-BREW

NEW JERSEY

Ale & Mead Brewing
181 Willowdale Ave.
Montclair, NJ 07042
(201) 744-5498

The Barnegat Bay Brewing Co.
215 Route 37 W.
Toms River, NJ 08755
(800) HOP-ON-IT

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

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

Coffee Thyme 'N More
201 N. Broadway
Gloucester, NJ 08030
(609) 456-8833

The Home Brewery
56 W. Main St.
Bogota, NJ 07603
(201) 525-1833; (800) 426-BREW

Red Bank Brewing Supply
67 Monmouth St.
Red Bank, NJ 07701
(908) 842-7507; (800) 779-7507

Richland General Store
Route 40, PO Box 185
Richland, NJ 08350
(609) 697-1720

U-Brew Co.
1809 Springfield Ave.
Maplewood, NJ 07040
(201) 763-8405; FAX (201) 763-5839

NEW YORK

America's Brewing Co.
100 River Rd.
Triangle Plaza, Suite 8
Harriman, NY 10926
(914) 782-8586

Arbor Wine & Beermaking Supplies Inc.
74 W. Main St.
East Islip, NY 11730
(516) 277-3004; FAX (516) 277-3027

Brew By You Inc.
119 Rockland Center, Suite 293
Nanuet, NY 10954
(800) 9-TO-BREW;
FAX (914) 732-8213

The Brew Shop
@ Cornell's Hardware
310 White Plains Rd.
Eastchester, NY 10707
(914) 961-2400; (800) 961-BREW

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

The Brewery
11 Market St.
Potsdam, NY 13676
(315) 265-0422; (800) 762-2560

The Brews Brothers at KEDCO - Beer & Wine Supply Store
564 Smith St.
Farmingdale L.I., NY 11735-1168
(516) 454-7800;
(800) 654-9988 (outside N.Y.only);
FAX (516) 454-4876

East Coast Brewing Supply
124 Jacques Ave.
PO Box 060904
Staten Island, NY 10306
(718) 667-4459; FAX: (718) 987-3942

D.P. Homebrew Supply
1998 E. Main St., Route 6
Mohegan Lake, NY 10547
(914) 528-6219

E. J. Wren Homebrewer Inc.
Ponderosa Plaza (behind Heids)
209 Oswego St.
Liverpool, NY 13088
(315) 457-2282

Great Lakes Brew Supply
310 Adams Ave.
Endicott, NY 13760
(607) 785-4233; (800) 859-GLBS

Heimstatte Homebrewers Supply
RD #1 Box 354
Livingston Manor, NY 12758
(914) 439-4367

Lager 'N Suds Homebrew Supply
RD 3 Box 253 Burlingham Rd.
Bloomingburg, NY 12721
(914) 733-1093

Little Shop of Hops Home Brewing Supply Co.
15 W. 39th St.
New York, NY 10018
(212) 704-4248; (800) 343-HOPS;
FAX (212) 704-9611

Little Shop of Hops II
79 New St.
New York City, NY 10004
(212) 422-3636

Mountain Malt and Hop Shoppe
54 Leggs Mills Rd.
Lake Katrine, NY 12449
(800) 295-MALT; (914) 336-7688

The New York Homebrew Inc.
38 Cherry Lane
Floral Park, NY 11001
(800) YOO-BREW;
FAX (516) 358-0587

Niagara Tradition Homebrewing Supplies
7703 Niagara Falls Blvd.
Niagara Falls, NY 14304
(716) 283-4418

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

U.S. Brewing Supply
815 Madison Ave.
Albany, NY 12208
(800) 383-9303; (518) 449-2470

NORTH CAROLINA

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

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

Brew Better Supply
103 Covington Square Dr.
Cary, NC 27513
(919) 467-8934

NORTH DAKOTA

Happy Harry's Polar Package Inc.
1125 19th Ave. N.
Fargo, ND 58103
(701) 235-4661

The Home Brewery at Happy Harry's Bottle Shop
2151 32nd Ave. S.
Grand Forks, ND 58201
(701) 780-0902; (800) 367-BREW

OHIO

The Grape and Granary
1302 E. Tallmadge Ave.
Akron, OH 44310
(216) 633-7223

OKLAHOMA

Bob's Brewhaus
724 W. Cantwell Ave.
Stillwater, OK 74075
(405) 372-4477

Professional Brewers LLC
2917 W. Hefner Rd.
Oklahoma City, OK 73120
(405) 752-7380

OREGON

F.H. Steinbart Co.
234 S.E. 12th St.
Portland, OR 97214
(503) 232-8793

Home Fermenter Center
123 Monroe St.
Eugene, OR 97402
(503) 485-6238

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

Wasson Bros. Winery & Beer and Wine Supply
41901 Hwy. 26
Sandy, OR 97055
(503) 668-3124

PENNSYLVANIA

Beer Unlimited
515 Fayette St.
Conshohocken, PA 19428
(610) 397-0666

Beer Unlimited
Routes 30 and 401,
Great Valley Shopping Center
Malvern, PA 19355
(215) 889-0905

BREW by YOU
3504 Cottman Ave.
Philadelphia, PA 19149
(215) 335-BREW

The BREWSMITH Ltd.
323 E. Main St.
Collegeville, PA 19426
(610) 489-8986

Country Wines
3333 Babcock Blvd.
Pittsburgh, PA 15237-2421
(412) 366-0151

Home Sweet Homebrew
2008 Sansom St.
Philadelphia, PA 19103
(215) 569-9469; FAX (215) 569-4633

Homebrewers Outlet
10 Lincoln Circle
Fairless Hills, PA 19030
(215) 943-8569

Keystone Homebrew Supply
Montgomeryville Farmers Market
Route 63
Montgomeryville, PA 18936
(215) 641-HOPS

Mr. Steve's Homebrew Supplies
4342 N. George St.
Manchester, PA 17345
(717) 266-5954

Neibert's Spielgrund Wine & Gift Shop
3528 E. Market St.
York, PA 17402
(717) 755-3384

RHODE ISLAND

Brew Horizons
884 Tiogue Ave.
Coventry, RI 02816
(401) 826-3500

TENNESSEE

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

The Winery & Brew Shoppe
60 S. Cooper St.
Memphis, TN 38104
(901) 278-2682

TEXAS

Bulldog Brewing Supply
2217 Babalos
Dallas, TX 75228
(214) 324-4480; (800) 267-2993

DeFalco's Home Wine & Beer Supplies
5611 Morningside Dr., Dept. Z
Houston, TX 77005
(713) 523-8154; FAX (713) 523-5284

Homebrew Supply of Dallas
777 South Central Expwy., Suite 1-P
Richardson, TX 75080
(214) 234-5922

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

Homebrew Headquarters — North
13929 North Central Expy.,
Suite 449
Dallas, TX 75243
(214) 234-4411; (800) 966-4144

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

St. Patrick's of Texas Brewers Supply
12922 Staton Dr.
Austin, TX 78727
(512) 832-9045

The Winemaker Shop
5356 W. Vickery
Fort Worth, TX 76107
(817) 377-4488; (800) IT BREWS;
FAX (817) 732-4327

VERMONT

Something's Brewing
196 Battery St.
Burlington, VT 05401
(802) 660-9007

Vermont Homebrewer's Supply
20 Susie Wilson Rd.
Essex, VT 05451
(802) 879-2920; (800) 456-BREW

VIRGINIA

Brew America
138 Church St. N.E., Suite F
Vienna, VA 22180
(703) 938-4805

James River Brewing Co.
2602 W. Main St.
Richmond, VA 23220
(804) 353-5006

WASHINGTON

Brewer's Warehouse
4520 Union Bay Place N.E.
Seattle, WA 98105
(206) 527-5047

Cascade Brewing Supplies
224 Puyallup Ave.
Tacoma, WA 98421
(206) 383-8980

The Cellar Home Brew
14411 Greenwood N.
Seattle, WA 98133
(206) 365-7660; (800) 342-1871

Evergreen Brewing Supply
12121 N.E. Northup Way, Suite 210
Bellevue, WA 98005
(800) 789-BREW; (206) 882-9929

Jim's 5¢ Home Brew Supply & Traditional Beer Emporium
N. 2619 Division St.
Spokane, WA 99207
(509) 328-4850; (800) 326-7769

Liberty Malt Supply Co./ Pike Place Brewery
1432 Western Ave.
Seattle, WA 98121
(206) 622-1880; FAX (206) 622-6648

Northwest Brewers Supply
915 6th St.
Anacortes, WA 98221
(206) 293-8070

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

WISCONSIN
B. Bros. Brewing Supply
1733 Charles St.
La Crosse, WI 54603-2135
(608) 781-WINE

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

The Market Basket Homebrew & Wine Supplies
14835 W. Lisbon Rd.
Brookfield, WI 53005-1510
(414) 783-5233

Nort's Worts
7625 Sheridan Rd.
Kenosha, WI 53143
(414) 654-2211

North Brewery Supplies
9009 S. 29th St.
Franklin, WI 53132
(414) 761-1018

The Wine & Hop Shop
434 State St.
Madison, WI 53703
(608) 257-0099

CANADA

MANITOBA
Wine Line and Beer Gear
433 Academy Rd.
Winnipeg, MB R3N 0C2
(204) 489-7256

ONTARIO
Marcon Filters
40 Beverly Hills Dr.
Downsview, ON M3L 1A1
(416) 248-8484

➡ **If you are interested in having your shop listed, please call Linda Starck, (303) 447-0816, for all the details.**

BEER BEARINGS

A DIRECTORY OF NORTH AMERICA'S FINEST PUBS

CALIFORNIA

HENRY 'N HARRY'S GOAT HILL TAVERN

1830 Newport Blvd.
Costa Mesa, CA 92697
(714) 548-8428

Seeing is believing! Our world-record 131 taps pour 101 different draft beers. Casual atmosphere featuring darts, billiards, shuffleboard and pinball. Open seven days, 11 a.m. to 2 a.m.

LYON'S BREWERY OF DUBLIN

7294 San Ramon Rd.
Dublin, CA 94568
(510) 829-9071

A beer connoisseur's heaven with 40 microbrewed and imported beers on draft. Non-smoking pub featuring darts, billiards and live music. Open seven days 11:30 a.m. to midnight.

COLORADO

WYNKOOP BREWING CO.

1634 18th St.
Denver, CO 80202
(303) 297-2700

Colorado's oldest brewpub, located in historic lower downtown in a renovated 1880 warehouse, features fresh beer, hearty pub fare, with live cabaret below, elegant pool hall upstairs. Free brewery tours Saturdays 1 to 5 p.m.

IOWA

DALLAS COUNTY BREWING CO./OLD DEPOT RESTAURANT & PUB

218 S. Ninth St.
Adel, IA 50003
(515) 993-5064

Fine dining featuring game meats like buffalo and venison in restored depot. Adjacent microbrewery producing lagers, ales, porter and seasonal beers. Bottled beer, gift shop.

OREGON

DESCHUTES BREWERY INC.

1044 N.W. Bono St.
Bend, OR 97701
(503) 382-9242; FAX (503) 383-4505

Top-quality handcrafted ales, fresh food including brewery-made sausage, bread, potato chips, mustard, root beer and ginger ale. Comfortable atmosphere. Ales distributed in Oregon and Washington.

PENNSYLVANIA

DOCK STREET BREWING CO. BREWERY & RESTAURANT

Two Logan Square at 18th & Cherry St.
Philadelphia, PA 19103
(215) 496-0413

Philadelphia's only full-grain brewery. International brasserie cuisine. Billiard room. Live jazz/reggae Friday and Saturday. A thoroughly polished pub. Moderately priced. Lunch, dinner, late night.

UTAH

SQUATTER'S PUB BREWERY

147 West Broadway
Salt Lake City, UT 84101
(801) 363-BREW; FAX (801) 575-7139

Salt Lake's only brewpub. Featuring pizza, sandwiches, pasta, fresh seafood and award-winning beer. Open daily 11:30 a.m. to 1 a.m. Located downtown in the Salt Lake Brewing Co. building.

CANADA

¿C'EST WHAT?

67 Front 19 Church
Toronto, ON MSE 1BS
(416) 867-9499

Pub-Club-Café. Downtown. Twenty of Toronto's best on tap. Brewery and winery on premises. Original live music nightly. Ethno-Clectic menu 'til the wee hours.

CLASSIFIED

CALL LINDA STARCK, ADVERTISING MANAGER, AT (303) 447-0816 FOR OPTIONS, RATES AND DEADLINES.

BOOKS

My Homebrew was average.
Not anymore! By asking fellow homebrewers what worked, I improved. I'd love to share five years of information with you. For your copy of the book "50 Great Homebrewing Tips," send $5 to Lampman Brewing Publications, PO Box 339, Harrisville, NH 03450-0339; (603) 827-3432. Special introductory price only good through 1994.

EQUIPMENT

15.5 GALLON KEGS
Build your own pilot brewery! Reconditioned 304 SS half-barrel brewing kettles. Straight sided, ready to use. $99.95 + S&H (414) 681-2608.

THE HOMEBREWERS STORE
(800) TAP-BREW

THE PERFECT PLACE TO BUY
or sell Contact Linda Starck, advertising manager, at (303) 447-0816 for options, rates and deadlines.

TUBULAR HOP BAGS
Designed for easy insertion and removal from carboys when dry hoping, reusable. Three for $9.95 plus $1.50 S&H. NY residents include 7.75% sales tax. Dealer inquiries invited. D&M Enterprises, 122 Union Center Rd., Ulster Park, NY 12487.

INGREDIENTS

Southern Homebrew Supply
2103 Scenic Rd., Tallahassee, Fl 32303. Free Catalog. Dutch Dry Malt 3 lbs. $8.50 plus shipping.

H.B. DISCOUNT WAREHOUSE
Just malt extract. Just by the case. Just low prices. Free Catalog! (800) 491-6615.

WHY PAY MORE?
Check out our low prices, free shipping and bulk discounts. Free catalog. Science Hobby Emporium (800) 763-3212.

Head Start Brewing Cultures
Not duplicates of other suppliers! More than 50 strains as low as $2.75 each. Free shipping. Info: 921 Bill Smith Rd., Cookeville, TN 38501; (615) 372-8511 eve. or E-mail BAN5845 @ TnTech.edu., or return FAX, FAX: (615) 528-7220.

U.S. Brewing Supply
Low Prices! Large Selection! Free Catalog! Fast Service! 24-Hour Order Line! MC/Visa (800) 728-BEER.

We love to talk beer (and wine) and we know what we're talking about! Fast reliable friendly: The Purple Foot. Complete selection. Never out of stock. Free catalog: 3167 S. 92 St. Dept. Z, Milwaukee, WI 53227; FAX (414) 327-6682, (414) 327-2130.

THE HOMEBREWERS STORE
(800) TAP-BREW

JUST HOPS
We specialize in those hard-to-find imported whole hops. Kept vacuum sealed and frozen. Free catalog. Just Hops, 335 N. Main, Mt. Zion, IL 62549; (217) 864-4216.

Extensive stock of grains, hops, yeast and supplies at the right price. Free Catalog. Frozen Wort, PO Box 947, Greenfield, MA 01302-0947; (413) 774-2217.

MAKE QUALITY BEERS!
Free catalog and guidebook. Low prices, fastest service guaranteed. Reliable. Freshest hops, hops grains, yeast, extracts. Full line equipment. The Celler, Dept. AZ, PO Box 33525, Seattle, WA 98133; (206) 365-7660, (800) 342-1871.

JT PRODUCTS
We've got the basics: malt, grains,extracts, hops, yeasts, equipment. For a price list phone or FAX (801) 258-5118. Mail PO Box 171, Richmond, UT 84333.

FREE BEER
and Winemakers catalog (800) 488-5444, 24-hour ordering, 30 years experience, Semplex.

BRAUER HOMEBREW SHOPPE
quick reliable homebrewing supplies (800) 450-2610.

New
DIGITAL pH METER

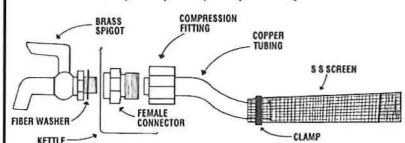
RANGE:	00.00-14.0
RESOLUTION:	0.001
ACCURACY:	0.1
CALIBRATION:	By Slope & Two OFFSET Trimmers
ELECTRODE:	Replaceable
BATTERY LIFE:	3000 Hours
SIZE:	2" x 7"

GREAT FOR MASHING
JUST "DIP & READ"
Accessory Kit $5.50
$39.50 + $3.50 P&H

American Brewmaster
3021-7 Stoneybrook Dr.
Raleigh NC 27604
(919) 850-0095

THE MALTMILL®
for the **serious** homebrewer or the small **brewery**. Don't be fooled by pint sized immitations.

EASYMASHER®



- The simplest and least expensive all-grain system.
- Even the novice can achieve extraction of 30+ pts.
- So efficient, it can make beer from flour.
- Easy to install in any brew kettle.
- Nothing else needed for the first all-grain batch.

Jack Schmidling Productions
4501 Moody • Chicago 60630 • (312) 685-1878

MICHAEL JACKSON
(Author: A Pocket Guide To Beer)
&
FRED ECKHARDT
(Author: Essentials Of Beer Styles)
&
RAINER NITSCHKE
(Technical Manager Erdinger)
at
"The Taste of the Great Lakes"
5th Annual
Homebrew Conference & Competition
Frankenmuth, MI
November 4 & 5 1994

For Registration Pack and More Info:
(517) 652-9081

WHOLE HOPS ARE BEST
Find out why in our free catalog. The Hop Source, 11886 Paradise Alley Silverton, OR 97381; (503) 873-2879.

SUPPLIES

STELLA BREW
We treat you kind! 16 State Rd. Rt. 20, Charlton City, MA 01508. Call (800) 248-6823. New store! 197 Main St., Marlboro, MA 01752; (508) 460-5050. Free catalog/info!

THE HOMEBREWER'S STORE
(800) TAP BREW

WE KNOW BEER
Our microbrewery sells homebrew supplies. We offer expertise and true brewing experience as well as great products. James Page Brewery, 1300-Z Quincy, Minneapolis, MN 55413-1541; (800) 347-4042.

FREE CATALOG.
Quality homebrew supplies. Fast service. Belle City Brew Haus, PO Box 513 Dept. 8P, Racine, WI 53401; (414) 639-9526; (800) 236-6528.

Beermakers and Winemakers
Free catalog. Large selection malt extracts, grains, fresh hop flowers compressed into 1/2-ounce discs. Yeast Bank™, equipment, accessories. Country Wines, 3333y Babcock Blvd., Pittsburgh, PA 15237.

Screen-printed and kiln-fired beer bottles and steins, no minimum quantity: 3506 C St. N.E., Auburn, WA 98002; (206) 624-2360.

Low Prices Great Service!
Let us help you do what we enjoy doing best: brew great beer. Fast, easy, economical. Free catalog. R.J Goods, 3555 Rt. 60E 302, Barboursville, WV 25504.

NEW! COLOR LABELS
Now affordable!! Free Brochure. Psycho Kitty Design, PO Box 370113, West Hartford, CT 06137-0113.

Brewers Dozen
We feel the benefit of all-grain brewing is rewarding in itself, but some of you need a little extra convincing. Send for our 20-page all-grain information packet and we'll include a dozen Grolsch-style bottle gaskets. Free. No charge. No kidding! Stew's Brew, W. 10157 710th Ave., River Falls, WI 54022; (715) 425-2424.

DEFALCO'S — SINCE 1971
Homebrew supplies. One of the country's widest selections of beer, mead and wine making supplies. Try us for those hard-to-find items. 5611-Z Morningside Dr., Houston, TX 77005. Call (800) 216-BREW for ordering or a free catalog.

Free Catalog! Mailed today!
Call (816) 254-0242, or write Kraus, Box 7850-Z, Independence, MO 64054.

Food grade phosphoric acid, yeast nutrients, ingredients. Hrouda Associates, Box 7061, Moreno Valley, CA (909) 924-7342.

Free Catalog (800) 266-HOPS
At WindRiver Brewing Co. we offer the finest in supplies, knowledge and service! We also have wholesale prices for homebrew stores. Fastest shipping in the midwest. Call for more information.

Brew Your Best Beer Ever
Our 23 years experience serving homebrewers uniquely qualifies us to help you make the best beer you have ever tasted. Take advantage of our information, equipment and large selection of fresh ingredients. Winemakers, 689 W. North Ave., Elmhurst, IL 60126; (708) 834-0507. Free catalog.

FREE CATALOG — TRY US!
(708) 393-BEER (2337). Quality products. Friendly service. Outstanding prices. Fast shipping. Home Brewing and Wine Making Emporium. 28W685 Rogers Ave., Warrenville, IL 60555.

Best Mail-Order Prices. Free
Catalog. Quality hops, grains. Friendly, fast service. Winemaker's Market, 4342 N. Essex, Springfield, MO 65803; (417) 833-4145. Visa/MC accepted. Toll-free order line.

12-oz. Beer Bottles
$10/case for sterilized bottles. $7/case for non-sterilized bottles. Assorted colors, shapes and logos. $9/each for stout flavor booster. Add for each, $2 packaging & $7 post. Beer Booster; 2141 Baseline Rd. #5, Boulder, CO 80302; (303) 447-8955.

B&B Brewing Supply
M&F or John Bull 3.3# can malt syrup $8.25, hopped $9.25, 5 gross caps $5.75, M&F plain DME 3# $8.75, M&F 4# kits $10.75, 75 plus different kits in stock, hops, dry and liquid yeast, 22 grains, equipment and more. Free catalog. Write B&B Brewing Supply, Box 206, N. Clarendon, VT 05759; (800) 834-5459.

BREW YOUR OWN BEVERAGES
Homebrew Supplies. The best service in the South! 20 E. Andrews Dr. N.W. Atlanta, GA 30305. Free Catalog. (800) 477-BYOB.

$19.95 BOTTLE TREE SALE
45-seat tree, Free shipping!!! 24-hr. service. Free catalog. Order today! MC/Visa accepted. Barley & Hops. Call now. (800) 810-4677.

In Southern California
Large selection and low prices. Free catalog of brewing supplies by mail order. South Bay Homebrew Supply, PO Box 3798, Torrance, CA 90510; (310) 517-1841

MEAD

BARBARIAN MEAD SOCIETY
Authentic recipes and kits. Garit Imhoff 315 Hillcrest Dr., Leucadia, CA 92024; (619) 944-9519.

Two gallons of mesquite honey for $17.50 plus UPS - Chaparral Honey Corp., 1655 W. Ajo No. 154-Z, Tucson, AZ 85713.

Inside Mead Magazine
Join us! Articles and secrets by mead experts, technical support, national award-winning recipes, five issues of Inside Mead Magazine. Free recipe guide with membership! Call (800) 693-MEAD or send $15 to AMAZ4 PO Box 4666, Grand Junction, CO 81502.

MISCELLANEOUS

THE HOMEBREWER'S STORE
(800) TAP-BREW

THE HOMEBREWER'S BBS
(206) 483-3049 (n,8,1,)

BRAUER HOMEBREW SHOPPE
quick, reliable homebrewing supplies.
(800) 450-2619

THE PERFECT PLACE TO BUY
or sell Contact Linda Starck, advertising manager, at (303) 447-0816 for options, rates and deadlines.

SOFTWARE

Internet Homebrew Digest
On disk! 40 megs of homebrew info. Free brewers catalog. Homebrew Supply of Georgia, 8665 Hope Mews Ct., Atlanta, GA 30350; (404) 552-9882.

CLASSIFIED

A PERFECT PLACE TO BUY OR SELL!

Call Linda Starck, advertising manager, at (303) 447-0816 for options, rates and deadlines.

COME ON BACK TO THE TURN OF THE CENTURY... TO THE **HOME BREWERS GENERAL STORE**

WE CARRY GENERIC PRICES ON PREMIUM SUPPLIES AND EQUIPMENT FOR THE NOVICE TO THE MOST EXPERIENCED BREWER.

call or write for free catalog

1-800-600-8774

THE HOME BREWERS GENERAL STORE
846 E 25 TH CT
DES MOINES, IA 50317

St. Patrick's of Texas

12922 Staton Drive
Austin, Texas 78727

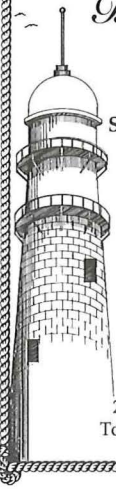
512-832-9045
FREE CATALOG

- **Marie's™ Munich Extract**
- **wort chiller $22**
- **8 gallon pot $33.50**
- **Wyeast $1.50** limit 1 w/purchase
- **5 to 16 gallon SS pots**
- **Mesquite & Guajillo Honey**
- **complete kegging system $143**

3-LEVEL BREWING SYSTEM
SS screens, SS valves, sturdy stands

Briess Malt Extract
Dry $8/3 lb Syrup $10.90/6 lb
English Malt $35.75/55 lb

The Barnegat Bay Brewing Co.



Your Guiding Light to Quality Homebrewing Supplies on the Jersey Shore

Malt • Yeast • Hops
Books • Expert Help
Equipment

Call for a Free Catalog
1-800-HOP-ON -IT

215 Route 37 West
Toms River, NJ 08755

YOUR ONE STOP SHOP FOR BREW SUPPLIES

The Brew Place

Northwestern malt extract
Case of ten-3.3# mix and match unhopped $49.00
Gold, Amber, Dark, Weizen
Two-row klages grain-briess 50# bag $23.00 20 varieties of hop pellets 17 varieties of Briess grains and much more!!

Call Toll-Free for a Free catalog
1-800-847-6721
Local calls (414) 262-1666

The Brew Place
P.O. box 414
Oconomowoc, WI 53066

BELOW WHOLESALE
EDME MALT EXTRACT
3.3 lb. Cans - Yeast Included
Superbrew Pale Lager
Superbrew Light

ONLY $31.50 per Case
Limited Supply
ORDER NOW
1-800-780-7837
VISA MC AMEX
Free Catalog
SEBASTIAN BREWERS
7710 91 Avenue
Vero Beach Fl. 32967

Beer Lovers

HOP

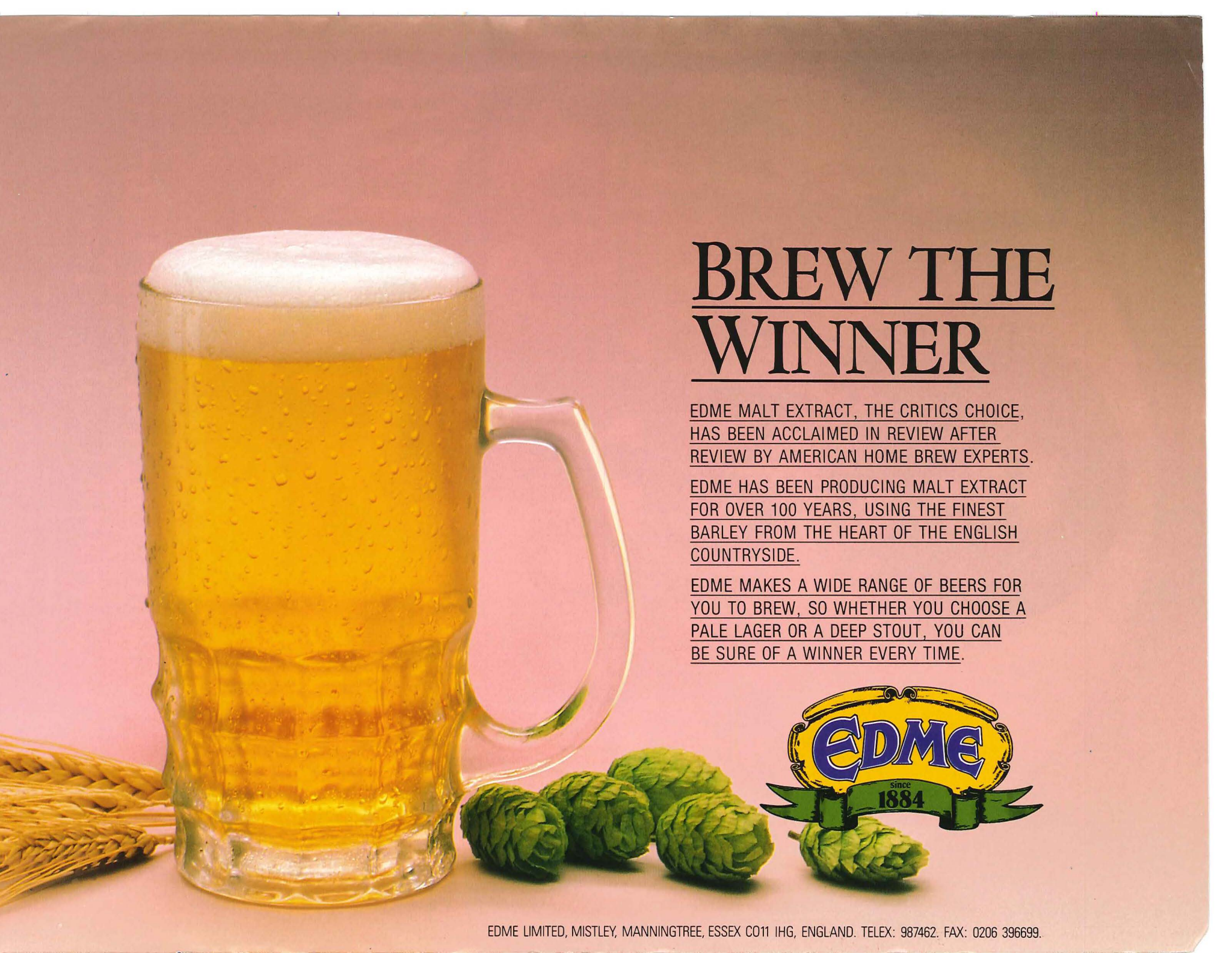
HEAD™

= Collection =

◆ **SPORTSWEAR – GLASSWARE** ◆
— MORE —

Call toll-free
1-800-TB-GEAR-0
(824-3270)
For Free Brochure

ZYMURGY ADVERTISER INDEX



BREW THE WINNER

EDME MALT EXTRACT, THE CRITICS CHOICE, HAS BEEN ACCLAIMED IN REVIEW AFTER REVIEW BY AMERICAN HOME BREW EXPERTS.

EDME HAS BEEN PRODUCING MALT EXTRACT FOR OVER 100 YEARS, USING THE FINEST BARLEY FROM THE HEART OF THE ENGLISH COUNTRYSIDE.

EDME MAKES A WIDE RANGE OF BEERS FOR YOU TO BREW, SO WHETHER YOU CHOOSE A PALE LAGER OR A DEEP STOUT, YOU CAN BE SURE OF A WINNER EVERY TIME.

EDME since 1884

EDME LIMITED, MISTLEY, MANNINGTREE, ESSEX CO11 1HG, ENGLAND. TELEX: 987462. FAX: 0206 396699.

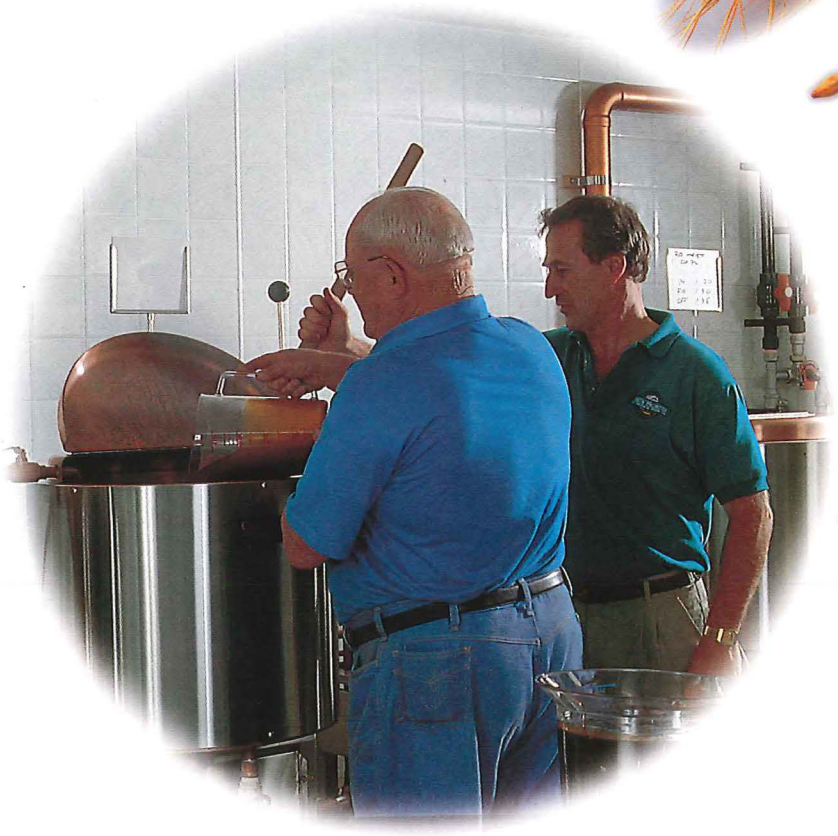
MAHOGANY COAST™

Finest Quality English Malt Extract for Your Hand-Crafted Beers

Mahogany Coast Brewing Co.
Importer: G.W. KENT, INC. Tel.: 1-800-333-4288 Fax: 1-800-500-7505

CUSTOM BREW BEER SYSTEMS

THE BREW ON-PREMISES PEOPLE



Custom Brew Beer Systems is the leading provider of advanced brew on-premises systems, supplies and service. Contact us for assistance with:

- Site selection
- Installation
- Training
- Operations
- Raw Materials
- BOP Equipment

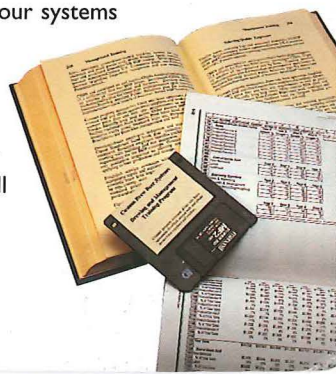
A brew on-premises (BOP) is a place where ordinary people make extraordinary beer. A BOP is not a brewpub where someone else does the brewing. At a BOP, your customers make great beer for themselves.

It takes more than the world's best BOP equipment to make a brew on-premises work. At CBBS we provide comprehensive training and support to help ensure your success.

BOP began in Canada in 1987. Since that time nearly 300 brew on-premises have opened for business. This exciting, high-growth industry is now expanding to the United States. At CBBS we have developed the most advanced BOP technology available. With our systems, world-class support and quality ingredients we've helped our clients open more on-premise breweries than any other supplier in the industry. If you're an entrepreneur seeking a unique business opportunity, we can help you.

We offer a full range of advanced equipment, supplies and training designed to assist you with site selection, installation, operations, quality assurance and on-going technical support. Each of the more than 50 CBBS system installations is a testament to the quality, reliability and support we provide.

With your entrepreneurial ambition and our systems and support you can start your own small business where individuals brew, ferment, filter, carbonate and bottle all natural, hand crafted beer. For information about this business opportunity call Custom Brew Beer Systems at 1-800-363-4119.



PREMIER®

Reserve Gold Label

Premier Introduces it's new line of Unhopped Extracts (Light, Amber & Dark). Available in 3.3# cans.

For information on where to get these new extracts, please call Premier Malt Products, Inc.

Premier Malt Products, P.O. Box 36359, Grosse Pointe, MI 48236

1-800-521-1057 or 1-313-822-2200

BRING HOME THE GOLD


SIX OF THE BEST!
HEADMASTERS CUPBOARD
STRICTLY OUT OF BOUNDS!
JOHN BULL
PREMIUM
HOME BREW BEER KIT
TRADITIONAL BITTER
Makes 66 bottles 12oz.fl. (22.5 litres)
FROM
JOHN BULL
PREMIUM
HOME BREW BEER KITS
TOP OF ITS CLASS
So simple you can brew it anywhere!
The 100% Malt Extract Kit currently available only from your specialist retailer in the following varieties
Tyneside Brown Stout
Traditional Bitter
Barley Wine
Dry Lager
Export Pilsner Lager
Canadian Recipe Ale
PAINE'S
MALT LTD
ST NEOTS HUNTINGDON
CAMBS. PE19 1BN

Coopers Pure Malt Extract

Makes a good beer great

COOPERS BREWERY

Imported for Canada and the U.S.A. by
CONSOLIDATED BEVERAGES
1-800-368-9363 • FAX (206) 635-9364